Planning controls and sustainability

PlanFirst's potential seen through a case study of Pittwater 21

Do local plans written using the principles contained in Plan First contribute to improving ecologically sustainable development? An Australian perspective on the sustainability impacts of the interaction between planning and building design.

By Richard James Clarke

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Certificate of authorship and originality

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Candidate:

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Richard James Clarke

Dated this …….. day of …….. 2006.

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Abstract

Sustainability will only be achieved if it is universally accepted and embraced by the community, rather than remaining the domain of the innovative few, or a plaything of the rich and able. Local planning instruments have a significant effect on the sustainability of the built environment, and the process by which they are made has a big effect on their content and its outcomes. In the Australian local government context, PlanFirst offered an opportunity for the process of making local plans to focus on community consultation and sustainability, using a collection of principles proven in local or international experience, and supported in the literature. While PlanFirst was never implemented as policy by government, a few councils created their local plans in response to it, providing some limited opportunity for study.

Pittwater Council, on Sydney's northern beaches, prepared a new Draft Local Environment Plan using PlanFirst as a template, which is studied in this research to test the potential of the PlanFirst principles, and to measure their predicted outcomes in the built environment. The process of writing the LEP is analysed using actor-network theory, which assists an understanding of it for future similar processes.

Three ecological impact categories – greenhouse, water demand, and car dependency – are measured in residential developments approved under the old and new planning controls. Measurement tools are used to predict greenhouse emissions, mains supplied potable water demand, and motor vehicle traffic impacts on greenhouse and human amenity.

The research finds that PlanFirst's principles offer potential for improved sustainability, which is supported indicatively in the case study. Effective community consultation is found to be a vital component of the process, with a targeted education component. An effective means of delivering the relevant planning controls to the designers is also important, and a web based interrogative system is found to be an effective vehicle for this. Policy stability, and bureaucratic stability at the highest levels is also found to be critical to enabling councils and communities to make and execute long term plans.

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Terminology

The research uses terminology common to the building design and urban planning fields. Some terms which may not be familiar to the reader, or which are peculiar to this local context, are explained here.

BASIX ……Building Sustainability Index produced by DIPNR

BCA……Building Code of Australia

BTP……Building Thermal Performance

CC……...Construction Certificate – obtained after gaining a DA, allows construction to commence

planning control….a clause or other written device that steers or limits specific physical elements of a proposed development

DA …… Development Application – lodged with local councils to gain planning approval. Approximate equivalent to Building Application in some other states of Australia.

DCP ……Development Control Plan – contains planning controls, a sub-set of an LEP

development …….human activity which results in something being built

DIPNR ……NSW Dept of Infrastructure Planning and Natural Resources

DUAP……..NSW Dept of Urban Affairs and Planning

ESD ……Ecologically Sustainable Development

EP&A Act……NSW Environmental Planning & Assessment Act (1979)

IPCC ……...Inter-governmental Panel on Climate Change

iPlan……a web based interrogative planning instrument

LA21 ……Local Agenda 21

LEP ……Local Environment Plan – established in NSW legislation, written by local councils to steer all land use and development within the whole or part of the local government area

MasterPlan…….Pittwater Council's web based interrogative DCP, modelled in iPlan

masterplan…….also masterplanning – a detailed planning strategy setting out physical form and limits to development over a number of lots

medium density…a relative measure of dwelling units per hectare, usually intended to mean villas, and townhouses, or single residential on very small lots

NABERS …….. National Australian Built Environment Rating System

NatHERS ……. Nationwide House Energy Rating Software

NLA ……National Library of Australia

P21 ……Pittwater 21 Local Environmental Plan

passive cooling….cooling design principles which require little or no artificial energy

passive design…..techniques for providing thermal comfort which require little or no artificial energy

passive solar heating……..heating design principles which require little or no artificial energy

place based planning…….planning strategies which define places people belong to or go to, rather than permissible land uses

PLEP 93…… Pittwater Local Environmental Plan 1993

PMC ……Pittwater Municipal Committee

SEPP …… State Environmental Planning Policy

SoE ……State of the Environment Report

solar access……..design techniques that allow the sun to penetrate a building, may be good or bad

sustainable ……that which can be carried on over unlimited time

sustainability……..the study of, or movement towards, being sustainable

thermal mass…….materials which can absorb, store, and distribute heat, as in passive design

urban density…….a measure of dwellings per unit of area

1 Introduction

1.1. The research question

This section of the research discusses the thinking behind the research question:

> **Does PlanFirst offer an effective local planning template for encouraging sustainable development?**

It commences by explaining where the research question comes from, by outlining the problems that arise in the everyday business of building design, in dealing with local government and state planning agencies, with regard to achieving improved sustainability in the built environment. Improving sustainability in the built environment, which is a product of this relationship, is the objective of the research, and led to the formulation of the research question. Two propositions that can be tested in the field are used in order to answer the research question. The need for answering the research question is then brought into focus, and the beneficiaries of the research identified.

1.1.1. Finding the research question

Sustainable building design is the process of finding a buildable resolution to a collection of complex requirements. Local planning guidelines set the parameters for much of the design process, and as such, become part of the balancing act. This is made simpler by clear and effective planning controls, whose contents achieve improved sustainability. It is state and local government's responsibility to produce planning policies and instruments that fulfil this need, yet the results often fail to meet the objective.

The literature reveals some of the reasons for this, and one key reason is that there is currently a dysfunctional relationship between governments and the communities they are supposed to represent. This has a powerful effect on the formulation of poor policy that does not reflect the needs of the community, perpetuating the dysfunctionality of the relationship, reinforcing distrust of bureaucracy and its processes. A circuit breaker is needed, that will change the process from the start, and result in planning policies that respond to community need, contribute to the education of communities so all decisions are not based on self-interest, and produce planning policies and instruments which are

inherently sustainable. These are more likely be owned and embraced by the communities who contributed to their formulation.

PlanFirst – a reformation of Part 3 of the NSW Environmental Planning and Assessment Act, proposed in 2001 – presented just such an opportunity for change.

1.1.1.1. Objectives

The research has several objectives, expressed in the research question and propositions, which require investigation in the literature and in the research project. These arise from experience with the faults and inadequacies of the existing relationship between government and community, as manifest in the current planning paradigm. The objectives are to discover answers to the following questions:

i. What characteristics of the relationship between Australian governments and the community affect sustainable development, and how?

ii. Does a plan making strategy incorporating the local democracy principles of LA21 have the potential to improve sustainable development?

iii. Can open and honest consultation between governments and communities help achieve sustainability?

iv. What would the product of a process that addresses the shortcomings of the present planning paradigm look like, and how well would it work?

The research question was derived from these objectives, as explained below.

1.1.1.2. Hypothesis

Background to the research

When the PlanFirst White Paper was presented for public exhibition in February 2001, this writer reviewed it on behalf of the Building Designers Association of NSW, and found it presented possible solutions to the problems identified by many in the design industry. Several key industry groups had previously joined together in an attempt to address these issues, in a movement called “2001: an Urban Odyssey”, which aimed to act as an honest broker between government and community in a series of forums discussing

Sydney's future growth strategies. The research presented in this thesis sprang out of the writer's involvement with that movement.

Research question

The research commenced with the intent of finding solutions to the dysfunctional relationship between governments (at state and local levels), and the communities they represent, in relation to the sustainability of the built environment. This generalised search found a useful point of focus in the PlanFirst proposal, and so the research question was formed around the idea that it may offer an effective local planning template for encouraging sustainable development. This would best be answered practically as well as theoretically, and so a proposition that could be tested was formed.

Research propositions

PlanFirst was intended to reform part of the Environmental Planning and Assessment Act (EP&A Act), by the NSW Government, and as such, would provide a new way for councils to write their local environment plans (LEPs). An LEP written using the PlanFirst guidelines would be a most useful vehicle for testing its effects. The proposition was formed that a PlanFirst-based LEP would be more sustainable than an LEP written under the old paradigm. However, it became clear in the early stages of the research that such an LEP might display all of the potential offered by the PlanFirst theory, but not actually provide any effect in practice. Therefore, two propositions were needed to test both the potential effects, and the actual effects, of the LEP.

The two propositions were formed as follows:

> **Proposition 1 - That Pittwater 21 has the *potential* to provide improved sustainability outcomes.**
>
> **Proposition 2 - That the *implementation* of Pittwater 21 has *resulted* in improved sustainability outcomes.**

The first proposition suggests a qualitative analysis, while the second suggests a quantitative analysis. From these two propositions, the research was designed as a case study, ecological impacts were measured using indicators, and the findings analysed to arrive at conclusions. Section 1.4 below outlines the contents of each chapter.

1.1.2. Why the research question needs answering

The research question needs answering because the prevailing planning paradigm in Australia has not yielded consistently sustainable development. There have been isolated examples of great gains being made, such as Leichhardt Council in Sydney, where, for instance, solar water heating was mandated in the late 1990s. Even there it can be shown that the change occurred because the principles contained in PlanFirst were employed, and a 'change champion' garnered support for the controls. These latter characteristics are examined in the research using a theoretical framework focussed on key actors, and explained further below. Often though, gains in sustainability have occurred for reasons beyond the influence of LEPs. More recent improvements brought about by regulation, such as Minimum Energy Performance Standards (MEPS) for appliances, and BASIX (in NSW) for energy and water consumption, have not come from local government.

1.1.3. Who will benefit from the research

Answering the research question aims to inform the process of writing local planning instruments, thus benefiting local and state government planners. It also aims to benefit the end users: the building designers, and the community. It is important that all stakeholders in the planning system trust it to deliver outcomes that broadly respond to need, including the need for sustainable development. A planning system that is transparent and inclusive, understood, trusted, and ultimately embraced by all stakeholders, will result in accelerated adoption of ESD practices by all. The research aims to assist that in occurring.

The next section outlines a suitable definition of sustainability, why sustainability is important, and how it is impacted by planning controls on the built environment.

1.2. What sustainability is all about

This section outlines the position taken by the research with regard to broad understandings of what sustainability is, why it is important, and what the relationship between planning controls and the built environment is in the context of sustainable development.

1.2.1. Defining sustainability

It is self evident that anything that cannot be sustained over time is unsustainable. It is a simple semantic definition, but when applied to human affairs, requires clarification. The research adopts the generally accepted definition expressed by Brundtland (1987), that "sustainable development" is any human activity that meets present needs without preventing future generations' from meeting their needs. This concept of inter-generational equity is also balanced by an acceptance of the need to establish equity between different nations and social sub-groups in the present, as espoused by Basiago (1998) and du Plessis (2003). The research's critiques of the detail and characteristics of the particular planning instruments and templates examined, are made in the light of these two perspectives on ecologically sustainable and socially equitable development.

1.2.2. The importance of sustainable development

In considering 'the importance of sustainable development', a short discussion of the values underlying the word *importance* is warranted, before proceeding to more technical discussions of *development* per se. The broad view of sustainability espoused by Brundtland, Basiago and du Plessis infers that without it being achieved, human worth is lessened. This is a value judgment, which must be handled with care, but is unavoidable in any futures study. This research adopts the position that it is fundamentally important for all human activity to be sustainable, and notes that there is a wide variety of world views that share this position. Each activist or writer may have a different weltanschauung[1] motivating them, effecting a variety of theoretical perspectives and epistemologies. For the purposes of this research, they are accepted in their common agreement that *not* achieving sustainability would be *wrong* or *unacceptable*. The underlying values are simply accepted, and are not examined or questioned further.

The importance of sustainable development can be seen to hinge upon what happens in future *if* it is not achieved, as well as what is happening in the present *when* it is not being achieved. The literature contains a wealth of information on what possible futures exist if any of a series of different models are correct. It is not critical for this research to pursue those discourses, it is sufficient to note that they exist, and that they point almost

0. [1] Weltanschauung is the overall perspective from which a person sees and interprets the world, forming a collection of beliefs about life and the universe. These are what motivate individuals and groups to act in the ways they do. It has been called 'epistemology in action'.

universally to undesirable probable futures, unless radical changes are made to existing practices. That includes current planning practice, especially in regard to the sustainability of the built environment.

1.2.3. Sustainability, planning controls, and the built environment

Globally, buildings account for approximately:

- 33% of all resource consumption (products & materials)
- 42% of all energy consumed
- 40% of all waste to landfill
- 40% of all air emissions
- 8% of water consumption (OECD 2003), in Australia, this is 12% (Australian Government 2001)

It has been argued that if buildings are 40% of the problem, they are also potentially 40% of the solution (Sederov 2003). Planning controls are only one of many factors affecting the way buildings are built and operate, but they are amongst the most important. They can affect operational energy and water demand, which has ramifications as long as the building lasts. They can affect longevity (which strongly affects a building's embodied energy), water and other resource depletion. And they can affect the way the building sits in, and impacts on, its landscape, with ramifications on the hydrological cycle, and biodiversity. Therefore each and every building constructed contributes to increasing or reducing that 40% impact. The effects are also felt by the whole community economically and socially, so governments at all levels have a role in steering development practice towards lessening the impact.

The next section discusses how some governments have responded to that need.

1.3. Government responses

This section briefly examines what governments in NSW have done to respond to the need to provide improved sustainability in the built environment.

1.3.1. Where PlanFirst came from

The EP&A Act administers planning and the assessment of development proposals in NSW. Part 3 of the Act controls local councils' planning powers, and had been scheduled for review since the mid 1990s. The review, carried out by the state planning

department, set out to address the core issues of land use planning, taking account of basic principles of democracy, transparency of process, and community consultation. Local Agenda 21 (LA21) had some influence in these areas. Thus the process by which the PlanFirst White Paper was produced in 2001 also reflected the methods it proposed for subsequent use by local government in its operation. It contains a significant and explicit commitment to sustainable development.

1.3.2. Where Pittwater 21 came from

'Pittwater 21' (which is both a draft LEP, and a DCP) is used as a case study in the research. Pittwater Council was formed in 1992, after a long struggle by the local community for more accountable local government. The aims of the secession activists were not fulfilled until they had a new local plan, created by the residents of Pittwater for the benefit of Pittwater. The timing of the council's moves to write a new LEP coincided with the release of PlanFirst, which at the time was intended by the NSW Government to become state wide policy. Thus it was seen by Pittwater Council as both fortuitous and logical that they use the new draft template, ensuring the goals of democracy, sustainability, and compliance with future policy coincided.

1.3.3. This writer's involvement in the action research

This writer was involved in the process from early in the process, as a resident, and as a member of the council's Urban Design Advisory Panel, which provides council with advice on planning and design matters, including the controls within the Pittwater 21 Draft LEP, and later DCP. This positions the writer in action research, which is explained in the next section.

1.4. Where the research goes and what it finds

This section outlines the nature and extent of the research, its structure, with brief chapter outlines, and foreshadows the conclusions that have been drawn.

1.4.1. Nature and extent of study

This is a piece of action research. The writer played an active role in the case study, which is identified at the relevant stages in the thesis. A case study was used because it is real and practical, it occurred at an opportune time in the pursuit of the research question, and the results from it are easily understood and applied by those working in

the field. The research used a combination of qualitative and quantitative methods to analyse the case study.

The research is transdisciplinary in nature, since it combines studies in architecture and building science (thermal performance and water consumption) with town planning, and social sciences (community consultation techniques). Actor-network theory is used to describe human processes of change creation, within a pluralistic epistemology. A positivist stance is used for discussions of the hard science of buildings, a constructionist position for discussions of how policies and planning controls work, and a subjectivist view postulates on what future impact those policies and controls are likely to have, and what is required to achieve future results.

1.4.2. Chapter outlines

This section briefly summarises the contents of each chapter of the research.

Chapter 1 - Introduction

The research is introduced and the research question identified. The need for the research is explained, those who are intended to benefit from it identified, and an overview of its structure is given. The writer's position in the research is identified, and an epistemology stated.

Chapter 2 - Literature review

The literature is reviewed in relation to the research question. Current practice is critiqued and found wanting, and definitions of sustainability examined. The literature suggests that current practice can be changed, and the means of measuring change examined. Literature on ecological impact categories and their associated indicators are identified, and the way they are affected by planning controls described. Indicators are selected for each of three ecological impact categories: operational energy is identified as having greenhouse impacts; mains supplied potable water demand is identified as having hydrological and infrastructure impacts; and requirements for mandating car parking is identified as institutionalising poor social amenity and greenhouse impacts. The role of state and local governments is reviewed.

The PlanFirst alternative model is reviewed, and seven principles are identified as key elements. Community consultation is identified as one of the critical features of PlanFirst. Its proposed consultation methods are reviewed, and found to be effective.

A gap in the literature is found in the implementation of PlanFirst. The use of a case study for testing the PlanFirst model is shown to be appropriate, and the indicators applied accordingly. Two research propositions are put, to assess the *potential* and the *implementation* of the PlanFirst local plan in the case study, and thus answer the research question.

Chapter 3 - Research design

Actor-network theory is established as the theoretical framework for the research. Pittwater 21's selection as a case study is explained. The data gathering methods are set out, along with the analysis method. Finally the validation of the results is discussed, and limitations identified.

Chapter 4 - Findings - Pittwater 21 and the Actor-network

This chapter is divided into two distinct sections: the first deals with the process of forming the new Pittwater 21 LEP and DCP, and uses actor-network theory to describe and explain it. This proves the first research proposition regarding the *potential* of Pittwater 21 to effect sustainability. The second section examines the implementation of the sustainability provisions within the case study LEP, and measures the effectiveness of the planning controls in practice, using the three indicators of thermal comfort greenhouse emissions, potable water demand, and car dependency. The findings show a distinct but not universal improvement in the Pittwater 21 sample set. This is sufficient to prove the second proposition, that Pittwater 21's implementation has had a positive effect on sustainability.

Chapter 5 - The implications of the findings

The implications of the findings are discussed, following the same structure as Chapter 4. The Pittwater 21 process is found to offer more potential than was realised in the case study. The community consultation process was found to be more successful than any previous activity, but did not fulfil the PlanFirst potential, and reasons are identified. The quantity of controls in a planning instrument is found to be a potential problem, which an interrogative DCP information system largely overcomes. A qualitative analysis is made

of four Pittwater 21 planning controls which affect the three selected indicators, providing an understanding of how the findings in Chapter 4 came about, assisted by actor-network theory. It is put forward as a useful tool for anticipating and predicting future processes, and overcoming barriers to the successful implementation of sustainable policies and instruments. The chapter concludes with a discussion of what it takes to create change in local government.

Chapter 6 - Conclusion

The thesis concludes that there is an affirmative answer to the research question, and supports the view that in the face of social inertia, Pittwater 21 made good progress in the sustainability change-creation process. The benefits to plan makers are identified, with a series of changes suggested, focussing on aspects of planning which have been shown to have an affect on the three selected impact categories of greenhouse, potable water demand, and transport amenity. Opportunities for further research identified.

Chapter 2 follows here, with a review of the literature on sustainable development and PlanFirst. It finds a gap in the literature, and proposes the research question as a means of filling the gap. It goes on to review the literature on the proposed research methods, and introduces the case study, which is detailed in Chapter 3.

2 Sustainability and planning controls: literature review

2.1. Introduction to the literature

This chapter reviews arguments for and against the principles contained in PlanFirst, and shows that limited research has been done on these in the Australian context. In seeking to determine what affect such a planning regime might have on sustainability, the available literature revealed that most authors considered PlanFirst's formative influences generally had a positive effect on setting a framework for improved sustainability. However, LEPs written under the PlanFirst template have not been widely studied, especially with regard to the specific building and land use controls generated by such an instrument. Literature generally showed that Development Control Plans (DCPs) do have a major effect on sustainability, as they are the primary control instrument for land use and building form. Land use controls were shown to be major influences on such things as habitat loss, loss of water quality, transport impacts etc. Building form was shown to be the major driver for building operational energy use, with associated affects on resource depletion, greenhouse emissions etc.

This chapter will therefore examine the following areas of the literature:

1) Ecologically sustainable development – what is wrong with current practice, can it be changed, and ways of determining if and when sustainability is achieved.

2) The existing planning paradigm – the roles of state and local government; the current planning paradigm in action.

3) The PlanFirst alternative model – the proposed reforms and their legislative context; how PlanFirst would function.

4) Testing the PlanFirst alternative – options for testing, use of case studies, use of indicators.

This leads the research to its principle question – does PlanFirst offer an effective local planning template for encouraging sustainable development?

2.2. Ecologically sustainable development

2.2.1. Current practice examined

This research is based upon the premise that improved ecological sustainability in the built environment is served by planning instruments with certain characteristics. It begins by identifying a commonly accepted definition of sustainability.

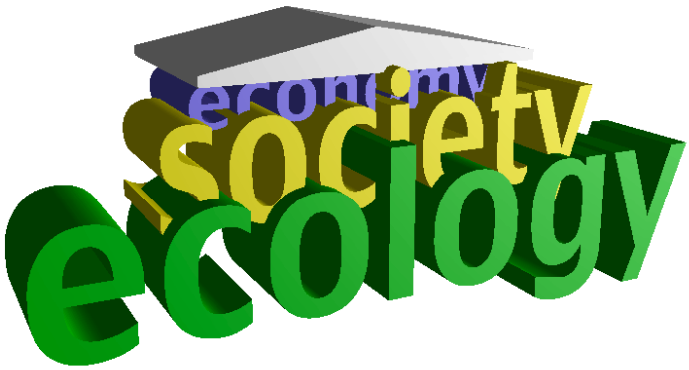
The World Commission on Environment & Development report *Our Common Future* (commonly referred to as the Brundtland Report) has formed a basis for discussion on the imperative view of ecologically sustainable development for much of the writing on ESD over the last two decades. Its imperative position that a balance can and must be struck between humanity's social and economic needs, and the ecology which supports that human activity, has been questioned by many (Albrecht 2001; 1997, p.20–21; Naess 2001; Perrings & Ansuategi 2000). One of the more fundamental criticisms is levelled against its acceptance of the "luck egalitarian" nature of contemporary global society[2] (Gosseries 2005), yet its fundamental statement that "Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland 1987) is both defensible and appropriate as a basis for examining planning policy (Barham 2001; Edgeman & Hensler 2001; Hoejer 1996b).

Brundtland's well known definition considers sustainability occurs when the three needs of economic, social and ecological systems are in balance (1987). However, this '3-legged stool' model of sustainability has been questioned, on the basis that it ascribes equal value to all three aspects, being ecology, society and economy. Without human development, the ecology of earth would continue, so it is really human development which is at risk of causing rapid ecological degradation, and thus the focus of any futures study on sustainability (Basiago 1998). As Basiago argues, all three aspects of human development are not of equal importance– or perhaps more precisely – if they are to co-exist at all, they must exist in a natural hierarchy, with each sitting in relation to the

[2] The concept of sustainability *savings* and *dissavings*, and different notions of intergenerational equity which contrast with the Brundtland definition) is explored by Gosseries in "The Egalitarian Case Against Brundtland's Sustainability" (2005). The discourse is not pursued here because it does not alter the prima face need to reduce energy consumption to achieve sustainability, by any definition. The discourse on the exact nature of sustainability will improve the framework for future research and policy formation.

others in way which ascribes the fundamental relationship between them (Basiago 1998). This concept, and similar hierarchical notions of sustainability have been developed in the literature for over ten years, yet the notion of equal value of the components of sustainable development is still the prevalent paradigm (Giampietro 1994; Howe 1997; Lafferty & Hovden 2003; Marshall & Toffel 2005). This research adopts the hierarchical approach because human development is ultimately dependant upon maintaining a sustained ecology: without a supporting eco-system there can be no society, and thus no economy. Figure 2-1 shows this graphically, expressed in the visual language of building: ecology as the foundation, society and economy being founded upon that in successive layers, until all are balanced, allowing the roof of sustainability to sit on top.

Figure 2-1 Hierarchical model of sustainable human development



There are some well-accepted basic tenets of sustainability that undergird the premise that sustainability is possible. Basiago acknowledges that at times it seems unlikely sustainability will ever be achieved in "this 'culture of maxima', of which the world has become enamoured. [which]…rushes towards an individualistic lifestyle.." and "…carries in its wake environmental destruction and social disintegration [and] practically goes unchallenged" (Basiago 1998). du Plessis describes society as "lemmings rushing toward an obviously yawning abyss of ecological change and systems collapse", and along with the International Panel on Climate Change (IPCC) reckons that global warming alone is all but out of control (C. du Plessis pers. comm. 17/2/2004), a view supported by Article 2 of the United Nations Framework Convention on Climate Change (UNFCCC) (Hare 2003). du Plessis (2003) strongly challenges current practice,

especially within the development industry of the western world, where she identifies a culture of “do nothing; pretend to do something, while not really changing anything; or [just] plug the most obvious leaks”, none of which produce the required change (p.1). Stevens (2004) argues from his controversial position of attacking architectural practice, that even current sustainable design is the preserve of the rich, thus denying the bulk of society the opportunity to have an impact where it is most needed. The *State of the Environment Reports* made to the Australian Government since 1996 also point to unsustainable practice, and a serious decline in ecological resources (Australian Government 1996, 2001, 2005). Greenhouse emissions from residential buildings have been shown to have increased markedly over the same period (Australian Greenhouse Office 1999).

2.2.2. Current practice can be changed

However, it has also been argued that currently unsustainable practices can be changed toward sustainable practice. A ‘culture of moderation’, as called for by Basiago, Bruntland, Stilwell and Hartkopf is possible, and has been shown to be achievable, albeit subtly at times (Hartkopf & Loftness 1999; Stilwell 1999). Achieving real sustainable development has been described as attempting to “square the circle”, but even those who criticise techno-fixes, still agree it is possible, if solutions engage communities in meaningful ways (Robinson 2004, p.370). Planning for sustainable land use practices has an obvious and central role in this, and by definition, this function rests with government. Government can be involved in leading society towards more or less sustainable practices through implementation of more or less sustainable policies.

Population pressure is most easily identified as the principal cause of ecological degradation, with human population having increased fourfold between AD 1600 and 1900, and the same again to AD 2000 (Doeleman 1997). Providing housing, work and transportation to this growing population has caused a net drain on global ecological resources, and this is certainly true in Australia. It is suggested by Bunker and Holloway that the role of governments is to provide a framework in which this drain is balanced by natural regenerative processes (Bunker & Holloway 2003), which is confirmed by the preambles and expressed goals of two relevant pieces of NSW legislation, the Local Government Act, and the Environmental Planning and Assessment Act (NSW Parliament 1979, 1993). The literature relevant to the detail of these is examined in

detail in Section 2.1.1 below. This then informs the discussion of the role of government in the formation of planning controls, and their impact on sustainability.

2.2.3. Determining whether sustainability is being achieved

For discussion about sustainable change processes to be meaningful, there must be ways of comparing sustainability before and after the change agent has been applied. Being able to measure actual change is critical, using real units or cognitive elements, as Porter and Wensing have argued (Porter et al. 2002).

The relevance of the built form to sustainability has long been understood by most writers, and 'ecologically aware' design practitioners (Bunker & Holloway 2003; Gonçalves, Camelo & Oliveira 2002; Reardon pers. comm. 10/3/2005; Troy et al. 2002, 2003). That this understanding has yet to make a significant impact on the built environment is an issue this research tackles one aspect of: what influence the various planning controls have on the process of a community producing 'the built form'. Some writers have taken approaches which are seen in traditional urban planning and architectural practice as radical, such as Krishan's "ecological process of design" (2002) and Baggs' earth covered buildings (1996), but which still rely on proven technologies to produce low energy-input / low waste-output buildings. Others like the Australian Greenhouse Office have, in the Your Home series of publications, attempted to seduce the "culture of maxima" by fighting fire with fire – in this case, desire and aspiration with ecologically sustainable satisfaction of those desires and aspirations (Reardon 2001). As Jelsma (2003, p.103–104) observes, a script (such as a DCP) may help modify the (design) behaviour of users, even if it never completely determines that behaviour. Reardon (pers. comm. 10/3/2005) has also shown that the Australian residential design industry is changing toward more sustainable practice at the point of design intention, but the results of those intentions have yet to be plotted in the built form.

2.2.3.1. Ecological indicators and planning controls

Indicators are seen as useful as a means of finding out exactly how management of a system is being carried out. This applies to human management, eco-system management, or a combination of them (such as planning controls). Indicators must be applicable to the field of study, and be able to measure change within it. For instance, in the field of catchment management, Turner et al have said that a "hierarchical

classification of ecological indicators of sustainability would need to take into account existing interactions between different organization levels, from species to ecosystems" (2003, p.99). This view is echoed by the literature in business and management, which also contains parallels to the operations of government (Hacker & Brotherton 1998; Schiemann & Lingle 1997). The University of Technology, Sydney, has confirmed the usefulness of indicators in the way it monitors its own performance in student management and research (UTS 2005). At the most fundamental level, indicators will offer some or all of the following features:

- Improve governance by providing a high level reporting framework to assist strategic decision making;
- Guide the management body about the study subject's performance relative to strategic priorities;
- Provide information for external reporting and communication about the study subject's performance (qualitative reporting);
- Monitor study subject's progress/change against predetermined targets (quantitative reporting) (after UTS 2005).

Planning controls contain aspects which sit across the range of quantifiable and non-quantifiable. There are a number of indicators useful for measuring change in sustainability practices, which should be selected to reflect those aspects of the particular change creation process that are being studied. In the case of planning controls, only those things which are directly – and ideally, solely – affected by such controls, should be measured (Hacker & Brotherton 1998; Wong 2005). Further, as Corbiere-Nicollier et al (2003, p.231) have noted, indicators become less quantifiable the more the subject matter moves toward sociological and psychological areas of study, and it becomes necessary to consider qualitative analysis as well as quantitative (Porter 2002).

Indicators which measure the impacts of energy, water and transport are effected by planning controls, and thus affect sustainability outcomes in specific ways (discussed in detail below), and although Porter (2002, p.2–3) argues for a broad sweep of indicators which also measure abstract things such as quality of life, this research focuses on more

quantifiable indicators. It is then possible to use this quantifiable data (found in Chapter 4) to inform the qualitative discussion (found in Chapter 5). It should be noted that as this research examines sustainability outcomes found in the built form, the predictive methodology used does not require PlanFirst to be implemented; refer to Chapter 3 on BASIX, and further discussion below.

The use of indicators is supported in the literature as a means of gauging the success of sustainability provisions within planning controls. The planning controls that can be shown to be relevant to this research include those affecting a building's operational energy, water use, and reliance on available means of transport. These are now discussed in more detail.

2.2.3.2. Operational energy for thermal comfort

"Although energy can be sought and sold like any other commodity, it is not 'just another commodity, but the precondition of all commodities, a basic factor equally with air, water and earth'... Here, in fact, is a field in which one cannot let things rip, where one has every reason to mistrust the wisdom of mere market forces; where there is need for foresight, good husbandry, and conscious conservation."

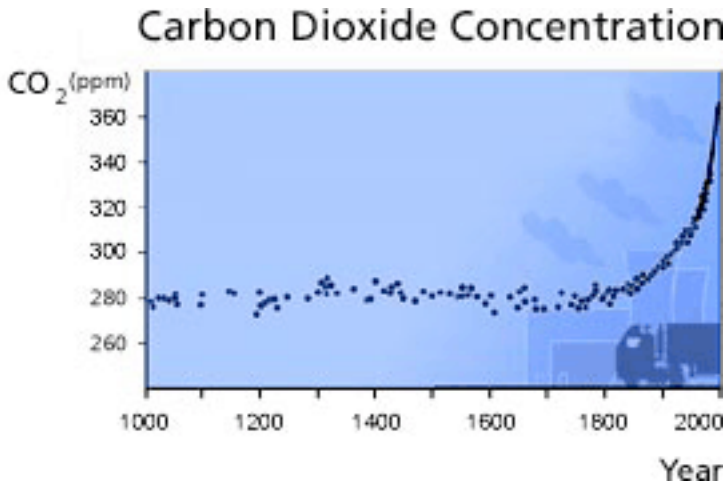
E.F.Schumacher, (1964).

The energy a building consumes in its normal course of operations can be predicted or measured, and used as an indicator of its sustainability. Ecological sustainability is affected by climate change, and the single biggest agent interfering with the natural greenhouse balance is CO_2 from fossil fuel exhausts (Houghton et al. 2001; Suzuki 2004). Fossil fuels (coal and gas) make up 96% of NSW's energy sources, thus any grid or mains supplied energy used for heating or cooling buildings is greenhouse productive (Housing Industry Association 2004). Figure 2-2 shows how global atmospheric CO2 concentrations have increased since the industrial revolution, indicating that human industrial activity (including supplying energy to houses) is responsible (Suzuki 2004). In this research, the term *operational energy* is used to describe its total energy demand for heating, cooling, lighting, and cooking etc. As noted elsewhere, it does not include its construction (embodied) energy.

It has been argued that the embodied energy of any given development outweighs its operational energy (Bunker & Holloway 2003; Troy et al. 2003), but this is a function of the building's operational or service life, and assumptions must be made as to what that will be. This research has avoided delving into that particular Pandora's Box for two

reasons: it needs to be established at the very outset of any discourse on embodied energy exactly what the adopted values and weightings given to different materials and systems are, and there is too little consensus amongst writers to justify inclusion of the whole gamut of views here; and the lifespan of buildings in Pittwater is slightly higher than the current Sydney average, and may climb steadily as more valuable buildings gradually replace older lower quality ones, but that is far from guaranteed. Although this may invoke a plethora of other arguments about the equity facets of sustainability, this research does not attempt to unravel those to any great extent, as it is not central to the research question.

Figure 2-2 - Global atmospheric CO2 concentration over time (IPCC and David Suzuki Foundation)



A building's operational energy can be expressed as the relationship between the energy *consumed* by the building, and the energy *produced* by the building, measured over a given period of time, usually a year, or perhaps its operational life. This does not take into account the embodied energy consumed in producing the building in the first place, as noted above. Operational energy is typically consumed in producing light, heating and cooling, and running appliances etc. It may be produced by renewable energy systems such as building-integrated photovoltaics (PV). The component of operational energy most likely to cause the largest ecological impact is that part required (or predicted to be required) to provide thermal comfort, in the form of space heating and cooling (Reardon 2001). This distinction is discussed further in Chapters 3 and 4.

The importance of limiting operational energy is commonly acknowledged amongst the ESD-motivated design profession, most often referred to as “energy efficiency”. The concept is discussed by dozens of writers in the Australian Council of Building Design Profession’s Environment Design Guide, (Baggs & Mortensen 1995; King 2000; Pears 1997; Prassad & Fox 2001) and in the AGO’s Your Home Technical Manual (Reardon 2001 and contributing authors, myself included). Planning researchers in Brazil (which unlike much of Europe, has a similar climate to Australia) have looked at design issues such as solar access, and confirmed that planning processes have a major effect on good solar design, but have not explored the potential of the principles embodied in LA21 (or PlanFirst) to positively influence those planning codes (Leveratto 2002). This research explores the flow of influences (including LA21) into specific building controls, and measures the effectiveness of those.

Thermal computer modelling is generally accepted as being a useful way of predicting comparative energy demand. International research has established that it is based on a valid premise, and that the results are useful, if not perfect ((Akbari, Konopacki & Pomerantz 1999; Crawley et al 2001; Dhakal & Hanaki 2002; Kosny & Kossecka 2002; Meldem & Winkelmann 1998; Reilly et al. 1995). In Australia the most widely used application is NatHERS, and writers generally agree on the validity of the basic premises used in it, and the usefulness of the results in comparative analysis (Ballinger et al. 1995; Pearson 1994) There is also ample evidence of the incorporation of the information provided by such modelling into the design process at an early stage being accepted practice (Gottfried, De Angelis & Trani 1999; Shaviv 1999).

However there has been some criticism of the most common method used to predict this in Australia, being the NatHERS simulation software, especially its favouring of large poorly ventilated houses (Oosthuizen 1999). It has been shown that this house type, commonly referred to as “McMansions” easily meet the previously regulated minimum 3.5 star NatHERS requirements, yet actually consume large amounts of energy in their working life. This has been especially true in recent summers, with these buildings responding to high radiant and ambient head loads very badly. NatHERS may not give accurate results under these conditions (Bryn & Smidsrød 2002a, 2002b; R Webb 2002). Some researchers have found that the current highest NatHERS rating for thermal performance (5 stars) gives only mediocre results in comparison to most European standards, and points to various shortcomings with the climate data and ventilation and

mass modelling (Williamson, O'Shea & Menadue 2001). Nonetheless, without expecting to predict actual energy consumption, use of a modelling tool like NatHERS can give good indicative data on a comparative basis (Ballinger & Cassell 1994). This research has been designed to account for this, by not attempting to correlate prediction and practice, as discussed in Chapter 3.

2.2.3.3. Mains supplied potable water demand

"Discarding urban rainfall in the world's driest inhabited continent makes no sense."

(Cameron & Moore 2002)

The water supplied from community infrastructure, which a building consumes in its normal course of operations, can be predicted or measured, and used as an indicator of its sustainability. A building's net water use is determined primarily by its demand, and secondly by any capacity it has to supply that demand. It has been argued that the provision of hydraulic services are the most basic of urban services, and by inference, the most fundamental responsibility of service providers, usually state and local governments (Neutze 1999; Troy 1999). Nuetze has identified the low perceived value of fresh water in the developed world as a cause for its profligate use, and of the importance of factoring the loss of water flow downstream of dams into consideration of the environmental health of a catchment.

The balance between supply and demand is self evident when one examines a building in isolation: if the building and its occupants require no water – for instance, a bus shelter – then none needs to be provided, and the demand on the resource is nil (Neutze 1999). A detached single residence is often the building type at the opposite end of that scale, with large demands for landscaping, showers, toilets, dishwashers and washing machines etc. It is possible for two apparently similar houses to use vastly different amounts of water, and to derive their supply from either a shared off-site resource, or to be completely self sufficient with on-site rainwater harvesting (Loh & Coghlan 2003). The current situation in say, Sydney, with permanent water restrictions and government plans to commit large funding allocations to a desalination plant, has arisen at least in part because in the past there have been policies which discouraged rainwater tanks and recycling systems, which have served to inhibit their widespread installation as a means of reducing demand on community infrastructure (Tranter 2004).

It has been shown that the demand side is the driving factor in the ecological cost of providing water to a building (White 1998). It has also been shown that demand varies widely across Australia, with outdoor use being the major variable (ibid, p.17). A DCP can influence the way buildings use this resource, through requirements for such things as water efficient taps, and controls on species selection in gardens, and the porosity of landscaped surfaces, as White and Fiander note (ibid, p.94). But as White also points out, end users are the final determinant for consumption rates. It could be argued that any DCP which sets out to limit water use will only ever be able to provide a relative limiter, by way of capping flow rates from taps and showers etc, but will not be able to limit the length of time showers are run (for instance). Nonetheless, it has been shown by White and others that technological improvements can reduce demand substantially.

All aspects of water use must be considered, both on the supply and demand side, and where these cross over within the confines of each development. The reuse of waste water is one such instance where individual buildings or whole communities can make better use of the resource, and it is the only water source guaranteed regardless of droughts, and which increases with population increase (keeping in mind that the original water must be sourced somewhere) (White 1998). The scope of an LEP may include the instigation of community treatment schemes, but a DCP does not, even if it controlled aspects of its design. Therefore for the purposes of this research, only on-site wastewater treatment is considered.

The use of other legislative instruments must also be considered when discussing the whole water supply issue, such as water efficiency labelling and associated education programs, bans on fixed garden watering and hosing hard surfaces (such as those in place within Sydney Water's jurisdiction at the time of writing). This also touches on issues such as the legal logic of a corporatised water utility also being the policeman in monitoring water restrictions, but these are not considered here (refer to Neutze 1999; also White 1998).

2.2.3.4. Private car dependency

"The Australian consumer feels limited personal responsibility for the effects of their choice of vehicle on social or environmental outcomes. I can choose whatever I want without any guilt and I do."

(Ian McCleave, Executive Director, Business Strategy & Planning, Holden, 2003)

Transport and commuting can have a large impact on community energy consumption, and therefore on greenhouse emissions (IPCC 1996; Suzuki 2004). Thus the provision for, or encouragement of, transport options in local planning controls can be used as an indicator of sustainability (Campbell 1989; Fisher 2002). Requirements for provision of car parking spaces can be used as a measure of this impact on transport sustainability – simply by its encouragement or discouragement of private car use. Transport – and private car use in particular – is a much bigger contributor to greenhouse gas emissions, for instance, than the entire residential building operational energy sector (Australian Greenhouse Office 1999, 2005), yet much more effort goes into increasing the thermal efficiency of the building envelope than goes into reducing its transport demands (Stevens 2004). Individual buildings do not often control transport options beyond the site boundaries, and so it can be argued that a single residential development is more at the mercy of town and transport planning than vice versa. Large commercial and mixed use or high-density residential developments, however, are obvious drivers of high transport usage, and in such cases it may be argued that there is a much more even-footed relationship between such developments and the town planning which attempts to control them (Gleeson 2004b). Searle (2003) argues that strategies which presuppose certain increased urban densities will have some benefit in terms of reduced car use, improved air quality etc, but questions the ability of areas of Sydney which are thus earmarked to be able to meet the demands. Searle and others have contributed to the literature on the planning context, but little architectural research has been carried out on what the Australian built form might look like which satisfies Searle's criteria.

Zeibots (2003) suggests that because individual lot-scale developments occur on such a large scale and in such high numbers, they should be considered in the same way as large scale developments. In the case of the subject of this research's case study and sampled developments (single residential development applications), this is evidenced in the way transport options are considered and responded to in the built form, most obviously manifest as car parking spaces. Requirements for such spaces based on occupancy (such as number of bedrooms) or other criteria can be considered a measure of how the planning document is responding to the collective expectations of provision of transport services. Thus it can seen in some local planning codes (such as City of Sydney) that there is reward for providing less individual car parking spaces, although

this only occurs in areas serviced by high frequency/high penetration public transport – certainly not the case in Pittwater (City of Sydney 1996; Pittwater Council 2003c).

Alternatives to motorised transport are usually more sustainable, and the research needs to consider how these are treated. It is well accepted that people who exercise regularly are generally healthier than the community average, and it has also been shown that urban form can have a positive or negative affect on this, by means of encouraging or discouraging walking (Frank & Engelke2001). “Through the lens of our car culture, city planning and its allied professions have become unaware of the health impacts that our land use and transportation decisions have on …physical activity” (ibid, p.203). While a full investigation of human health implications is beyond the scope of this research (since most DCPs concentrate on development within individual lots), it is still pertinent to note that an LEP can have a major influence on community health in this way.

Controls which require a high number of car parking spaces per dwelling, for instance, can be seen to encourage car use, and thus discourage walking, cycling or use of public transport, with all the accompanying negative health impacts noted by Frank & Engelke (2001), as well as greenhouse gas emissions and other negative impacts noted by many other writers (Fisher 2002; Houghton et al. 2001; Suzuki 2004; Ziebots 2003). By way of contrast, an LEP or DCP which allows or encourages home-based businesses (given certain constraints) can be shown to reduce the number of commuters (Hoejer 1996a), although this could also decrease walking. A qualitative assessment could be made based on allowing other business uses within residential zones, and a quantitative analysis made on the basis of minimum car space requirements.

2.3. The existing planning paradigm: planning controls and sustainable development

It is important to identify the ways in which planning controls actually affect sustainability outcomes, and to examine where those controls come from, and how they are administered. This allows some light to be shed on the subsequent questions of what is wrong with existing planning paradigms, and what better options are there? There is a hierarchy of control in the Australian government context, with the federal constitution ascribing control over land use planning to the states. Therefore, the investigation

commences with state administrations, under which councils are created and empowered to control the majority of planning functions.

Because PlanFirst proposed to reform the way local planning is carried out, it offers the opportunity to change long established patterns. Some commentators have attributed certain dysfunctional features of contemporary society to a history of rigid land use control (Frost 1990; Huxley 1994). Huxley expresses the negativity of dormitory suburbs as '[the] mindless homogeneity and closed communities of empty streets, ...where we watch ourselves watching each other" (p. 157). He points out that zoning – the prevailing mantra of the planning instruments past and present – sets the frameworks in which debate and legal actions occur, but that "very rarely is the whole legal structure of *control* itself questioned" (ibid) and that when these big questions are asked, it is usually the process of *control* simply seeking to reinvent itself with a new skin, serving whichever power structure dominates at the time. It is the expectation of many that this is precisely what will happen with any reformation of the EP&A Act, such as were proposed in PlanFirst (Hatch 2003). As Gleeson (2004a) has observed, without an over-arching national planning strategy, "The legacy of splintered urbanism will be a long one". So it is important to examine the possibility that PlanFirst contained reformation principles useful in changing more than just the skin, but the core of the planning system.

The alternative model proposed by PlanFirst is examined in Section 2.4.3 below, and further in Chapter 5. It is useful to review the literature on the role of councils and the functioning of planning controls, all within the existing paradigm, prior to commencing the review of PlanFirst.

2.1.1 Role of state government

The enabling legislation for all NSW councils is the Local Government Act of the NSW Parliament. Local government in Australia exists only by the grace of state government, as there is no Australian Constitutional structure for it. This Act enables councils to provide certain services on behalf of the state government, such as local roads, some community health services such as garbage removal and baby health support, libraries, and in some regional areas, hydraulic and sanitary services. All local governments in Australia follow similar patterns and structures as a consequence of the states' simultaneous Federation in 1901.

The *NSW Local Government Act (1993)* sets out a clearly stated purpose, being to provide environmentally responsible, transparent and accountable system of local government in NSW. It explicitly aims to "require councils, …to have regard to the principles of ecologically sustainable development in carrying out their responsibilities." It also encourages "effective participation of local communities in the affairs of local government" (NSW Parliament 1993). Even without the input of LA21, an imperative can be seen to exist to provide both community participation and ecological sustainability in the provision of the services sanctioned under this Act. It has been argued that the currently accepted structures and systems fail on both counts, thus demanding local actions along the lines of LA21, and this research seeks to investigate those arguments (Carson & Martin 1999; Mant 2001; Searle 2003).

Writers such as Mant and Searle support the view that the status quo has not significantly engaged communities in creating their own land use planning, either through structured institutions, or by use specific programs, until the reforms proposed in PlanFirst appeared (Mant 2001; Searle 2003). That is not to say that they support PlanFirst's proposed reforms in their entirety, which is discussed in detail below. Since the County of Cumberland Plan was introduced in 1945 (which was the first modern holistic regional planning template in NSW, but only covered the greater Sydney basin) there has been no record of systemic community consultation (Christoff 1999; CSIRO 2004). Freeman et al have observed that when invited, submissions may be evaluated and acted on where it seen to be appropriate, but the system relies upon interested, motivated and articulate respondents, and in most events is not transparent (Freeman, Littlewood & Whitney 1996), a position supported by the previous experience of this researcher. As Carson and Martin have demonstrated, this does not engage any more than interested specialists and activists, and does not make meaningful contact with the broader community (1999). In this way it is really looking for problems (raised in objections), rather than opportunities (brought out through pursuing what communities actually want and need) (Carson & Martin 1999).

In NSW, local government's responsibilities for planning, control of development, and administering land use are contained in the *Environmental Planning & Assessment Act (1979) (*EP&A Act). This sets out to achieve provision of "a better environment" and "ecologically sustainable development" through a coordinated "sharing of the responsibility for environmental planning between the different levels of government in

the State." It provides an opportunity for community participation in those roles and responsibilities by means of "public involvement and participation in environmental planning and assessment" (NSW Parliament 1979). This Act also sets out to embed sustainability, along with community participation in the process of achieving it.

Part 3 of the EP&A Act covers the creation of planning instruments, and as such, is included in the focus of this research. Part 3 sets the whole framework and pattern for plan making, and sets up a hierarchy which includes State Environmental Planning Policies (SEPPs), along with Regional Environmental Plans (REPs), and, at the bottom of the hierarchy, Local Environment Plans (LEPs). The Act establishes LEPs in legislation, so that their contents are defensible at law, but other state legislation such as SEPPs can still override this. Mant and Searle have argued that the aim of promoting a presumably coordinated sharing of responsibility for environmental planning between the different levels of government is a low priority, and that it is a goal often overlooked in the political rough and tumble of implementing state policy by means of instruments like SEPPs (Mant 2003a, 2003b; Searle 2003). The emergence of groups such as Save Our Sydney Suburbs (SOSS) bears testament to a popular reaction to planners at state level disregarding the wishes of local planners and communities (although it has been argued that the agenda of groups like SOSS care little for the broader impacts of their policies on ESD) (Searle 1999). Development Control Plans (DCPs) exist only within the framework of the council's LEP, and do not have legal standing at law in the way an LEP does. Their position is strengthened by an LEP's specific reference to a particular DCP, but even so, DCPs often "take a battering" in the Land & Environment Court (Lawton 2005a).

2.3.1. Role of councils

Councils are responsible for drafting and implementing their own development and land use plans. The EP&A Act sets the framework for the production of Local Environment Plans (LEPs), which are established as law, and recognised as such by the Land and Environment Court. An LEP traditionally set goals and standards for its subject land area, without setting definite numerical limits or controls. Under the framework of the LEP, Development Control Plans (DCPs) may be produced, which have traditionally been used to set numerical limits and controls on the built form. The distinction between LEPs and DCPs is often blurred however, and some writers and industry organisations

have been critical of the uncertainties of the process, especially with regard to the politicisation of development assessments (Housing Industry Association 2003; Mant 2001).

The council structure which produces the planning documents, and then administers their execution must also be considered. Pittwater Council's structure, by way of example, follows a common municipal model found in urban areas across Australia. Development approval processes are subject to various degrees of political and populist influence, over and above the technical assessment carried out within the framework of the LEP or DCP (Bunker & Holloway 2003; Dickson D. pers. comm. 28/10/2004; Downes P. 27/10/2004). It has been argued that councils with weak planning controls, and a poor understanding of, and commitment to, good planning, allow over-development and disenfranchisement of original citizens (Halperin 2002). Conversely, it has been shown that over-zealous adherence to planning controls with no allowance for merit-based assessment disallows design innovation (Lipman 2004).

The role of consultation must also be considered. Council and committee meetings are usually open to the public, although only an interested few regularly attend, and it can be argued that residents or other stakeholders who do not attend, due to lack of interest in or ignorance of events, are effectively disenfranchised from the process (Carson & Martin 1999). This principal was recognised by the Strategic Planners at Pittwater Council when Pittwater 21 was drafted, and as well as the public consultation process used during the exhibition, some structures were placed within it to minimise the disenfranchisement, with regard to notification of neighbours and stakeholders (which is discussed in detail in Chapter 4). Clearly there can be no compulsion for affected parties to become involved, so the ultimate effectiveness is hard to measure, but a lack of involvement is certain to diminish the end result (Carson & Gelber 2001; Carson & Martin 1999).

It is important to examine how the planning controls themselves have been viewed in the literature, which follows in Section 2.3.2 below. At the macro-planning level there is a common thread amongst many writers that identifies failings with the current paradigm in the area of community engagement, and politicisation of planning instruments not well understood by the community they are supposed to serve. The impacts of planning controls on the built form have been debated at length within academia and the

development industry at large. But literature on the real ESD outcomes is more disjointed, with relatively few researchers having pulled all the threads together. This is explainable in part by the fact that much planning debate is concerned with achieving and maintaining some clear direction and vision for planning methods, leaving too few writers with too little time to investigate what the final outcomes might be.

2.3.2. Councils and planning controls in action - the Development Application process reviewed

While the intention of councils is generally to achieve sustainable outcomes, most commentators in academia and industry agree that the complexity and layering of the assessment process make it unnecessarily complicated in most instances (Housing Industry Association 2003; Lawton 2005b; Mant 2001). The EP&A Act sets out five major 'heads of consideration' which must be addressed in each DA, which cover the spectrum of ecological and social impacts from almost any conceivable development. These heads of consideration are expressed within the LEPs and DCPs produced by councils, where they are interpreted into a local context, and often layered such that there is repetition and conflict (Australia. Dept. of Housing and Regional Development. 1995). In such cases the required detail and complexity makes interpretation of the controls difficult, and where complexity and difficulty occur, good results are often compromised by other factors (Barham 2001). In Pittwater Council's case, the shortcomings of the existing planning assessment paradigm were recognised, and an attempt was made to improve the system by reducing its complexity. A discussion of some of the detailed controls within the new LEP and DCP is found in 2.5.1 below, but is useful to note here the problems of the previous system, and to note also that it is still the predominant system in most councils in NSW.

Good results in the built environment are defined in literature as building designs which achieve the best ecologically sustainable outcomes. These can be measured using various indicators, many of which are included in such tools as BASIX, the National Australian Building Environmental Rating Scheme (NABERS), Green Star, Australian Building Greenhouse Rating Scheme (ABGR), and others. They can also be qualitatively analysed on a case by case basis. Development controls which affect these measurements cover issues such as the number of car parking spaces and their location, tree preservation, solar access and thermal performance of the building envelope, landscape design and site permeability, and protection of biodiversity.

Achieving a design which satisfied all of these (and many more), as well as satisfying clients and neighbours, was as much as many designers could manage. Achieving a design which satisfied them *well* was much more difficult, and if a large and complex design had been completed over a period of many months whilst inadvertently overlooking one or more DCPs in the plethora of planning controls common in urban councils, it was uncommon for the whole concept to be revisited, so much so that in the experience of this research, it never really happened (UDAP 2003). Much more common was an adjustment process, whereby some attempt was made to accommodate the extra controls[3].

LEPs often contain dozens of individual DCPs, and it is often not clear which DCP applies to what site or proposal type. Thus it is common for a DA to be lodged with a council, either to be rejected at the counter because it does not contain documentation addressing all the issues council staff consider relevant, or to have its assessment process stall at a later date while additional information requested is produced, or another DCP considered. Because the applicant is sometimes unaware of exactly which DCPs affected the proposal, in many cases the fundamental design does not address the relevant issues. When these problems are brought to the applicant's attention, there is usually an adjustment of the design which results in a compromised design solution – which is rarely the best result (Housing Industry Association 2003; Reardon 2001).

Another factor in the currently dysfunctional relationship between planning authorities and their communities has been identified as the lack of understanding of the intent of some planning policies. Often these are instigated at state planning level, crafted as strategic responses to perceived needs, but are then administered at a local level. It is at this point they have in the past met tremendous opposition from community activist organisations and individuals alike. A case in point is the reaction against urban consolidation (strategised by SEPP53, and reflected in various local planning documents) by Save Our Sydney Suburbs (SOSS) (Searle 1999, 2003).

The failings discussed above beg the question – in what ways could the planning system be improved? The following section discusses the PlanFirst alternative, first proposed in NSW in 2001.

[3] Recent reforms in NSW aim to reduce the number of DCPs such that there is only one per site, but these occurred outside the timeframe of this research period.

2.4. An alternative model: the PlanFirst proposal

"Planning our future is a very important task."

Andrew Refshauge, Minister for Urban Affairs and Planning (2001)

Planning the future could be described as *the* very important task, above most others. The PlanFirst White Paper (referred to here as PlanFirst) set out to reflect the thinking behind the reform process as it then stood – a draft template, with clearly defined operating principles. It summarised the process up to the date it was published, discussed plan making theory, identified the key features of the proposed system, then examined plan making from the local level through regional to state level, concluding with a projection of what legislation was likely to occur to enable the new system to be implemented, and what transitional arrangements would be made. It was accompanied by a discussion document entitled "*Ideas for Community Consultation: a discussion on principles and procedures for making consultation work*", which contained most of the material dealing with consultation, which is also discussed in this part of the research.

2.4.1. PlanFirst – the proposed reforms to the existing paradigm

PlanFirst was conceived to be a reformation of Part 3 of the EP&A Act (as described in 2.1.1 above). There is not a lot of literature on it specifically, in contrast to the plethora on planning issues generally. But this wider literature is very useful in shedding light on the principles behind PlanFirst.

Mant is one of the writers to have critically examined PlanFirst, decrying it as "the wrong instrument produced by a wrong process and the wrong organisation", on the grounds that it attempts to control a time-bound process of development-driven change without being able to move ahead of that process, thus being behind the game at all times (2003b). Further, he argues that the PlanFirst reforms provided no resolution to the inconsistency between the perceived political nature of development (such as when development applications are debated by elected councillors) and the objective and judicial nature of the same issues when viewed in light of planning controls (and often by the Land & Environment Court) (Mant 2001; Smith 2001).

Others have taken a contrasting view. Smith (2001) says “It could be argued that if the status quo is maintained, reform of the planning system will be needed in an attempt to make the planning system less complex, so that communities, councils and the Court are clearer as to 'what should go where'” (p.2). He infers that PlanFirst was just such an opportunity. Gleeson and Randolph (2003) contend that the lack of open and transparent planning heritage and culture in Sydney is perpetuating a planning disaster. They say that “an integrated planning vision, based on a joined-up understanding of the city region as a whole, to replace its traditional technocratic and opaque deal-based approaches to managing change” is needed (p.1). They argue that “The vision driving the plan would be distilled from an open public debate and transparently negotiated. It would be complemented and reinforced by Planning NSW's PlanFirst reform proposals for the state planning system which will greatly simplify and strengthen the governance of urban and regional development in NSW” (ibid). This view ascribes positive potential to the PlanFirst reforms, supported by the Local Government and Shires Association’s (2001) submission to PlanningNSW, and a majority of other submissions recorded in the PlanFirst Feedback Report (Urban Frontiers Program 2002).

A common theme among influential Australian writers suggests there is a regional planning vacuum in NSW, even four years after the PlanFirst principles were first proposed. This position is supported by Falk and other writers at the Planning Research Centre (University of Sydney (Falk & Toon 2003)), Troy at the Urban Frontiers program at the University of Western Sydney (Troy et al. 2002), Gleeson at Griffith University (Gleeson et al. 2004), and Searle at the University of Technology, Sydney (Searle 1999, 2003). But as Gleeson et al (2004) pointed out, even regional plans have their limits, without an over-arching national planning strategy. Such a strategy does not exist, and there is no indication in research or the media that it has any immediate likelihood of appearing.

Other Australian writers who support the need for integration of national and regional strategies, with effective consultation as a means of ensuring understanding and acceptance of the plans, include Vincent (1999), who suggests that all sectors of government would provide better “service” for its beneficiaries (or “customers” as she puts it) if public participation is pursued. Some Australian media commentators have shown resistance to certain features of LA21 governance, referring to it as ‘loss of sovereignty’ etc, and the convergence of public management postulated by Osborne and

Gaebler (1993) in their often critiqued *Re-inventing Government* would be anathema to them. Despite the lack of academic rigour usually displayed in the popular media, such cynicism is justified by Hogan (2001) who says "A tendency to encourage some measure of popular cynicism about politicians and politics is built into the democratic system" which applies at all levels and functions of government (p.28). Carson recognises this widely held cynical view of political processes, and addresses it in *Random Selection in Politics* and by inference in the PlanFirst community consultation paper (Carson & Gelber 2001; Carson & Martin 1999). Carson's view that consultation is essential and effective is supported by Becker's early landmark work (1974), and many others (Doeleman 1997; Emery & Purser 1996; O Renn, Webler & Wiedremann 1995).

Different urban forms and densities may affect community interaction with government in different ways, and the literature sheds some light on this. Writers such as Jones and Stanton have examined the role of public participation in non-urban contexts, and with some allowance for these being in north-western USA, have argued that place-based (or "end state" as Mant terms it) planning is still appropriate, and that public participation is both a valid and effective means of ensuring its applicability (Jones 1999). Others nominated acceptable densities, and in the process have attempted to defend the logic in their methods, and it is generally accepted that a contained and dense urban form like Munich is more sustainable than say Canberra (Tanghe, Vlaeminck & Berghoef 1984). This research does not pursue that discourse any further, as Pittwater is contained geographically – thus eliminating the possibility of significant urban sprawl, and because its geography and relative remoteness from the Sydney CBD is generally seen as inappropriate for high densities, at least in the short to medium term.

The following sections discuss the small amount of literature which comments on PlanFirst's drafting process, its philosophical influences, and its expressed goals.

2.4.1.1. Drafting and legislative context

PlanFirst had its beginnings in 1998 when an initial round of consultation with selected focus groups generated ideas for inclusion in a Green Paper (DUAP 1999b). Typically Green Papers are the means by which governments flag ideas for debate, which they have no certain solutions for, but which warrant sensitive exploration in the public domain. Released in 1999, the Green Paper had four months of exhibition, and contained the key reform agenda. Discussion forums were then held in 26 locations

across NSW involving about 1000 participants from all regions. Discussions were also had with selected industry, environmental and indigenous groups. There were 336 submissions in response to the Green Paper, and in 1999 the Feedback Report on these discussions and submissions was released. Later that year focus groups were again used to discuss the "draft directions" which came out of the feedback. Following these discussions the proposals were refined in further consultation with other State agencies, councils and other unspecified groups. These were then published as the PlanFirst White Paper in 2001. It does not contain any specific planning content for any part of NSW, only a series of methods for determining these. At its release, it was envisaged that the enabling legislation and enactment would occur within 18 months.

The consultation process used in the drafting of both the Green Paper and the White Paper (PlanFirst itself) reflect many of the principles espoused in the final document. The involvement of so many stakeholders – both community and industry – reflects a broad desire on its authors' part to achieve a balance between the three pillars of sustainability: society, economy and ecology (Shankie-Williams N. pers. comm. 18/12/2003).

Not all writers are convinced that PlanFirst required separate legislation (or Regulation, appendant to the EP&A Act). Mant argued that all the necessary powers existed already (Mant 2003a). However it was introduced, the important aspects of it so far as this research is concerned, were those which effected the planning controls which affected the built form, and in that context, Mant's criticisms, however valid, are not relevant.

2.4.1.2. Background influences

PlanFirst's influences can be traced back to various Australian and international experiences and policies. Analysing these from the start of the process then, the formative influences include NSW Government policy, the insights, preferences and prejudices of the authors of PlanFirst, and sources referenced by them during the drafting of the White Paper. LA21 (United Nations 1992b) was a strong influence, and many of the values espoused in PlanFirst can be found explicitly within it. While there is a wealth of research material on local implementation of Agenda 21 from communities in the UK, Europe, Eurasia and the Middle East, relatively little research has been done in Australia on the results of its implementation within the local planning context (Buvik, Andresen & Matusiak 2002; Chibli 2002; Christoff 1999; Freeman, Littlewood & Whitney

1996). Foster (1999) has traced the history of Australian urban planning and development in great detail and has analysed all the common planning processes used up until the new millennium, and apart from noting LA21's presence, does not discuss its impacts.

Chapter 28 of Agenda 21 (that part termed 'Local Agenda 21') was intended to be directly applicable to local communities throughout the world regardless of cultural differences (United Nations 1992a), and few writers have criticised this aspect of it. Environs Australia produced a guide for communities and local government which accepts these principles (Cotter & Hannan 1999), indicating that in the eyes of Australian government, the position taken by PlanFirst is justifiable.

The Green Paper *Plan making in NSW: Opportunities for the future – discussion paper* was released in February 1999 with the aim of stimulating debate on ways to improve planning in NSW. The time was ripe for such reforms: there was a growing awareness of the need to conduct development in a more sustainable way on the one hand, and an increasing level of frustration with governments not seen to be responsive on the other (Selman & Wragg 1999). Although this was a global phenomenon, as Selman and Wragg point out, it was manifest locally as a growing dissatisfaction amongst development industry organisations over the 1998 amendments to the EP&A Act, whereby all building works were required to obtain Development Consent (a much more complex process than was previously required).

The feedback to the Green Paper provided useful information to government on how some of the people of NSW felt the planning system was disenfranchising them: that government was imposing unaccountable policies with no interaction or transparency, and that they were not in control of their local environmental issues (DUAP 1999a). The impact on sustainable planning policy of cynical and distrustful views of government is hard to quantify, but is clearly seen not to aid the process (DUAP 1999a; Hatch 2003; P Healy 1996). This correlates with this author's experience of public and industry attitudes to state planning administrations (Clarke RJ. 2000, 2003b).

Public response to the Green Paper amounted to 336 submissions, published in the Feedback Report. The common themes focused on the need for simplicity, accessibility to information, greater certainty in the assessment process, better community

consultation and improved sustainability outcomes. The feedback also suggested that "better practice" would achieve these outcomes, that legislative change was not needed.

From these themes, the White Paper then identified the following five outcomes as critical for the review to achieve:

1. Improved coordination between levels of government to enable plans to work together and fit in with one another more effectively (i.e. better integration of plans);

2. Reduced complexity by having a better organised system and fewer plans;

3. Better communication and participation in plan making;

4. Effective land use management to guide development;

5. Efficient processes for making and reviewing plans.

It is noteworthy that the words *sustainable, ecological* and *environment* do not appear in this list, yet when the authors of PlanFirst had finished their work, it was embedded into the wording and the structure. This may have occurred for two reasons: first, it is arguable that a truly effective review, which achieved the outcomes listed, would by necessity address ecological sustainability issues in one way or another. This is supported by the LA 21 experiences in the UK and other places, which was a key factor in the minds of PlanFirst's authors (Freeman, Littlewood & Whitney 1996; Sathiendrakumar 1996; Shankie-Williams N. pers. comm. 18/12/2003). It has also been argued by Basiago (1998) that while it is necessary to name the sustainability goals explicitly at the start of such a change process, they should ultimately disappear as separate items, having become embedded in the very core of the normal operations of the organisation concerned. Secondly, the principle of 'championing' change, discussed in depth in Chapter 4, applies within any organisation, including state government agencies (Issenberg et al. 2003; Shankie-Williams N. pers. comm. 18/12/2003). 'Change champions' at work within the state planning agency had a significant influence over the character and content of the final document.

2.4.1.3. Goals

Based on the five outcomes listed above, the PlanFirst White Paper sets out its objectives in two layers. One concerned with simplification of the planning process and integrating plan making top to bottom, the other with community involvement. The literature reveals that these are correct responses to commonly identified faults in the currently predominant planning system. Both of these broad goals can be evaluated in response to the research question: does PlanFirst offer an effective template for encouraging sustainable development?

a. Simplification

PlanFirst restates the planning system objectives of simplification (first identified in the Green Paper) by "reducing the number and layers of plans applying to land and making those plans easier to find and understand." At this first level, the outcomes are couched in terms of savings to business and the community, through clear integrated regionally based strategies (Section 2 of the White Paper). This is expressed as an iterative relationship between local, regional and state plans and planning policies. The opportunities for this to occur have been explored in local government contexts in Europe and North America (Mant 2003b; Osborne & Gaebler 1993), and Mant (2003b) agrees that the principles are applicable and advantageous in Australia.

However, simplification cannot be used as a justification for removal of fundamental functions of either a local plan or the EP&A Act itself. This could undermine the aims of the Act, and those of at least one other significant Act, the Environmental Protection and Administration Act[4] (1991), as noted by Prattley (pers. comm. 7/3/2002). A recurring problem with the political administration of planning in NSW, especially with regard to major developments and infrastructure planning, has been identified when these Acts are amended at will by the government of the day, without due consultation or explanation (Goodsir 2005). The worthy goal of 'simplification of process' has been used on more than one occasion to justify removal of environmental protection processes from the assessment process (Goodsir 2005; Smith 2001). PlanFirst did not offer an opportunity to rectify that in a structural sense, since the review of Part 3 of the EP&A

[4] The Environmental Protection and Administration Act (1991) is not to be confused with the Environmental Planning & Assessment Act (1979), which in the research is always referred to as the EP&A Act. The former Act pertains to protection of eco-systems, and the management of bodies which may have an effect on such systems.

Act has no influence over how Parliament might treat the whole of that Act, or any adjacent Act. The implication of Goodsir's observations and Smith's review of the litigation and legislative problems inherent in the existing system (as seen in the many planning disputes which come before the Land & Environment Court), are that it would have made the Act less vulnerable to such unilateral interference due to a heightened awareness of planning issues at the regional and local levels, brought about by its focus on community involvement.

b. Community involvement

The second layer of intent in PlanFirst emerges at this point: clear reference to community involvement reflects the LA 21 influence; and explicit references to sustainable management of resources, environmental protection, affordable housing, and vibrant communities reflect the aims of providing socially balanced ecologically sustainable development. Here it also aligns with the explicit goals of the Local Government Act. Section 3 of the White Paper further develops the stated commitment to sustainability, setting out broad methods for working towards whole-of-government involvement in plan making, with community involvement from the earliest stages. Carson and Martin's earlier work on random selection in the political process, identified the value of involving and empowering communities at a grass roots level. This is in contrast to the disconnection from the core of the process commonly experienced by communities described by may writers, including Sandercock, Dore and Carson (Carson & Martin 1999; Dore 2001; Sandercock & Friedmann 2000). The thrust of Carson's arguments are that meaningful ownership of a planning policy can only be guaranteed when sometimes radical methods are used to achieve participation by a truly representative sample of the community. International writers concur, with many examples available from Canada, Europe, the UK, and certain parts of the USA (Coote & Leneghan 1997; Emery & Purser 1996; O Renn, Webler & Wiedremann 1995). Carson's role in co-authoring (with Gelber) the accompanying *Ideas for Community Consultation* to the White Paper means it is no coincidence that PlanFirst strongly emphasises these same principles. Other writers such as Emery concur on the need, reporting similarly effective results when the techniques proposed by Carson and Gelber are implemented (discussed in more detail below) (Emery & Purser 1996).

Following is a survey of the structure and content of PlanFirst, with a review of the literature which pertains to it specifically, or to its principles. The goals of simplification and consultation discussed above are further explored below as they manifest themselves in the different parts of PlanFirst.

c. The importance of collaboration

In *Ideas for Community Consultation*, Carson & Gelber put forward Healy's alternate definition of the whole ethos of planning as a means of managing change: "Planning thus becomes a process for collectively and interactively addressing and working out how to act, in respect of shared concerns, about how far and how to 'manage' ...change" (1996, p.234) This is very different from the usual vision of the planning process, which is proscriptive: allowing certain things to happen or not happen. The change management process pictured by Healy can be argued to be incorporated into the place based scenario in various ways, but it is not critical that it be followed to a conclusion, or that those ways be enunciated. What is important here is to acknowledge that those writers are stressing the importance of creating a structure that allows for engagement with the interpersonal dynamic of the planning process, not to convince the reader that planning only works in that way.

The interpersonal dynamic being emphasised here then, is collaboration. The fundamental ingredient for a successful outcome is identified as a form of interaction that provides for collective reasoning and deliberation, involving a range of participants who are representative of the social diversity of the subject population. This notion is reinforced by Carson & Gelber's use of terms such as "communicative deliberation", which once again reflects an iterative educational process. This section of the PlanFirst consultation document is summarised with the following key paragraph:

> "Collaboration, then, is respectful discussion which values, listens and searches for real and effective understanding between participants – understanding that benefits the plan making process enormously." (p.11)

The need for this approach has been debated in the literature, but those whose research points to its success – and thus support of the PlanFirst reliance upon it – have little in the way of Australian experience to draw upon (Christoff 1999; Doeleman 1997; Emery & Purser 1996; Freeman, Littlewood & Whitney 1996; O Renn, Webler & Wiedremann

1995; Vincent 1999). This research therefore provides an opportunity to add to that experience.

2.4.2. PlanFirst's structure and content

PlanFirst defines three levels of planning in a hierarchy: state, regional and local, which are discussed here in that order.

a. Integrating state plans

PlanFirst sets out a broad methodology for the integration of the three levels, stating that local councils "will participate in drawing up the new regional strategies" (p.10). As discussed above, there is general consensus in the literature for integrated strategic planning policies (Gleeson et al, 2004; Mant 2003b). It is necessary to know the proposed mechanism or structure for effecting such integrated strategic planning in order to critique its likely effectiveness, and in this, PlanFirst is incomplete. As Gleeson et al note, the sustainable benefit is thin, if integration is nominal or ineffective (Gleeson et al. 2004) Being a White Paper, there was latitude for such detail to be filled in, and adjusted over an extended period of time. While section 6 explains the revised strategy for preparation of state policies, there is insufficient detail on the proposed iterative relationship between these and the remaining structure of the legislative process to allow a full discussion of the 'nuts and bolts'. The shortcoming is relevant to this research insofar as a properly developed regional strategy would have affected things like the consideration given to increased urban densities. At the time of the writing of Pittwater 21, there was no cohesive or detailed planning policy for the Sydney region, and no further literature on this aspect of PlanFirst.

b. Integrating regional plans

Regional planning is given a thorough overhaul in PlanFirst, with a proposed Regional Strategy becoming "a region's principal environmental planning document" (p.31). The regional strategic focus of PlanFirst tends to run counter to the predominant 'Sydney-centric' view of regional planning by successive state governments (Bunker 2002). It proposes a number of regions around the state and within the greater Sydney metropolitan area, whose boundaries were set to "correspond with existing regional identities or areas of 'community interest'" (p.36). This effectively means all boundaries followed local government boundaries, so that there was continuity and consistency

between the two levels of government in the development and implementation of regional strategies.

However local government boundaries do not always reflect logical cleavages on ecological issues (such as catchment watershed boundaries), or demographic groupings (Laut & Taplin 1988). This is not addressed by PlanFirst, as it reflects the Local Government Act's role in the administration of the entities which control planning and development in NSW. This inconsistency in the overall administration and coordination of local government is the cause of some problems at the social, economic and ecological levels, and real reform of the planning process would also address the physical boundaries between planning regions, as noted by Laut and Taplin (1988; 2000), and the Murray Darling Commission (2000). An example in Pittwater's case is the management of Narrabeen Lagoon[5], which has a large catchment sitting in two local government areas. PlanFirst's proposed regional structure for greater Sydney is presented by PlanFirst in two options: where the area is divided into two regions (east and west), or where it is divided into four: west, south west, south and north. In the second option, the northern region wholly contains Pittwater and thus solves the difficult issue of managing Narrabeen Lagoon. However, north and south are divided by Sydney Harbour, and thus many catchment management issues would remain problematic there. The alternative would be to divide the regions along ridgelines, such as the Pacific Highway where it runs from Milsons Point northward towards Hornsby[6]. Because this ridgeline has become a ribbon of economic development, the social and administrative network would be rent asunder by such a division, and would create at least as many problems as it might solve, as noted by Mant in the Australian context (2000), and supported by Canadian experience by Begadon et al (1995). Therefore, the PlanFirst boundaries are reasonable, if not perfect.

c. Integrating local plans

Integration of local plans into an overarching regional plan is seen by most writers as critical to achieving sustainability, but did not occur when Pittwater 21 was drafted, as

[5] Narrabeen Lagoon is a partially tidal coastal lagoon with significant siltation and occasional flooding problems. Its shoreline forms the boundary between Pittwater Council to the north, and Warringah Council to the south. In the past there have been management disputes between the councils.

[6] This follows a traditional Aboriginal trading path, which in colonial times became a cart track for produce heading to market in Sydney.

the rest of the PlanFirst structure was not in place in legislation. PlanFirst states that councils will "work towards the agreed priorities and outcomes of their region when drawing up their local plans" (p.10), a position supported by the majority of Australian planning writers (Bunker & Holloway 2003; Gleeson et al. 2004; Mant 1998, 2000; Searle 1999) In the absence of any regional strategy, the draft Pittwater 21 LEP responded to state planning policies in an *ad hoc* fashion, such as SEPP 53's ability to provide for medium density housing irrespective of what a council might prefer (State Environmental Planning Policy No 53 — Metropolitan Residential Development 1997)[7], a policy soundly criticised by Gleeson and Randolph (2003) and Searle (2003), and regularly in the popular media, exemplified by Duffy (2005). The role of SEPP 53 in the Pittwater 21 process can also be described accurately using a theoretical framework such as actor-network theory, which is discussed further in Chapter 3.

PlanFirst defined a local plan as being a single "strategic whole of council plan" which would act to coordinate and focus all planning activities (p.21). In Pittwater's case, implementing PlanFirst meant not only a single responsive LEP, but also the dissolution of almost 60 individual control plans and locality statements. It should be noted again that PlanFirst intended iPlan – the electronic planning information delivery system – to provide immediate access to all relevant planning controls, and that Pittwater's MasterPlan, the development of which was funded in part by DIPNR, fits exactly the iPlan model. The importance of this is discussed in Section 2.4.2.2 below.

PlanFirst aims to provide "savings to business and the community" (p.5). The simplification of the structure and process itself can only achieve so much – if there are still a large number of individual controls, and if those controls are complex, then the design and assessment process will necessarily also be complex, and savings will be minimal, as identified by (then) Planning NSW in its industry research (Hatch 2003). Therefore, if the authors of a PlanFirst LEP do not engage fully with both the written letter *and* the intent of the reforms, the simplification will be limited, and any savings also limited. If, however, these planners are motivated by the intent of PlanFirst – which can be linked to the goals and methods of LA21 – they are much more likely to produce a plan which achieves the necessary environmental, social and economic outcomes. This by means of a certain elegance, a connected simplicity, that reveals the necessary

[7] State Environmental Planning Policy No. 53, establishes targets and a framework for increasing urban densities, and as a SEPP, over rules councils' LEPs.

information to the applicant in such a way as to make it both plain and applicable, principles identified as critical in human learning processes by Ellis, nearly 30 years ago (1978). This is a critical element in the PlanFirst formula: reducing the plethora of planning documents, which currently exist at a local level – a significant problem identified by writers such as Cherry (1996) in the UK, and Falk and Toon (2003) in Sydney. These principles are also suggested by the International Council for Local Environmental Initiatives in its guide to implementing LA21 in the local government structures (I.C.L.E.I. 2002).

Thus, an ideal local plan would pursue *simplicity* and *information immediacy* in attempting to balance the often different goals of local ownership and global sustainability. The *simplicity* would be manifest in a smaller number of individual controls that are clear, succinct, and unambiguous in their intentions. The *immediacy* would be manifest in all the relevant controls being brought to the attention of the applicant or designer at the start of the design process, so all may be considered together (Ellis 1978). The relevance of this 'intelligent and immediate' access to planning information is that an applicant (the information seeker, be they designer or lay person) is presented with all the planning and building controls at the outset of conceptualising a project. Ellis argues that this creates an opportunity to consider and balance all factors at the most effective stage in design decision making.

2.4.2.1. Sustainability made explicit

PlanFirst ties itself explicitly to the sustainability aims of the EP&A Act (as stated in section 3.1 "working towards sustainability", and again in subsequent sections) in two distinct ways. Firstly it strengthens the emphasis on those commitments, which are perhaps weaker than they might be if the Act had been written now, as the general understanding of sustainability has changed over time, as noted by Albrecht (2001). Because PlanFirst sought to be an instrument of reform which straddled the need for good governance and legislative robustness, as well as being accessible and appealing to the broader community, it addressed this changed understanding of sustainable development. It therefore reinterprets the Act, in light of the contemporary understanding of sustainability; then it draws power from that reinterpretation. PlanFirst would always have been empowered by being an integral part of an Act of Parliament. But the new emphasis on sustainability is underlined by this connection between the newly

reinterpreted and reinforced sustainability priorities of the Act's original objectives, and its own internal reforms of the process of plan making. Albrecht's thinking on the reinforcement and synthesis of hitherto disparate elements of a legislative context for sustainability, is reflected in the way PlanFirst gathers strength from a newly redefined Act of Parliament, and carries it to the community for simultaneous action and reinforcement (pp.323-325). This commitment is present in every aspect of PlanFirst, manifesting itself in different ways in each case. Central to these reforms is the role of communities in self-determination, which is also a central plank of LA 21.

2.4.2.2. Information presentation

The way information is presented has an affect on the way that information is processed, and subsequent decisions made. PlanFirst set out to improve the way planning information is made available to the community and the design and development industry, through an electronic sorting and presentation system called iPlan. A key factor in this analysis is the role of the designer. Whether this role is filled by an applicant in the development application process who is professionally trained or not, the way they are presented with planning and building controls affects the way they perceive them, and this can fundamentally affect the design outcomes. If there are barriers to obtaining the necessary information at the start of the design process, and even if that information is obtained later in the process, the design outcome does not reflect the intended result as well as if all information is considered at the outset. Latour and others have discussed the way this works in formal and informal learning situations, and the role that information technology plays in that, if it is involved at all, and the ways in which it can aid or impair the absorption of information (Latour 1994b). It was his research in this area that led Latour to describe *actor-network theory*, as a means of explaining the interaction of human and non-human elements within a learning or change creation environment, which is discussed fully in Chapter 3 below. A design process is a change creation process, and the designer is an actor in that network, alongside the planning controls which apply to the project. If these controls are not identified, or are misunderstood, there is a negative implication for the built form if a partial redesign is necessary, as this will often be a compromise, perhaps satisfying only the minimum requirements of the control.

It is useful then, to consider what the literature has to say on the general principles involved, and specifically how they affect the design process.

a. In human learning and problem solving

Classical theories of learning date back to ancient Greek times, but modern writers since the 1970s, such as Ellis (1978; 1979) have found agreement on several key elements. When a person is presented with all the parameters of a problem at the outset of seeking a solution, they are much more likely to discover a workable solution that balances all the competing needs, than if they uncover some of the parameters after they have begun to formulate a solution. The processes involved have been researched more recently by educators and human behavioural writers such as Paas, Renkl and Sweller, who demonstrated that people have the ability to make decisions about the relative importance of different aspects or parameters of a given problem, and then order them in such a way as to envisage solutions which solve the most important features first or best, while still solving the other elements to the extent judged necessary (Paas, Renkl & Sweller 2004). If another element is added later in the process, it is less likely to be resolved in a way that reflects its importance, or, if it is ordered correctly, the whole solution becomes less elegant and balanced. This process is repeated in the daily life of the average person without them necessarily being aware of it, as it is developed from the age of four or five (Ellis 1978, 1979; Sprenger 1999; Tarpy & Mayer 1978).

PlanFirst seeks to address these phenomena by ensuring that all information is available to the enquirer or applicant in the first instance. The references within it to iPlan are general, as it had been conceived but not developed when PlanFirst was written. The later development of the Pittwater MasterPlan web based DCP serves to fulfil this intended function of iPlan, and enables this research to more thoroughly reflect on its effectiveness in that regard.

b. In building design and the DA process

The information transfer phenomenon described above is also true of the process of designing a building in the DA process. Literature focussing specifically on the theories established by Ellis and others as seen in the design processes of buildings is limited, but the following analysis shows how they are reflect in it. The design of most buildings is the result of a complex series of problem solving exercises. More complex buildings have layer upon layer of complex resolutions of conflicts or coincidences between

design elements and considerations. For example, the designer's thought process might be attempting to balance such things as the client's preferred layout with the correct orientation for winter sun, summer breezes, summer shading, and available views; combined with decisions on selection of the best material for a given wall location where the need for thermal mass might conflict with structural constraints on a steep unstable site; all of which might be complicated by a requirement to keep wall heights and boundary setbacks within certain limits to satisfy building envelope requirements.

By way of example, the design process can be traced in detail. Upon enquiry of the relevant planning code, say a *Residential and Dual Occupancy Development Control Plan*, relevant controls might be discovered which affect all the above design elements and considerations, and a concept is developed in response to these. Typically, this concept will be presented to the client, developed further in consultation with them, and documented to a point where it is presentable to council for a pre-lodgment conference, to discuss any concerns the planners may have. At this point, it is likely that many hours have been spent in the development of the design, and a considerable sum spent by the client in fees to the designer. If at the pre-lodgment meeting another DCP is uncovered by council staff which perhaps controls landscape design and bio-diversity issues, it might then be discovered that the proposed site coverage is over the prescribed limit, and the design must be altered to reduce it. The threat to the design is that the original balance of all the design requirements – which was considered as a holistic solution – must go back to square one if it is to achieve that balance again. Commercial and deadline pressures, combined with various amounts of emotional inertia, tend not to allow this to happen. No research on this was discovered during the literature review for this research, so it is not possible to provide more than this writer's anecdotal estimate, but that is that a small minority of designs would be totally reconsidered in such instances. This has serious implications for the quality of design outcomes, if planning information is not presented in an immediate and accessible manner. Following is an analysis of PlanFirst's proposed solution, iPlan.

2.4.2.3. The role of iPlan in presenting information

PlanFirst seeks to address this problem in two ways: firstly by allowing for the development of a web based interrogation tool known as iPlan, which occurred in

Pittwater through the Pittwater 21 MasterPlan[8]; and secondly, by introducing uniform definitions in the terminology of planning documents. At the time PlanFirst was written, iPlan was in its infancy as a concept, and Pittwater Council received government funding to develop the *Pittwater MasterPlan* service as a council-based embodiment of the iPlan concept. The intellectual property and actual experience was then used by PlanningNSW (and later DIPNR) to develop the iPlan model for other councils. Apart from the literature previously cited, at the time of writing there was no specific research on iPlan.

1. The iPlan prototype: MasterPlan

The iPlan template, and its prototype MasterPlan, is an interrogative internet device which allows any enquirer to discover in one place and at one time all of the planning controls that apply to a specific site for any specified type of development. Innes and Simpson (1993) identified the potential of the use of such technologies in the planning and assessment process over ten years ago. iPlan was originally titled the Development Enquiry and Assessment Program (DEAP), and is the first of its type to be introduced in NSW. While the volume of information returned to the enquirer is large, this reflects more the amount of control of building development that Pittwater Council has developed over the years, rather than the efficiency of the interrogation and information delivery system. This is a common characteristic of eastern Sydney councils, and many coastal NSW councils, and the efficacy of any system that attempts to deliver their planning controls must be considered in light of the volume and diversity of that information. In that regard MasterPlan is reasonably efficacious, once the enquirer understands the layering of the delivered information.

2. Uniform definitions

As discussed above, information acquisition is critical to its processing, and standardised definitions allow designers to focus on the best or most appropriate resolution of design issues, rather than focusing on (or becoming confused by) the definitions themselves (Ellis 1978; WC Gordon 1989; Tarpy & Mayer 1978; Teyler 1978). Existing practice allows each council to set its own definitions for such things as building height, setback

[8] The term *MasterPlan* denotes only the web-based information access tool, and is not to be confused with the term *master plan* which denotes a very localised plan which covers more than one property, or an overlying pattern for larger individual lots. These are usually applied by councils or larger developers as a means of setting the physical form of a neighbourhood or development which will be subject to a series of separate DAs.

lines, floor area, floor space ratio, and site coverage. Because most designers work across different council areas, sometimes regularly dealing with a dozen different sets of controls and definitions, there is a need for them to continually check the definitions, and to keep these in the forefront of their mind as they conceive each project. In reality this may not happen properly, due to pressure of time, and confusion when attempting to recollect which controls apply to each case. It would be easy for regulators to pontificate about the need for high professional standards guaranteeing that explicit reference is always made to the relevant controls, but in reality – especially when under pressure – people tend to act on memory and recollection rather than spend time discovering or relocating the source information (Ellis 1979; Paas, Renkl & Sweller 2004; Schwartz & Reisberg 1991; Slamecka 1967; Sprenger 1999). This is exacerbated when combined with varying degrees of difficulty in locating the information, as described above. Thus PlanFirst's aim of making such definitions uniform across all NSW councils can be expected to have a positive effect on overcoming the barriers to understanding the intent of specific building controls.

2.4.2.4. Place based local plans

Localities form the basis of the PlanFirst approach to local planning. This is a planning technique which identifies the characteristics of each separate or discrete locality, such as a suburban village centre, and then sets out clearly by site or precinct what land uses are appropriate, what building forms are suitable, and how these are intended to contribute to creating or maintaining a given visual character and functional outcomes. The Green Paper feedback listed zoning as the most useful and practical way of establishing certainty in the planning assessment process, however PlanFirst modifies this from generic land type zoning to locality zoning, in an attempt to provide better control at the local level.

In the design and building process studied here (Pittwater 21 LEP & DCP), place based planning finds application through the MasterPlan internet interrogation tool, which selects the controls specifically applicable to each locality, for presentation to the applicant. Many writers have argued for such a system, and of these, the ones relevant to sustainability are well accepted (Falk & Toon 2003; Local Government and Shires Associations of NSW 2001; Mant 1998, 2000).

Master planning[9] is also proposed as a key element of a PlanFirst local plan. Master plans are usually prepared for large urban sites, or aggregated sites, and traditionally if they have been prepared at all, are usually only made in response to a site or sites becoming available for an improved plan, or when a site is subject to redevelopment. PlanFirst suggests a more proactive approach to master planning, where specific objectives for a given locality are focused in such a master plan, as part of the preparation of the bigger local plan. This would enable municipality- or shire-wide strategic plans to better anticipate future needs, both in immediate environmental outcomes such as stormwater management etc, and also in provision of social services. These can then be predicted with greater certainty, alongside the funding for them through Section 94 contributions (developer contributions made under Section 94 of the EP&A Act, specifically for provision of community services such as libraries and recreation facilities). Place based planning has demonstrable benefits, but without connection to a means of improving sustainability, would be meaningless – PlanFirst makes this connection.

2.4.2.5. Community involvement

"Plan first, ask questions later! What would the government know about community consultation?"

Comment from the floor during Pittwater Council's public consultation meetings during the public exhibition of Pittwater 21 LEP.

In the context of the creation of local planning controls, it is important to discuss the effect of *education* and *consultation* working in tandem, to achieve a more effective result. It is posited in the literature that this improved result occurs through engendering a greater *understanding of the need* for change, and therefore a greater *desire to support* change (Lechner, Oswald & Schrattenecker 2002; Littlewood, Smith & Geens 2002). Carson & Gelber's community consultation guide which accompanied PlanFirst at its release, contained more pages than the original PlanFirst White Paper, indicating the importance PlanFirst's authors placed on effective community engagement. Recent writers such as Kasemir et al have reinforced this notion, stressing the importance of effective engagement of the wider community (Kasemir et al. 2003).

[9] Master plans and master planning are not to be confused with *Pittwater MasterPlan*, see note above.

Defining the terminology

Several terms are commonly used to convey the same meaning: providing a service or framework whereby a community can become involved in determining its own future, by means of steering the formation and implementation of public policy. This concept is spelt out clearly in LA 21 and the various iterations of it, such as "Our Community Our Future: A Guide to Local Agenda 21" (Cotter & Hannan 1999), which was published as a guide for Australian local government. The terminology used to describe this principle varies in the literature, with community consultation and public participation being the most common. In this research it is all considered to mean this one thing. Variations might be intended to convey different modes of delivery, or differing levels of efficacy, but the modes and efficacies have so many possibilities, it is considered here to be misleading to use one of only several terms to describe them. It is better if the actual processes and outcomes are described in detail, and highly specific labels such as citizens jury or focus group used to describe specific modes of operation.

PlanFirst's emphasis on community consultation

This emphasis on community consultation prevented what could have been a very pithy joke on the White Paper's name from taking hold: "PlanFirst, ask questions later", as in reality, it did attempt to ask the right questions first, then formulate the planning strategy in response to the answers provided by communities. Certain types of ongoing consultation have been identified by Robinson (2003) as offering greater benefits than those usually proclaimed by its proponents. Using "second generation backcasting" the consultation participants are able to continually redefine the desired future, as part of an emergent process of dealing with the stakeholders (p. 841). He suggests allowing for an unpredictable and open process of social learning, which traditional government management may see as extremely risky, but which Robinson records as having significant efficacy in Canada (p.854). This literature suggests that PlanFirst proposed consultation could have been extended to that degree by the communities involved, and in doing so, gone well beyond the common experience of consultative processes in Australia.

Reference was also made in the White Paper to limited prior experience of LA21 implementation in the Australian context (pre-dating Khan & Bajracharya, above). The literature presents different views on whether the position taken by PlanFirst is

appropriate or not. Mant (2003b) argues that there has been "little intellectual discourse about the planning system in NSW", blaming a plethora of public relations material emanating from PlanningNSW at the time for "swamping" the opportunity PlanFirst should have had to generate such debate (ibid, p.31). LA21 calls for significant community involvement, which should answer Mant's concerns about the lack of discourse, as this community involvement could be lead by the intellectual seeding he implies. The Pittwater 21 experience sheds some light on whether this occurs in reality, and as a case study for this research, is discussed in Chapter 2.5.1 below.

2.4.3. How PlanFirst proposed to change the way planning occurs – literature on its seven key elements reviewed

This section summarises the principles within PlanFirst, and sets up a framework for the subsequent analysis of the Pittwater 21 experience in Chapters 4 and 5. Here, the research shows how PlanFirst proposed to change the way local planning policies are made, and reviews the literature on the proposals, examined in principle, and where possible, by experience.

This section sets out a distillation and interpretation of PlanFirst's key ideas, which appear as seven key elements. These are presented in the research in a way which broadly reflects the way they are presented in the White Paper, and in the PlanFirst Feedback Report (Urban Frontiers Program 2002). The key elements are interconnected and layered in different ways, so it would be an oversimplification to order them by priority, and nor does PlanFirst do this. There is a repeated emphasis on sustainability, community involvement and ownership, and coordinated strategic planning across all levels of government. The seven key elements each relate to the *content* and *process* of PlanFirst, and each element is later dissected along these two lines of enquiry.

These are the key message of PlanFirst:

. **1. Simplification of the planning process through a reduced number and layers of plans, and making those plans easier to find and understand.**

Structure and content: The existing system is complex, and relevant information often difficult to find (Mant 2003b; Westacott 2004). Fulfilling the aim of simplification requires the policy to be embraced by state government, and adopted and implemented through local government, with all necessary funding in place (Begadon & Agocs 1995). Collation

and presentation of local planning controls in easily accessible formats is the final requirement for of this aim to be fulfilled (Paas, Renkl & Sweller 2004). IPlan, the interrogative internet portal which presents all relevant information to the user, has important functional benefits to the design process because of the way designers absorb and respond to information. The use of standard definitions and terminology across the state planning framework is an equally important factor in achieving the stated aim (Cappie-Wood, A. pers. comm. 22/10/2003; Shankie-Williams, N. pers. comm. 27/4/2005).

Production process: This element would force councils to reduce the number of LEPs and DCPs, which would require transparency and consultation for the process to be understood and embraced, as emphasised by Hogan, and Carson and Martin (Carson & Martin 1999; Hogan 2001). This is discussed further, in point 4, below.

. 2. Savings for business and the community through this simplification.

Structure and content: Simplification of the planning process can be expected to produce savings, through reduced time spent gathering information (Pittwater Council 2004). At the local level, a plethora of planning controls may still apply, and these savings could be diluted significantly, as the quantity of controls which must be considered by designers is seen as equally time consuming as identifying them all in the first place (Hatch 2003). However, having all the plans and controls present at the start of the design process helps ensure a better holistic design, and assuming these contain sustainability principles, will ensure reduced ecological impacts, noted by Paas, Renkl and Sweller (2004). Commercial pressure on designers to limit the time spent on the de4sign process adds to the benefit. Longer term savings may then be found through better building development, with reduced operating costs, and increased longevity (Fay & Treloar 1998; Troy et al. 2003).

Production process: This element has limited expression in the process of production, except as noted in point 1, above.

. 3. Clear integrated regionally based strategies with structured and transparent monitoring and review processes.

Structure and content: Global sustainability can only be achieved through coordinated global responses (du Plessis 2003). These should percolate through successive layers of local planning: international, national, regional and finally, local (Chibli 2002). The need to integrate regional strategic planning and local planning, where the embodiment of global sustainability occurs, is widely supported (Local Government and Shires Associations of NSW 2001). The necessary elements to enable this are presented in PlanFirst, and the implementation plans, though basic and introductory, are clear enough to gain tentative support from critical writers (Mant 2003b). Part of the intent of a White Paper is to provoke discussion of the detailed proposals, and the emphasis placed on ongoing consultation indicates that these regional strategies would succeed[10] (Becker 1974). The regular monitoring and review process set out by PlanFirst using tangible indicators was a key element, which puts it in contrast to the current paradigm (Shankie-Williams N. pers. comm. 18/12/2003). Lack of monitoring using clear indicators which inform a review process does not allow progress toward sustainability to be made (Wong 2005).

Production process: The principle of regional integration is well established in the literature, and NSW Department of Planning has, since PlanFirst, continued to develop a framework and strategy which sets out to achieve this (NSW Department of Planning 2005; Shankie-Williams N. pers. comm. 27/4/2005). This confirms the value placed upon them, a view supported by several other Australian writers (Falk & Toon 2003; Gleeson et al. 2004; Searle 1999, 2003; Troy et al. 2002). But as Gleeson has pointed out, even regional plans have their limits, without an over-arching national planning strategy (2004a).

. 4. Community involvement, understanding and ownership of planning strategies.

Structure and content: Consultation is generally welcomed in local government circles, if not fully implemented (Local Government and Shires Associations of NSW 2001). The need for an iterative/educative component in community consultation is emphasised in the *Ideas for Community Consultation* companion document. The need to inform

[10] Note that Pittwater 21 was created without a coordinated strategic regional framework.

communities of their 'global responsibilities' (assuming sustainability is engaged as a desired outcome) is therefore also an essential component of the educative process (Pittwater Council 2005a). Carson and Martin (1999) are not alone in emphasising the critical importance of community involvement in successful implementation of changed planning strategies – without it, the process will fail (Corbiere-Nicollier et al. 2003; Khan & Bajracharya 2004a, 2004b; Porter et al. 2002; O. Renn 1993; Selman & Wragg 1999). It is possible for local government to pull back from full consultation for various reasons, such as lack of funding, fear of an uncontrollable process, or lack of skilled staff to manage it effectively. However, the literature agrees with PlanFirst that inadequate consultation will result in inadequate engagement with the necessary information, leading to a lack of understanding of the issues and necessary responses, and ultimately to a lack of willingness to embrace the final plan (lack of ownership) (Mant 2000). This will lead to ongoing dysfunction, and unnecessary obstacles finding their way into the design and assessment process (Jones 1999).

Production process: The three stated components of this element must be examined individually:

Involvement speaks of the penetration of the ideas under discussion into the wider community. It can be measured by several means, including response submission rates, attendance rates, and surveying the community for awareness of the process (Kades pers comm,16/5/2005).

Understanding comes from an informed knowledge, implying a large degree of completeness to that knowledge, and that the knowledge can be practically applied in a way which fulfils the purpose of possessing it (Wikipedia 2005)[11]. This relies on an iterative educative–consultative process, where information is made available for assimilation, critical review, and action by the recipients (Robinson 2003).

Ownership in this context occurs when individuals within the community feel that a policy is theirs: that they have created it, are responsible for it, and are willing to live by it (Carson & Martin 1999). Ownership of a new LEP can only come through *involvement*

[11] Wikipedia is cited here because it is a popular quasi-academic resource which reflects a mix of current academic and popular thinking. This is considered appropriate here because the stated aims of PlanFirst are specifically focused on the general population, and so its terminology must be examined in that light.

and *understanding*. As Kasemir et al put it, "consent" for change is only achieved in a democratic setting after such a process is fully engaged (2003, p.6). It is most fully expressed when those individuals change their previous behaviour and act accordingly, such as not objecting to a particular development which is in accordance with the "owned" LEP, even if it is a significant change from the status quo which previously they would have protected.

. **5. Ecologically sustainable development through provision of sustainable management of resources, environmental protection, affordable housing, and vibrant communities.**

Structure and content: These stated aims of PlanFirst are not discussed in the literature, due to its limited effective lifespan. Most councils aim to provide the social environment envisaged, and PlanFirst may have provided a structure which allowed this to occur. Whether this would occur in a balanced way is more difficult to determine, as each council would interpret and enact the PlanFirst (and LA 21) principles differently. Further discussion would be required to focus the meanings in other social demographic populations, and it should always be done within a perspective of global equity and sustainability. PlanFirst is less explicit in this regard, but its references to LA 21 imply the intention. The literature yields many arguments in support of the LA21 principles, and these may be used to infer at least qualified support for PlanFirst in this regard (Gordon A. pers. comm. various dates 2004)

Production process: This element would obligate councils to integrate all other social services into development planning policies (where relevant). This would likely result in more cost-effective provision of those services, according to several writers in the local context (Bunker & Holloway 2003; Transport And Traffic Planning Associates & Sims Varley Traffic Systems Pty Ltd 2001).

. **6. Use of place based planning frameworks to achieve appropriate building form, with local adjustment of controls over time, especially through the use of masterplans.**

Structure and content: Using localities as the basis of land use, instead of the more traditional land use type-zonings, allows local characteristics to be preserved, as change and increased development move through a locality, as noted by Mant (Carson & Martin 1999). The aim here is modify the usual preservation aspect to encourage or enforce

buildings to respond to the climate and culture of the locality. It also allows more direct local control, as long as council write the LEP to follow the PlanFirst review and feedback response model. While this may please local stakeholders, its effect on sustainability is potentially negative if it simply prevents change toward more sustainable building types (Prattley G. pers. comm. 7/3/2002). Masterplanning (where a detailed set of planning controls are tailored to specific sites or precincts) is proposed as a useful means of expressing a sense of place in a coordinated way, which takes account of all the worthy elements and provides a path for phasing out the unworthy (George & Bennett 2005). This is still critically linked to the need for effective consultation, without which it will fail to be seen to meet community needs, and therefore fail to be embraced (Wong 2005).

Production process: The place based planning framework appears at first to be a *content* issue, but can be evaluated in terms of *process* (community involvement), because it seeks to be adjusted over time using local input, via community involvement and consultation (Emery & Purser 1996; P Healy 1996). This element is related to point 3, monitoring and review, above.

. 7. Explicit commitment to sustainability, existing references to sustainability in EP&A Act reinforced, and then used to add potency to whole framework.

Structure and content: A commitment to sustainability is manifest to varying degrees in all of the aims summarised above, and is the main focus of this research. PlanFirst reinterprets the EP&A Act, then draws power from that reinterpretation (refer to 2.4.2.1 above). It is attempting to bring the Act from a 1970s understanding, to a current understanding, of what it takes to make sustainability happen, which is the essence of reform in any situation (Pears 1997). It therefore acknowledges that an awareness of what is required to achieve sustainability must be present in any and every area of consideration. Its reliance on community involvement in the process of making that happen, and subsequent ownership of the outcomes, is one of its main strengths, yet is also its least tested attribute in the Australian context.

Production process: The explicit commitment to sustainability at all levels is critical feature of an LEP which aspires to effect sustainability, as it emphasises the need for *awareness* on the part of the community it serves (Kasemir et al. 2003). To achieve such

awareness, Kasemir suggests the community must be informed, and consulted (2003, pp.69, 73).

2.4.3.1. A framework for analysing Pittwater 21

These seven key elements are used to critique Pittwater 21 in Chapters 4 and 5. Chapter 4 examines the process of producing new planning controls using the PlanFirst template, and the comparative results in the built form, using indicators in three selected impact categories. Chapter 5 discusses the implications of those findings, in the light of these seven key elements.

2.4.3.2. PlanFirst's palette of suggested procedures for making consultation work

PlanFirst places heavy emphasis on community consultation, as noted previously, and it is useful to examine what the literature says on this in detail. In the companion consultation guide to PlanFirst *Ideas for Community Consultation,* Part 1 discusses the methodology and options for selecting participants, and Part 2 describes in detail various methods of carrying out effective and representative consultation. Seven methods are outlined there, all being innovations of the last decade or so. Because the Australian community has not enjoyed a long history of consultation in its dealings with government, most people in the community are unfamiliar with the methods (Porter 2002). This is recognised by the authors, so each method is detailed sufficiently for an introductory discussion, without specialist knowledge. The seven methods are:

- Search conferences;
- Deliberative polls and tele-voting;
- Citizen's juries;
- Consensus conferences;
- Focus groups;
- Charrettes;
- Residents' feedback panels.

A potential shortcoming in several of the above procedures, is identified in the literature as the difficulty in allowing sufficient time for participants to assimilate and reflect upon new ideas gained during the process. As several writers have noted, even if assent is given to a new idea (presumably because its logic is clear and irrefutable), it may not take root in the mind of the thinker until it is reinforced with further discussion, following a time of reflection – and the bigger the new idea, the more time is required (Ellis 1978, 1979; Issenberg et al. 2003; Schwartz & Reisberg 1991; Slamecka 1967; Sprenger 1999; Tarpy & Mayer 1978; Teyler 1978). Carson & Gelber do not labour this point in the PlanFirst companion document, although it is acknowledged in Carson's other work "*Random selection in politics"* (Carson & Martin 1999) as a characteristic of public participation which should not be under estimated.

2.1.1.1 Evaluation of *Ideas for Community Consultation*

The authors of *Ideas for Community Consultation* are explicit in their desire to put forward ways of enabling communities to get involved in their own planning futures, and encouraging them that it is possible to do so meaningfully. To do this, they have also appealed to the relevant authorities to step outside the traditional paradigm, to "experiment, be flexible and try something new" (p.55). There may be some within government who were not willing to proceed with the experiment to see lay people as "resourceful, gifted and creative" (p.55), which resulted in the PlanFirst review. The authors of the document make the point that community members who are thus engaged are a positive resource to planners, able to constructively collaborate. These planners, it is argued, are then able to act as better corporate citizens, and be seen as such by the community. It is further argued that effective consultation with this engaged community by responsive planners produces stronger support for state and local government policy, "deepened community ownership of planning problems and their solutions, enhanced capacity for involvement... and cost effectiveness" (p.55). This certainly goes against the conventional planning paradigm, as described by the literature discussed earlier in this chapter.

Having reviewed what literature has to say on the principles and detail of PlanFirst, it is then logical to examine what the literature reveals about an appropriate means of testing these ideas. This discussion follows.

2.5. *Testing the PlanFirst alternative model*

To test the effectiveness of an alternative plan making template, it is best to use real data if it can be obtained, rather than theoretical predictions. A case study is therefore useful, as it provides an opportunity to look at the process from beginning to end, that is, the writing of a PlanFirst Local Environment Plan, its implementation in the processing of Development Applications, and some form of testing of the buildings thus approved. Within this case study, selected ecological impact indicators are used in a quantitative analysis, and the seven key elements discussed above are used in a qualitative analysis.

2.5.1. Case study

Case studies can be an effective way of balancing qualitative and quantitative research methods, where field data is collected and interpreted through qualitative and theoretical frameworks (George & Bennett 2005; White 1998). Pittwater Council presented an opportunity for such a study, when it set about writing a new local Environment Plan at the same time that PlanFirst was announced. Pittwater 21 LEP was first conceived as being ecologically sustainable, socially responsive, and fitting to the PlanFirst template. The council had also looked to LA 21 for additional guidance in community consultation. These characteristics fit the profile needed for such a case study. Pittwater 21 is also useful as a case study in this research due to this writer's familiarity with it, and because of his involvement in reviewing it during the consultation process. For other practical purposes as well, such as access to council records and personnel, and local design practitioners, Pittwater 21 is a logical choice for a case study. Overall, it fits the general criteria put forward as critical to a useful case study by George and Bennett (2005). Chapter 3 discusses the use of case studies in more detail.

2.5.2. Use of indicators

As discussed in Section 2.2.3.1 above, ecological indicators are useful and available for most of the areas impacted by buildings, as noted by Wong (2005). Three were selected which are significant in ecological terms, topical in terms of community need and awareness, and available from research in the field.

a. Operational energy – space heating and cooling

Operational energy and its associated greenhouse emissions for the provision of thermal comfort through space heating and cooling is a core function of a building, and one affected directly by planning controls (Halperin 2002). It is also easily measured at DA stage through the application of predictive thermal modelling software (BDAA 2001; King 2000).

b. Water use – in the landscape & in the building

Mains-supplied potable water demand is driven by a number of things which are also affected by local planning instruments, such as landscaping requirements (White 1998). It is also possible to use a predictive rating tool to measure comparative impacts (Aqua Consulting 2004; Simpson R. pers. comm. 16/2/2004).

b. Transport – encouragement of private car dependency

Transport is often identified as Australia's single biggest sustainability challenge, with problems arising from greenhouse emissions from fossil fuels, road trauma and community health, urban heat banks from paving, amongst others (Australian Greenhouse Office 2005; Frank & Engelke 2001). It is possible to evaluate an LEP's impact through how its policies encourage or discourage private car use (Warren Centre for Advanced Engineering. 2002).

2.6. Research question proposed

Between the White Paper and the *Ideas for community consultation* guide more emphasis is given to community consultation than any other aspect of PlanFirst, which underlines the importance its authors placed on it, describing it from the outset as "an important principle in plan making" (p.19 of the White Paper). PlanFirst emphasises the need for early community involvement as a means of producing plans that are more responsive to "local needs and aspirations" (p.20). It states that greater ownership and support for a plan will be ensured if the community is involved early in the process, and empowered to help set the agenda. Many writers support this broad principle, albeit with some different views on how it should be achieved, as discussed above (Carson & Martin 1999; Coote & Leneghan 1997; Cotter & Hannan 1999; Freeman, Littlewood & Whitney 1996; Jones 1999; Khan & Bajracharya 2004b; Porter 2002; O Renn, Webler & Wiedremann 1995).

Gaps in the literature (and in practice) exist in the area of the relationship between planning instruments produced by an educative consultation process such as PlanFirst, and the sustainability impact of the built form guided by that planning instrument. Therefore it is pertinent to study the effect of planning controls formulated using PlanFirst principles. The scope of any research project that seeks to address these is broad, and must be focussed in reality – that is, a real planning instrument that guides the construction of real buildings. This points to the use of indicators within a case study, which is discussed in Chapter 3.

Therefore, there is a need for further research to fill the gap in the knowledge of what is required to make local planning more sustainable. This can be expressed in the research question:

> Does PlanFirst offer an effective local planning template for encouraging sustainable development?

This can be tested using two research propositions:

> *Proposition 1 - That Pittwater 21 has the potential to provide improved sustainability outcomes.*
>
> *Proposition 2 - That the implementation of Pittwater 21 has resulted in improved sustainability outcomes.*

The literature reveals sufficient knowledge of local planning and the sustainability impacts of buildings, to be able to test these propositions. The first proposition demands a qualitative analysis, while the second proposition lends itself to the use of indicators.

Chapter 3 follows with discussion of the way the research was designed to allow these two facets to be used together to answer the research question.

3 Research design

This chapter discusses the design of the research. This is set up to answer the research question proposed in Chapter 2,

> *Does PlanFirst offer an effective local planning template for encouraging sustainable development?*

It does so by testing the two propositions:

> *1. That Pittwater 21 has the **potential** to provide improved sustainability outcomes;*
>
> and
>
> *2. That the **implementation** of Pittwater 21 has **resulted** in improved sustainability outcomes.*

The first proposition leads the research to qualitatively evaluate the creation process and the content of a local plan produced using the PlanFirst template. The second proposition leads to a quantitative measurement of the implementation of that local plan, using the indicators discussed in Chapter 2.

It commences by discussing the use of actor-network theory (ANT) as a framework for the analysis. It then discusses why the particular case study was selected, and the usefulness of case studies in general. The theoretical framework for the research is then set up, which informs the later discussion of the findings and implications of the research, in Chapters 4 and 5. This chapter then examines the data collection and analysis methodology and methods, and concludes with a discussion of the validation of that data.

3.1. Theoretical framework for the research

A theoretical framework is necessary to complete an understanding of what is being observed, and to assist future research built on that understanding. It is also an aid to understanding the processes at work in the field of study, for practitioners and researchers alike. The framework selected as most appropriate to this research is *Actor-*

network Theory (ANT), first described by Latour (1981), and since developed by many others, notably Callon (1991a) and Law (1992; 2003).

This section of the research begins by describing what ANT is and how it works, and how it was applied to this field of study. It goes on to identify its shortcomings, and describe how the research worked around these. Finally, ANT is positioned in the research within a pluralist epistemological position, an understanding of which is necessary to position the researcher's world view, and interpretation of observed events and phenomena.

3.1.1. What ANT is all about

"There are four things that do not work with actor-network theory; the word actor, the word network, the word theory and the hyphen! Four nails in the coffin."

Bruno Latour (1998, p.13)

A quote which appears to nail the lid to the coffin of ANT may seem a contrary way to commence a discussion of why a particular theory has been found useful in setting a theoretical framework. This quote, from one often credited as being the parent of actor-network theory, was made at a time when he was attempting to describe the theory afresh, against a context of changed language and altered understandings since the embryonic theory was first described in the late 1970s, and later defined in the 1980s. Latour and others such as Callon and Law have continued to refresh the theory, and reiterate its core functions and relevance. The discussion below uses the commonly accepted ANT terminology, defining the terms as they arise.

Why a network of actors?

Actor-network Theory[12] (ANT) was first described in the 1980s, and has the useful characteristic of being symmetrical, in that it can treat artefacts, codes, people and institutions as equal actors within one network (M Callon 1991a; Michel Callon & Latour 1981; Law 1991). The use of the word *network* has a particular meaning here: it refers to a *process* of relationships within a defined change event in a social system; not an ongoing set of human relationships, which is the common meaning. This is the

[12] Law is accustomed to expressing the term in the hyphenated form *actor-network theory*, whereas Latour and Callon commonly use the non-hyphenated form. The intended meaning is the same in either case. This thesis uses the hyphenated form as a means of distinguishing these *change networks* from the more commonly understood meaning, being interactive groups of humans.

fundamental semantic distinction between the use of the word network in this context, which can lead to initial confusion, and later diffusion of meaning – a fact recently lamented by Latour (1998), as noted above. The expression of the theory using the hyphenated form *actor-network*, as preferred more recently by Latour and others, is used in this research to ensure the two meanings remain distinct.

There are many factors and players which affect the process of forming the built environment, including property developers, state and local government policies, market conditions, the knowledge and skill sets possessed by individual designers and builders, and so on. Each of these acts on the others in various ways – sometimes in predictable and thoughtfully prepared ways, such as a Development Control Plan's building height limit. Others may act in less obviously predictable ways such as varying market conditions at any given time causing pressure on acceptable floor space ratios. We can think of the whole set of inter-relationships as a network of heterogeneous elements, each acting on the others in ways which are determined by its nature and characteristics. In this way they are actors – some are initiating actors, some are reactive or reflective actors, some display combinations of these characteristics. It is a complex network, with many of the actors reacting to each other in ways which defy simple description of dependent and independent variables.

How actor-networks work

Latour, Callon and Law created ANT to describe the study of disparate elements within one sphere of influence (Latour 2003). The different elements, forces or individuals within the field of study can be made of completely different stuff, act in completely different ways, yet still be brought into one plane of analysis. It is seen to be of value when involved in trans-disciplinary study of complex systems (Latour 1994a, 1994b, 2000; Montuelle et al. 1997). As Latour puts it, actor-network theory is useful as a means of examining the "implications of treating humans and nonhumans symmetrically in the same way as truth versus falsehood and efficiency versus irrationality" and "To put it simply, ANT is an argument not about the 'social' but about the associations which allow connections to be made between non-social elements." It should be noted that even though he is seen as the 'father of actor-network theory', even Latour does not take it too seriously (Latour 1994a; 2003, p. 35). Any dualist paradigm, and even Post-Modernism itself, can be criticised for its description of nonhuman and human as separate

"ontological universes opposed to each other". Latour is not alone in maintaining that all relations have always been "sociotechnical" – combining fundamentally disparate elements (Caldwell 2003).

For the purposes of illustration, a simple actor-network theory has been described as the action of driving a motor vehicle along a road. Actors in the network include the road surface, warning and speed limit signs, the driver's expectation of what is ahead, another vehicle approaching and so on. All these act in the network in their own ways, and are probably fairly easy to predict. The appearance of a random actor such as a wasp in the driver's air vent would cause the network to behave in a very different way, and while ever the wasp is present, it would actually be a different network. Actor-network theory on one level gives all actors in the network equal billing, whether they be human or inhuman, abstract or tangible, making them all actants or actors depending upon each writer's personal preference. Likewise, the use of the word *network* implies a connectedness between the actors – that is, an actor cannot simply ignore or choose to avoid another actor in the network, they are inseparable whilst they are part of the process: there is no *exit stage left* option, perhaps only *exeunt.*

Defining the terminology

The terminology used by writers on this theory is evolving still. Some prefer the term *actant* to *actor*, using it to provide a distinction between the conventional concept of human action within purely human networks, to those with disparate actor types, although there is no clear pattern to this usage (M Callon 1991a; Stalder 2004). The term *actor* has been used here exclusively for reasons of simplicity: the relatively simple epistemological position of the thesis does not demand or justify a deeper analysis of the different variations of the theory. In describing of the workings of an actor-network, there is a widely accepted convention on terminology and process, which Callon and Law (1982) have identified as four stages…

> ***Problematisation*** – the initial identification of the issues which need resolution or impasse which must be overcome, by one or more of the people or groups involved.

Interessment – solutions are suggested by proponents who attempt to form alliances with other affected people or groups. This is the starting point for the network.

Enrolment – occurs when actors accept the principal change actions required of them, this being the obligatory passage point. ***Obligatory passage point*** – the point of recognition of the issues which define the network, and acceptance of the proposed agreement, which all must pass to join the emerging network.

Mobilisation – when the network attains stability or finds an equilibrium, making the resolution irreversible (or "black boxed") (M Callon & Law 1982).

This conventional structure of an actor-network has commonly been applied to relatively short term change processes, such as the restructuring of the engineering courses at the University of Technology, Sydney (Bryce, Johnston & Yasukawa 2003); the reform of Norwegian health care services (Hanseth & Monteiro 1998); and to assist in the analysis and planning of systems and networks of artificial intelligence, where it has been used to trace intangible flows of consciousness (Risan 1997). The application of the theory to the complexities of state planning law's formation of local planning codes, requires some adaptation of the definitions in the four stage process described above, and this is discussed in Section 3.1.2 below.

A theoretical framework for the research

The nature of the research demands a transdisciplinary theoretical framework, and an epistemology to support it. At the end of any futures study a reality check should be done, and it should begin with the question 'So what – does this make any difference?' It is useful to remember that in the last fifty years there have been more than a few theoretical 'isms' which have gained popularity as the panacea for the shortcomings of all previous frameworks, only to be superseded a few years later. As Kegley & Wittkopf put it, "grand theories fade with the passage of time", and some systems are so dynamic and complex as to defy description, explanation or prediction (2004). Nonetheless, the

likelihood of a better alternative at some point in the future does not absolve the research from the pursuit of rigour here and now.

To answer the 'so what?' question, this research adopts a dualistic objectivist–constructionist position, as identified by Crotty (1998). Epistemological pluralism is valid, as argued by Healy (2003), especially in fields which pertain to political actions, where proper scientific perspective is otherwise uncertain, as noted by Riedy (2005). Therefore, in this research, quantitative considerations are objectivist, using positivism to discover differences in predicted results, while the qualitative analysis uses interpretivist thinking to analyse changes in results. Constructionism is used to draw conclusions from these analyses.

3.1.2. Application of *Actor-network Theory* to this field of study

In the context of the theoretical framework, the research question is expressed thus: can ANT shed light on how the PlanFirst pattern encourages sustainability? ANT is applicable to the study of the relationship between planning controls and the built form, and the interactions that follow, as it can adequately analyse and reconcile the relationship dynamics of all the heterogeneous components of the processes involved (Michel Callon & Latour 1981; M Callon & Law 1982). Here it is used to describe the process of translating an idea into reality As Hanseth & Monteiro (1998) have pointed out, it is not just a matter of acknowledging that such complex interplays exist, but understanding how they work. Literature on European and British planning experiences has used ANT to define the process and progress towards sustainable communities, and to express the need to deliver on the promise of improvements (Selman & Wragg 1999). The near-total institutionalisation of planning paradigms, the influences inherent in the building design process, and non-human and technological factors influencing the DA process is recognised by ANT. Other writers on ANT have described the four stages, which need specific definition when the theory is applied to the planning/built form paradigm. Adapting a theoretical framework to the field of study allows a more thorough analysis. This is explained in the following section.

3.1.3. Complexities inherent in the interaction between planning & the built form

The relationship between the activity of planning, and the buildings designed within its influence, is complex. There are abstract things affecting and being affected by tangible

things, also humans affecting and being affected by inanimate artefacts. ANT provides the ability to think about what might be done to create or accelerate change in areas where change toward sustainability is currently not occurring. This involves combining thinking on human nature (how to invoke action from designers) with thinking on empirical data (setting the planning controls to give the desired result). ANT allows such a contextualised analysis, allowing the network to be sliced open through various facets or lines of connection. ANT is most useful in this regard, as it allows a particular focus on the way change occurred, which then allows conclusions to be drawn about how to recreate it in sustainable ways.

3.1.4. ANT's limitations in the case study

Actor-network theory allows disparate elements in a change creation process to be examined equally. It allows preceding events to be considered if they are linked by the actors to the actor-network being considered, as in the creation of Pittwater Council as a precursor to the creation of the new LEP. These features mean that in this field of study, ANT's drawbacks are few: it does not easily allow a study of events outside the actor-network, such as the measurement of the ecological impacts of the planning instrument created by it.

Therefore the research has separated the qualitative analysis of the change creation process (writing the new planning instrument) from the measurement of its impacts. The following section describes how the pluralist positions of the research are connected.

3.2. Why Pittwater 21 was selected

This section discusses why case studies are useful, and why Pittwater Council's new LEP (*Pittwater 21*) was selected as a case study. It then discusses how this case study is relevant to the study of sustainability generally, and local planning policy in Australia.

3.2.1. Why case studies are useful

Case studies are useful because they allow real situations to be analysed, and compared to theory or prediction. Ecological indicators can be used to evaluate the impact – and therefore the effectiveness – of real planning policies. The use of a case study in this research allows the theories and proposed model of PlanFirst to be tested in reality, both in the process of drafting a new LEP, and in its implemented operation

and outcomes. As George & Bennett have noted, "…case studies, statistical methods, and formal models are complementary rather than competitive" (2005, p.1). Actor-network theory provides the theoretical framework within which the creation process is analysed, which allows predictable patterns to be identified in Chapter 4. The implications of these for sustainability are then discussed in Chapter 5. The built form's effect on sustainability is assessed by the impact indicators identified in Chapter 2, and discussed in detail in Sections 3.3 to 3.5 below.

3.2.2. How Pittwater 21 is relevant to sustainability

Pittwater 21 is relevant to a wider understanding of what is required to achieve sustainable development because, through PlanFirst, it was written with sustainability as one of its primary goals. The link back to LA21 establishes community involvement as a fundamental component. These two features set PlanFirst apart from all NSW Government planning policy that preceded it. Pittwater 21, as a product of the PlanFirst template, can then be examined to determine what the benefits might be to sustainability generally.

In measuring selected ecological impact categories in the Pittwater 21 case study, this research also provides insight into the physical performance of local planning instruments that use the PlanFirst principles.

3.2.3. How Pittwater 21 is relevant to the study of local planning policy in Australia

The Pittwater 21 experience sheds light on possible improvements to local planning policy for all levels of government in Australia. Local planning is, for the most part, the responsibility of local government. The relationship between state and local government in regard to planning matters has often been strained, and at times been dysfunctional. PlanFirst was an attempt to make that relationship more democratic. The Pittwater 21 experience is able to demonstrate some of the outcomes of that attempt. The knowledge gained from that is then able to inform the process of improving local plan making policy in Australia.

3.3. Data gathering - impact category selection, methods and methodology

Three impact categories – energy, water and transport – were selected on the grounds of having immediate and significant impacts on ecological sustainability, to test the effectiveness of the content of the PlanFirst-based DCP. These three impact categories need a practical way of being measured. The selected methods are required to provide meaningful results, which can be used to inform future thinking, expressed in the formulation of planning controls and building design. Energy and water assessments are generated by models, rather than physical measurements, as the information inputs are taken from council approved plans, not from built or occupied buildings.

3.3.1. Data collected to measure the impact categories

The following four sub-sections describe briefly what data was collected, and how it was used to assess ecological impacts, and the effectiveness of the new Pittwater 21 system, compared to the old Pittwater LEP 93 system.

Operational energy and associated greenhouse emissions

PlanFirst aims at improving sustainability, an obvious outcome being a reduction in energy usage caused by occupant response to lack of thermal comfort. BASIX is used to quantify the potential operational energy use of new single residential and dual occupancy buildings, applied in the research to a representative selection of DAs. The hypothesis that a PlanFirst LEP improves sustainability (due to expert input in its drafting, and the educative component of its consultation, which encourage passive design) can be tested by looking for reduced predicted space heating and cooling energy requirements in the DAs it approves.

Mains supplied potable water demand

PlanFirst's aims include improved sustainability in the realm of potable mains water demand. BASIX is used to estimate the potable mains supplied water demand of new single residential and dual occupancy buildings, applied here to a representative selection of DAs. The hypothesis that a PlanFirst local plan improves sustainability (due to expert input in its drafting, and the educative component of its consultation, which encourage lower water consumption) can be tested by looking for a reduction water consumption in the DAs it approves.

Greenhouse and amenity from private car dependency

A measure of transport sustainability impacts is carried out by comparing the number of car spaces proposed in the same DA sample groups, as an indicator of private car use and inferred dependency. The hypothesis that a PlanFirst local plan improves sustainability (due to expert input in its drafting, and the educative component of its consultation, resulting in more flexibility in car space requirements) can be tested by looking for a reduction in car spaces provided in the DAs it approves.

The following sections discuss the sample selection method and methodology.

3.3.2. Data collection methodology and method

This section discusses the methods used to collect the data, and the methodology behind those methods.

3.3.2.1. DA process – documents & metrics used

The analysis of the sustainability impacts of a local planning instrument (Pittwater 21) and its guiding template (PlanFirst) can be measured in various ways, but any method must reflect the fact that what is being studied is the planning process, and must focus on the artefacts of that process, as well as their physical effects. So, the Development Application process and the documents used within it, is examined using accepted metrics and estimation tools.

3.3.2.2. Sample type - why new single residential DAs were selected

The sample type is restricted to new residential DAs, either single or dual occupancy, because the research is interested in the way the planning process affects the sustainability of the built form. Other development work regulated by an LEP is outside the scope of the research. There are three main categories of buildings defined by the BCA: residential, commercial and industrial, with various sub-groups, or classes.

This research focused on low density residential development, because Pittwater has no high density residential development, and relatively little commercial or industrial building activity. Within single residential and dual occupancy building types there are DAs lodged for both new and renovated or extended buildings. The distinction between these is often blurred, with many renovations being virtually new buildings. Because this allows

DAs to be approved (albeit reluctantly on council's part[13]) which do not reflect the best outcomes of the DCP, and because at the time of writing, BASIX does not measure alterations and additions, only new buildings have been sampled. Other residential types that occur within the Pittwater Municipality, but not covered by Pittwater 21 DCP, were not sampled here, as the planning instruments which controlled them were not created within the PlanFirst template. The large multi-residential developments in the Warriewood Valley are included in this. Another case is housing for the aged and disabled lodged under either SEPP5 or Seniors Living SEPP 2004, which over-ride many DCP controls. The impact of these two (and other similar planning instruments) is outside the scope of this research.

For purposes of brevity, DAs sampled from the old Pittwater LEP 1993 period are referred to in the shortened form of PLEP 93 DAs; and those sampled from the Pittwater 21 LEP/DCP period are referred to as P21 DAs.

3.3.2.3. Sample period – PLEP 93 to P21

The sample period was determined by two crucial factors – the introduction of P21, and the introduction of BASIX as Regulation. This allowed a period of 5 months for collection of suitable DAs *after* Pittwater 21 DCP was introduced (1 February 2004 and up until 30 June 2004, when BASIX was introduced). BASIX regulated all new single and dual occupancy residential DAs in Sydney after 1 July 2004, and its minimum standards for water and energy efficiency overrode all similar controls in any DCPs[14]. This caused all DAs to conform to different and higher standards than the controls contained in Pittwater 21, effectively changing the criteria under which DAs were prepared, thus rendering any DA lodged after that date unsuitable for purposes of this research. This occurrence is not related to the use of BASIX as measurement tool in the research. A period of seven months was found to be required *prior* to the introduction of Pittwater 21 (from 1 July 2003 to 31 January 2004) to collect an equivalent number of DAs produced under the old PLEP 93.

[13] Pittwater, along with many other councils, struggle to define new construction. It is of concern because many developments escape fundamental LEP/DCP controls by being classified as "alterations and additions", which undermines the power and value of local planning policies, like Pittwater 21.

[14] Pittwater had an "Energy Smart DCP", whose thermal performance standards were lower than those required by BASIX.

A short sample period was also necessary because the period since 1996 has been one of rapid change in the Australian residential building sector, and background change would be expected to influence design outcomes over a period of longer than 1 year. Much of this change has occurred in the realm of environmental performance, with an increase in regulation coupling with increasing consumer awareness and demand for ESD. The design and construction industry has at the same time been undergoing rapid increases in knowledge and implementation of sustainable practice, in an attempt by some to lead the market, and others to simply keep up with it (Reardon pers. comm. 10/3/2005). These changes have combined to create a background rate of change that can be tracked over a period of several years, with Reardon (pers. comm. 10/3/2005) describing a distinct increase in understanding and practice over a period of as little as two years. It is necessary to reduce the effect of that background change on the results here, and so a compressed sample period is necessary.

The question of statistical validity of the sample set is limited. The sample period for PLEP 93 and P21 contained approximately 30 suitable DAs in each group, of which roughly half were selected and available for testing. Although the documentation used in collecting data is on the public record, and held in Pittwater Council's online archive, not all DAs contained a complete record of the necessary information. This had to be requested from the designers and/or thermal performance assessors individually, which was not always provided, thus limiting the number that could be measured. Because of the variability in the results, testing the complete set of suitable DAs would still not provide a statistically significant result. Therefore this research claims to provide indicative results to the impact category measurements, as the number which were ultimately measured are representative of the total. This is discussed further below.

3.3.2.4. Sample selection method

Within the parameters discussed above, the samples were selected from the public list of DAs on the Pittwater Council website[15] by the following method:

[15] *Determined Development Applications Register* at http://www.pittwater.nsw.gov.au/RWP/bd.nsf/allDocs/RWP183192291783F55CCA256D8700344680?OpenDocument

P21 DAs:

1. Search performed for all DAs lodged between 1 February 2004 and 30 June 2004 (5 months);

2. Single residential and dual occupancy DAs were selected from the total available, by selected alternate DAs from both the start and the end of the period, working towards the middle, until a sample group of approximately half the total was collected;

3. The selection was checked to ensure a representative spread across the five month period.

4. A search was then made for completeness of information. Where this was not on record, a formal request was made to the applicant, designer, or thermal performance assessor. When this information was not forthcoming, another DA was selected using the above method, until approximately half the total group was sampled.

PLEP 93 DAs:

1. Initial search performed for a similar number single residential and dual occupancy DAs lodged prior to 1 February 2004 (this required a 7 month period to yield an equivalent number);

1. The selection was checked to ensure a representative spread across the time period.

2. A search was then made for completeness of information. Where this was not on record, a formal request was made or another DA selected as described above in the P21 group, until approximately half the total group was sampled.

3.4. Data analysis method

The purpose of this section is to discuss the need for a means of quantifiably comparing the performance of the building controls in the old and new DCPs, and to discuss how it was done in the research. Chapter 2 explored the literature on the three selected categories of energy, water and transport, and put forward a justification of the selected

impact categories. The need to provide quantifiable results is discussed here, along with the criteria which any selected measurement method should satisfy. Then the selected methods are discussed. Note that this section discusses only the validity of the measurement tool for energy and water. The transport indicator receives less discussion because the measurement method was necessarily very simple.

3.4.1. Criteria for a measurement method

It is useful to the analysis of ecological outcomes of planning controls to have a means of quantifying the impact of the buildings the controls allow to be constructed. If one set of planning controls is to be meaningfully compared to another, the analysis should be both qualitative and quantitative. The quantitative must be meaningful, accurate, and for practical purposes of measurement, the data inputs should be available from accessible sources, such as the documents which carry the information from which the projects are constructed (i.e., here, DA documents).

In this research, the following criteria were used to select a measurement tool, as an application of the accepted maxim wherein 'the method must be correct, applicable and appropriate'. The tool must therefore fulfil the following requirements:

- use scientifically justifiable & politically acceptable measurements;
- use proven measurement techniques that can be readily evaluated;
- use tangible or measurable elements of the building to enable a useful range of samples to be measured via easily accessed input data sources;
- be able to give results which can be applied to existing industry and government mechanisms to inform the planning & design processes, and therefore assist in changing those paradigms.

The reasons behind these four criteria, and the selection of BASIX to meet them are discussed below. The detail of the veracity and validation of the tool is discussed further below.

3.4.1.1. A scientifically & politically justifiable measurement method

BASIX is scientifically and politically acceptable for the purpose of measuring the ecological impact of buildings in the Sydney environment. BASIX – the NSW Government's Building Sustainability Index – is a rating tool developed by the NSW state government. BASIX development included significant input from various experts who formulated, and adjusted it, to ensure a reasonable degree of accuracy. Any use of BASIX as a measurement tool in research relies on the methodology of its authors, and therefore on the methods they have used in collection of the raw data used to set the baselines, and the logic and accuracy of the formulae used to arrive at a result. The BASIX methodology is to quantify estimated energy and water demands of a proposed residence and compare them to the equivalent estimated demands of a baseline average, called the "benchmark" dwelling. That benchmark comprises all existing housing stock in the Sydney region as of 2003, of the same type as the proposal. This is based on occupancy, using the number of bedrooms. In this way, all houses with a given number of bedrooms are compared to the same benchmarks for energy and water, which, according to the published calculation methods, are "taken as the average greenhouse gas emissions and water consumption" for all existing detached dwellings in Sydney with that number of bedrooms, based on 2003 data (DIPNR 2004).

The need for a politically justifiable tool hinges upon the aim of producing research results that are recognisable to, acceptable to, and adoptable by both the design and construction industry and government at local and state levels. This follows the research and knowledge paradigm defined by Glassick, in which knowledge is not scholarly until it is shared (1997). BASIX is increasingly understood by governments across Australia, as well as relevant departments within the Federal Government. In NSW, it is well understood by the housing industry at large, and by the councils they deal with.

3.4.1.2. A measurement method which is already adapted to local conditions

BASIX meets the need for a tool produced with settings based on Sydney data, which are applicable to the Pittwater area. When this research commenced in 2001, the Pittwater 21 LEP was still an idea in the minds of the councillors and senior staff at Pittwater Council, and BASIX had not been conceived. At that stage, the research was focussed on PlanFirst as a plan making template, and the need to measure ecological

impacts was being assessed, in the light of available research and measurement methods developed elsewhere in the world. There was no one tool available to measure the impacts of water, energy (greenhouse) and transport, in an Australian context. This meant using either North American or European tools, developed with different source data than was applicable to the Australian – and specifically Sydney basin – conditions.

BASIX uses data supplied by local water and energy suppliers, and uses product information based on what is commonly available to consumers in Australia, and fitted to homes in the case study area. This enabled the research to use the tool with an assurance that without seeking absolute consumption or emission figures, the comparative results will be reasonable accurate.

3.4.1.3. Use of measurable elements of a building and site

In its use of architectural plans, BASIX 'speaks the same language' as the design information it seeks to measure. Applied to the use of statistical analysis, the old adage 'garbage in, garbage out' applies. If the data entered into the measurement tool is not accurate to the necessary degree, then the results will be misleading.

Because the samples tested are in graphical form, that is, plans submitted and approved as part of a Development Application, the tool which would best suit the purpose would be able to take data straight from such plans. BASIX was developed to fit straight into the DA process in NSW under the Environmental Planning and Assessment Act, and so was ideally suited to meet this criteria. The energy and greenhouse calculations did not measure any element beyond the building structure, or envelope, as modelled by NatHERS. For energy, that means ceiling fans were not modelled; and for water, consistent assumptions were made about the efficiency of taps and sanitary ware.

3.4.2. A review of the BASIX methods

This section reviews and discusses the internal workings of the BASIX web-based assessment tool, in relation to its appropriateness as a measurement tool in this research. It follows the format and flow of ideas as expressed in the published notes “Calculation Methods used in BASIX, DRAFT, May 2004” (DIPNR 2004). It begins by looking at what BASIX’ creators (variously politicians, planners and scientists) were trying to achieve, at what levels, and in what ways. This sheds some light on the way the tool has been set up, what user assumptions have been made, and what the

implications are when using the tool in a scientific sense. This discussion relates to those parts of BASIX used in conducting comparative measurements in this research.

BASIX was originally conceived as a rating tool, not a regulatory tool, and the transition has had some effect on its performance targets, and its internal workings. At the time of its launch as a SEPP within the EP&A Act, the government announced that it "would not add cost or complexity to the DA process" (Taper pers comm. Mar/Apr 2004). While this might risk over-simplifying the tool, it was useful for purposes of comparison, as both sets of sampled projects were subject to the same assumptions. These assumptions are detailed in the relevant sections further below.

The next sections discuss the methods used by BASIX to set reduction targets compared to existing benchmarks.

3.4.2.1. 2003 benchmark dwellings

The central element in the BASIX methodology is its use of a benchmark house for all comparative measurements. It compares predicted performance to a theoretical average Sydney house, based on 2003 energy and water consumption data. The comparative scores are expressed as percentages below or above (better or worse than) the benchmark, which has both simplicity and accuracy. The simplicity satisfies the BASIX policy goal of being easily understood, and the veracity is reflected in the statistical accuracy of the data, and the calculation methods, discussed below.

This research used only the water score in its aggregate form, while the greenhouse (or energy) score was used in its two primary component forms: heating and cooling loads. The difference between the sample DA and the benchmark, is expressed in all cases in the same positive and negative sense as is used in the BASIX scores, that is, positive is a higher demand and emission, negative is lower than the benchmark. Thus it is possible to simply track changes in environmental performance in the selected impact categories.

3.4.2.2. BASIX calculation methods and its shortcomings

The focus of this part of the research is on comparison, rather than absolute accuracy of estimated performance. The following sections explore a critique of the accuracy of the tool, for the purpose of ensuring it id fit for the intended purpose.

a. Energy calculation method

The Simulation Method was used within BASIX for all thermal performance modelling. NatHERS version 2.3.2 or 2.3.2a was used in all cases. BASIX applies correction factors to limit the heating and cooling loads calculated in this program, as a means of correcting the shortcomings identified in Chapter 2.

BASIX limits the allowable cooling load at the outset of the Thermal Comfort modelling process when using the tool. It is set up to reward passive design, and penalise non-passive design. Is it reasonable to limit cooling loads in this way? And if so, what is a justifiable numeric limit, given the use of NatHERS as the fundamental thermal modelling tool in the Simulation Method[16] in BASIX, and the other occupancy-based settings? There may also be a discrepancy between the BASIX occupancy user settings, and actual practice in Pittwater. This is because of a traditional awareness of the availability of the sea breeze for cooling on most hot summer days, and a slight tendency towards appropriate coastal building forms along the coast.

There is an inherent bias in NatHERS toward rewarding large buildings, and buildings with a near cubic shape, which BASIX attempts to correct. Houses with plan shapes near square have the smallest envelope to floor area ratio. The floor area correction factor used in BASIX hangs off two critical assumptions: a 1.5 squareness ratio of the 2003 benchmark building; and the average floor area. There is no supporting literature for these assumptions, highlighting the need for further research, but it does not render the tool unsuitable for this research.

b. Water calculation method

When it comes to water, BASIX is primarily concerned with measuring the impact of household demand on potable water supply, and end use data informs its assumptions and calculation methods. This data has been drawn from Sydney Water and other sources, but is not published or referenced by BASIX. Literature on water demand patterns elsewhere in Australia is referenced by BASIX. End use data has also been collated for Melbourne, and it is reasonable to assume that Sydney's usage patterns closely mirror these (Simard 2005, ISF - unpublished).

[16] BASIX is continually being reviewed and refined, not always for purely scientific reasons, but at the time the research was conducted, the Simulation Method had fixed cooling loads as discussed here, as did the Deemed to Comply Method.

3.4.3. BASIX assumptions on benchmark technologies

The technologies and emission/consumption rates defined in the benchmark dwellings need to be identified. According to DIPNR, each technology is a hypothetical hybrid of the market penetration of each actual technology. This is illustrated by the BASIX market share analysis of hot water systems: "the makeup of the benchmark hot water system is, in effect, a mixture of ~74% electric, ~23% gas and ~2.5% solar technologies" (2004). Thus the benchmark technology for water heating is calculated based on the relative efficiencies (actual emissions) of each different type, factored by their share of installations across the benchmark sample. Relative efficiencies are expressed for greenhouse and water technologies "offered" to the "proponent", such as the progressive improvement in scores allowed by 3A rated toilets as compared to those with no rating.

Relative efficiencies can easily be demonstrated to exist between such things as 3A and unrated toilets, but to demonstrate the reduction in consumption provided by a 3A toilet over the benchmark means that the existing penetration of 3A rated toilets must be known. This data is published by DIPNR in *Calculation Methods Used in BASIX – Draft*, and although it was revealed by some of BASIX' authors and consultants that the source of the data is Sydney Water and the Australian Bureau of Statistics, no explanation is given as to how the data was collected other than sales figures, and no transparent verification is available (Eckstein, D. pers. comm. 12/2/2004; Simpson R. pers. comm. 16/2/ 2004).

3.4.4. Other quantifications in the research – counting car spaces,

Two other indicators are quantified in the research, but do not require detailed analysis, as they are simple numerical comparisons of items or events before and after the introduction of Pittwater 21. The method used in the transport and amenity impact category involves a simple count of the number of car spaces proposed in each DA, in each of the two sample sets. These are compared and discussed in Chapter 4, and implications deduced in Chapter 5.

3.5. Validation and limitations

This section concludes the discussion of the measurement tool by discussing how the research validates the results, prior to Chapter 4's discussion of the findings. Because the research uses quantified results in a qualitative framework, the validation is discussed in two ways, as appropriate to the metrics or qualities under discussion, as contended by Patton (2002, p.1189).

3.1.1.1 Quantified results: what the BASIX tool can measure

The research method must use the right tool for the job (demonstrating validity), and it must measure accurately (demonstrating reliability). BASIX uses predictive computer modelling to measure thermal heat flows through the fabric of a building. As Williamson et al have noted, there has never been any widespread validation studies carried out on buildings modelled in this way (Williamson, O'Shea & Menadue 2001). The limited research done by Williamson's group did not indicate an immediate correlation between predicted and actual performance. As noted above, this research does not set out to define actual performance, but rather comparative performance between two sample sets, demonstrating validity (Steel & Torrie 1960). Provided the measurement tool is applied to each sample and the two groups in exactly the same way, the results are valid for these purposes.

3.1.1.2 Qualitative results: validity, reliability, and practicality

As noted by Barbour (2001) and Jordan et al (2005), the fundamental nature of qualitative research is that it relies on the qualities of certain artefacts declared important by the researcher, and any attempt to quantify these, or to ascribe relative values to them, must be done within the context of the artefacts themselves. In this research then, the qualitative discussion is informed by the literature: its analysis of the effectiveness of Pittwater 21's community consultation is validated by what the literature agrees is effective in other similar social contexts. As Crotty has stated, this may be as much validation as a field of research is able to sustain, where "outcomes will be suggestive, rather than conclusive" (1998, p.13).

3.1.1.3 Limitations of the research

Limitations of the research are acknowledged as being the small sample size and timeframe, and the relatively narrow demographic profile of Pittwater's population, the selected sample size comprised about 50% of the total available, providing a good representation of the total. The demographic profile of Pittwater is narrower than the Sydney average (Pittwater Council 2002a), which could have a slight affect on the housing type sampled, but since the research is using an essentially comparative methodology, this is acceptable. The extent of this affect is uncertain, and the research does not attempt to quantify it. An opportunity for further research presents itself in this regard.

Consideration must also be given to the possibility that the introduction of BASIX as regulation immediately after the P21 sample period may have affected the designs sampled at that time. It may be that there was some positive effect – as if by anticipation of the forthcoming changes – that improved thermal performance and reduced potable water demand. Conversely, applicants (designers and developers) may have reacted against the impending 'raising of the bar', and reduced performance, but this is extremely unlikely. Most likely, there was a rush to lodge DAs which conformed to the standard of design practice which was common at the time, regardless of the changes ahead. This would render the samples subject only to the background changes applying to the design industry and community as a whole, as discussed in Section 3.3.2 above.

Chapter 4 follows with a presentation and discussion of the findings of the research carried out using the methods described above, which then leads on to Chapter 5's discussion of the implications of the findings for sustainable development practice.

4 Findings - Pittwater 21 and the Actor-network

This chapter discusses the effectiveness of the outcomes from the application of the controls. Using actor-network theory as a framework, it traces the emergence of the actors (human and non-human) which formed the Pittwater 21 planning controls, in Section 4.1. The potential sustainability impacts of the controls are then examined. Section 4.2 examines the implementation of these controls, and presents the results of the testing process, using the three selected ecological impact indicators. Section 4.3 draws interim conclusions from these results, for further discussion in Chapter 5.

4.1. Development of the controls… the actor-network and its influence on sustainability controls

This section examines the development of the planning controls within Pittwater 21, and proves the first research proposition:

> That Pittwater 21 has the *potential* to provide improved sustainability outcomes in the built environment.

This is largely a qualitative analysis, drawing on the arguments explored in the literature, reviewed in Chapter 2. It commences by examining the actors in the actor-network, both human and non-human, in Section 4.1.1. Because local government is the focus of the change-creation process being studied, the community perceptions of local government are examined, using the case study as an example, in Section 4.1.4. This sets the context for the subsequent analysis of the forming of the actor-network in Section 4.1.2, and its result in Section 4.1.5. A critique of the resultant controls, and their likely sustainability impacts is contained in Section 4.1.6.

4.1.1. The actor-network – who's who

This section examines the actors, their background, and their inter-relationships, which came together to form the actor-network that ultimately produced the planning controls which are the subject of the research propositions.

4.1.1.1. Geography & topography as non-human actors

The peninsula between Pittwater and the Tasman Sea forms the northern half of what is generally described as "The Peninsula". This term is often used colloquially as a

substitute term for Pittwater, and more loosely, the whole of the northern beach suburbs of Sydney. Pittwater's geography has had a marked influence on its development, modifying the kind of development responses displayed by its inhabitants, and its councils.

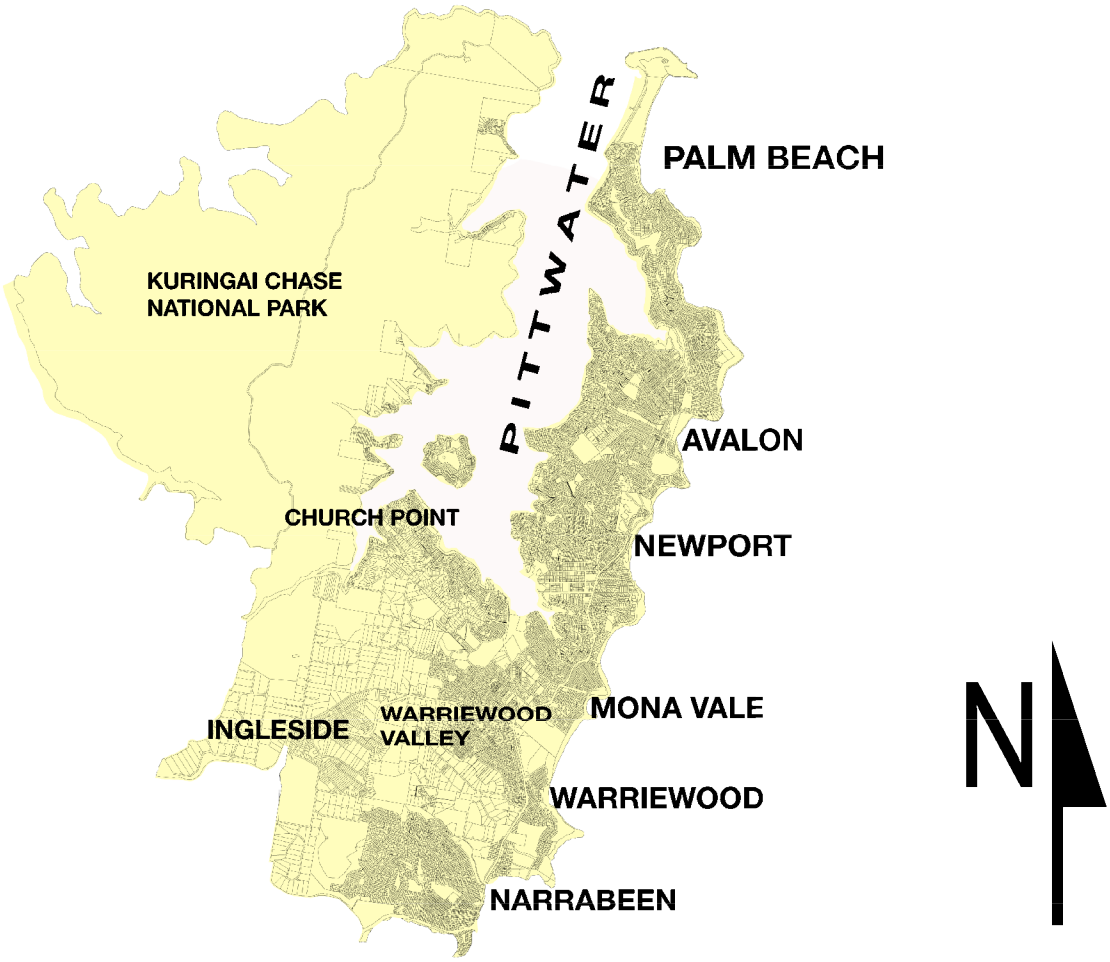
i. The unique topography of Pittwater

Pittwater sits near the north extremity of the Sydney Basin, and straddles part of a flooded valley in the estuary of the Hawkesbury River. The escarpment running from West Head at the mouth of the Hawkesbury, southwards to Narrabeen Lagoon, is an unbroken convoluted bastion, with a flat plateau on top, and varying coastal landforms below. Between and around the shores of Pittwater and Narrabeen Lagoon, is gently undulating land originally vegetated with melaleucas and casuarinas, and wetlands. The plateau to the west is naturally vegetated with low scrub. Much of this natural vegetation has been disturbed, except in the Kur-in-gai Chase National Park, which comprises about half of the whole municipality's land area, with no urban settlement, as shown in

Figure 4-1 below. The difficulty of access from the west, and the relative ease of access from the south along the coast to Sydney, gave rise to the northern peninsula being socially connected to Manly, rather than Pymble and the North Shore suburbs, which are closer. In the 18th and 19th centuries, access to the Sydney market for most agricultural and forestry products was by means of water from Broken Bay, and by land along the coast from Manly for human traffic. These archaic travel routes have had an influence on the notion of the 'insular peninsula'.

The south-western plateau area of Pittwater is currently used for rural residential purposes. There is little remaining of the horticulture which prevailed here until the 1960s. Except for isolated pockets, the soils on this plateau are generally thin and sandy, and significant pasture improvement has been required to achieve economic returns. Because of the commercial value that land in this area now commands, primarily for residential purposes, there is little agricultural activity, although recreational equestrian activities are common. It is the remnant of this natural state that Pittwater 21 has attempted to preserve in balance with community needs.

Figure 4-1 - Map of Pittwater Council local government area (modified from Pittwater Council 2005)



ii. Landform and landscape as an actor in the process

An actor-network analysis of the formation of a new LEP and associated planning controls in Pittwater must take account of any non-human actors, including the topography and vegetation. The predominant element is the peninsula landform. Pittwater's southern boundary is the northern shore of Narrabeen Lagoon, and although it is linked with a land boundary to Warringah Council along its south-western side, most of this is bushland (either crown land, unoccupied or semi-rural freehold land, or National

Park). This effectively creates a peninsula-like shape, with the only other exceptions being the small urban settlements along the western shores of Pittwater itself. Because these are not connected by any means of land transport (other than on foot), they encourage the 'peninsula mentality' of separation from all adjoining urban areas of Sydney. The area's perceived unique features include the relatively dense tree cover, the high proportion of native and endemic plant species, the abundance of what are believed by many to be Sydney's or the world's best beaches, relatively undisturbed natural landforms and micro-topography, such as creeks and wetlands (Pittwater Council 2003a, p.9; 2003c).

4.1.1.2. Human history – the emergence of some human actors

"The bygone days of beautiful Pittwater, its early residents whose children are scattered far and wide, its farms and orchards, its ships and fisheries, are fading from the memory even of those who call it home, and it seems likely that it will soon be only a playground for the city whose youthful needs it toiled hard to supply."

Maybanke Anderson, "The Story of Pittwater" (1920)

The purpose of this section is to place Pittwater Council's current LEP and planning controls in a historical context: to show how its society came to be what it is, and to explain what influences have affected that planning formulation process. It is useful to note how human occupation of the Pittwater area was affected by, and also affected, its geography, and how that then influenced the political history of the area.

Sydney's settlement and growth has followed a pattern typical of Australian colonial cities. The development of Pittwater has been within the range of what has been described as typical of fringe suburban development in Australian cities (Foster 1999a). What is atypical is the limited agricultural or industrial intermediate phases many other suburban areas experienced, and the relatively narrow ethnic and socio-economic diversity of its population. The relative isolation of the Pittwater peninsula and the tendency of some of its residents to stay within its bounds has led to the popular notion of "the insular peninsula". The sense of community which this geographical separation has engendered, is reinforced by other social mechanisms, discussed below.

i. Original inhabitants

Aboriginal people had lived and thrived in the area for at least 6,000 years prior to colonisation by Britain in 1788. As discussed in the section on geographical context

above, there was a plentiful supply of natural resources to sustain them, and they in turn appear to have struck a balance with the land that supported them (Jacobs 2003). Their rapid and almost unmarked disappearance from the Sydney region was not brought about by gun and poison, as it was in other parts of Australia, but by disease and dispossession (Flannery 1994, 1999; Jacobs 2003).

The relatively rapid evacuation of the original occupants left the land near vacant for white settlers to take over without resistance. While a deeper discussion of Aboriginal society is not within the scope of this research, it is important to understand its role in the establishment of the wealth and prosperity of Australia, and by inference, Pittwater. As the first colony, Sydney then acted as a springboard for the development of the rest of continent, which produced such wealth in the late 19th century that the colonies were empowered sufficiently to federate and negotiate independence from Britain (Clark 1995). This in turn created the economic conditions which led to Australia's current affluence, the context in which all local planning occurs, including Pittwater's (M Walsh 1979).

ii. Colonisation and early European settlement

Sydney, like Hobart, and to a lesser extent Brisbane, began as a tent settlement[17]. It was transformed into brick and stone with limited forethought or formal town planning. Nonetheless, until the latter part of the 19th century, these cities were truly compact – it was possible for most people to walk from home to their work in factories and offices that were centred in the commercial district, and likewise to most social activities. This was a distinct phase in the city's growth linked to available transport (Foster 1999b). With accelerated commercial growth and matching population increases in the 1870–80s, new options in public transport were provided, in the form of trams or railways. Workers in the middle to upper wage brackets then had the option of buying land or houses in garden suburbs beyond the noise and grime of the factories – these new suburbs began to spread the cities' boundaries (Cannon 1975). They are recognisable today as the older inner and middle suburbs such as Glen Waverley in Melbourne, and Ashfield in

[17] Melbourne, Adelaide and Perth, and to a lesser extent Darwin, have all grown out of a commercial imperative – delivering goods to market. Forster calls this the "new urban frontier" city berthing philosophy (2003). Compared to the convict cities, they show some distinct differences in the way they have developed at various stages, but are now comparable in their profiles of population, density, inner urban redevelopment patterns, and fringe suburban sprawl. Canberra stands in contrast to the other capitals, being Australia's only totally planned city, and having essentially only *raison d'etre*: the provision of and support of government.

Sydney. Pittwater missed out on this phase of development altogether, which affects considerations of its urban form, and especially transport options, considered later.

iii. 19th century villages in a 21st century planning document

The settlement of the peninsula was directly affected by the landform, and this is now reflected in the detailed content of the Pittwater 21 LEP, through the Locality Statements. Pittwater's first white settlement was gathered around the valleys, forming villages, which are the basis of the 'place planning' in Pittwater 21. It is therefore helpful to trace how these came to be. From the period of first settlement until the 1890s, agriculture and horticulture were the primary employers and drivers of development along the peninsula from Dee Why to Palm Beach. According to contemporary records, "Some 60 years after Governor Phillip's visit, there were only 63 inhabitants living in the whole territory between Manly Cove and Narrabeen" (NSW Government 1848). This record from 1848 confirms that the bulk of human development in the Pittwater area is less than 100 years old, which has relevance to a discussion of the average lifespan of buildings there, which is a factor in the analysis of local planning issues. The first and second generation buildings were constructed in the villages that formed around the natural sequence of headlands and valleys. The sand dunes and beaches so popular in contemporary society were not the focus of these villages, and thus they are often removed from the beachfront itself. The headlands were largely ignored except for grazing purposes: the soil was poorer, and the exposure to strong winds made building less attractive.

iv. Overcoming isolation - early growth and transport difficulties

20th century development occurred as a response to population pressure in the growing city, with an added appreciation of the natural features of the coastal landform and environment. Transport was a major impediment to creating larger dormitory suburbs north of Brookvale. Bus trips to the city were slow and arduous, with a ferry over The Spit at Middle Harbour, or another at Roseville. Trams finally ran from Manly to Narrabeen in 1913. It was tourist trade which was responsible for much of this service's construction, as it was too slow for commuters heading for the Manly ferry (Regimbal 1997b).

The first land release as residential subdivisions occurred in 1881[18], but did not trigger a flood of such development until the early 20th century. According to records, one early land speculator commented "there were many reasons why Narrabeen Torrens title land will continue to realise a profit on every lot purchased" (Bosler 1996). These have proved to be prophetic words, given the high real estate values currently seen on the peninsula. Another significant early land release was the Green Hills Estate at Narrabeen (now known as North Narrabeen and Elanora Heights)[19]. The sales material mentioned the views, which is possibly the first recorded recognition of an appreciation of the natural values so strongly defended in Pittwater 21.

Local populations had gradually begun to relate to their surroundings on more than a purely exploitative level, enjoying the beaches and unofficially at least, the waves[20]. This supplied a steady increase in visitors keen to discover these treasures for themselves. Tourism as an identifiable commercial activity had begun in Manly in the middle of the 19th century, gradually extending northwards as transport became available. By the early years of the 20th century, day trippers were reaching beyond Narrabeen to Newport.

The original road link to the Peninsula was Pittwater Road, which linked it southwards along the coast to Manly, via the bridge over the previously ferried Narrabeen Lagoon. What is now known as Mona Vale Road[21] was originally an Aboriginal trading and seasonal migration route between coast and hinterland, and white settlers followed its easy path along the ridgetops from the northern settlements (Regimbal 1997a). Motor vehicles became the most convenient and time-effective mode of transport for day

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[18] Richardson & Wrench sold the 'Mt Ramsay Estate' at Collaroy and Wheeler heights, which sold quite slowly because of its perceived isolation.

[19] It was centred around "the Gordon Road, also known as the Powderworks Road" (poster published in 1911 advertising the land sale, held on 26 Dec 1911). The vendors in this instance used many words still found in real estate jargon today, such as "easy access" and "views cannot be built out". It encouraged all and sundry to buy land in the estate, claiming there was something for everyone, even somewhat mischievously claiming that tradesmen (sic) would find plenty of work in the new growth areas of Pymble and Gordon, and have easy travel along Mona Vale Road. This trip took nearly an hour by car, for those without a vehicle it was an impossible task.

[20] Swimming at the beach during daylight hours was illegal until 1902. The Manly Daily was instrumental in leading a series of acts of civil disobedience, which ultimately led to the law being abolished. Shortly after, Sydney had its own beach celebrities like Isobel Letham, who rode a surfboard with the famous Hawaiian royal surfer Duke Kahanamoku. This had a direct influence on the culture of the Northern Beaches of Sydney.

[21] Mona Vale Road started around Pymble Hill, where it was called the Telegraph Track, or Stoney Creek Road, Other names applied to various sections of it, and it was not until early in the 20th century that the name became uniform.

trippers and locals alike, and this dominance soon relegated the trams to an untenable loss making position. The last tram ran to Narrabeen in 1939, replaced by buses. Eventually a third road connection, the Wakehurst Parkway, was opened in the late 1940s. Two of these three road connections are considered by the Bureau of Transport & Regional Economics (BTRE) to be unsafe and unreliable, considering the volume of traffic they carry[22] (2003). Private car dependency is very high because the district's only transport options are road, which have limited bus services[23] (Transport Study Group of New South Wales. 1993). This historical car dependency has had later implications for Pittwater 21, and its interplay with wider policy implementation, as discussed in Section 4.2.2.3 below, and in Chapter 5.

Much of Pittwater's recent history is inextricably connected to its longer political history, and these are examined in more detail in Section 4.1.2 below.

4.1.1.3. Community activist groups

A prominent group of actors in the actor-network are community activist groups. There are over twenty community activist groups recognised by Pittwater Council, based mainly around localities, but also focusing on activities and special interests. The most common of these started life as Progress Associations at various times in the 20th century, at a time when the focus was on pressuring authorities for 'development' which was seen as being synonymous with 'progress': the provision of basic services such as sewerage, town water, sealed roads, kerb and guttering etc. In more recent times their policies tend to be based on resisting change and 'inappropriate development' pressures (Ingleside Residents Association 1995, 2003; Bilgola Preservation Society, Pittwater Council Library 2001). Figure 4-2 below, lists some of the current groups formally recognised by Pittwater Council.

[22] Mona Vale Road has a long history of motor accidents resulting in many fatalities, and Wakehurst Parkway likewise. Additionally, the Parkway is often closed after heavy rain when Middle Creek floods the roadway of the lower section up to half a metre in depth (although the frequency of these events has been reduced by recent roadside flood mitigation works). The BTRE review made recommendations for further investigations and discussions, none of which has yet materialised (Forest Coach Lines 2005).

[23] Pittwater is serviced by government owned buses (Sydney Buses) and one private company (Forest Coach Lines), with peak hour services at 10 to 15 minute intervals, and out of peak hour services up to one hour apart during the day, with none at night (Warringah Shire Council 1998).

Figure 4-2 - Community Associations recognised by Pittwater Council, 2004

Aboriginal Support Group Manly Warringah Pittwater
Avalon Preservation Trust
Bayview Church Point Progress Association Inc
Bilgola Preservation Society
Church Point Reserve Association
Clareville & Bilgola Plateau Residents Association (Clareville)
Coasters Retreat Association (Palm Beach)
Combined Pittwater Offshore Associations
Friends of Avalon Dunes
Friends of Bungan
Ingleside Blue Hatched Progress Association
Mackerel Beach Association Inc
Newport Progress Association
Palm Beach Association incorporating Whale Beach Preservation Society
Pittwater Natural Heritage Association
Pittwater Residents Against Inappropriate Development
Residents Association of Pittwater
Scotland Island Residents Association Inc
West Pittwater Community Association

Most of these community groups state their concerns as being the maintenance of a perceived clean green environment, where large buildings and developed areas are unseen. Whether this green image is actually ecologically sustainable is doubtful, and for most people it is simply the absence of industry and obvious pollution that leads to the notion of environmental cleanliness. There is significant pollution in the Pittwater area, even if the low levels of air pollution belie this (Pittwater Council 2003c). Thus it can be seen that by arguing for the status quo in terms of development and urban density, the activist groups are not necessarily arguing for sustainability per se. Nonetheless, they vocal, and played a significant role in the formation of both the council (in 1992) and the new Pittwater 21 LEP, as discussed further below.

Activist groups are also subject to societal changes, operating within the broader paradigm of a society that tends to carry out more building work as a result of its

increasing affluence. This can even be seen to operate within the very groups that most vehemently oppose increased development. Thus the status quo is continually creeping toward a more developed built environment: higher urban densities (from dual occupancies[24] and home unit developments of various kinds) and less natural and soft landscaped area (from bigger houses, larger driveways, swimming pools and paved entertaining areas, etc). These changes may be a mixed bag for sustainability: it is widely accepted that increased housing densities improve sustainability by using existing infrastructure, but it is also true that larger houses consume more materials, and it is generally accepted that they also consume more energy (NSW Legislative Assembly 2004; Taper pers. comm 1/11/2004). While these two issues are not necessarily linked, they are occurring together in practice.

Activists can directly influence planning controls. For instance, the relative lack of dual occupancy houses in most of Pittwater is due largely to the efforts of community activist groups. It is important to discuss the linkage between community activist groups and the controls within the DCP which affect planning and building design. By way of example, Section 4.1.4.2 below details a negative outcome observed during the interaction of activist groups during the public participation phase of Pittwater 21's creation.

4.1.1.4. Local media

It is useful to discuss the role of the *Manly Daily* newspaper as one of the actors in the actor-networks which created Pittwater Council, providing a strong and continuing influence in the development and maintenance of the "peninsula mentality". The *Manly Daily*'s penetration into every household and business, and the daily saturation of local issues, has been one of the main factors in maintaining the "insular peninsula" syndrome: local stories written up by local journalists for consumption by local residents[25] (Wright 1990). Editorial policy focuses almost exclusively on local issues, or

[24] The term "dual occupancy" defines a particular dwelling type: a duplex, or semi-detached house where there are two dwelling units within what looks ostensibly like one house, and in its original intention, is the size of house (albeit a large one in practice). It is this design feature which allows dual occupancy in neighbourhoods that were traditionally zoned single residential.

[25] Circulation was audited at 91,348 for the April to September 2004 period (CAB audit), readership indicated as being 153,000 by Roy Morgan Research for period October 2002 to September 2004. There is anecdotal evidence that many people do not read any other newspaper, although this has not been thoroughly researched. What other news and current affairs sources are commonly viewed by residents of Pittwater is not thoroughly documented, but it is possible that the *Manly Daily's* position is being gradually weakened by cable and free

wider issues with a local connection. This introverted focus gave the newspaper a key role in the secession of Pittwater from Warringah Council in 1993. Although not taking an active role in meetings during the secession process, it was informing and reinforcing notions and opinions with every issue. In that sense, its role as an actor must be considered.

4.1.1.5. Government structures

The Environmental Planning and Assessment (EP&A) Act, and the Local Government Act are actors in the actor-network, since they both regulate the operation of Councils. The legal framework of the EP&A Act enabled, and at the same time constrained, the council's activities. PlanFirst's influence must be accounted for (as the reform of Part 3 of the EP&A Act), since it was the primary influence behind council's thinking on *what kind* of LEP to write, and *how* to write it.

4.1.2. The precursory actor- network: secession of Pittwater Council, leading to the new LEP

This section discusses the political background to the formation of Pittwater Council, and its ultimate goal of controlling local planning through its own LEP. In 1992, the northern part of Warringah seceded to form the separate Pittwater Council, the first new council in NSW for 100 years. The actor-network which formed with the purpose of achieving this goal is described here, and the emergence of the actors traced from the background discussed in Sections 4.1.1 and 4.1.4 below. During the research it became evident that the writing of the Pittwater 21 LEP by the council was inextricably linked to the creation of the council itself; where the ultimate goal of secession was seen as unfulfilled until a locally developed LEP had been produced.

"We consider the only future for this area and for the preservation of those ideals and policies for which we stand is to become an independent Shire … the need for this electoral reform has been clearly and sufficiently demonstrated to enable the Government to come to a decision and no longer forestall the issue. Put simply we call upon the Government to put the matter now to the people of A Riding to determine."

Warringah Shire Councillors Robert Dunn and Eric Green, representing A Riding in Warringah Shire Council, to NSW Government. (Dunn & Green 1990)

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to air television, other broadsheet daily newspapers, and the proliferation of news gained via the internet.

Actor-network theory as first proposed by Callon, Law and Latour, sets out the four distinct phases described in Chapter 3. But as noted there, in practice the boundaries between these phases can initially appear blurred, especially with more complex actor-networks which involve actors of disparate types, such as in the formation of a new council. In this research, as in a lot of other ANT writing, it was found that the phases were most clearly identified long after the events had transpired (although a clearer understanding of them is expected to assist future events, as discussed in Chapters 5 and 6, below). In this discussion of the four phases then, some events central to earlier phases are also carried forward and used within later phases. These are explained as needed. The events leading to the secession of Pittwater from Warringah are described below, and the characteristics of each is ascribed to the appropriate ANT phase.

4.1.2.1. Problematisation phase: perceptions of poor governance and bad planning control

The problematisation phase began when public statements were first made about the perceived insensitive planning decisions and inequity of spending in the northern part of Warringah Shire Council (then known as A Riding). Since the 1960s, there was a reported feeling amongst residents north of Narrabeen lagoon, and most noticeably north of the Bilgola Bends (Avalon to Palm Beach), that council rates were not being spent equitably, that funds from the northern part of the shire were being spent disproportionately in the southern part. It had often been recorded in the *Manly Daily* that Pittwater residents considered that planning issues in the Pittwater district were not being handled with the sensitivity demanded by its environment, or in an equitable way in relation to other districts. Letters to the editor, newspaper articles, and personal conversations[26] occurred over a period of twenty years prior to 1993. Typically, comments would be made to the effect that decisions "coming out of Dee Why" (where Warringah Council offices were located) were inappropriate for the Pittwater area. Such comments were made in all sincerity, although it is difficult to test for reality in the perception (Curby 2002; Revitt 1999). Secession had been a topic of occasional debate for many years, the first record being the early 1960s[27].

[26] This was also communicated to this researcher by builders, designers and private residents on many occasions.
[27] Mr Des Creagh, an A Riding councillor, from the northern peninsula.

Long after problematisation had progressed to the next (interessment) phase, issues which supported the cause of the protagonists continued to arise. Resistance to what was perceived to be inappropriate development pressure came to a head in 1985 when development consent was granted for an eight storey commercial building in the business and retail district of Mona Vale, known as the *Delmege Tower*. Prior to this development, no building higher than four storeys had been constructed north of Brookvale, where there had been continual industrial and retail development since the 1950s. There was intense public debate over the perceived merits or otherwise of the project when the application was first lodged with Warringah Council, and many council meetings were dominated by debate on it. The *Manly Daily* acted as the primary facilitator of information regarding the political machinations, and as a forum for private individuals to express their views. It is evident from the volume of correspondence to the *Manly Daily* that the tide of public opinion was not supportive of the proposed tower block, and its approval by the elected council elicited an outpouring of “disbelief and disgust” from ratepayers (*Manly Daily* 1985). Reports of "rowdy scenes" at Warringah Council on the night approval was finally granted to this development also support the view that there was a high level of antipathy towards the council at the time (Sawyer 1985). Another development application at the northern end of the peninsula also added to the controversy. The *Blueberry Ash*[28] mixed retail and residential development was the biggest commercial development ever proposed in Palm Beach, and being set amongst some of the most expensive real estate in the shire, with a powerful lobby of influential neighbours, contributed to the controversy.

In the interessment phase – when alternatives are being put up as solutions to the fundamental problem – the original problem was shown to still exist. This fuelled the subsequent enrolment phase, which is discussed below.

[28] It is noteworthy that *Blueberry Ash* was recently demolished to make way for a residential redevelopment. Having a ten year lifespan, it is one of the highest ecological cost developments yet carried out on the Peninsula, and is of interest here because it demonstrates the extreme pressure put upon the development control system, and the ecological support system, from the high financial rewards to be gained from providing residential real estate. This was found to be a recurring theme throughout the research.

4.1.2.2. Interessment phases: secession put forward as the alternative

The interessment phase centred on the secession of A Riding from Warringah. The Warringah Councillor who commenced that debate went on to form the Pittwater Municipal Committee (PMC). It began in essence with the secessionist actors proposing the new council as a means of achieving their aims, and arguing the case to the other parties involved. This suggested solution met with varying responses, and so the proponents began the process of persuading others to accept their position. This involved addressing a range of issues including ignorance of local government structure and responsibility, and resistance of state bureaucrats and ministers to consider change. Their repeated submissions to the various Ministers for Local Government yielded no positive response until 1985. The problematisation phase can be seen to overlap the interessment phase, in that while the various actors were forming alliances, which is a characteristic of the interessment phase, the problematisation was continuing to develop as more unpopular building approvals occurred in the northern peninsula area, which was used by the protagonist actors to reinforce their case. While increasing development was not the only factor in the minds of the proponents of secession, it had become a symbol for the whole issue. With the almost universal outcry which followed the approval of the *Delmege Tower* in 1985, the problematisation phase can be seen to move quickly into the enrolment phase.

4.1.2.3. Enrolment phase: grass roots action

The enrolment phase can be seen to have clearly begun following the approval of the office block in Mona Vale. As has been noted previously, the boundaries between phases are often blurred, and the distinction between interessment and enrolment more so than the others. This is due to a lag between what one group in the community 'know and understand', while others are still grappling with the issues for the first time (Law 1992).

Public meetings were organised by actors in the actor-network (specifically, community activist groups, small collectives of concerned individuals, like the Pittwater Municipal Committee). Crowds of up to one thousand attended these meetings, and spawned a new political body, the Peninsula Residents Council (PRC). This body was a critical actor in the enrolment phase, and went on to supply the founding personnel for the new

council. This politically aggressive group lobbied the state government, and eventually a Local Government Department inquiry led to the dismissal of Warringah Shire Council in December 1985[29]. Elections for a new Warringah Council were held two years later in 1987, and two PMC members[30] were elected to represent A Riding (the council ward north of Narrabeen Lagoon). Their expressed mandate was "Urban Conservation and Local Government Reform" (Curby 2002). At this point the movement for secession from Warringah became more forceful, and any blurring between interessment and enrolment has gone. In 1987, a 12,000 signature petition was presented to the Minister for Local Government, but was rejected.

A year later, following a change of state government, a second petition containing 20,000 signatures was presented to the new Minister, who was also the Member for Manly, and thus may have had more empathy with local issues. He agreed to instigate a Boundaries Commission Enquiry, which was held in Mona Vale in 1990. Those opposing secession argued that the formation of such a small council would not be logistically or financially viable. Those in favour of secession argued that a smaller council was not only viable, but that transparency and accountability would be increased. According to Revitt, "The PMC submission of hundreds of pages highlighted the financial viability of the proposed new Council and the overwhelming public demand for local control of their natural and urban environment" (1999).

The Commission's report recommending secession was presented to the NSW Government on April 26, 1991. It concluded that a relatively small municipality such as Pittwater would be comparable to such councils as Woollahra, Auburn, Willoughby and North Sydney, but its results were inconclusive[31]. The Commission found that two of the key requirements for granting secession – 'geographic cohesion' and 'community of interest' – did exist, but the Commission did not cause the Minister to immediately enact it. Instead, on 2 May 1991, after further pressure from the activists and correspondence in local media, as well as the "strong representations made by Pittwater MP[32]", the

[29] Warringah Council was dismissed for a third time in 2003, a NSW record in local government.
[30] Eric Green and Robert Dunn.
[31] It should be noted that current NSW Government has subsequently applied pressure on small councils to consider amalgamation or boundary adjustments, and has threatened forced amalgamations. The secession of Pittwater Council was therefore in contrast to subsequent trends.
[32] The Hon. Mr Jim Longley, MLA

Minister for Local Government[33] announced that the will of the people would be tested directly by referendum (NSW Hansard, May and June 1991).

A referendum was recommended for the residents of Warringah Shire A Riding (north of Narrabeen Lagoon), but the government did not encourage the secessionists in any way. A voluntary postal vote system was used, with a requirement that over 50% of registered voters must respond. The normal response rate for voluntary postal votes is about 20%. According to Revitt "There was no precedent in Australian voting history for a response of the magnitude demanded" (1999). The Pittwater Municipality Committee actively lobbied large numbers of residents, claiming to have visited every street in A Riding. It is recorded that 48.5% of residents voted, with 73.5% of these in favour of secession. In spite of the yes vote being 1.5% below the prescribed proportion, the Minister for Local Government decided that those who had not voted "did not care one way or the other" (Sydney Morning Herald 1991) and therefore on 4 July 1991, announced that the secession would proceed. This was accompanied by some ongoing dissent (usually expressed in the *Manly Daily* letters' page) from those opposed to secession, or those who insisted that due process must be followed no matter what. These dissenters were eventually left behind as the actor-network mobilised the process, in secession.

Creating a new local government area is not a quick or easy process, and it was another year before the secessionists finally achieved their goal, in 1992. The Minister for Local Government created Pittwater Council on May 1 and its first meeting was held on October 24, 1992. Appendix to 4.1.2.3 contains a timeline of the events marking the creation of Pittwater Council.

4.1.2.4. Mobilisation: a new council proclaimed

The final ANT phase of mobilisation began with the minister's decision to proclaim the new Pittwater Municipal Council, using Warringah's A Riding boundaries[34]. At secession,

[33] The Hon. Mr David Hay, MLA

[34] The northern shore of Narrabeen Lagoon is the southern boundary, with all other boundaries carrying over from the existing Warringah Shire boundaries. (Elanora Heights, Ingleside and Kuringai Chase National Park form the western boundary; all other boundaries are set by the ocean beaches and Pittwater.) Staff and equipment were divided with significant debate and turmoil between Warringah and Pittwater, with the existing Northern Works Depot at Mona Vale (Winnererremy Bay) becoming Pittwater's base for the provision of works and services

Pittwater adopted a re-titled copy of the 1985 Local Environment Plan that Warringah had been using, developed from the previous Warringah Planning Scheme Ordinance, originally written in 1963. This was seen as an interim document, amended only as necessary to apply to the new local government entity and boundaries, and adopted as the Pittwater Local Environment Plan 1993 (PLEP 93), which was gazetted on Feb 4, 1994. Most Development Control Plans (DCPs) were adopted with some minor modification from the Warringah DCPs[35]. The PLEP 93 is a document written in the formal and proscriptive style of most planning instruments produced in the mid 20th century. The old Warringah LEP 1985 was only the second LEP in Warringah's history at that time, and in 1963 most municipal planners in NSW were still using mindsets trained in the pre-WW2 era (Foster 1999a). It put more emphasis on defining prohibited land use than setting out desired future outcomes, thereby being reactive rather than pro-active. This researcher found it was not 'user friendly', even for people working in the planning and design/development industries, much less the general public whom it was supposed to serve, as discussed in Section 2.4.2.2.

The first years of Pittwater Council's history were turbulent, with councillors involved in a process of learning to work together with a practical degree of harmony (Curby 2002). Factions formed and re-formed, based on power plays and local political affiliations. These can be described using actor-network theory as reflecting the first two phases (problematisation and interessment) and beginning the third phase (enrolment), but failing to reach mobilisation. Thus that actor-network was in a vacillating state of partial stability, which resulted in a higher than expected level of dissatisfaction amongst ratepayers, and is a common characteristic of local government. It is a view inferred by Curby, and confirmed by this research, that recent councillors have learned from that experience, with meetings and deliberations more often held in a consultative manner. This research considers that this has been one of the important factors in council setting the framework for the production of Pittwater 21, and actor-network theory can also be used to describe this phenomenon.

This observable process within the elected council's history is a peripheral actor-network – or perhaps a series of actor-networks within the main actor-network that produced the

[35] More DCPs were written in the following years, including a landmark sustainability control, the Conservation of Biodiversity, DCP 25, enacted in August 2000, and one of the earlier take-ups of the Sustainable Energy Development Authority's Energy Smart Homes Policy, DCP 28, enacted September 2000.

new LEP. At this point, however, that actor-network diverges from the focus of this research (being the production of the new LEP), and is not discussed further.

4.1.3. The next actor-network: the new Council's objectives for a new LEP

The actor-network that set out to form Pittwater Council had two broad aims in mind, and until both of these were achieved, its ultimate goals remained unfulfilled. The first was for equitable distribution of spending, the second for sensitive and accountable planning controls. The creation of the new council achieved the former, and the creation of a new LEP (and its planning policies and controls) would achieve the latter. Thus the new LEP is a key part of the original actor-network's goal.

Applying ANT to an examination of Pittwater Council's process of writing a new local environment plan, and considering what its sustainability outcomes might be, is actually a series of ANT processes. This research examines one process of change – one snapshot within the unfolding story of plan-making, planning and development. Even then, it is not a simple linear process, for unlike some simpler ANT studies involving smaller actor-networks and more linear processes, in Pittwater 21's case the phases appear to revert and overlap in some ways, and start–finish points are not always easily defined. Where these cannot be pinned down to one point, the various points have been identified, and the process of overlap described.

The elected councillors and senior management had spent some years attempting to achieve the original goals of the secessionists (demonstrating their enrolment), by amending the old LEP (PLEP 93) and subsequent planning controls in an attempt to provide more effective response to local issues, and better protection of the qualities loosely believed to be central to the character of Pittwater. Yet it was still felt by many between 1992 and 1999, that at the core of its planning functions, the council was making do with an instrument which was at best less than perfect, at worst dysfunctional (Clarke RJ 2003a; Pittwater Council 2005c). Below is an analysis of this actor-network treated as a distinct and independent process, but with reference made to the preceding actor-network, which led to the creation of the council itself.

4.1.3.1. Problematisation – the old LEP fails to meet new expectations

The problematisation phase was instigated by councillors, senior management and planning staff, with support from the human actors from the preceding secession actor-network. The dissatisfaction with the existing Pittwater LEP 1993 (PLEP 93) is gently expressed in council's explanation of the evolution of Pittwater 21 as having become "cumbersome and outdated" (Pittwater Council 2004). Having an LEP which dated from 1963, and over fifty DCPs, with no systematic means of coordinating these, was a problem easily demonstrated. The problematisation phase was therefore straightforward.

It is important to identify all the actors who were drawn into the actor-network at this point. Not all actors can be found on the list of participants in the public participation process. The non-human actors are to be found elsewhere. The problem of uninvolved human stakeholders in the actor-network is addressed where it is relevant below, but in general this chapter is concerned with what actually happened, not what might have, or perhaps should have happened. ANT is most often used to describe actor-networks that form within defined organisational structures, where it is difficult for the human actors to be totally uninvolved, which is discussed in Chapter 5 (Bryce, Johnston & Yasukawa 2003). When dealing with the wider community and change in local government, the actor-network is often much more ad hoc, with boundaries that are harder to define, that change as actors come and go.

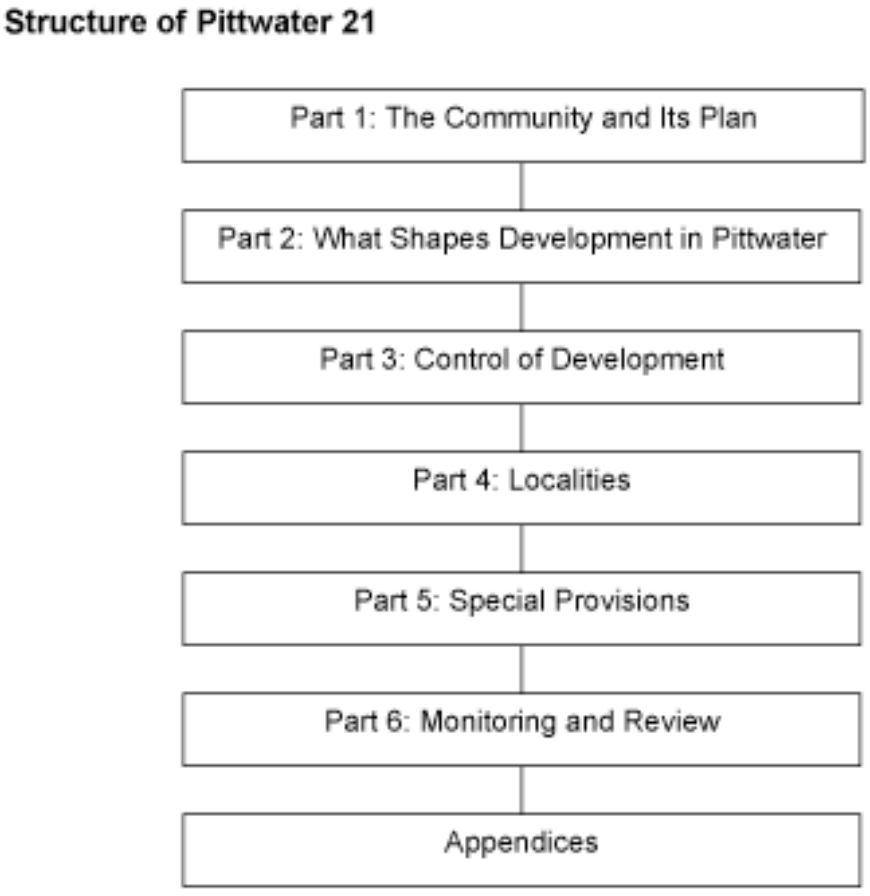
4.1.3.2. Interessment - the Pittwater 21 Draft LEP held up as the new model to follow

The interessment phase began with the public announcement and consultation around the Draft LEP. The research suggests that the preparatory focus groups had given sufficient guidance to the council strategic planners to create the Draft in such a way as to address the failings of the existing LEP and DCP content and structure, and to foreshadow the improved information coordination and access system (MasterPlan). This combination of documents and proposals became the centre of the interessment phase.

Figure 4-3 shows the intended structure of the LEP, as published in an early draft (c. 2001) during the interessment phase. It was used in all publicity material, and at public forums, to demonstrate a flow of ideas ordered by the community's expressed priorities,

with a process of review, that reflect a strong sense of community ownership. This is consistent with the goals of PlanFirst and LA 21, but importantly here, can be seen as a direct response to the issues raised in the problematisation phase of the actor-network that created the council in the first instance. Note that for the purposes of the discussion this section, the distinction between the LEP and the DCP is intentionally blurred, since the intent of the overall process included the outcomes provided by both these instruments.

Figure 4-3 - Structure of Pittwater 21 LEP



The starting point for the Pittwater 21 interessment phase was the publicity given to the public forums, and invitations to participate in the process of consultation. Involvement could have been either by attendance at forums, which was a deliberative process, or by written submission, which is much less deliberative. It is important to note the distinction, because interessment relies on involvement – partaking in the process. Making written submissions can also be seen to affect the proceedings, in that the submissions can be seen as actors, or at least, a number of common submissions may act together as one actor. But it is a much less active role in the ongoing actor-network process than that of a person who attends a forum, considers the information presented, and who then attends a subsequent forum, making contributions to the deliberations which are perhaps altered by the experience of attendance and consideration of the material presented, and the discussions which follow. This is the essence of deliberation, and is a particular characteristic of an actor-network such as this.

Latour's notion of actors being *entities that do things* to effect the process of change, can be used to describe the various actors at work in the Pittwater 21 actor-network. Some actors behave as one on occasions, and it can be seen from the characteristics listed here, that there are some commonalities which lend themselves to that (M Callon 1991b).

The actors in the P21 process are identified as follows, with the attendant characteristics or roles in the actor-network:

- The existing PLEP 93 and DCPs:
  - These set the existing operating environment for council and other involved stakeholders (see discussion below on non-involved stakeholders);
  - The LEP and DCPs are considered as one actor here, as their roles cannot be effectively distinguished from each other.
- The Pittwater 21 Draft LEP and DCP:
  - Being the focus for discussions, all other actors were forced to react to the contents of these documents;

- ÷ The LEP and DCPs are considered as one actor here, as their roles cannot be effectively separated.

♦ Pittwater Council staff…

- ÷ Can be considered as being one actor at this point, although it is almost certain that the drafting of the LEP had involved a number of actors in a short actor-network of its own, but by the time the LEP was put on public exhibition, the council staff position was unified.

♦ Attendees at public forums…

- ÷ Cannot be considered as one actor in any sense, although once enrolled they may act as one at times;
- ÷ Represented many different points of view and motivations;
- ÷ Not all stayed in the actor-network from beginning to end…
  - Some withdrew voluntarily, perhaps through lack of interest, or cynicism,
  - Some were effectively eliminated as the actor-network progressed.
- ÷ Had highly variable roles and characteristics, including…
  - Representatives of community activist groups, motivated by various specific agendas, or self-interest,
  - Individuals not aligned to any organisation or with any professional interest or skills, also motivated by varying interests from self to global citizenship,
  - Individuals with professional interest, experience or skills in planning, design or building, with varying

motivations ranging from self-interest to wider global sustainability.

- The media used in communication between council and other actors…
  - The characteristics and limitations of the communication methods had a passive role in the actor-network. If communications were perfect, every stakeholder would have been exposed to all of the arguments in the interessment phase, which in reality may never happen. Media most readily identifiable as actors included…
    - Direct mail to ratepayers,
    - The Manly Daily.
- State planning department…
  - Controlled the legislative framework for the whole process;
  - Specific policy directions had a direct effect on other actors;
  - Personalities sometimes appeared as identifiable actors, such as the planning minister and Director General, etc.
- Written submissions…
  - These had an active role initially, then became passive, or were removed from the actor-network entirely as deliberations progressed and the actor-network moved from interessment through enrolment.
    - Those which supported predominant actor's positions remained active,

- Those which set agreed parameters became passive. Those which supported positions which were not sustained were effectively removed.

4.1.3.3. Who failed to respond to the interessment and why

The problem of non-involvement must be addressed here. As discussed further in Section 4.1.5.3 below, certain stakeholders do not appear to have participated in the actor-network, and it is relevant to discuss which characteristics of the actor-network may have effected that lack of involvement. It is important to do this for two reasons: so that all parts of the process are examined properly, resulting in a thorough application of the theoretical framework; and so that through the application of the theory, insight may be gleaned for the purpose of improving similar processes in future.

One of the limitations of actor-network theory in an analysis of making local planning instruments is that it does not easily take account of events or vectors outside the actor-network being studied (Stalder 2004, p.8). Where these externalities occur, some explanation is necessary. In the local government and community contexts, a particular problem is the non-involvement of stakeholders, as noted in the discussion in Section 4.1.5.4 below, which focuses on its effects on the community consultation process. In that section, the potential actors are identified, and reasons for their non-participation are explored. ANT is not able to describe the role of potential actors who do not partake in the actor-network. Yet one of the characteristics of some of these actors is so common and easily identifiable it would almost be possible to treat it as another discrete actor whose presence in the actor-network actively prevented others from joining.

This characteristic is *apathy*, or more accurately, a cynical state of mind which disinclines the person from participating, and is usually due to a combination of beliefs that their involvement will have no effect on the outcome, and that they do not know enough to contribute (and perhaps are fearful that in so doing they will be made to look ignorant or foolish) (Kades pers comm. 13/5/2005; Renn, Webler & Wiedremann 1995). This research suggests that this disinclination requires serious attention from local and state governments, for the purpose of improving planning outcomes through understanding and ownership, as discussed in Chapters 5 and 6. Discussion of the adjustment of ANT to accommodate apathy as an actor is not the focus of this research. Here this characteristic is simply identified as being present in many individual actors,

and it is noted as being most prevalent in those who did not become enrolled in the actor-network at all, evidenced by the low attendance rates in the public participation (Pittwater Council 2005a), discussed in detail in Section 4.1.5.5 below.

4.1.3.4. Enrolment – gathering momentum for the new LEP

Enrolment occurs when actors accept the "principal change actions" required of them, this being the *obligatory passage point* in ANT – the point all must pass to join the emerging actor-network (Bryce, Johnston & Yasukawa 2003). In the case of a new LEP, this is necessarily a blurred point – or more accurately, a series of points – as there are many issues which make up the *change actions.* It is simplistic to describe them all together as 'one lump' of change. This is a point at which ANT is particularly useful: the ability to describe shifting points during the process (Stalder 2004). This shift occurs as the many clauses in the LEP are subject to amendment during the consultation process, thus creating a situation where the Draft LEP, as an actor, changes. The various other (mostly human) actors then adjust their positions in response to that change. For the actor-network to progress through the enrolment phase, the various actors must accept this series of obligatory passage points, become enrolled, and thus advance its cause.

This researcher, as an actor in the process, observed this form of enrolment occurring on more than one occasion, and traces of it are recorded in Council's consultation records (Pittwater Council 2005a). An example is the requirement contained in the DCP for correct shading, by means of eaves or other devices. The first draft of this control required all shading devices to be kept within the whole building envelope, with the result that several actors (including this researcher) noted that this discouraged low energy passive design, with the result that uncontrolled solar access would overheat buildings[36]. The original draft control was an actor which caused other actors to react to it. The control was amended (Pittwater Council 2003b), and this shift in position allowed further enrolment of other human actors.

The enrolment phase approached completion when the final round of public forums had taken place, and the final Draft LEP and Draft DCP was put on public exhibition. There were some in the community who were not satisfied that the documents either met their

[36] The literature shows that in an affluent society, overheated buildings tend to use energy to provide comfort (ccoling), which in NSW means the consumption of greenhouse intensive electricity.

stated objectives, or met their individual needs, typically expressed as "concern… about all aspects of development in their area" (Manly Daily 2003). But with few exceptions, these people had withdrawn from the actor-network or had never joined it (Pittwater Council 2003b). Actor-network theory makes no value judgment about this, simply providing a framework to describe the process by which the result is achieved. Value judgments may be made by each commentator according to their position, and this was discussed in relation to epistemology in Chapter 3, and in relation to the position taken by this research in Chapter 5.

In the case study, enrolment was not completed in the first instance due to the failure of one critical actor – the state planning authority – to join the actor-network. The enrolment phase of an actor-network cannot progress to mobilisation until the critical actors combines with a critical mass of other actors to enable the whole to move forward. Critical actors are those which have a right of veto over any significant part of the process, and which cannot be removed from the actor-network without the actor-network ceasing to exist or have any meaning. DIPNR was the critical actor in any process involving creating LEPs in NSW – and thus the enrolment phase would necessarily hover at the obligatory passage point, until they passed it.

This was the case in the enrolment phase of Pittwater 21, as DIPNR declined to gazette the new LEP. Gazettal would have constituted the mobilisation phase, but without DIPNR's agreement, the process could not proceed to that point. The precise reasons for this refusal have to do with DIPNR policy adjustments at the time this research was being completed (Shankie-Williams N. pers. comm. 27/4/2005), and in this instance are not central to this consideration. The important thing to focus on here is that DIPNR was acknowledged by the other key actors as a critical actor to be enrolled (Webb K. pers. comm. 1/4/2003). They had attempted to ensure DIPNR's concurrence from the outset. Initially this had seemed a fait accompli, since the LEP process used the new template produced by the government (DUAP's PlanFirst). During the formative stages of the actor-network, DUAP changed not only its name (to PlanningNSW, and then to DIPNR), but also changed its position on PlanFirst (following a change of Planning Minister), thus fundamentally altering its role as an actor within the actor-network.

4.1.3.5. Mobilisation finds a way around a snag

When the actor-network can act as one collective, *enrolment* is considered to be complete and the actor-network is *mobilised*. It is then in a position to cement the change, enabling the organisation to move on and not worry about holding the changed circumstance together. As it is often expressed, the change is *black boxed* (Michel Callon & Latour 1981). In Pittwater's case, because of the delay enrolling DIPNR, the mobilisation did not proceed in the usual way. Council considered that DIPNR's delay in gazetting the LEP was obstructing its key agenda for reform. The LEP actor-network split into two as a means of progressing the enrolment to mobilisation with regard to building planning controls.

Because councils are free to create their own DCPs without the direct involvement of the state government, it was seen as expeditious to take all the building and land use controls – which were the teeth of the LEP in terms of controlling land use and development – and put them in an instrument which could be introduced immediately. This split was a conscious and strategic action on the part of the council, who immediately set about enrolling the actors who were part of the LEP actor-network, into the new DCP actor-network, which excluded DIPNR. Thus there were two actor-networks in the same space and time, with most actors present in both, and with similar goals, yet one critical difference.

By redefining the actor-network's context, and excluding the reluctant critical actor, the actor-network reached a position of unanimity in a short period of time, and thus mobilised the change. Other less tangible aspects of the LEP, such as the explicit commitment to sustainability, were left to the ongoing struggle of the original actor-network. Once again, ANT can make no judgment about the values and reasons behind the disagreement between council and DIPNR, both of which had logical grounds for their positions. The theory is useful simply to describe the events, and to aid understanding of how to improve them in future.

4.1.3.6. Black boxing the changes

When mobilisation is complete, the previous process is ostensibly opaque to any future users of the system (here, the DA process), at which point it is commonly referred to as

being 'black boxed' . At the time of writing, the Pittwater 21 DCP is black boxed, while the LEP is not going to be gazetted in its current (at time of writing) draft form.

4.1.4. Community action in local government

"Pittwater is a very special place – we have to make sure the council always understands that."

Spokesperson for Bilgola Preservation Society, spoken at a Pittwater 21 community consultation meeting, 2003.

Residents join to protect suburb

No more special than the others

Manly Daily

NICE try, Pittwater Council. The bid to close your borders to many nasty types of development was well worth a shot.

Unfortunately, the council has been told it can't prohibit things like drive-through food outlets, brothels or even prisons in its draft local environment plan.

To the council's horror the Infrastructure, Planning and Natural Resources Department, which must approve the LEP, has instructed Pittwater to remove its blanket bans. Our councillors shouldn't panic, nor should residents fear that jails or houses of ill repute will ruin their amenity.

One would think Pittwater's limited commercial zones and sensitive environment would give the council a strong case, especially for its added request to rule out shops, clubs, pubs and the like from residential areas.

However many councils, from the peninsula to the Blue Mountains, could build their own excellent not-in-my-backyard arguments. In directing our local council to drop its bans, the department isn't suggesting that "Pittwater Prison" has a nice ring to it. Nor is it suggested that developments will no longer be judged on merit and suitability.

What is being suggested is that the council shouldn't consider itself more special than any other area.

Meldrum, (cartoonist for *Manly Daily*); and *Manly Daily* 2002–03

This section contextualises later discussion of community consultation in the Pittwater 21 process, within an actor-network framework. It describes how the local community sees Pittwater Council, in terms of expectation, and actual performance, which is typical of many community–local government relationships in urban and coastal Australia (therefore applying to 85% of the nation's population). This informs the wider discussion of the sustainability implications of the change processes of instruments like PlanFirst.

4.1.4.1. Councils as mediators and gate-keepers to change

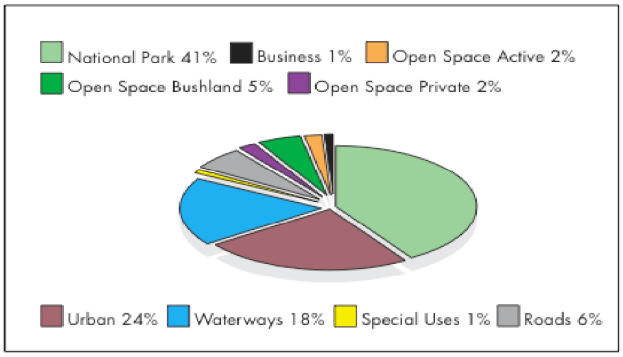
Like all local government areas in NSW, Pittwater is subject to significant development pressure, which will certainly change its physical appearance and have various effects on its social structures, as well as its ecological sustainability. Pittwater's State of the

Environment Report 2003 (SoE) shows that open space comprises over 50% of the total area of the municipality (not including waterways – refer to Figure 4-4 below). (Pittwater Council 2003c) It is a statistic that underscores the widespread community perception that Pittwater is an area of relatively unspoilt bushland. This perception is easily understood when the history of development in Pittwater is considered – small villages with surrounding residential building types being small freestanding cottages below the predominant tree canopy. There was little industrial activity, and the agriculture had cleared paddocks or erected glasshouses in relatively small areas in the valleys. This development type was the precursor to the current P21 DCP controls on building height and landscaped area ratios, amongst others, discussed in Chapter 5. The reality in the last two decades has been somewhat different: larger houses on increasingly smaller lots resulting in the landscaped area ratios being taken to the limit or tested in a majority of DAs; and larger higher developments in the commercial areas.

What Figure 4-4 does not show is the reduction in this de facto open space on private property over the last 40 years. That is, land not built upon in any way, which although unavailable for direct access by the general public, was part of the visual bank of 'greenness' available for the enjoyment of all. Also outside the SoE's scope, and therefore unreported, is the widespread community feeling that overdevelopment has already cost the Pittwater community too much (Manly Daily 1985, 2003). This feeling has led to the establishment of resident action groups like Pittwater Residents Against Inappropriate Development, and virtually all the Progress Associations to become lobbyists against development. This trend has been witnessed in other parts of Sydney and in other cities (especially Melbourne), seen in groups like Save Our Suburbs (Lewis 1998; Lindsay 2004; Millar 2004; Spurr N. pers. comm. 3/11/2004).

Figure 4-4 - Land use by % area, and open space in Ha (Pittwater Council 2002a)

Land Use by % of LGA



Open Space

Category	No.	Ha
Coastal beach reserves	9	41
Foreshore parks	42	24
Bushland reserves or part bushland reserves, including coastal headlands*	99	330
Large developed parks	15	44
Small parks	70	23
Sportsground areas	11	40
Golf courses	3	34
Wetlands	4	52

*excluding national park

The growth in the median size of new suburban houses over the last 40 years has been nearly 300% (Fuller & Treloar 2004), and the corresponding increase in their visibility in the landscape, combined with a reduction in planted landscaping and tree canopy cover, has caused the most friction between “developers” (strictly, any applicants for development consent) and surrounding neighbours. Council is most often caught in the middle, attempting to placate both sides using development controls in the DCP, which are frequently tested beyond their limits in the Land & Environment Court[37]. This illustrates the need to have controls that are defensible both logically and legally, further discussed in Chapter 5.

It is common for people everywhere to comment on the performance of their local council, and some writers and commentators have reflected on this, which tallies with this writer’s experience in Pittwater and other councils. It coincides with the argument put by the recently retired General Manager of Pittwater Council, that "people are seeking to use council as a weapon against their neighbours" which, if it continues as he suggests it might, promises a very troubled future (Lawton 2005b). Gleeson et al state that

[37] It is also true that many an objector to DAs has found the boot on the other foot when they attempt to gain approval for a development of their own – even something as seemingly simple as a residential alteration and addition.

consultation with the community in advance of delivering policy is an effective way of averting conflict, because it produces broad ownership of the policy, a policy central to PlanFirst (Gleeson et al. 2004; Sandercock & Friedmann 2000). The 2001 Review of the Land and Environment Court commissioned by the NSW Parliament also pointed out the poor outcomes of the current adversarial nature of many development applications (Smith 2001).

4.1.4.2. When community activist groups effect dubious policy

One of the fundamental principles of LA21 is that communities should be free to form whatever voice is appropriate to their culture and needs. With every *right* comes *responsibility*, a notion developed and accepted globally since the 19th century (Gewirth 2001; Obiora 1999; Patterson 2003; Sengupta 2002). Community activist groups (introduced in Section 4.1.1.3 above) are certainly a valid way for 'the appropriate voice' to be found, and a common feature is that within such organisations it is the loudest human voices which tend to get heard most, which attract other people of a similar mindset, which then guides the formation of policy. That policy does not always reflect a global view of sustainable development. Furthermore, there is a dichotomy at work here: the community group comes together because of a commonly felt need, but at the same time, democratic dissension may be effectively disallowed by the personal dynamics at work within it (Law 1991). Actor-network theory can be used to describe the processes in most community activist groups, but rather than pursue a further case study of such a group, within the broader case study being examined in this thesis, sufficient insight into the workings of the process can be gleaned from examining the process of the review of the dual occupancy policy, immediately prior to the drafting of Pittwater 21 LEP and DCP. Although this predates the Pittwater 21 period, it is relevant because the PlanFirst based LEP was on the council's agenda at this time, and the controls in this DCP were intended to be transferred with no change into the new LEP, and the processes of consultation were also similar.

Council's traditional position on medium density has been negative (even allowing for the redevelopment of Warriewood Valley, as noted elsewhere). This has been influenced significantly by community activist groups, against a background of enforced density increases from state government. The NSW Government has for over a decade been encouraging greater urban densities in Sydney suburbs, at times amounting to what

some councillors have described as coercion. Indeed, some councils have had their planning powers removed by the state government due to their perceived intransigence on implementing medium density planning policies (Kur-in-gai for example, in 2003). This has been used as a threat by the NSW planning minister against those councils the government does not consider to be accommodating their share of population growth currently bearing on the Sydney region. The state government has also introduced State Environmental Planning Policies (SEPPs) that automatically override all LEPs and DCPs.

i. An example of activist influence working against sustainability

It is useful to discuss the results of activist input based on poor information, which involves only a few of the total stakeholders, and which does not inform all those involved of the consequences of their decisions. This can be used to contrast the desired outcomes of the principles that form PlanFirst.

During the public exhibition period of the Pittwater's *Dual Occupancy DCP R2*, in 2002, submissions were made to the elected council regarding some of its proposed numerical controls. This writer played an active role in the research at this time[38], making a written submission to council in the course of this review process. The submission set out to make the Councillors aware of the likely design and sustainability outcomes of the controls they were proposing. The Draft DCP contained controls for dual occupancy buildings that failed to take account of passive design principles and the need for functional designs, and which differed significantly from those applying to single residential proposals. They are summarised here, with a brief statement of the design flaws inherent within each:

- Site coverage (developed area) limited to 40% of site,
  - Compared to single residential limit of 60% coverage.
    - Politically driven control, intended to eliminate dual occupancy from all but the largest sites (Clarke RJ 2002). All proposals on urban lots can be expected to occupy the maximum allowable.

[38] This was in his role as a practicing building designer in Pittwater, and as President of the Building Designers Association of NSW (BDA NSW).

- First floor area limited to 50% of ground floor area,
  - Compared to no first floor limit in single residential.
    - Combined with the site coverage limits (above) this control produced dysfunctional layouts, as there is an arbitrary delineation between floor levels, whereas good design allows the layout itself to delineate the arrangement of the levels.
    - Dysfunctional buildings may have increased operational energy, and have shortened lifespans, resulting in much higher embodied energy and ecological resource consumption impacts (Troy et al. 2003).
- Buildings were to fit within a 3.5m high/45° envelope with only a 200mm exemption for "minor eave protrusion" for shading control,
  - Similar controls for single residential, but looser envelope and developed area controls combined to give better opportunity for effective shading control.
    - This would encourage buildings without sufficient (or any) eaves or other shading devices, allowing uncontrolled solar access, with resultant overheating, increasing the likelihood of occupants using air conditioning, with increased greenhouse emissions (Williamson, O'Shea & Menadue 2001).

The role of some of the community activist groups in the formulation of the above controls can be seen from their submissions to council during the drafting of the R2 DCP (quoted and discussed below). As discussed above, community groups play an important role in allowing a democratic expression of interest and advocacy, but this advocacy can have negative effects on occasions. One example criticised aspects of the DCP as being too lax, and proposed numerical and qualitative controls which would work together to create a planning environment where dual occupancy was unlikely to

occur at all (Pittwater Council 2002c). This is in line with that activist group's stated position, and is thus an expected policy response, but there is no indication in any of their published documents that the policy has been formulated with regard to global sustainability.

ii. How the submissions were treated

The interesting point to note here is the way in which council staff assessed and responded to these submissions. The council document *Review of DCP R2 – Dual Occupancy 24/06/02* contained a record of all submissions made, but without any identification of who had made them. This report formed the basis of the policy voted on and adopted by council, and contains the public submissions with comments from council staff and their recommendation.

The councillors' desire for building controls to be the de facto means of executing planning policy that excludes dual occupancies is evidenced in the report, expressed somewhat obliquely in the phrase "Higher (i.e., more stringent) building standards are required for dual occupancies than for single dwellings." The report's author has simply responded to the clearly expressed intentions of the elected councillors. Interesting to note is the total lack of background explanation of that assumption: light would have been cast on a policy decision which all concerned may have felt disinclined to have drawn to the attention of the state government. Yet, in another example, a change is adopted where improving control of solar gain is concerned.

The question then arises as to why the latter suggested change was adopted while the first example was not. They are both logical and founded in good design principles, yet the former was summarily rejected. Actor-network theory describes (or allows for) the partial enrolment of actors, where some remain entrenched in their original positions when the controls are 'black boxed' (Latour 1994a). In this particular actor-network, there was no process or structure whereby it could be discovered if all the actors accepted the new positions, so it is not possible to fully describe the process (a shortcoming discussed in Chapter 5). However, the reasons for the difference warrant discussion, as some of the factors are the same as the Pittwater 21 process. It is also important to point out that it is unlikely that all the actors in the actor-network were made aware of all the issues (although this research could not discover that with total certainty). The wider sustainability impacts of short-lived buildings may never have been communicated to the

councillors, for instance, and so the actor-network was operating without all actors present (information) to enable it to proceed to a sustainable mobilisation. Instead, it mobilised an unsustainable result.

4.1.5. The actor-network and the planning controls

It is useful to explore aspects of the operation of the actor-network that affected the planning controls. This best done by discussing the inadequacies of the PLEP 93 and its myriad DCPs, then discussing the process that occurred in forming the new DCP, and finally discussing the effect of those controls on sustainability.

4.1.5.1. The inadequacies of the old LEP

There is both literature and empirical evidence that PLEP 93 had sufficient failings to warrant replacement. The literature, as discussed in Chapter 2, contains repeated criticism of proscriptive planning methodologies (Christoff 1999; Huxley 1994; Mant 2000; Naess 2001). Some of the newer Pittwater DCPs written under PLEP 93 did not reflect purely proscriptive methodologies, but these still sat within a broader context of proscription, and their overall impact still contributed to that paradigm (UDAP 2003). The evidence from field experience, that is, of users both inside and outside of council, was universally negative (Clarke RJ 2002; Dyce 2005; UDAP 2003).

4.1.5.2. Drafting the planning controls – the 7 key elements of *process*

Using the seven key elements of PlanFirst identified in Chapter 2, the *process* of producing the new LEP is examined, which then informs the discussion of its sustainability implications in Chapter 5. This section focuses on the public participation component of Pittwater 21's creation, consistent with seeking to understand the research question: whether PlanFirst offers an effective template for encouraging sustainable development. The seven key elements of PlanFirst are laid over the Pittwater 21 process, and the respective characteristics discussed, to form a gap analysis. These seven key elements are here applied only to the *process* of public participation, not to the *content* of the submissions or discussions held during that process, except where the process may have brought vested interests to the fore, or where the content indicates something about the process. Issues of *content* are discussed in Section 4.1.6.2 below.

1. Simplification of the planning process through a reduced number and layers of plans, and making those plans easier to find and understand.

2. Savings for business and the community through this simplification.

These elements of PlanFirst have more to do with content than process, and thus have no direct application to a critique of the Pittwater 21 public participation process.

3. Clear integrated regionally based strategies with an iterative relationship between local, regional and state plans and planning policies.

Pittwater 21 was developed without the encompassing PlanFirst regional strategy or plan, so this element could not be tested by this research. The community consultation process was deprived of a connection with a wider regional consultation process, and the information that might have brought to the local process. That DIPNR has since developed a framework and strategy confirms the value placed upon them, which is supported by Falk and other writers at the Planning Research Centre (University of Sydney (Falk & Toon 2003)), Troy at the Urban Frontiers program at the University of Western Sydney (Troy et al. 2002), Gleeson at Griffith University (Gleeson et al. 2004), and Searle at the University of Technology, Sydney (Searle 1999, 2003).

4. Community involvement, understanding and ownership of planning strategies.

This key element of PlanFirst is fundamentally applicable to the Pittwater 21 process. The three components of this element can be examined individually.

i. Involvement speaks of the penetration of the ideas under discussion into the wider community. It can be measured by several means, including written submission rates, attendance rates and surveying the community for awareness of the process. Numerical response rates can be misleading if there is no correlation of attendee records, as discussed above, and if selection methods have no way of ensuring representative participation. The Pittwater method of direct invitation to ratepayers cannot be shown to guarantee representation as discussed above. The participation rate

of 1.7% by adult population, or 4.2% by household, does not fully satisfy the goals set out in PlanFirst (or LA21).

ii. Understanding refers to the depth and breadth of knowledge of all the relevant issues possessed by individual stakeholders affected by the process. *Understanding*, according to commonly accepted definitions, comes from an informed knowledge, it implies a large degree of completeness to that knowledge, and that the knowledge can be practically applied in a way which fulfils the purpose of possessing it (Wikipedia 2005)[39]. This relies on an iterative educative-consultative process, where information is made available for assimilation, critical review and action by the recipients. In this regard, the Pittwater 21 process did not have a comprehensive method for delivery of such information. Draft LEP and DCP information was available to those who sought it, but often in very large quantities, with the result only a dedicated few (researchers, professional planners, and motivated community activists) delved into it. An exception to this were the Locality Workshops, which, because of their highly focused subject matter, were able to provide a degree of effective iteration between the participants. Therefore, the level of understanding was mixed, and did not achieve the potential offered by a more effective consultation process.

iii. Ownership in this context occurs when a majority of individuals within the community feel that a policy is theirs: that they have created it, are responsible for it and are willing to live by it. Ownership of a new LEP can only come through *involvement* and *understanding*. As Kasemir et al put it, "consent" for change is only achieved in a democratic setting after such a process is fully engaged (2003, p.6). It is most fully expressed when those individuals change their previous behaviour and act accordingly, such as not objecting to a particular development which is in accordance with the "owned" LEP, even if it is a significant change from the status quo which previously they would have protected.

[39] Wikipedia is cited here because it is a popular quasi-academic resource which reflects a mix of current academic and popular thinking. This is considered appropriate here because the stated aims of PlanFirst are specifically focused on the general population, and so its terminology must be examined in that light.

5. Ecologically sustainable development through provision of sustainable management of resources, environmental protection, affordable housing, and vibrant communities.

These elements of PlanFirst have more to do with content than process, and thus have no direct application to a critique of the Pittwater 21 public participation process.

6. Use of place based planning frameworks to achieve appropriate building form, with local adjustment of controls over time, especially through the use of masterplans.

The place based planning framework appears at first to be a *content* issue, but can be evaluated in terms of *process* (community involvement), because it seeks to be adjusted over time using local input, via community involvement and consultation. The Pittwater 21 consultation process focused heavily upon discussion of locality character and built form issues, with a dedicated series of public forums discussing locality based planning issues. These gave an opportunity for those interested enough to participate, to engage in the discussions, which reflected the desirable educative/consultative characteristics discussed in Chapter 2. The finally agreed form (prior to gazettal) of the new LEP also had a regular community review process structured into it, ensuring that the consultation would continue into the future. Thus, the consultation process responded to the need for responsive locality (place based) planning.

7. Explicit commitment to sustainability, existing references to sustainability in EP&A Act reinforced, and then used to add potency to whole framework.

The explicit commitment to sustainability at all levels is an important feature of an LEP, as it emphasises the need for *awareness* on the part of the community it serves. To achieve such awareness, the community must be informed, and consulted. The Pittwater 21 process certainly set out to do that, with limited success compared to the potential offered by PlanFirst and *Ideas for Community Consultation.* Budget appears to have been the primary limitation, which effected decisions about scale, duration and participant selection methods, as anticipated by the Local Government and Shires Association of NSW (2001).

4.1.5.3. Public participation methods used in Pittwater 21 compared to PlanFirst template

PlanFirst majors on the importance of meaningful public involvement in the creation of local planning instruments, as does LA21. It is useful to the research to focus on the effectiveness of the public participation program Pittwater Council undertook as a means of satisfying this PlanFirst requirement. This provides insight into the reasons for its success and limitations, which are further discussed in Chapter 5. The seven methods of carrying out consultation described and reviewed in Chapter 2 (Section 2.4.3.2) are discussed here in relation to what actually occurred in the P21 LEP consultation phase. As described above, the effectiveness of this process is critical to the outcome of the actor-network's processes.

- ***Search conferences***: This method was used by Pittwater Council early in the process of visioning the new Plan of Management in 2000, and again at the start of the P21 LEP drafting process. Its use can be shown to match the criteria set by the PlanFirst template (Carson & Gelber 2001).

- ***Deliberative polls and televoting***: This would have been useful as a before and after testing method, but was not used.

- ***Citizen's juries:*** This would have been most useful at the drafting stage of the LEP, used in conjunction with other polling methods. The necessity to pay participants excluded this from Pittwater's methods, which probably reduced its effectiveness (Kades pers comm. 16/5/2005).

- ***Consensus conferences:*** This would have been useful in formulating the Draft LEP, as it is a method that can handle complex processes while ensuring true representation. It was not used.

- ***Focus groups:*** The Urban Design Advisory Panel, and the Pittwater Sustainability Working Group function as focus groups for Pittwater Council, but these were not formed specifically for the purpose of developing the P21 LEP. They do provide specialist input on an ongoing basis on a range of topics, including the LEP.

- ***Charrette:*** The public meetings held in the P21 DLEP process most closely resembled focus groups, rather than charrettes, as it was only interested individuals and interest groups who were motivated who attended. This does not provide true representation, and obliges the organisers to estimate the breadth of community concern on any issue raised from attendees.

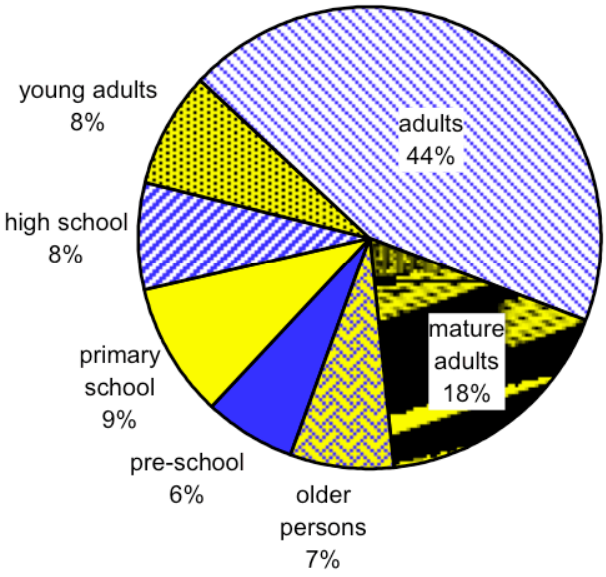
- ***Residents' feedback panels:*** These were not used in the P21 DLEP process. These would have been most useful if used at the start of the whole Pittwater 21 LEP process, but should have been started at least 2 years before the draft LEP was finalised, as it would have taken that long for sufficient knowledge to build up in the community to allow any globally informed deliberative consultation. This method still offers potential for an LEP review process in the future.

From the above it can be seen that the P21 process did not fully exploit the methods PlanFirst put forward. This resulted in less effective consultation than was possible.

4.1.5.4. Public participant selection procedures used in Pittwater 21

It is important to define who the possible participants in any consultation process are, before commenting on the effectiveness of the participation process. Pittwater's total population at the time was slightly less than 56,000. Figure 4-5 below shows that if all adults (18 years and over) were included, 77% of the whole population would be eligible to participate, or about 43,000 people. It could also be argued that those below the age of 18 have a right to participate, as a means of ensuring youth issues are adequately addressed; and that some of the "older persons" group might be unable to engage with the process. To avoid a complex discussion of these issues, both are ignored here, and the simple groupings of 'all adults' is used.

Figure 4-5 - Pittwater population by age, (Pittwater Council 2002a)



Using the ratepayer database, invitations were mailed to residents, and published in the Council Notices in *The Manly Daily*. The main emphasis was on direct mailing, as it cannot be shown with any certainty that significant numbers of people read the Council Notices[40]. Ratepayers are essentially property owners, both residential and business. There is no guarantee that a meaningful attendance rate will be achieved, or that those who do attend represent all of the stakeholder groups. Carson and Gelber identify poor attendance as one of the reasons people do not trust consultation processes to produce results which reflect real community wishes (2001). The invitations to participate were broader than just attending meetings, and included the suggestion of making written submissions, delivered as letters, faxes or emails.

It is worth questioning whether ratepayers are the only stakeholders in the process who needed to be consulted. Others present in the community, who do not necessarily appear in council records, include residential tenants, and small business operators who do not own their premises. Identifying these groups can be done by a process of participatory mapping, with geographical factors being overlaid by sociological factors (Greenwood 1999). Contacting these groups requires time and funding for research

[40] Directly mailed invitations may elicit a 1.4% response rate if the response to the original *Pittwater 2000: A Community Vision* is any guide, where 600 surveys were returned out of a potential 43,000.

before mailing lists are finalised, and thus the necessary extra budgeting would have to be made available.

4.1.5.5. Public participation rates in Pittwater 21

It is useful to discuss the participation rates as a means of evaluating the effectiveness of the Pittwater 21 public participation process. Because the participant selection method could not guarantee a representative participant group, other proportional measures must be used to gauge its effectiveness. Two of the most applicable have been selected, and are discussed here.

i. by total eligible population

The total number of participants over the whole process was as follows:

- survey respondents – over 600;
- attendees at public forums – approx. 800;
- written submissions – approx. 400.

(Kades pers comm,16/5/2005)

This totals approximately 1,900 individual participant events, making no allowance for those who attended more than one meeting, or who attended meetings as well as making written submissions. This is likely to be a small but significant proportion of the total (as defined above), but there are no complete records to enable an accurate correlation. There is insufficient literature on estimation or correlation methods to enable a statistical accurate estimate, but this writer estimates that up to 50% of people who made written submissions also attended meetings. It is also certain that because all survey respondents were ratepayers, and that ratepayers also made up the vast majority of (if not all) meeting attendees, these groups appear twice and thus the survey responses should not be counted in the total. Accounting for these two corrections then, the overall number of participants in the Pittwater 21 process could be in the order of 1000, or about 1.7% of Pittwater's adult population (40,660 at 2001 census, expected to be over 42,000 in 2004 (ABS, in Pittwater Council 2002a)). Conventional statistical thinking sees this as a significant result for a large population number (Moore 2004; Steel & Torrie 1960), but as Carson points out, assuring democratic representation from less than 5% participation is unwise (Carson & Martin 1999). Being a process of self-representation, in response to motivation and interest (including but not limited to, self-

interest), it necessarily represents a smaller cross-section of the actual diversity of local opinion.

Therefore, the 1.7% participation rate would provide a useful and representative sample of the total population if the participant selection method could be shown to have achieved such representation. Because there is no record of how many people attended more than one meeting, or whether they attended on behalf of community activist groups (as discussed above), there remain unresolved questions about the participant selection method. This does not mean that the public consultation process was a total failure, as other factors also affect its effectiveness, and a degree of empirical evidence exists to support the end result, in the form of improved sustainability outcomes, as discussed in Chapter 5. The consultation process also needs to be seen in the context of what is common practice in NSW local government at this time, in which case the Pittwater 21 process is a significant improvement over common past practice.

ii. by households

Another way to look at the participation rate is to think of it in terms of a proportion of households. This follows the unitary model first proposed by Becker (1974), and modified by many since, including Mazzocco (2004), and Bateman & Munro (2003). This method of analysis of participation rates as a function of households is valid so long as it is not the only – or main – method of doing so, as it is not always robust in identifying gender-specific variations, without detailed characteristics of the sample group being known (Bateman & Munro 2003). It is used here in conjunction with the analysis by total population, above, and more emphasis is placed on that interpretation than on this one.

The demographic profile of households in Pittwater shows 77% as being two parent households, the bulk of the remainder containing single parents, childless couples or lone occupants. Actual attendance of 800 at public meetings represents 4.2% of the possible total. The rate is likely to be lower than that because of repeat attendances at LEP Forums and Locality Forums, but this cannot be quantified by this research. Carson and Martin (1999) suggest that actual attendance rates of less than 5% can achieve representative sampling, assuming random selection, but not voluntary participation; Robinson (2003) also suggests voluntary participation needs to be treated carefully before reading too much into such feedback. That it cannot be so demonstrated, as a sample of either household type or total population, raises questions over the efficacy of

the selection method. Further questions are raised by the use of mail to ratepayers as the primary invitation method for voluntary participation, since not all members of the household may be aware of its arrival or significance.

In conclusion, the research found there is no perfect means of analysing the participation rates in this case, but the above methods are an opportunity to sketch it out in two ways, to better understand it. These two analytical methods both indicate shortcomings in the Pittwater 21 participant invitation and selection procedures.

4.1.6. The controls and their potential for sustainability outcomes

Having explored the *process* above, it is then useful to explore aspects of the *content* of the new P21 DCP. This commences with a survey of the new documents, followed by a gap analysis using the seven key elements of PlanFirst, concluded with a discussion of what aspects the new LEP/DCP can be expected to lead to better sustainability.

4.1.6.1. The end result – a survey of the new LEP & DCP

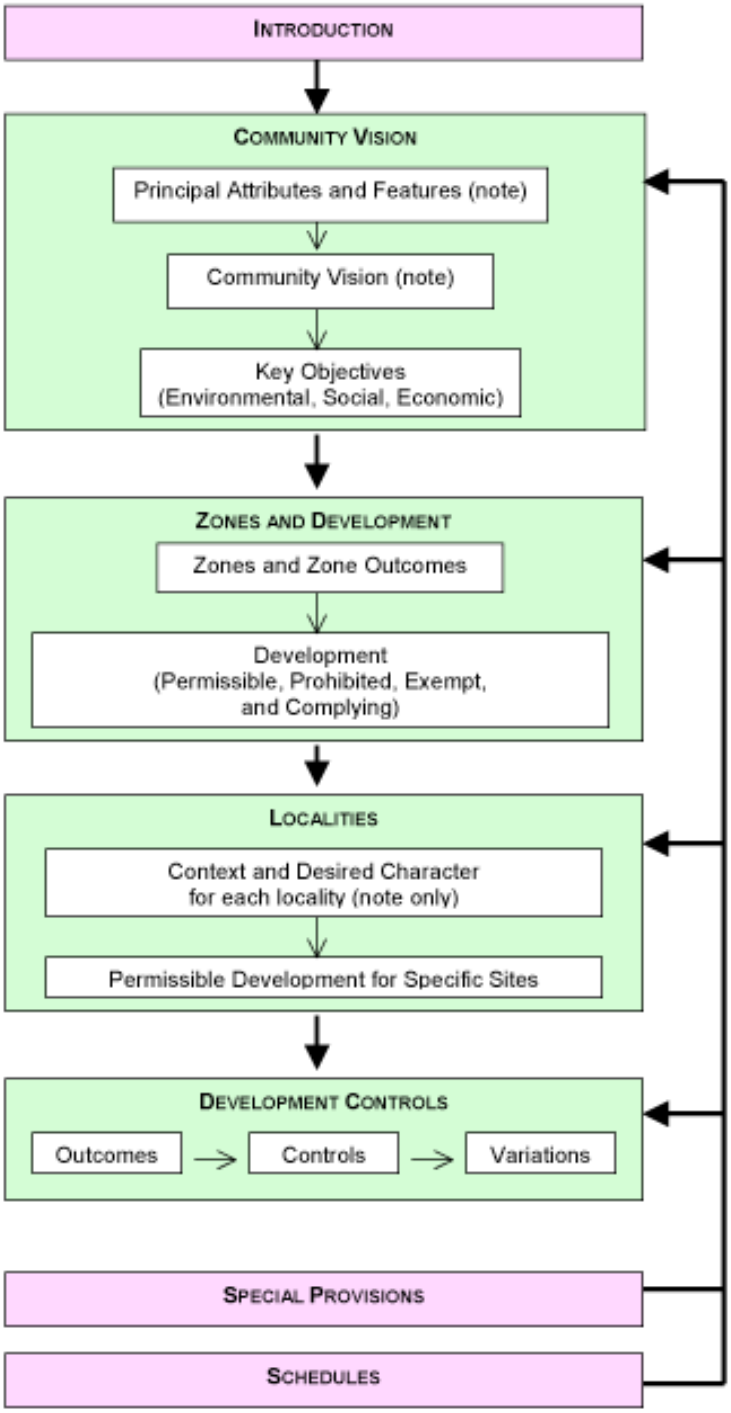
The Pittwater 21 LEP begins with an introduction that formally sets out its fundamental purpose, as well as certain conventional relationships between it and the land to which it applies, and other planning instruments (Pittwater Council 2005d). It contains a succinct statement of the key objectives, which centre on the opening paragraph of the "Community vision":

> *This plan guides the management, development and conservation of land in Pittwater to achieve the key objectives … of this plan.*
>
> *The community vision also seeks to achieve ecologically sustainable development, that is, development that maintains the ecological processes on which life depends while meeting the needs and improving the total quality of life of the current generation, without compromising the ability of future generations to do the same.* (p.4)

This explicitly positions the intent of the document to create a sustainable environment, socially, economically and ecologically. It reflects the input of several key and initiating actors in the actor-network.

Figure 4-6 below shows the flow of ideas that guided the production, operation and review of P21 LEP. The following sub-sections survey the LEP.

Figure 4-6 - Structure of ideas in Pittwater 21 Local Environment Plan



i. Explicit commitment to sustainability

This expression of the Brundtland (1987) definition of sustainability is made clear in the Pittwater 21 documents, so its intent should be clear to all, especially participants in the public consultation process. The statement of the key objectives is comprised of three sub-sections, which each spell out the detailed objectives of "Environmental… Social…" and "Economic Objectives". This places equal importance upon all three 'legs of the stool' in the familiar three-pillar model of sustainable development. While this model of sustainability has its critics (Albrecht 2001; Gosseries 2005), it is still important to acknowledge its presence in the LEP. In the Australian local government context, it may be splitting hairs to argue over epistemological differences inferred in terminology, when in reality, many LEPs barely mention sustainability at all (eg. Wyong Shire Council LEP 1991, amended 2004). It is agreed in the literature that a proper understanding of sustainability leads to more effective creation and implementation of sustainability policies (Basiago 1998; du Plessis 2003). The use of the 'three pillar' model of sustainability which appears in the Objectives of Pittwater 21 may not provide the best policy framework (Giampietro 1994), but it is acknowledged here that Pittwater 21 ascribes great importance to an unfolding understanding of sustainability, and reflects the commitment expressed in PlanFirst without any diminution of its intent.

ii. Parts 1 and 2 - The Community Vision and Key Objectives

The LEP controls land use, and thus community activities, by applying a process of thinking to each piece of land within Pittwater, coordinating the interaction of uses allowed on that land. This thought structure begins by accurately describing the starting point (in Part 1 of the LEP) – the geography and the inhabitants, then identifying a shared vision, which identifies key usage or activity types, applies those as appropriate to each defined locality within the municipality, and finally, produces development controls which will ensure the outcome in reality. Figure 4-6 above shows the schematic flow of the process (as published in Pittwater 21 Draft LEP).

A critical step at the start of the process is to get a clear picture of the shared vision – without which all other steps along the way are in jeopardy of failing to meet the community's real needs, thereby causing tension between community members when development occurs which does not meet their expectations, and causing increased disruption to the development assessment process by allowing conflict to arise between

applicant and council or neighbour. The community consultation phase in the drafting of a new LEP is the most effective time to capture this vision, and is therefore critical. The LEP itself has little to say about its own creation process, but in its first two draft forms proposed regular reviews with significant community input. These planned reviews were removed from the final (2005) draft due to DIPNR's desire to have state-wide consistency of all LEPs achieved within three years, thus limiting the lifespan of this LEP. This policy should be a good thing in the long term if the best characteristics of PlanFirst form a central part of that reformation process, but that discussion does not directly affect the analysis here.

From the community vision comes the Key Objectives in Part 2, which also include an expressed commitment to sustainability, reflecting PlanFirst's own explicit commitment.

iii. Parts 3, 4 and 5 – Place based planning: Zones and Localities - what the Guringai people knew all along

Part 3 of the LEP describes the process of planning to encourage a sense of place, by creating locality specific "zones". These are different to the traditional concept of 'use zonings' generally applied across a council area, regardless of locality constraints, where activities seen as undesirable were proscribed from the any area covered by that zoning. The old approach did not encourage retention or development of individual local characters, such as villages. In Pittwater 21, the zones are modified by the locality-specific controls, which defines those local characters. This is done in Part 4, by repeating the LEP's initial steps: describing the subject area, but in detail. Permissible development is then described for each locality, including the activity type, general building typology and form. Part 5 contains the development controls, and is closely linked to Part 4's "desired character", containing general control guidelines. The Special Provisions and Schedules inform parts of the process of the LEP, but are not relevant to this analysis, and are not discussed.

This pattern neatly satisfies the intended outcomes of PlanFirst "Local plans: planning for places" (1998, p.30; 2000), an approach supported by Mant (1998; 2000). The process described there of establishing the local community profile, what the vision for the locality is, how that vision will be seen in concrete outcomes, then setting strategic actions with monitoring and review, is embodied in the combined actions of Pittwater 21 LEP and DCP. The usefulness of place based planning has been shown in the literature

to have strong support, expressed succinctly by Mant (2002) as the need to put a sense of place at the centre of planning so that the community "...better appreciate that they are stewards of the land, rather than exploiters of its resources" (p.2). It is interesting to note that in the Key Objectives (Part 2 of the LEP), reference is made to the original inhabitants of Pittwater, the Kuringai people, stating that the area is part of their "homeland" with links stretching back thousands of years. The strong connection Aboriginal people feel for 'country' – for their homeland – is well known, and it is perhaps ironic that western place based planning is, in this generation, rediscovering the sense of place so well understood by the Guringai people in the past.

4.1.6.2. The planning controls' sustainability outcomes - the 7 key elements of structure and content

Using the framework first set out in Chapter 2.4.3, the content and structure of Pittwater 21 can be compared to the framework laid out in PlanFirst. The seven key elements of PlanFirst identified there are laid over the Pittwater 21 LEP, and the respective characteristics discussed, to form a gap analysis. These seven key elements are applied only to the *structure and content* of the LEP and DCP here, not the *process* of their creation, except where the *structure or content* have been clearly affected by the *process*. Issues of *process* are discussed in Sections 4.1.5.2 above. The LEP and DCP are discussed together here because in their present situation, the one cannot function without the other[41]; and because the controls within the DCP came out of the intent of the LEP, and were formed by the Pittwater 21 process. Note that the individual characteristics are dealt with in the detail demanded by each, thus some are considered in detail, others summarily passed over.

1. Simplification of the planning process through a reduced number and layers of plans, and making those plans easier to find and understand.

The new LEP in its original draft form included all the locality specific controls, and combined with the MasterPlan (iPlan prototype) internet interrogation tool, would have achieved significant simplification, tempered by the number of controls. As discussed in several other parts of this research, the reasons for the number of controls is a result of the relative affluence of the area, combined with a perceived high level of development

[41] At the time of writing, the LEP had not been gazetted by DIPNR.

which must be limited in future. This is a comparatively high level of control, relative to other less affluent councils where development may be being encouraged. The application of PlanFirst principles in other councils would be expected to result in different scales of reduction in complexity.

For the reasons discussed in Section 4.1.3.5 above, the development controls were removed from the DLEP, and introduced as the separate Pittwater 21 DCP. In spite of this apparent doubling of the number of documents controlling land use and development, the reality of the situation is that the meshing of the DCP and the LEP is such that the layering is imperceptible from the applicant's point of view, and thus the aims of simplification are achieved. This is enhanced by MasterPlan's role in interrogating the DCP on the applicant's behalf for development controls specific to each parcel of land. This research has noticed a reduction in problems associated with not having all information present at the time of enquiry, and this is corroborated by members of the Pittwater Urban Design Advisory Panel[42] (Australia. Dept. of Housing and Regional Development. 1995; Reardon 2001). Conversely, the assessing officer is less likely to impede the assessment process due to belatedly discovering relevant controls.

2. Savings for business and the community through this simplification.

The intended effect of the simplification is to reduce costs to the applicant. There is a direct link between time spent searching for controls and/or time spent correcting or amending proposals to account for later information not included in the initial design of a proposal, and extra costs associated with putting development proposals to council for assessment. This characteristic appears to have been achieved, so long as council assessment officers follow the framework, and do not embark on ad hoc assessments that do not follow the intent and explicit controls of the LEP and DCP. There is a grey

[42] Delays and other problems are still reported by this group as being encountered during the assessment process from time to time, but have other causes, usually associated with errors made by either the applicant or the assessing officer. While devices such as MasterPlan have a role in reducing such errors (by putting all relevant information up front), the presence of humans in the system will continue to reveal human error. This area of the workings of the DA assessment process is not relevant to the core of this research. More problematic, but also not quite within the scope of the research is the misinterpretation of the intent or application of controls by the assessing officer. The reasons for occasional misinterpretations possibly implicate the formulation of the controls, but further research will be required to determine any definite links.

area here, in that it is not always possible or preferable to carry out a strictly numeric compliance or 'tick the box' assessment.

3. Clear integrated regionally based strategies with an iterative relationship between local, regional and state plans and planning policies.

This feature of PlanFirst has no clear reflection in Pittwater 21, due to the change in policy by the NSW Government in 2003, when PlanFirst was not implemented. Beyond recognising the useful potential of this (as discussed earlier), the current lack of coordinated regional strategies means this characteristic cannot be evaluated here.

4. Community involvement, understanding and ownership of planning strategies.

This characteristic has more to do with the *process* than the *content*, and discussion of it can be found in Section 4.1.3 above.

5. Ecologically sustainable development through provision of sustainable management of resources, environmental protection, affordable housing, and vibrant communities.

To discuss this set of aims each component must be examined, then the Pittwater 21 response evaluated in relation to the statement as a whole.

i. Sustainable management of resources is taken to mean those resources within the control of local government rather than say, mineral extraction, which is not. This should consider all those available in a given area of jurisdiction, including tangible and intangible resources. The tangibles could include such things as greenspace, tree cover, and the hydrological cycle, as well as recreation space (reserves and playing fields etc), libraries, community halls etc, and beaches. Intangibles could include the knowledge base of council staff (such as the Pittwater Library Local Studies Unit, and the Coastal Environment Centre) where these can be seen to assist the understanding of local issues for the purposes of enabling better decision making, by councillors in the course of council business, and the community in everyday life. Pittwater 21's effect in assisting or retarding this process is not easily defined, as an LEP does not directly affect council social services policy.

ii. Environmental protection infers an effective means of preventing degradation of the terrestrial and aquatic biome of a given area. While Pittwater covers a relatively small sector of the biome of the Australian continent and adjacent ocean and waterways, the principle enunciated here lays a clear responsibility at the feet of councils to do what they can. In Pittwater's case, the LEP's Key Objectives hold out the goals, but would mean nothing without effective controls being applied to bring them to fruition. These controls are to be found in the DCP, and include some which affect things like natural hydrological cycles (through controls on site coverage and developed area ratios), air quality and biodiversity protection (through tree preservation orders, and landscaping species requirements), localised flooding and erosion protection (through on-site stormwater detention and sediment control requirements). Less obvious, are controls, which have an impact globally rather than locally, although even these usually have some immediate and local benefit, such as solar access requirements for neighbouring buildings. This example protects the rights of neighbours to solar access, which provides higher levels of amenity, economy, and comfort, in accordance with accepted planning principles (1987); and also reduces demand for artificial heating, thus reducing global greenhouse emissions. Thus, it can be seen that the Pittwater 21 LEP and its derived DCP reflect the *environmental protection* characteristic of PlanFirst.

iii. Affordable housing as an expression of social equity is an essential part of sustainability, as it works against social stratification, but an LEP's ability to encourage it is limited. Brundtland's definition of sustainability discussed in Chapter 2 speaks of equity between generations, but this necessarily implies that there must be equity within generations (du Plessis 2003; Newcastle City Council 2005). Affordable housing is provided by a combination of forces, and is not entirely within the control of council planning policies (NSW Department of Housing 2005). Without government intervention, affordability is almost totally at the mercy of the free market (NSW Department of Urban Affairs and Planning 1999). Left to its own devices, the free market would provide no affordable housing in Pittwater at all (Berry 2002; Pollard 2004). This is discussed further in Chapter 5.

iv. Vibrant communities is a term that needs definition, as it is open to interpretation. For these purposes, it is considered to mean a society which people find it exciting to be part of, and which has energy and vigour – a definition taken from popular usage, which reflects PlanFirst's use of non-jargon (Pittwater Council 2002a).

Excitement also needs definition. Here it is taken to mean that members of the community find emotional and intellectual stimulation within their own community without the need to leave regularly; and that the local community meets most work and recreational needs, by a combination of physical and natural attributes of the local area.

The village centres, which the LEP identifies as central to the social make up of Pittwater, perform a crucial role in making *vibrant communities*. Pittwater Council's own research, uncovered in the Pittwater 21 public participation process, and reinforced by the 2001 profiling of Pittwater from 2001 census data, shows that residents tend to gravitate towards one or two local centres (Basiago 1998). This is discussed further in Chapter 5.

v. Socially balanced ecologically sustainable development – this is the summation of the separate parts of this key element: true sustainability is only achieved if social balance is also achieved (Berry 2002). The term *social balance* implies social equity, both in economic and democratic terms. This is key to the implementation of the fundamental principles of LA 21, and PlanFirst emphasises it. But in Australian society, the "fair go" egalitarian society falls short of the popular notion (Architectural Review (ed) 1994; Baggs 1996). An LEP can encourage or discourage the balance, but on its own cannot create it.

6. Use of place based planning frameworks to achieve appropriate building form, with local adjustment of controls over time, especially through the use of masterplans.

This characteristic is complex, involving an over-arching planning paradigm (a *place based framework* and *masterplanning*), which is subject to an ongoing review process with local input, and it is useful to consider the parts separately. As discussed above, one of the fundamental characteristics of Pittwater 21 is its emphasis on place based planning. The Locality Statements, and their locality-specific controls, focus on maintaining the desired future character of each locality. The success, or otherwise, of this can be measured in several ways. A simple measure is the degree to which applications comply with the controls, thus being seen to meet the preferred outcomes.

i. Appropriate building form, in general terms of thermal comfort and operational energy usage in residential buildings, can be defined as the use of passive

design techniques to provide naturally controlled thermal comfort (HIA Greensmart (reproduced by) 2004). Thus it will allow winter sun to provide heating, but exclude summer sun through use of shading structures (awnings, eaves and pergolas etc), It will and allow cross ventilation, possibly combined with stack ventilation, to remove excess heat in summer. Insulation and glazing will prevent detrimental heat flows through the building envelope. The *form* of the building responds to the demands of these design principles, by arranging the habitable spaces, and plan form, accordingly. It is useful by way of example to note how Pittwater 21 treats shading devices.

The controls relating to shading devices tend to encourage proper use of these design elements. Eaves, shade frames and fixed or movable screens are not required to fall within the building-planning envelope (a hypothetical line drawn from the boundary, which the whole building must fit within). Figure 4-7 below shows an example of this, where a 1m side boundary setback applies. This is generally the minimum setback applicable in areas covered by the Pittwater 21 DCP, and is the worst-case scenario for providing correct shading due to the limited space between the building and the boundary or other structures. Figure 4-8 below shows the passive solar design principles, demonstrating the importance of controlling solar access by exploiting the varying seasonal sun angles.

Figure 4-7 - Pittwater 21 building planning envelope diagram, with one possible shading angle superimposed (from Pittwater 21 DCP, and Clarke (2003))

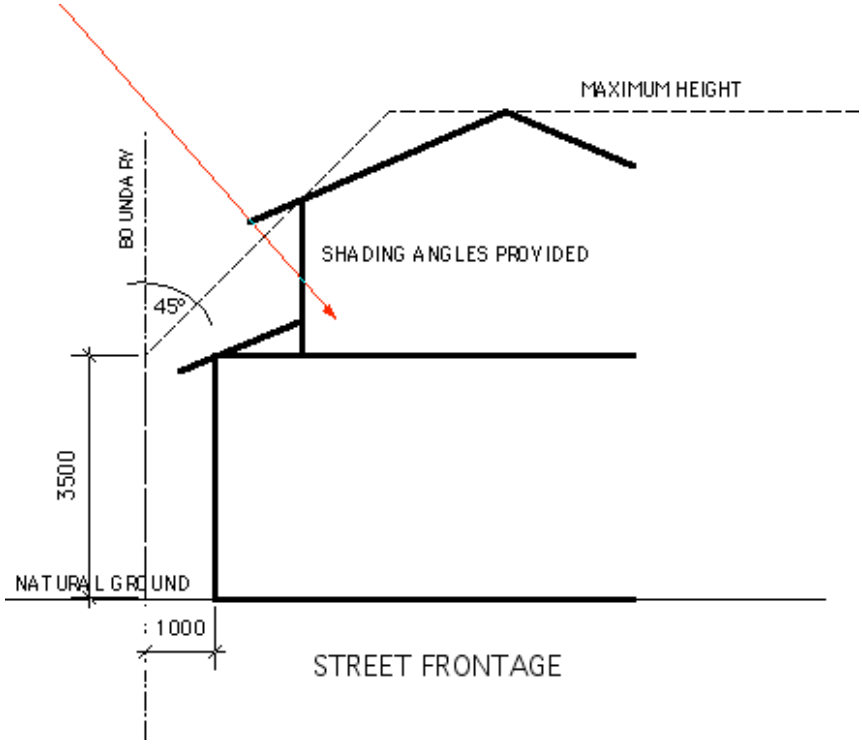
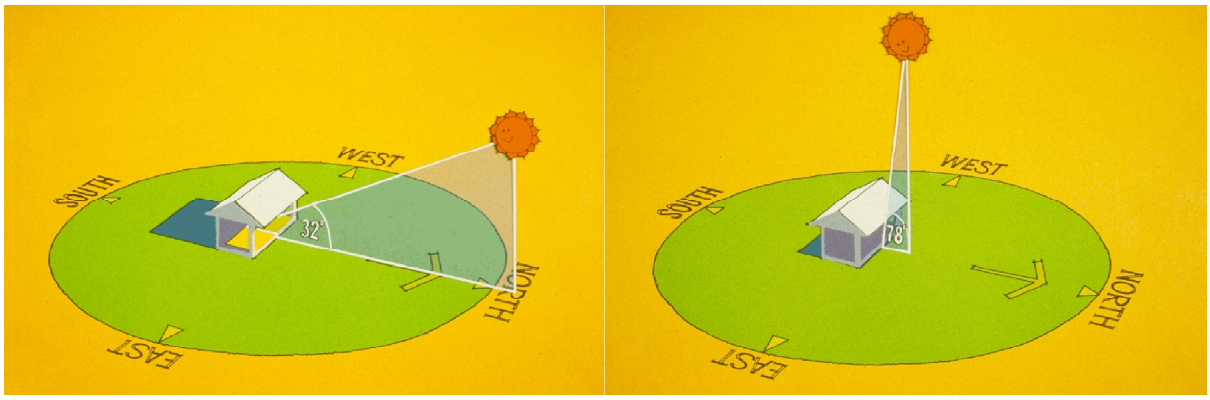


Figure 4-8 - Seasonal solar elevation angles as used in passive solar design (from HIA Greensmart et al)



Appropriate has cultural implications, especially in the discussion of PlanFirst, given its emphasis on *place.* Moreover, this researcher agrees with others from within and without the architectural field who have argued that relevance to culture should always be considered in a discussion of *appropriate building form*, (Bremmer & Lung 2003). It affects this research insofar as an effective LA21 process should not establish global cultural uniformity – as Bremmer & Lung have said, each cultural group within societies must be free to use the visual language that is traditionally theirs (also Chibli 2002), implying they should choose from the palette of materials which are readily and sustainably available. In Pittwater's case, this implies a style, which incorporates all of the design principles outlined above, as well as particular features to allow a response to its coastal climate. This would be expected to appear in several ways, one being a perforated building form to allow free passage of the regular summer sea breeze, with openings perhaps having directional ability (such as casement windows) in response to the narrow sector from which the breezes regularly come (the north east). This research has not uncovered such a design response to the DCP, but rather, a continuation of the design typologies commonly expressed before the introduction of Pittwater 21. This can be seen to be affected by the following factors:

- some designers (mostly local to Pittwater) already design buildings appropriate to the culture and climate, or believe that they do;
- designers usually work in more than one council area, and their design types are established to respond to variable DCPs;
- designers sometimes work across different client social and cultural sub-groups, whose demands makes it difficult to properly develop a particular (appropriate) style;
- education on the detail of Pittwater 21 was only carried out with interested local designers, and thus some of its impact is lost on those unfamiliar with it;

- a widespread lack of knowledge amongst designers at large, of sustainable design in general, and climate responsive design techniques in particular.[43]

It can therefore be concluded here that Pittwater 21 encourages, but does not mandate appropriate building form: it is encouraged, but inappropriate forms are not prohibited. In the context of NSW planning law, it is in fact very difficult for LEPs to prohibit certain building forms. This has been attempted through instruments such as SEPP 65, which attempts to improve environmental performance, as well as steering design appearance and aesthetics, with mixed results. An LEP or DCP is in a much less powerful position, and it is unlikely to be able to achieve this on its own.

ii. Local adjustment of controls over time relates to the possibility of an ongoing review process with community involvement. The community consultation component of that is described in Section 4.1.5.2 above. The structural element of the Pittwater 21 LEP was intended by Council to have regular formal community-wide reviews, as contained in the various initial Drafts. The removal of these, and the substitution of a three year sunset clause for the whole LEP was caused by DIPNR's intention to introduce state-wide consistency between all LEPs in that period, and while the detail of that policy had not been made public at the time of writing, in broad terms it is in line with PlanFirst principles. Thus, it is not possible to meaningfully critique Pittwater 21's response to this characteristic.

iii. Masterplans[44] involve combining controls for individual lots into larger parcels of land, allowing certain design flexibilities within each lot, yet having the whole

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[43] This has begun to be addressed with programs like the Your Home Technical Manual promotions, and various seminar series undertaken by industry organisations such as the Association of Building Sustainability Assessors, the Royal Australian Institute of Architects, the Building Designers Association, and Housing Industry Association's Greensmart course, and others. The penetration in numbers, and effect, is still low. The Australian Greenhouse Office, in partnership with the Association of Building Sustainability Assessors, the Institute for Sustainable Futures, and the main industry associations, has begun a more intensive industry education program titled the Building Industry Trainaing in Sustainability (BITS), which will target thousands of designers of all types nationally, starting in late 2005. One of BITS' main functions will be to train participants in detailed climate responsive design techniques. Programs such as these will work in tandem with DCPs like Pittwater 21, to effect definite change in the standard of design in residential development, with improved sustainability.

[44] Masterplans (and masterplanning) as small scale planning instruments, are not to be confused with MasterPlan, the Pittwater interrogative web-based DCP. This tool, as discussed in various parts of this thesis, is prototype of the NSW Government model iPlan. It is not clear why this title was not used, to avoid confusion. The use of the capital M, and P in the middle of the word, is its distinguishing identifier, but the context should also make the distinction clear.

responding to a more singular design, with improved outcomes for the whole locality. The ability to produce a binding masterplan in a DCP depends upon either the control of the subject lots (through common ownership), or a cooperative will amongst the titleholders. An LEP has more scope to provide binding controls through masterplanning, because of an LEP's standing as a legislative sub-set of the EP&A Act (unlike a DCP).

Pittwater 21 has provision for use of masterplans, especially in the commercial centres, but at time of writing, these have yet to be widely adopted. It is essential that a majority of landholders in any given area agree explicitly to be part of a masterplanning process, and therefore be bound by its outcome, or the result is likely to be significant litigation. Because masterplans have no legal standing in the EP&A Act, Council risks spending significant funds attempting to uphold them in the Land & Environment Court (Errikson 2004). It has also been discovered that in some parts of Pittwater there is a lack of cooperative will amongst titleholders to voluntarily embrace masterplans (Pittwater Council 2002b, 2003a).

iv. Summary – this characteristic of PlanFirst is partially reflected in Pittwater 21. This is due to some factors outside the council's control, and others that it could have affected:

- it is overtly place based, through the use of locality controls;
- it does not guarantee appropriate building form, it softly encourages it;
- it would have provided some mechanism for local control in the proposed review process, since sidelined by DIPNR in this instance (but possibly allowed for in the future state-wide plan making strategy);
- the use of masterplans is limited.

7. Explicit commitment to sustainability, existing references to sustainability in EP&A Act reinforced, and then used to add potency to whole framework.

The commitment to sustainability is explicit in both the Pittwater 21 LEP and DCP. This explicitness is exemplified by the opening statement in the 2003 Draft LEP: “To be leaders in the provision of Local Government services, to strive to conserve, protect and enhance the natural and built environment of Pittwater and to improve the quality of life for our community and future generations”. These words are repeated from the *Pittwater*

Management Plan 2002 – 2007, which is the document written by council to establish its own targets and modus operandi, with which Pittwater 21 must be consistent (Lipman 2004). The current Draft (at time of writing) has expanded and embedded this broad aim into the Key Objectives (as discussed above), enabling a more specific but no less explicit interpretation of the application of sustainability to be made.

The next section of the thesis examines Pittwater 21 from the second perspective outlined in the introduction to Chapter 4, in relation to the principles of public participation outlined in PlanFirst.

4.1.7. Research proposition proved: that Pittwater 21 has the *potential* to provide improved sustainability outcomes

Section 4.1 of the research has focussed on an examination of Pittwater 21's potential to provide better sustainable development. This has been examined in the process of answering the primary research question, as to whether PlanFirst offered an effective local planning template for encouraging sustainable development. The answer to this question would also apply to any similar planning template that used the same or similar principles.

Looking closely at Pittwater 21's creation process, and structure and content, and using the literature and PlanFirst itself as the yardstick, Pittwater 21 is qualitatively analysed. Section 4.1.1 uses actor-network theory to identify the human and geographical influences as actors in the actor-network that created the council, which led to the creation of the new Local Environment Plan, traced through Sections 4.1.2 and 4.1.4. This enables an analysis of the creation process itself in Sections 4.1.3 and 4.1.5, which the literature has shown is as important as the result. Section 4.1.6 then provides an analysis of the structure and content of the planning controls, demonstrating that the controls contain the potential to improve sustainable outcomes in the built environment.

Section 4.2 goes on to test the second research proposition, that this has been achieved, using a quantitative analysis. Chapter 5 then contains a detailed qualitative discussion of the implications for sustainable development of the creation and review processes, structure and content of the PlanFirst Pittwater 21 planning controls.

4.2. THE SUSTAINABILITY IMPACTS OF THE CONTROLS IN PRACTICE

This section examines the results of the implementation of the planning controls within Pittwater 21, and proves the second research proposition:

> That the *implementation* of Pittwater 21 has *resulted in* improved sustainability outcomes in the built environment.

This mostly a quantitative analysis, referring to research data reviewed in Chapter 2. It commences in Section 4.2.1 by examining the means by the planning controls are implemented, identifying some impediments to successful implementation. Section 4.2.2 then examines the impact of developments approved by Pittwater Council across the three selected ecological impact categories, using the indicators and the methods discussed in Chapter 3. These indicators are greenhouse gas emissions from space heating and cooling (operational energy); mains supplied potable water demand from housing and private urban landscapes; and greenhouse and social amenity detriment caused by private car dependency.

Section 4.3 concludes the chapter with a discussion of the shortcomings of the implementation of Pittwater 21. Chapter 5 contains a discussion of the implications of the findings contained in this, and the other Sections of Chapter 4.

4.2.1. Implementation of the sustainability provisions

This section discusses the implementation of the sustainability provisions of a local planning instrument (Pittwater 21 DCP) in the development approvals process, and what the impediments to that implementation are. It then examines whether a smooth path to development approval by council might indicate that one aspect of a sustainable planning instrument – community and industry consultation – has been carried out effectively.

4.2.1.1. How the controls are implemented in the DA process

The structured processes established within the case study council are discussed here, for establishing the potential impacts and opportunities presented by PlanFirst, as manifest in Pittwater 21.

Pittwater Council's structure follows a common municipal model found in urban areas across Australia. The elected Council consists of nine Councillors, to whom the General Manager is responsible. The GM carries responsibility for a conventional hierarchical structure of departmental and portfolio managers. There are a number of committees, including the one that deals with the focus of this research – the Environment & Planning Committee. Council meets in full session once a month, and community access to the democratic process is via one or more of the local councillors, although there is no barrier to prevent ratepayers lobbying councillors from other wards as well. Committees meet at other times, more or less regularly, although it is interesting to note that the Environment & Planning Committee meets twice monthly.

There is also an ex-officio body known as the Urban Design Advisory Panel (UDAP) which advises council on various matters, including but not limited to, the design of civic projects, significant built works, planning policy and specific building controls within those policies. This group is made up of selected design practitioners who live or work in Pittwater (including this writer), senior council staff including the Principal Strategic Planner, Director of Planning & Assessment, Manager of Environmental Planning & Community and on occasions the General Manager. Councillors are also free to attend. As noted in the Introduction to the research, through UDAP and by individual means, this writer has engaged in action research in the P21 case study.

The following four sub-sections summarise the four stages in the processes of lodging and assessing a development application (DA). It is useful to understand the intricacies of the process, as it sheds useful light on the way councils see themselves – and how applicants see councils – as the gatekeepers of appropriate development. This then informs the discussion of the implementation of the sustainability controls within local planning instruments.

Stage 1: Delegated authority – This is the fundamental level of assessment, performed by council's planning officers, using strictly interpreted guidelines. Compliance with DCP controls is normally mandatory at this level of assessment, disallowing 'merit assessment'. This stems from council staff's awareness that elected councillors are often ill-equipped to understand the subtleties of more complex design solutions, and thus 'feel more secure' ticking compliance boxes. A numeric compliance assessment method provides this perception of security through the benefit of transparent accountability and

certainty: anyone can examine the assessment after the event and determine whether it was done correctly or not, and the applicant knows ahead of the assessment process what is approvable and what is not. These characteristics had an effect on decisions made later in the process of drafting the Pittwater 21 DCP.

Stage 2: Development Unit (DU) – This is comprised of senior planning and/or engineering staff, and is used when serious objections are raised, or junior assessment officers are unable to approve more difficult applications. Matters are referred to it if the assessing officer considers the application has merit, but some details remain unresolved, and there are no major reasons for refusal. The DU has elements of politics and subjectivity at work at all times. This is due to its deliberative consideration of neighbour objections, and its members' mindfulness of what the elected council is likely to approve if matters proceed to that political forum. The written policies of the LEP and DCP, and the EP&A Act itself, exert influence because of the limits or desired outcomes they set, and are the starting point in the actor-network. Council staff **(**usually planners) have a particular set of biases, which may be applied to the approvals process without structured testing or balance from other disciplines. The DU also suffers from a tendency to look for compliance with controls in simple compliance assessment terms, rather than allowing merit-based assessment. The diligence and competence of staff in control of the process is a major factor (Begadon & Agocs 1995; Lawless 2002).

Stage 3: Council Consideration - Some complex applications are referred to the elected council for consideration, such as those with high local significance, or where objections have been unresolved by the DU. Councillors may also request that an application be brought to the council's attention for various reasons, usually the result of external lobbying. Staff reports recommend approval or refusal, and contain a complete analysis of the issues and difficulties, especially concerning the DCP and the desired outcomes as required by the LEP, which inform deliberations, and in theory allow councillors to make objective decisions without political bias or subjectivity. In practice, it is not possible to remove popular politics from the decision making processes of council. The process of debate within council meetings is often not exhaustive or deliberative, and can suffer from lack of information or preparation. Ad hoc addition of Conditions of Consent may also seriously affect the physical impact and performance of the building. There is no formal structure to control these ad hoc events, while there is anecdotal

evidence to suggest that they may be ill-considered (Dickson D. pers. comm. 28/10/2004; Downes P. pers. comm. 27/10/2004; Hatch 2003).

It has been argued by critics of common council processes that most matters should not come before council at all, if the controls are right and the objectives clear – but this is not the case in reality. Councillors are largely responsible for the emphasis on numerical compliance assessment, being unwilling for political reasons, or unable for lack of training, to risk using merit assessment of DAs which satisfy the intent of the LEP and Locality Statement, but fail to fully meet numerical compliance (Kosny & Kossecka 2002; Reardon 2001; Veale 2003). On the other hand, such approvals may risk being misunderstood by the community, and seen as council acquiescing to pressure from applicants.

Stage 4: Appeal to The Land & Environment Court - Applicants can appeal to the Land and Environment Court if their application is refused or modified by council, or if the application is not dealt with within the statutory time allowance of 40 days. The Court makes priority reference primarily to the EP&A Act, and then to any other state planning instruments such as SEPPs, then to the current LEP. DCPs are seen as guidelines by the Court – and may be considered binding in the absence of other over riding instruments. Other information[45] that could be argued to over-ride the DCP may be a design solution which can be shown to satisfy the objectives of the LEP in a way not anticipated or set out by the controls in the DCP. The fact that there are so many grey areas in any activity controlled by legislation gives opportunity for legal argument on issues of interpretation, intent, and merit. What may start as a simple exercise in ticking compliance boxes becomes a battle between protagonists attempting to gain support for their argument, with no certainty that sustainability is improved in the outcome. It is likely that clearly expressed and effective LEP objectives and DCP controls would reduce the number of cases taken to the Court.

4.2.1.2. Impediments to successful implementation

There are several impediments to successful implementation which have been identified by the research, some of which hinge around the assessment process. The current DA process in NSW is not a reliable way of arriving at sustainable outcomes, as discussed

[45] Another instance in which the Court may vary its consideration of an LEP or DCP is when there is a draft of a proposed new plan on public exhibition.

in Chapter 2. The goals of both the state planning authority and councils mostly intend to achieve sustainable outcomes, but the complexity and layering of the assessment process make it quite complicated in many instances. The assessment process used in Pittwater Council had not significantly changed under P21 LEP at time of writing. The result is that DAs responding to its encouragement of sustainability may be hampered by its assessment processes.

Possible failures within the assessment process include subjectivity on the part of the assessment team, political interference at staff or council level, and inability to make merit assessments when numerical controls do not offer the best result. These are discussed in Section 4.2.1.1 above, but this research has not pursued these any further.

Another impediment to successful implementation is the failure of the designer or applicant to respond correctly to the planning controls, for reasons of ignorance (not being aware of the relevant information), or lack of understanding or ownership of their purpose, as discussed in Chapter 2. MasterPlan has addressed the issue of identifying the relevant information, but its treatment on the designer's part remains a potential risk to the best possible outcomes.

4.2.2. Effectiveness of the controls in practice

This section of Chapter 4 presents the results of the measurement of Pittwater 21's impact on the three selected ecological categories, which are: greenhouse emissions caused by the predicted need for space heating and cooling (Section 4.2.2.1); mains supplied potable water demand in buildings and built landscapes (Section 4.2.2.2); greenhouse and human amenity impacts from private motor vehicle use (Section 4.2.2.3).

The impacts are quantified in the research here, and interim conclusions drawn on the relative performance of buildings approved by Pittwater Council under the old PLEP 93 paradigm, and the new Pittwater 21 paradigm. The results in this Section are intended to be interpreted indicatively, not as definitive statistical analysis. As discussed in Chapter 3, the sample size prevents more than an indicative result, and it is sufficient in any case, given the nature of the Pittwater 21 case study.

A discussion of the shortcomings of the research follows in Section 4.2.3, and the implications of the results are discussed in Chapter 5.

4.2.2.1. Operational energy (space heating & cooling) - greenhouse emissions

Using the method set out in Chapter 3 Research Design, two sets of results were obtained from development consents granted by Pittwater Council immediately before and after the introduction of Pittwater 21 DCP. Set A is comprised of those approved under the old PLEP 93 set of controls, Set B under the new P21 controls (P21 DCP controls as presented by Masterplan). The method uses the BASIX 2003 Sydney region energy loads benchmark for single and dual residential buildings as a yardstick, with each sample DA's heating and cooling loads (calculated using NatHERS) compared against it. No other items which can be measured in BASIX, such as lighting and ceiling fans, were considered – only the NatHERS predicted heating and cooling loads for the building structure.

Figure 4-9 and Figure 4-10 show the cooling load results for the fifteen selected DAs in each of the two sample sets. Figure 4-11 and Figure 4-12 show the heating load results in the same way. The sample codes (A01 to A15, and B01 to B15) identify the development consents (approved DAs), as discussed in Chapter 3. The median, mean and standard deviation are also shown at the right hand side of the bar charts. Note that these results are the actual cooling and heating loads in MJ/m^2/year as produced by NatHERS, expressed as a difference (above or below) the BASIX target cooling and heating loads, which are calculated within the BASIX tool for each proposal, forming the variable baseline of the BASIX 2003 benchmark building. These are not final BASIX percentage targets, as commonly expressed in the tool's nomenclature. Thus a low figure equals lower energy demand. The heating and cooling loads summarised here are not compared as percentages, because they are expressed as the difference – above and below – the BASIX benchmark, which varies with each sample, according to conditioned floor area and occupancy (as discussed in Chapter 3).

Figure 4-9 - PLEP 93 (old DCP) cooling load scores relative to BASIX Benchmark 2003

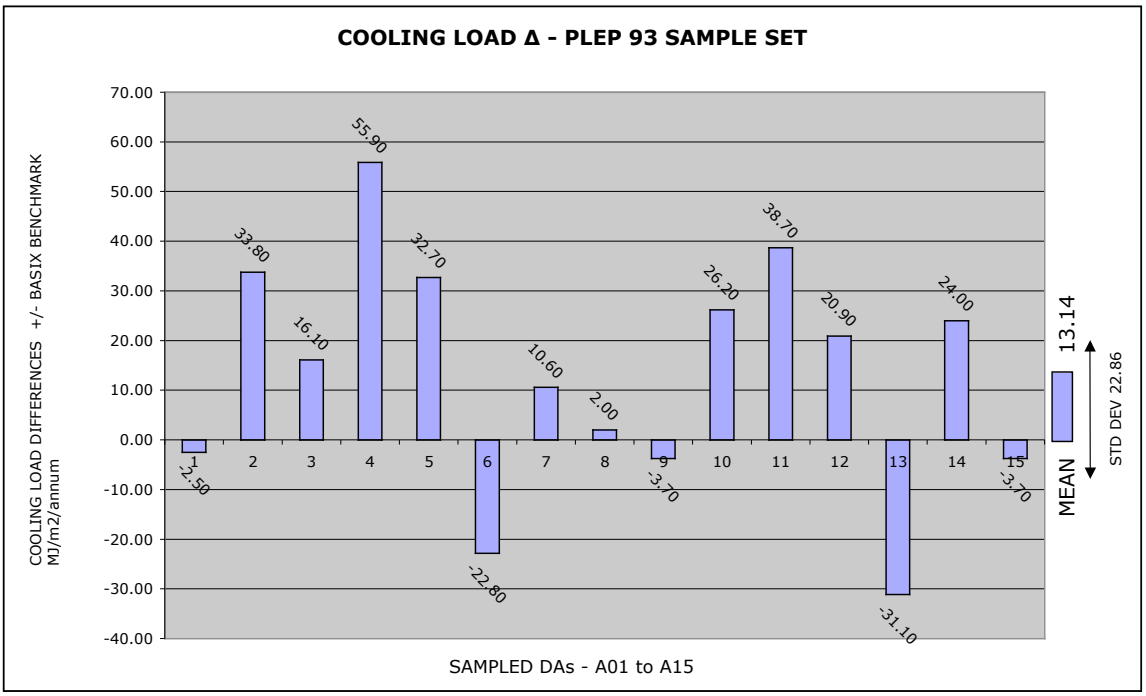


Figure 4-10 - P21 (new DCP & Masterplan) cooling load scores relative to BASIX Benchmark 2003

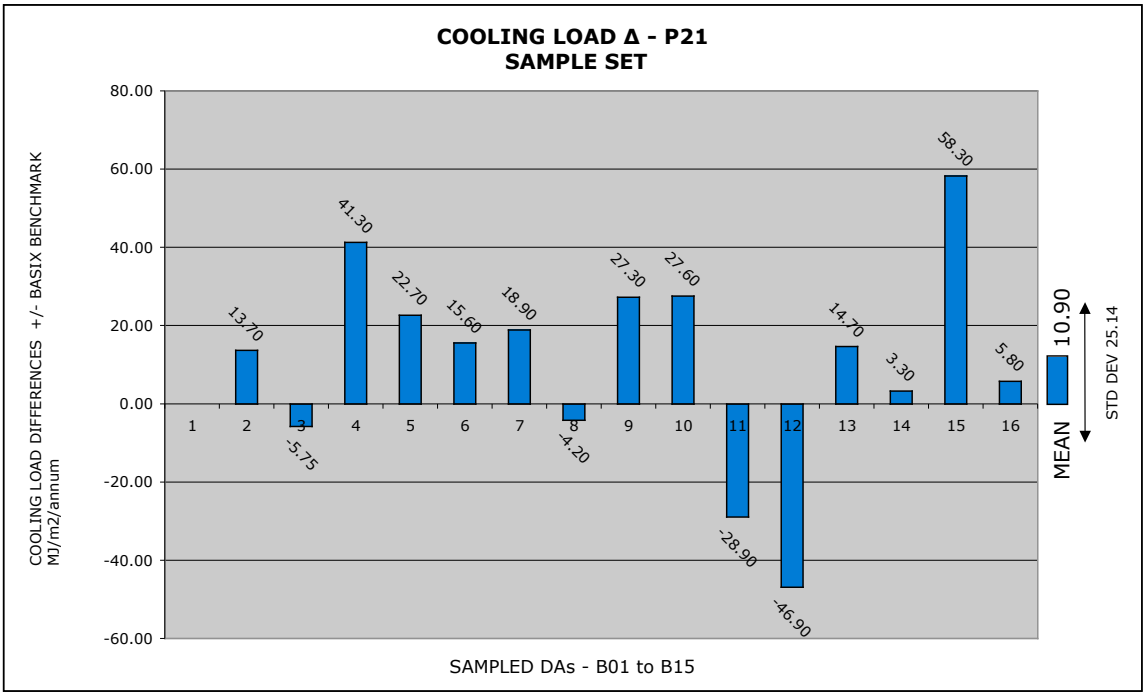


Figure 4-11 - PLEP 93 (old DCP) heating load scores relative to BASIX Benchmark 2003

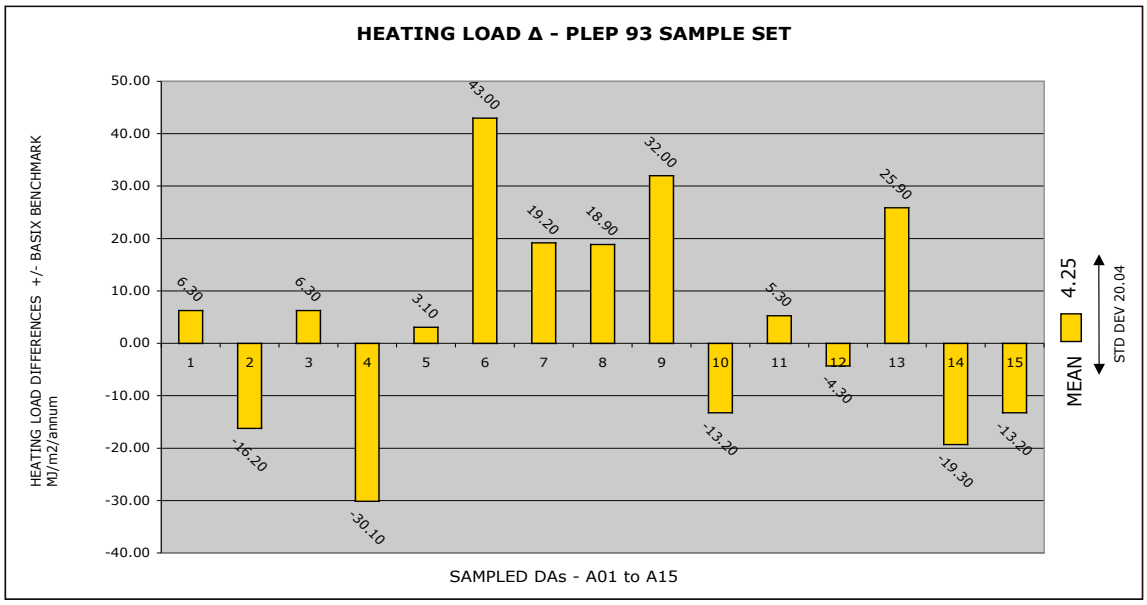
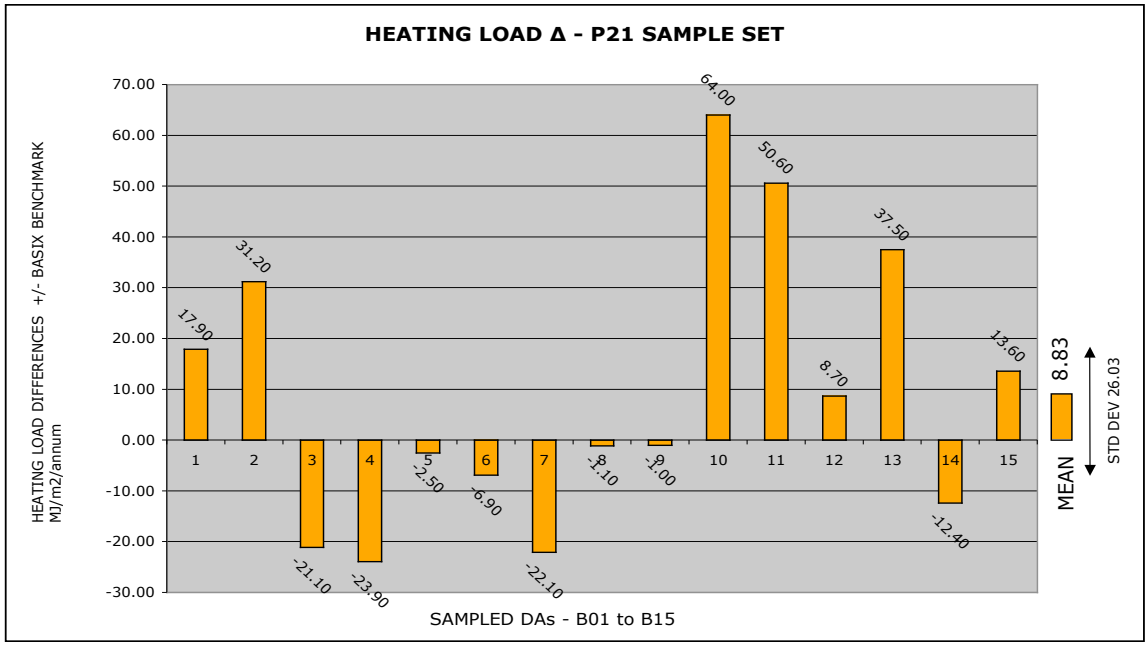


Figure 4-12 - P21 (new DCP & Masterplan) heating load scores relative to BASIX Benchmark 2003



COOLING LOADS: The PLEP 93 mean cooling load is 13.14 MJ/m^2/annum higher than the BASIX benchmark, whereas the P21 mean cooling load is slightly less, at 10.90 MJ/m^2/annum higher. Therefore, the P21 sample set showed a reduction in mean cooling loads of 2.24 MJ/m^2/annum. The median cooling load of the PLEP 93 sample set is 16.10 MJ/m^2/annum higher than the BASIX benchmark, compared to the P21 median at 5.30 MJ/m^2/annum higher. The mean and median follow the same trend.

HEATING LOADS: The PLEP 93 mean heating load 2.68 MJ/m^2/annum higher than the BASIX benchmark, whereas the P21 mean heating load is higher again, at 11.86 MJ/m^2/annum. Therefore, the P21 sample set showed an increase in mean heating loads of 9.18 MJ/m^2/annum. The median heating load of the PLEP 93 sample set is 5.30 MJ/m^2/annum higher than the BASIX benchmark, compared to the P21 median at 1.00 MJ/m^2/annum below the benchmark. The mean and median results diverge, the likely reasons for which are discussed below.

b. Discussion

The measurement of predicted heating and cooling loads using NatHERS did not produce a definite result across all fields, as the mean and median heating loads vary between an increase and a decrease compared to the BASIX benchmarks. There appears to be an anomaly in the P21 heating loads, since the mean is showing a trend in the opposite direction to the median.

There are a number of likely reasons for this, which require exploration:

i. **Cooling load results**: these are lower due to the P21 controls' encouragement of design for site and climate. The P21 plans (Sample Set B) showed less inappropriate design responses, with an increase in correct orientation, and a slight reduction in unseparated open floor plan living areas. These are considered in the literature to be key factors in improved passive solar heating, which is supported by the result.

ii. **Heating load results** in the P21 set display a divergence between the mean and the median. This indicates that while most scores are lower than the PLEP 93 set, the numerical value of the higher ones is such that it raises the average. This apparent anomaly reinforces the difficulty in ascribing statistical significance to

the results (as discussed in Chapter 3), rather than interpreting them as indicative. The factors which contributed to the result can be analysed as follows:

a. Design response to P21 DCP – the P21 sample set contains more designs that respond to the intent of the DCP. That is, they 'look more like Pittwater', or the coastal architectural style, as expressed in the Desired Future Character of the Locality Statements.

b. Design response to coastal climate – one of the outcomes of achieving the design response mentioned above, is that the building is more likely to achieve passive cooling, by means of effective cross ventilation and shading. These tend to occur more easily in buildings that reflect the 'Pittwater character', provided they are located in an immediate coastal climate (BDAA 2001; Clarke RJ 2004; Williamson, O'Shea & Menadue 2001).

c. NatHERS does not model passively cooled buildings well – as discussed in Chapter 2, one of NatHERS main failings is its inability to properly model passive cooling (a problem since corrected in its upgraded version, known as AccuRate). Thus any design which is considered by peer review to achieve good passive cooling, is likely to have higher cooling loads predicted by NatHERS (Williamson, O'Shea & Menadue 2001). The fact that the cooling loads have actually fallen across the sample set indicates that the designs are responding strongly to coastal climate design, so much so that the modelling shows an increase in heating loads, possibly due to the extra ability to cross ventilate. NatHERS may predict that there is a higher rate of air infiltration in such buildings. Also noticed in the plans, were slight increases in glazing areas, with resultant higher heat loss if single glazed and/or without drapes. The longer term effect of this would need to be corrected.

iii. Sample size – the relatively low numbers of suitable DAs available has the effect of allowing high and low performing results to skew the sample set, as discussed in Chapter 3.

iv. The median has fallen below the BASIX benchmark, which indicates that a larger number of samples within the P21 set have lower cooling loads, even if the average has risen due to a couple of high load buildings. Given the current trend of building design toward greater awareness of ESD, and higher standards in thermal performance, it is likely that this heralds an increasing trend, which is following a standard diffusion of innovation S-curve (Moore 2004; Steel & Torrie 1960). Reardon (pers. comm. 10/3/2005) indicates that the industry currently sits near the bottom of the steepest part of the curve, with the expectation that the largest take-up rate of ESD design principles is beginning to occur.

This result tends toward finding the second research proposition proved.

Chapter 5 discusses further sustainability implications of these results.

4.2.2.2. Potable mains-supplied water demand

Using the method set out in Chapter 3 Research Design, two sets of results were obtained from development consents granted by Pittwater Council immediately before and after the introduction of Pittwater 21 DCP. Set A is comprised of those approved under the old PLEP 93 set of controls, Set B under the new P21 controls (P21 DCP and Masterplan). The method uses the BASIX 2003 Sydney region water demand benchmark for single and dual residential buildings as a yardstick, with each sample DA's predicted mains-supplied water demand (calculated using BASIX internal formulae) compared against it. The research measured only those items shown on the plans: landscaped areas and vegetation types, rainwater and stormwater harvesting. Other items which can be measured using BASIX were assumed as the 2003 benchmark, thus giving a neutral score to both sample sets.

a. Results

Table 4-1 shows potable mains water demand results for the two sets of fifteen selected DAs in sample sets A and B, approved under the old PLEP 93 DCPs, and beside them, those approved under the new P21 DCP. The sample code correlates with the property address, identifying the development consent (approved DA), as discussed in Chapter 3. The median, mean and standard deviation are shown at the bottom of the tables.

Note that these results are expressed as the BASIX percentage target scores, above or below the 2003 Sydney region benchmark (unlike the energy scores above). Thus, a high score indicates lower water demand, as a percentage saving on the benchmark, and a low score indicates higher water demand. The score are expressed as whole numbers, as they are in BASIX.

Table 4-1 PLEP 93 and P21 BASIX water scores, as % above or below the 2003 benchmark dwelling

SAMPLE CODE	**WATER SCORE % IMPROVEMENT OVER BMK03**	SAMPLE CODE	**WATER SCORE % IMPROVEMENT OVER BMK03**
PITTWATER LEP 93 DAs…		**PITTWATER 21 DAs…**	
A 01	2	**B 01**	19
A 02	-6	**B 02**	6
A 03	-12	**B 03**	6
A 04	22	**B 04**	2
A 05	9	**B 05**	4
A 06	5	**B 06**	28
A 07	-9	**B 07**	60
A 08	-2	**B 08**	17
A 09	20	**B 09**	14
A 10	14	**B 10**	11
A 11	7	**B 11**	24
A 12	11	**B 12**	8
A 13	4	**B 13**	20
A 14	-3	**B 14**	11
A 15	-2	**B 15**	0
MEDIAN:	**4**	**MEDIAN:**	**11**
MEAN:	**4.00**	**MEAN:**	**15.33**
STANDARD DEVIATION:	9.71	STANDARD DEVIATION:	14.32

The PLEP 93 sample set A shows a mean of 4.0% saving over the 2003 benchmark, compared to the P21 sample set B, which shows a mean 15.33% saving.

The median reflects the same trend, from a score of 4 compared to 11, indicating that there are no statistical anomalies in these results (CSIRO 2001). This is discussed below.

Table 4-2 shows the number of samples that proposed to install rainwater tanks, and the capacity of each, expressed in litres.

Table 4-2 - PLEP 93 and P21 rainwater tank capacities, in litres

SAMPLE CODE	WATER TANK STORAGE PROPOSED	SAMPLE CODE	WATER TANK STORAGE PROPOSED
PLEP 93 DAs…		P21 DAs…	
A 01	0	B 01	17000
A 02	0	B 02	0
A 03	0	B 03	0
A 04	8600	B 04	0
A 05	0	B 05	0
A 06	0	B 06	0
A 07	0	B 07	40000
A 08	0	B 08	600
A 09	8000	B 09	0
A 10	0	B 10	0
A 11	0	B 11	4860
A 12	0	B 12	0
A 13	0	B 13	6700
A 14	0	B 14	2000
A 15	0	B 15	0
TOTAL:	**16600**	**TOTAL:**	**71160**
MEAN:	**1107**	**MEAN:**	**4744**

The PLEP 93 set reveal only two DAs proposing to install rainwater harvesting, with a total capacity of 16,600 litres, yielding an average over the sample set of 1,107 litres. In contrast, the P21 sample set show five projects proposing rainwater tanks, with a total of 71,160 litres capacity, yielding an average of 4,744 litres over the whole set. This is a

428% increase in gross capacity, with a large variation in capacity (from 600 litres up to 40,000).

b. Discussion

The PLEP 93 sample set's 4% mean saving is less than the P21 sample set's mean saving of over 15%. Because the median is trending the same way, the results reliably indicate that the P21 sample set can be expected to use less potable water than the PLEP 93 set.

P21 DCP has no controls that regulate water demand within buildings. Its controls relate to rainwater harvesting, wastewater re-use, stormwater control and discharge, and landscaped areas and species selection. The improved result for the P21 samples indicates that the emphasis placed by Pittwater 21 DCP on locally native landscapes, and the communication of that information by MasterPlan, is likely to have had some effect in reducing predicted potable water consumption in the garden.

The emphasis of P21's landscaping controls, as distinct from say, the BASIX Regulatory requirement for "indigenous landscape", is significant, and warrants discussion. Australian native plants grow in a wide variety of climatic conditions, and are not universally low in water demand (M Osborne & Dunn 2004; White 1998). P21 DCP requires landscapes to be designed with respect for, and in some cases almost total adherence to, the original floral communities of the Pittwater district. In protected spotted gum forest zones, for instance, the species selection controls are quite strict, less so in less sensitive zones. However, the general emphasis given to local native landscapes has been seen to encourage these to be planted and maintained, which is the precise purpose of the controls. The research indicates that this can be expected to have a positive effect on reducing potable water demand for irrigation purposes, as discussed by the literature (Clarke RJ 2003a; Gleeson 2004a; Warren Centre for Advanced Engineering. et al. 2002).

The number of DAs which proposed to install water tanks increased from two to five across the two sample groups, with a 428% increase in proposed capacity. The old DCPs allowed rainwater tanks within certain constraints, which did not materially change in the new DCP. However, greater emphasis placed on them in the new DCP because MasterPlan brings this information forward, unlike the old DCPs, which left the enquirer

to seek out relevant information. P21 allows applicants to credit rainwater storage against all or part of the volume of on-site stormwater detention tanks (OSD). This enables the real cost of rainwater storage to be reduced, by moving their cost into the budget allowance for mandatory OSD. These factors combine with the rapidly increasing awareness of the need to make better use of water discussed previously, to produce the notably different result seen in Table 4-2.

This result suggests strongly that the second research proposition is proved.

Chapter 5 discusses further implications for sustainability of these results.

4.2.2.3. Greenhouse and social amenity related to transport

Using the method set out in Chapter 3 Research Design, two sets of results were obtained from development consents granted by Pittwater Council immediately before and after the introduction of Pittwater 21 DCP. Set A is comprised of those approved under the old PLEP 93 set of controls, Set B under the new P21 controls (P21 DCP and Masterplan). The method simply counts the number of car spaces proposed to be included in each development; both roofed (garages or carports) and uncovered external.

The intent of the research is to demonstrate whether there has been a change in the emphasis placed on private motor vehicles as the preferred mode of transportation. Given that the car space requirements did not change in the new controls, it may seem a moot point to compare old and new, but there are two reasons for doing so. One reason is to factually prove or disprove apparent similarities; and the other is to determine whether any applicants in the sampled set had varied the control, and reduced the number of spaces provided (one DA in the Pittwater 21 sample set).

a. Results

Table 4-3 shows the car spaces proposed for the two sets of fifteen selected DAs in sample sets A and B, approved under the old PLEP 93 DCPs, alongside those approved under the new P21 DCP. The sample code correlates with the property address, identifying the development consent (approved DA), as discussed in Chapter 3. The car

spaces are counted in whole numbers, but mean results may appear as fractions of a whole. These are shown at the bottom of the tables, with the standard deviations.

Table 4-3 - PLEP 93 and P21 - number of car spaces proposed

SAMPLE CODE	CAR SPACES - ROOFED (PER DWELLING)	CAR SPACES - OPEN (PER DWELLING)	SAMPLE CODE	CAR SPACES - ROOFED (PER DWELLING)	CAR SPACES - OPEN (PER DWELLING)
PLEP 93 DAs…			**P21 DAs…**		
A 01	**2**	0	**B 01**	**2**	0
A 02	**2**	1	**B 02**	**2**	0
A 03	**2**	2	**B 03**	**2**	0
A 04	**2**	1	**B 04**	**2**	0
A 05	**3**	0	**B 05**	**2**	1
A 06	**2**	1	**B 06**	**2**	1
A 07	**4**	0	**B 07**	**1**	0
A 08	**2**	0	**B 08**	**2**	0
A 09	**2**	0	**B 09**	**2**	0
A 10	**2**	0	**B 10**	**2**	2
A 11	**2**	0	**B 11**	**2**	0
A 12	**2**	0	**B 12**	**2**	0
A 13	**2**	1	**B 13**	**2**	0
A 14	**2**	0	**B 14**	**2**	0
A 15	**2**	0	**B 15**	**2**	1
MEDIAN:	**2.00**	**0**	**MEDIAN:**	**2.00**	**0**
MEAN:	**2.20**	**0.40**	**MEAN:**	**1.93**	**0.33**
STD DVN:	0.54	0.61	STD DVN:	0.25	0.60

Table 4-3 shows that for enclosed car spaces, the PLEP 93 sample set revealed a mean of 2.2 spaces, with a median of 2.0, while the P21 sample set yielded a mean of 1.93 enclosed spaces, also with a median of 2.0. The mean result for open car spaces is 0.40 in the PLEP 93 set, and 0.33 in the P21 set, while each had a median of 0.

b. Discussion

The P21 DCP requires two car spaces behind the front building setback line, with no requirement for them to be covered or integrated into the building. However, the normal design response in Australian suburban house design is to incorporate a double garage wholly within the building, which may be called 'housing the motor car'. This pattern holds for all major urban centres, and is indicative of the level of convenience demanded by consumers, and underscores the degree to which Australians have become dependent upon cars to meet most transport needs (Steel & Torrie 1960). This pattern has become the dominant building form in Pittwater, although a significant minority of houses remain garage free, most commonly in the steeper areas with heavy tree cover, or difficult road access. Even in these cases, some form of parking is usually provided, perhaps as a platform, or terrace, adjacent to the road.

Some of the houses without garages have been purposely designed that way, on the owner's instruction, as a reaction to housing motor vehicles, or because they do not value their cars highly, preferring open space, or a smaller building. No literature on this thinking was discovered by this research, so no conclusions can be drawn beyond this writer's first hand and anecdotal experience. Council's internal process of drafting P21, and the public consultation process, did not reveal any desire to change the status quo.

Although there is a small reduction in the P21 result, it is too small to be a positive indicator of improvement. The discussion above does not suggest a definite trend away from private car dependency. Because car spaces are created and counted in whole numbers, any reduction in either the number required by the DCP, or the number created in the sampled DAs, requires a reduction in the order of 50% in magnitude, which is unlikely to occur quickly. Nonetheless, the result from the sampled sets does not support the second research proposition being proved.

Chapter 5 discusses the implications for sustainability of these results. The next section of this chapter reviews the validity of the results, both quantifiably and qualitatively.

4.2.3. Validity of results

This section discusses the validity of the results presented above. Validity has a number of possible definitions, and applications to the research. It is important to select a method of validation appropriate to both the source data and qualities being considered, and which matches the intent of the research question.

4.1.1.1 i. Validity of the quantified measurements

Discussion of the validity of the indicators' quantified results falls into two types: that which uses BASIX (energy/greenhouse and water), and that which uses simple numerical scores (transport). The reliability and validity of the results of the BASIX predictions of thermal heat flows through the fabric of the sampled buildings relies upon the reliability and validity of the two component programs, that is, both BASIX and NatHERS, both of which have an acceptable degree of accuracy for comparative purposes. The BASIX water tool has its limitations (as noted previously), and is unlikely to be at all useful for predicting actual potable water demand, but for comparative purposes – where all external assumptions are constant, is acceptable.

a. Reliability

Reliability relates to how accurately a tool measures its subject. BASIX' reliability shortcomings with regard to the NatHERS component has been discussed in Chapter 2, and BASIX itself corrects for many of these, as detailed in Appendix 3. The reliability of the BASIX water scores has the problem of partial over simplification, also discussed in Chapter 3, but any assumptions made were applied to all samples in both sets, thus cancelling out a potential problem. The transport indicator is thoroughly reliable, as it uses simple measures of car spaces. The test of reliability – that another researcher would arrive at the same results – can be proven by examination of the documents and calculation methods used in this research.

b. Validity

Validity relates to whether the tool is measuring the right things. Neither of these programs have had sufficient validation studies to verify their predicted results. However, BASIX use of real water consumption data combined with the known water saving technologies discussed in Appendix 3, does provide validation in that area. Because this research does not attempt to measure actual performance, but rather comparative predictive performance between two sample sets, the validity of the results can only be comparative, and therefore indicative (Yin 2002). Because the measurement tool was applied to both sample sets in the same way, the results are valid for comparative purposes.

The validity of the transport indicator is dependent upon simple arithmetic: the number of car spaces provided indicates the dependence upon cars for transport, thus, in light of the literature, validating the result.

4.1.1.2 ii. Validity of the qualitative results

The validity of the results of the qualitative analysis need to be examined in two ways – for construct validity, and for external validity.

a. Construct validity

Construct validity is appropriate for testing the results of case study evaluation, because it can handle observations and artefacts of many different kinds (Yin 2004). The limited sample size available prohibited statistically significant results, but allowed in-depth analysis, which provides more detail to be discussed, especially in relation to *process*. The use of original documents from the case study processes ensures that construct validity was further established (2003).

b. External validity

External validity occurs when the results of the study can be generalised. Interim (or tentative) generalisation is made possible in the research by the selection of one of the first councils to use PlanFirst as the case study subject. This enabled the research to observe both the process of production of a new LEP, and the immediate results of its implementation. Note that further research on the results of implementation, as time permits actual impacts to be further assessed, may challenge this generalisation, as noted by Bryman (Yin 2004). In spite of PlanFirst being replaced as policy by the NSW Government in 2005, its effectiveness as a sustainability template can still be tested by replicating the findings in other councils which have used it, or which use other policies that embody its principles. Replication logic will apply to individual identifiable principles, providing external validity in these cases (Jelsma 2003; Stevens 2004).

4.3. CONCLUSION TO THE FINDINGS

This section draws two conclusions from the findings discussed in Sections 4.1 and 4.2 above. The implications of these are discussed in Chapter 5, and further detailed conclusions are presented in Chapter 6. The processes and results summarised below are considered as providing the raw material required to address the research question, does PlanFirst offer an effective local planning template for encouraging sustainable development The research question was found to be proven by testing the two research propositions:

Proposition 1 - That Pittwater 21 has the potential to provide improved sustainability outcomes

In Section 4.1, The Pittwater 21 case study was examined in the light of the PlanFirst model, for both *process* and *content*. Actor-network theory was used to describe the formation of the change creation process that created Pittwater 21. It was shown that the geography of the Pittwater district influenced its human history, which in turn influenced the actors who came together to create the LEP. The local print media was also identified as an actor in the actor-network, as were government structures and legislation. Because the PlanFirst model emphasises the importance of community involvement, the process of creating the LEP was examined in detail, starting with the secession of Pittwater Council, which was a precursor to the creation of the new LEP. The four phases of ANT allow the research to identify, firstly, which actors performed in what ways during that process; secondly, which stakeholders did not join the actor-network as actors, and how that affected the community consultation process. At the end of the *process*, the *content* was examined, being the Pittwater 21 planning controls, and their sustainability potential evaluated. It was found in Section 4.1.7 that Pittwater 21 has the potential to improve sustainability outcomes.

Proposition 2 - That the implementation of Pittwater 21 has resulted in improved sustainability outcomes

In Section 4.2, results of the *implementation* of Pittwater 21 were examined. The DA process was discussed, and impediments to successful implementation identified as including problems with merit assessments (subjectivity, and resistance to approving alternatives to strict numerical compliance), and ineffective communication of controls to the designer at the initial concept design stage. There is evidence that these problems

are typical of all councils, but that they were reduced in Pittwater 21 compared to the old PLEP 93. The effectiveness of the planning controls in practice was measured across three selected ecological impact categories, of energy/greenhouse, potable water demand, and transport and amenity. It was found that on the first two (energy and water), there was an indicative reduction in the ecological impact of Pittwater 21 buildings compared the previous system. The transport indicator did not reveal significant change, which is consistent with there being no change in the controls. On balance, the research found that the implementation of Pittwater 21 has resulted in improved sustainability outcomes in the built environment.

Chapter 5 follows with a discussion of the implications of the results presented in this chapter.

5 The implications of the findings

This chapter discusses the implications that flow from the findings discussed in Chapter 4. It does this as a means of answering the main research question; does PlanFirst offer an effective local planning template for encouraging sustainable development? The chapter is structured around discussion of the research propositions, which focus on Pittwater 21's *potential* to deliver improved sustainability outcomes, and the *fulfilment* of that potential. It describes Pittwater Council's new planning instruments from three viewpoints: content, process and theory. In each case, this is done in the light of questioning PlanFirst's effectiveness as a template for encouraging the achievement of sustainable development.

The chapter commences by discussing the findings from Chapter 4 in an analysis of Pittwater 21 in three distinct ways: firstly by discussing its *potential*, where the controls and structure are examined in light of the key elements of PlanFirst, in Section 5.1. It then discusses its implemented outcomes in Section 5.2. Section 5.3 discusses ways of overcoming barriers to the implementation of sustainable planning policy, and uses actor-network theory to demonstrate how the Pittwater 21 process unfolded, how the outcomes occurred, and how well the needs of sustainability were met by the process. This concludes with a discussion of what can be improved in similar future events. Chapter 6 follows with conclusions summarised.

5.1. Pittwater 21's potential to improve sustainable development

This section deals with the potential of PlanFirst-based local planning instruments to facilitate improved sustainability. Using the case study, it focuses on the findings of the qualitative research discussed in Chapter 4. It commences with a discussion of the potential of the process of producing the new LEP, followed by a discussion of the sustainability potential of its content. Finally, the potential of P21's implementation is discussed. Section 5.2 follows with a discussion of the outcomes of the implemented case study.

5.1.1. Potential of the *process* of producing Pittwater 21

In aiming to produce a sustainable LEP, the process of producing it is an important part of ensuring the result is effective. Sustainability will only be achieved if it is widely

accepted and embraced by the community, rather than remaining the domain of the innovative few, or a plaything of the rich and able (Stevens 2004). Local land use planning has an important role in contributing to sustainability, and to be effective, it must also find broad acceptance across the community (Gleeson 2004b; Gleeson & Randolph 2003). The following sub-sections discuss the implications of the parts of Pittwater 21 that reflect the key elements of PlanFirst previously identified.

The iterative nature of the integration foreshadowed in the PlanFirst process contains potential to improve the result. It implies a level of communication that informs each layer of the process of the needs of the other layers, and with the correct management, would provide planning strategies responsive to both local needs and global responsibilities. Pittwater 21 did not have the benefit of the PlanFirst regional strategy, but as Gleeson and Randolph (1999) have pointed out, even regional plans have their limits, without an over-arching national planning strategy. In Pittwater's case, the new LEP was developed in a regional policy vacuum, and the consultation process suffered from the associated lack of understanding and limited discussion of Pittwater's role in Sydney's ongoing struggle in dealing with population growth pressures. In this regard, through external limitations, Pittwater 21 fell short of the potential of the principles demonstrated in PlanFirst. Nonetheless, as the literature shows, this potential is real.

The key element of PlanFirst most relevant to an assessment of *process* is the one relating to *community involvement, understanding and ownership of planning strategies*. Pittwater 21 reflected this in its production process. The three components of this element first discussed in Section 4.1.5.2 are again examined individually.

i. Involvement requires the reaching and engaging of all stakeholders, or at least a representative sample of them. The direct ratepayer invitation method used by Pittwater Council did not guarantee this. The response rates of 1.7% by adult population, or 4.2% by household, do not reflect the potential demonstrated by Carson & Martin's (1993) random selection methods, or Renn's (2001) three step method. The well tested Renn method was developed and expanded to a four step model by Carson and Gelber in the PlanFirst documents, which clearly spelled out the benefits, but Pittwater Council chose not to enact its full scope (Kades pers comm. 11/5/2005;16/5/2005). Three factors affected the council's decision: time, money and familiarity.

- **Time**: the timetable for the drafting and exhibition period of Pittwater 21 did not allow for the establishment of the full consultation processes outlined in PlanFirst. Several months of planning should have been allowed to establish the more sophisticated (and effective) methods espoused by Carson and Renn, as discussed in Chapter 4.
- **Money**: considering the budget provided by Pittwater Council, the Pittwater 21 consultation process may have demonstrated reasonable effectiveness, although this is difficult to ascertain with certainty. Budget limitations are a problem for small councils, and there is an argument for state government assistance, on the basis that successful implementation of state planning strategies is beneficial to society as a whole.
- **Familiarity**: unfamiliarity with new processes probably created a lack of understanding of what was actually required to achieve effective consultation. This resulted in less time and money being devoted to the process than was ideally required. Reflections on the process by the Strategic Planner and others, indicate that if the process was to be repeated, they would have pushed councillors harder for greater budget allowances, and this in turn would likely have resulted in the council making a formal approach to state government for assistance (Kades 16/5/2005).

ii. Understanding the relevant issues by the stakeholders relies on an iterative educative–consultative process. Pittwater 21's process lacked a comprehensive method for achieving this. The Draft LEP and DCP content were not consistently researched in depth by a representative sample of stakeholder participants. This reduced level of understanding did not realise the full potential offered by a more effective consultation process. The implication for sustainability is that the most sustainable features, such as combinations of controls working together to encourage passive design, are less likely to be understood, especially by lay people, resulting in a greater degree of resistance to DAs that possess improved sustainability outcomes.

iii. Ownership comes through *involvement* and *understanding* as discussed in depth in Chapters 2 and 4. The role of consultation has a key role in facilitating this. If the planning controls encourage sustainable development (as discussed in Section 5.2

below), it follows that proposals that comply with these controls will be more sustainable. If a community has more ownership of the controls, they will be more likely to accept complying proposals which would otherwise affect their self interest, and more likely to insist on compliance (or a merit based compliance with Locality Statements goals) where proposals fall short of the controls.

5.1.2. Potential of the *content* of Pittwater 21

This section discusses Pittwater 21's potential to improve sustainability by examining the *content* of the DCP, by sampling a few of the controls within it. It commences by surveying the structure, and discussing the number of individual controls and what impact this has, and how the DCP's internet portal manages these. The numerical requirements and quality of the controls are then examined in a couple of typical examples.

The following discussion examines a locality statement typical of those which covered the DAs sampled in the research in Chapter 4, and three specific planning controls which are pivotal in affecting the three selected indicators used in the case study (as outlined in the discussion on the research design in Chapter 3). The MasterPlan internet DCP portal brought up the results detailed in Appendix 5, which also contains a more detailed analysis of the controls.

5.1.2.1. The *quantity* of controls

The controls within the Pittwater 21 DCP must be examined to get a sense of what their sustainability emphases are. There are hundreds of individual controls within the DCP, which across all of the localities create thousands of possible permutations. The MasterPlan web-based interface makes sense of this, through its site-specific and development-specific interrogation of these controls, presenting only those controls that actually apply to the specific proposal. Even so, there are usually hundreds.

The DCP is divided into four sections, Parts A to D. Parts A and B contain information that informs and guides the structure of the DA, but most of it is not information required in a pure design sense. In the sampled case, only six of the 24 controls relate to how and where the building is placed on the site, and what shape and functions it must fulfil. Parts C and D contain the bulk of the significant information needed by an applicant or designer for the design process. Of Part C's 14 controls, at least 11 are relevant for

every site, and all 14 on some sites. Part D's 10 controls contain 9 that would always apply, and all 10 on any sloping site.

Therefore, of the total 83 controls that apply to new residential development in the sampled locality, a minimum of 26 (and up to 30) must be considered at the initial design concept stage in this typical example. There is insufficient data in the literature to determine whether this is a manageable task or not. Empirical evidence in the form of the ability of the system to work in practice, suggests in this research that it is probably well managed in most instances (Clarke RJ 2004; Dyce 2005). This is by no means conclusive, and further research would be of benefit here. Further discussion of this follows the next discussion of the *qualities* of the controls, and a tentative conclusion is drawn from information gleaned from both discussions.

5.1.2.2. The *qualities* of the controls

The content of the controls must be examined in relation to the sustainability goals expressed in Pittwater 21. The controls largely steer development toward improved sustainability, however individual controls may cause negative impacts. By way of example, five significant development controls are discussed in relation to their affect on the three impact categories measured in Chapter 4. These are Locality Statements, off-street parking requirements, landscaping and solar access controls.

Locality Statement – this sets out the geographical and historical setting, with details of the existing building typologies, land uses and commercial activities. This is fundamental to the place-based planning regime promulgated in PlanFirst, and was informed by the public consultation in the drafting of P21. It affects subsequent controls relating to height, building colour and materials, and site coverage. It also has the potential to inhibit passive design by requiring dark colours with high absorptance, which are known to increase the heating loads on buildings. This increases the likelihood that mechanical cooling will be used, with attendant energy and greenhouse impacts. In contrast to this, shading devices are explicitly mentioned as desirable, which will encourage designers to incorporate these basic passive design features into their concepts, thereby reducing the likelihood of mechanical cooling being used, with its associated greenhouse emissions (Reardon 2001; SEDA 2000). Buildings are encouraged to address the street, which is intended to create social sustainability through street security and a perceived sense of community for those in the street (PlanningNSW 2002). This may work against good

orientation for solar access and cooling breezes, if designers do not approach the need for dual orientation with care. These two requirements may be difficult to satisfy at once, and a poor design response which disregards solar access in favour of street presence (but acknowledging the importance of some aspects of social sustainability) may well result in poor passive design, which would fail to meet the ecological sustainability objectives of the LEP.

Off street parking - two large car spaces are mandated, which does not encourage more sustainable practices. The stated aim of Pittwater 21 is to provide housing choices in size and type, which is consistent with the literature on sustainable communities, and with government policy, so there should be an option for fewer and/or smaller car spaces. Pittwater has limited transport options at present, and a higher rate of car ownership than the Sydney average, yet 37% of Pittwater households have one or no cars (Pittwater Council 2002a). The control exists in response to longstanding community perceptions about the need for car parking: a perceived need to reduce the number of cars parked on the street; entrenched expectations of 'what a house should have in it'; lack of public transport as an alternative to private car use; and a real or perceived need for storage space. The size of car spaces has not traditionally been seen as having any impact on sustainability. Yet, improved sustainability would be achieved by a reduction in minimum requirements for both number and size of car spaces, with separate additional minimum storage requirements based on occupancy.

Pittwater 21 sets significant goals for sustainability, yet in the area of transport it does not make gains. While there are reasons for the control to have been in its present form in the past, it need not be so in the future. If the DCP allowed Variations of car space size and number, it would ensure provision of greater housing diversity, and encourage a reduction in private motor vehicle dependency in the long term. This would be accelerated if more effective public transport was provided to suburban areas, such as small regular shuttle services linked to main transport routes, and although exploration of options for increased public transport is beyond the scope of this research, it is clear from the literature that sustainability will be improved if transport options are increased. The LEP should be coordinated with government transport initiatives that establish such services.

Landscaping – this control establishes minimum standards for locally indigenous species, which can be expected to have water demands suited to the natural rainfall of the Pittwater area, thus reducing irrigation demand from mains supplied potable water. The improved water scores of the P21 results presented in Chapter 4 reflect this emphasis. The term *landscape* is an identifier for a plethora of controls and requirements, the result of which is a floral environment that provides benefits for increased shade, biodiversity, soil moisture control, visual amenity and wind protection. Its requirement for the location of canopy trees and street screening has mixed potential, depending upon site aspect and building design, and is discussed further below, following the discussion of solar access.

Solar access – this is mandated for minimum periods each day during the winter months, providing maximum amenity and natural comfort to the proposed building, while also maintaining the same benefit of solar access to adjacent buildings. This is inherently sustainable, by reducing the operational energy demands of both proposed and neighbouring buildings. The results of the case study discussed in Chapter 4 are consistent with the nature of this control. Importantly, controls such as this establish minimum standards for the ongoing protection of passive solar buildings, which is essential in the long term, if passive design is to become the norm. It establishes the same protection for solar boosted energy systems and services. On sites where solar access cannot be provided due to landform, vegetation, or neighbouring buildings, yet sustainable design techniques can and must be employed (Bunker & Holloway 2003; Clarke RJ 2003b; Reardon 2001, pers. comm. 10/3/2005; Rodger, Prasad & Divakarla 2002; SEDA 2000). The control allows variations for these, to be assessed on a merit basis, within a stated framework.

Solar access vs. landscaping – the DCP demands that landscaping controls take priority over solar access. This responds to the established notion (reinforced during the P21 consultation process) that Pittwater should have “houses amongst trees, not trees amongst houses” (Pittwater Council 2005b). This may seem an appropriate response to consultation, but it does not guarantee the most sustainable outcome. The consultation process may have benefited from more information. The protection of landscape (shade, visible green space, and biodiversity) must be balanced with other impacts caused by human development, specifically increased heating energy use induced by lack of solar access to passively heated buildings. Enhanced greenhouse-induced climate change

may pose a greater threat to biodiversity than urban land clearing (Hare 2003). These are complex considerations, and further research is necessary to provide definite data. The results of Chapter 4's case study indicate that overall the balance has been struck well, but it should be noted that the thermal performance modelling software used takes limited account of shade caused by trees, and so it is possible that both sample set results are more adversely affected than is apparent from the heating and cooling loads themselves.

The outcomes are in keeping with the Key Objectives of the LEP, which reflects the PlanFirst pattern. However, when implemented with controls C1.1 and C1.4, there is no certainty that the balance between reduced operational energy and protection of landscape (as defined above) will be achieved. Further research is needed to address this issue.

5.1.2.3. Conclusions on the DCP controls in providing sustainable outcomes

Pittwater 21 DCP's controls potentially achieve a more positive result than the previous PLEP 93 DCP did, but they are may not always achieve their intended outcomes. The information in them is more accessible (through the use of MasterPlan), and they generally have appropriate numerical or qualitative requirements. They may not fail so badly as to fall short of numerical or other requirements, but many express repeated design typologies more suited to other climatic conditions. This outcome suggests that the discourse on the ability of planning controls to regulate or enforce appropriate design responses will continue to unfold.

The formulation of these control demands consideration of the public educative element of the public participation process. In prioritising controls, foremost consideration should be given to those that will provide the greatest sustainability benefits. For instance, if a proposed house is to have the lowest operational energy impacts possible, it will use passive solar design to provide low zero energy heating and cooling. To achieve zero energy winter heating it must have reasonable solar access, but the landscape controls may prevent this from occurring, especially when combined with other controls within the DCP. The lifespan of the building must also be considered: if long (which is preferable, on condition that has low operating energy requirements), any operational energy impacts will be major, and should be given precedence over all but the most significant

of trees, and tree numbers should be maintained or increased in locations which do not prevent winter solar access. In this case, the greenhouse contribution of the heating energy could outweigh the carbon uptake of several removed trees by a factor of 30 or more, over an operating life of 45 years.

However, these outcomes spring from a design and construction typology which is entrenched in Australian society, and which is beyond the ability of an LEP or DCP to immediately control. Holistic change towards sustainable building practice cannot be driven by any one component of the process alone, and local planning controls exert some influence over time. It requires an integrated approach from all sectors (industry and government), and all facets of human activity (education, commerce, design and building) (Reardon 2001). Therefore, it is reasonable to conclude that within the limitations of existing social and government structures, the Pittwater 21 planning controls have the potential to contribute to improved sustainability. The next Section discusses the implications of the implemented outcomes of Pittwater 21.

5.2. Pittwater 21's implemented outcomes

This section discusses the generally positive sustainability implications of Pittwater 21's implementation, reflecting upon the findings from the selected indicators, reported in Chapter 4. It commences in Section 5.2.1 by discussing the ongoing management of the implementation, followed in Sections 5.2.2, .3 and .4 by discussions of the planning controls' effects in reflection to the three ecological impact categories, and what improvements could be made to each. Section 5.3 follows with a discussion of ways to overcome some of the barriers to the implementation of sustainable local planning policies, and a discussion of the research findings using actor-network theory. Although controls relating to thermal performance and water efficiency within the site have been superseded, and are no longer found within the Pittwater 21 DCP[46], the discussion is still relevant, since it applies to the way planning controls are formulated generally.

5.2.1. Adaptive management of local planning

Pittwater 21 has been shown to have a generally positive effect on sustainable development, and in its ongoing operation can be adaptively managed to adjust to

[46] Following the introduction of BASIX as Regulation in NSW on 1 July 2004.

change where needed. This is done through its scheduled review process, as per the PlanFirst model. Local learning and new knowledge can be incorporated into the controls through input from groups like the Urban Design Advisory Panel, establishing a pattern applicable to any local government context. When drafting and reviewing the controls, council staff also need a good understanding of passive design principles. The community consultation process should include an appropriate educative component, so that lay people also understand the implications of their contributions and submissions.

5.2.2. Operational energy – heating & cooling loads

As recorded in Section 4.2.2.1, the results of the new P21 sample set show an indicative improvement over the old PLEP 93 sample set. Likely reasons include Pittwater 21's encouragement of passive design. Because passive design provides thermal comfort with little or no artificial heating or cooling energy input, large numbers of highly passively designed buildings will produce a reduction in a community's energy consumption. This is permanently structured into the built environment, and can be separated from behavioural influences, so reductions in energy production and associated infrastructure and capital investment, can be made with some certainty. This has immediate benefits in reduced greenhouse emissions, as well as longer-term social benefits through reduced infrastructure financing costs.

The controls could be improved by presenting more explicit and quantified requirements for passive design. There is ongoing debate in the literature and in industry about the appropriateness of placing thermal performance requirements in planning controls, rather than in the relevant building construction code (BCA). While the BCA is a useful place to regulate insulation standards and fire resistance for instance, the fundamentals of good building design – orientation and aspect, layout and glazing orientation – are driven by the specific features of the site, over which the BCA has no control. For this reason, it is most appropriate for these fundamentals to be considered at the planning stage. If the stringency of the controls was increased, it would yield more buildings tending toward total passive design, and thus toward zero heating and cooling energy input requirements.

There is also a positive feedback loop created by increasing numbers of passive solar houses, which will reinforce the status of appropriate controls in planning instruments. It has been made clear by writers in different fields that participating in a working example

is the best way to gain understanding (Ellis 1979; Sprenger 1999). Participation in this sense comes from feeling comfortable inside a passively heated or cooled building, while being made aware that no external energy is being used to provide that comfort. Having increasing numbers of such houses exposes ever-greater numbers of people to their benefits, leading to greater understanding and uptake of the principles. This in turn can be expected to lead to greater support of increased stringency in the requirements of planning controls as they are reviewed and redrafted over time, thus compounding the trend effect. Chapter 4.

5.2.3. Water use – landscape controls and rainwater harvesting

The results of the measurements made on potable water demand, presented in Section 4.2.2.2, indicate that there is a significant improvement of over 10% between the old PLEP 93 DCP and the new P21 with MasterPlan interrogative DCP. This discussion begins by considering the demand side of water use, specifically about landscape and irrigation, and is followed by discussion of the supply side, centring on rainwater tanks.

A background trend toward reduced water use in the Sydney region during the 1990s needs to be accounted for when interpreting the P21 result (Sydney Water 2003; White 1998). This was primarily a behavioural change, especially with regard to irrigation, since there was no regulatory control of water appliances during that period. Therefore, it is likely that behavioural change across the whole community had some influence upon both designer and client with regard to the design of landscaping in the sampled DAs, which was reflected in lower water use as predicted by the BASIX tool. However, it is likely that over the 12-month sample period, this is caused a small proportion of the 10% reduction observed.

The encouragement of locally indigenous floral species is a factor in achieving reduced irrigation demand, but in isolation does not guarantee it. Greater effect would have been achieved if species selection were combined with efficient irrigation management control (such as requiring that irrigation be limited by soil moisture sensing). The controls' potential for further reducing irrigation demand is limited by community expectation of some design freedom in the choice of species. Requirements for exclusive use of locally indigenous species may not be supported by the community currently, although this is changing, with more awareness and appreciation of native flora than in the past (Pittwater Council 2005a). For example, Pittwater 21's current requirements in areas

classified as “Sensitive Land - Spotted Gum Forest” contain a specific plant species list, indigenous to that part of the Pittwater escarpment. The inclusion of these controls in the DCP was widely supported as important for the conservation and restoration of the area’s biodiversity during the consultation phase of the DCP’s drafting (Pittwater Council 2004).

The supply of irrigation water through the inclusion of rainwater tanks in the old and new regimes, showed marked improvements. This is likely due in part to the background shift in community attitude to rainwater, the introduction of rebates for the installation of tanks, with the result that previous negative attitudes to the safety and legality of rainwater tanks was rapidly changing (Cameron & Moore 2002). The reduced sitework costs provided by P21’s permitted OSD offsets are also a significant factor.

5.2.4. Transport & amenity – car spaces

The results of the car space comparison indicate that there is a minor reduction in proposed enclosed car spaces, between the old and new sample sets, down from 2.20 to 1.93. This is not a statistically significant trend, keeping in mind that reductions in DCP requirements can only occur in whole numbers, with a potential order of magnitude of 50% if two spaces are reduced to one, which is perhaps more than could be expected to have occurred in the P21 timeframe. However, the results’ slight reduction may be an early indicator of a societal trend toward placing lesser emphasis on garaging cars than has hitherto been the case. This possibility may also be supported by the recent lower sales figures for large cars compared to smaller cars (Australian Bureau of Statistics 2005), but the research cannot confirm this. In any case, considering that the controls have not changed between the old and new DCPs, any change must have come from external factors, and is not the result of Pittwater 21.

What can be definitively stated is that private car dependency has negative social and ecological impacts, and the more widespread and entrenched that dependency is, the more negative the impacts will be (Lipman 2004). If the community consultation process did not result in the inclusion of possible variations to the controls, as discussed in Section 5.1.2 above, it is likely that the educative input was inadequate on this point. Such input could come from council staff, specialist interest groups and professional sustainability research groups. The barriers to this input are discussed in Section 5.3 below.

The lack of transport options in Pittwater has acted to reinforce private car dependency, and an LEP is not able to address on its own. Local community public transport (such as small buses feeding to the village centres and major bus routes) would reduce the need for cars to a significant extent, and local government is in a good position to facilitate this, albeit with state government assistance, as demonstrated in Fremantle (Campbell 1989), and currently under discussion in Brisbane (Brisbane City Council 2006a, 2006b). To mandate two large car spaces is unhelpful in steering the Pittwater community to more sustainable practices.

In summary, the implication of the above discussion is that if the *process* of drafting a local plan is conducted using the PlanFirst principles (consultation with education), and if the *content* then reflects best practice ESD principles, the result will be improved sustainability outcomes. The next Section discusses options for overcoming barriers to successful implementation of sustainable planning policy.

5.3. Overcoming barriers to the implementation of sustainable planning policy

The research has shown that barriers exist to the implementation of sustainable planning policy. Overcoming these is critical if sustainability is to be achieved in practice.

5.3.1. Identifying the barriers to implementation

The first step to overcoming the barriers is to identify and describe them, and to suggest ways of dismantling or removing them. This research has uncovered some of these, in relation to the formation and implementation of planning policy and instruments, and this section summarises those discussed above, and suggests some ways of overcoming them. Section 5.3.1 commences with a discussion by type, then Section 5.3.2 uses actor-network theory to suggest further ways of overcoming barriers. Section 5.3.3 concludes the chapter with a discussion of what it takes to create change in local government.

5.3.1.1. Lack of merit assessment frameworks

A commonly encountered difficulty in the existing process is the lack of flexibility available which would allow assessing officers to approve DAs under delegated authority (without referring the application to full council) on merit. Merit assessment is an

uncommon occurrence due to the increasingly litigious nature of the DA process (as discussed above), and councils are keen to curb increasing legal costs incurred in the Land and Environment Court, as well as avoiding the need to defend their decisions in the political realm. Lack of a framework for determining merit assessments means council officers are loathe to risk the ire of the both councillors and senior staff. In Pittwater's case, the Development Unit (discussed in Section 4.2.1.1) has some scope in this regard, and other councils have found some success in similar ways. However, generally there are currently few reliable and controversy-free methods for achieving this. The advantage of providing a defensible merit assessment framework lies in its potential for the encouragement of innovation for sustainability (Mant 2003b).

5.3.1.2. Lack of stability in state planning agencies

A significant problem for councils trying to plan and implement long term strategies is the lack of policy stability demonstrated by the NSW Government. This may not be a trait common to all governments, but it is self evident in NSW (as witnessed by the review of PlanFirst, and the changes in direction of strategic plans for the Sydney basin, such as the Metropolitan Strategy of 2004–05), a view supported by writers such as Mant (2003), Gleeson and Randolph (Cherry 1996; CSIRO 2004). The literature indicates that long term planning requires the specific strategies within to be just that – long term. Major changes at regular intervals of two or three years disrupts the momentum necessary to carry out the plans (Forster 1999; Frost 1990). The County of Cumberland Plan introduced to steer greater Sydney's growth in the post-World War 2 era required a long-term commitment to maintaining green belts and other central elements. Without that commitment, they have been gradually reduced, and a cornerstone of the plan was lost, requiring adjustment after adjustment to subsequent planning strategies, with little continuity (Forster 1999).

By way of example in Pittwater, this lack of long term regional strategic planning led to a separate planning process for the Warriewood Valley. It has its own DCP, specifically geared toward meeting medium density housing targets, resulting from the state government's response to growth pressure within the Sydney basin. The policy (embodied in SEPP 53) was relatively hurriedly developed, even though the growth rate had been occurring for nearly two decades, and had been predicted even earlier (BDA NSW 2005).

Related to these problems, but identifiable as a separate barrier to the implementation of sustainable local plans, is a lack of stability within government agencies. Since the 1990s, the NSW Government planning department has had five name changes, with associated changes of structure, integration and disintegration with other departments, and significant changes in policy direction. This is partially dependant upon political stability within government itself, which is beyond the power of planning bureaucracies to manage, but the research indicates that governments juggling ministerial portfolios "like shifting deck chairs on the Titanic" (council planner, 2005) does not provide sustainable outcomes. These changes were compounded by several changes in minister, Directors-General and other senior staff. They created an uncertain environment for council planners attempting to plan more than 2 or 3 years in advance, such as Pittwater Council in the case study (Doeleman 1997).

The lack of stability in the areas mentioned above is inconsistent with the ideals and principles behind PlanFirst. Had government maintained the required stability, and committed to the regional integration central to PlanFirst, the outcome would be significantly more sustainable. The next section discusses the use of actor-network theory as a framework to assist in understanding, and better planning, future plan making processes.

5.3.2. Using ANT to avoid the problem of unequal power relations between actors

Actor-network theory can assist government and communities to work out more effective local planning practice, by providing an understanding of how powerful entities treat less powerful entities in a change creation process. Governments typically give ascent to the need for community consultation, but the aspect most often misunderstood by government is that there is no inherent symmetry in the relationship of the participants (Carson & Martin 1999; Chibli 2002). Governments and bureaucracies are large and have significant inertia in their systems and policies, and the ability to deal with small community groups and individuals does not come easily (Begadon & Agocs 1995). It is useful to identify these, and discuss how to make use of the knowledge this provides.

Different actors in an actor-network – including state government departments, councils and private individuals – have different power bases, and act in different ways. As Callon and Law (2002) have noted, the enrolment of actors with different characteristics of

power occurs in different ways, and while ANT allows them to be considered together, they do not act equally. Other systems theories may be useful for defining the power differences between such entities in the analysis of whole government/community context, and critical approaches will help identify the power relations (Freeman, Littlewood & Whitney 1996). It is not sufficient to simply acknowledge that a power hierarchy exists, for more effective and democratic practice to occur (reflecting LA21 principles, as noted in the literature), the situation must be handled in such a way as to provide balance for the weaker actors. ANT's usefulness is that it allows the inequalities to be predicted, and measures taken to mitigate their deleterious effects.

In the hierarchy found in the research, it is state government over local council and council over the individual. This must be held in balance to prevent both state and local governments functioning as an autocracy. An understanding of this effect has been discussed by Begadon and Agocs in Canadian local government (p.66Hambleton 1995), and by Lawless in decaying industrial US cities (2003), who noted the characteristic tendencies, centred on established institutions. Freeman et al (NSW Department of Urban Affairs and Planning 2001; Shankie-Williams N. pers. comm. 18/12/2003) note the erosion of the voice of localised democracy in the UK, repeating Hambleton's question, "Can cities dare to be more democratic?" (2002, p.118), which is ascribed directly to the unilateral exercise of power from central government. Denhardt and Denhardt suggest that it is time for government to consider the role of serving its community rather than dominating it (Huxley 1994; Khan & Bajracharya 2004a), an idea which carries strong echoes of LA 21. PlanFirst borrows not only the goals and philosophy of LA 21, which is by definition internationalist, but also extensively from international experience of its implementation (Begadon & Agocs 1995; Porter 2002).

However, do studies of the power relations between Australian governments and communities show the same characteristics? Walsh notes a tendency for higher levels of Australian governments to dominate those below, and contends that governments should reorder their priorities, to recognise their basic function is to "help citizens articulate and meet their shared interests rather than to attempt to control or steer society" (Ginsberg 1986; Huxley 1994; Khan & Bajracharya 2004b; Porter 2002). This is a view shared by other Australian writers as well (2004). It is also consistent with the goals of PlanFirst, and the evidence provided by the Pittwater 21 experience suggests that it is indeed possible to improve on the traditional paradigm.

The fundamental problem to be overcome here is for the larger and more powerful institutions to acknowledge that in the exercise of their responsibilities to govern and to lead, they also have a responsibility to serve and to nurture (Lawless 2002). There are multifarious reasons government agencies may not be cognisant of this, but the need is real, and the benefits are material, not esoteric (Basiago 1998). This research confirms the position these writers have taken: that while governments have the primary responsibility to *lead* by setting frameworks and limits, they should not *dominate* at the expense of *nurturing*.

5.3.3. What it takes to create change in local government

Actor-network theory is useful in describing change in organisations such as councils, because of its symmetrical treatment of human and non-human actors. Using the drafting and review of the dual occupancy control plan *R2 DCP 29* discussed in Section 4.1.4.2 as an example for comparison with the P 21 process, of which it was a forerunner, allows identification of some actors common to both processes.

Primary responsibility for the acceptance of the roof overhang/shading device change in the dual occupancy DCP is a human actor commonly identified in change creation studies as the *champion* of change (Issenberg et al. 2003). This person or group is the chief protagonist of change within the defined actor-network.

The councillors held the most power at the start of the process, and the most entrenched position. Their views can be seen as a response to the expressed demands of their voter base, the ratepayers. While it is a generalisation to describe them as one actor, and although they were at the time a non-homogeneous group, it is valid to use this generalisation here because on this particular issue (dual occupancy) there was a uniform attitude. The increasing awareness of environmental issues at large, and thermal performance of the built environment particularly, is the context into which all the human actors in this actor-network fitted: contemporary Australian society is exposed to repeated messages about environmental issues. How issues are received, interpreted and acted on, varies widely from person to person (Issenberg et al. 2003).

In the network which formed around the drafting and review of the Pittwater Dual Occupancy DCP, one of the critical actors were the strategic planning staff, and in particular, the principal strategic planner. Their philosophy, knowledge base and skill set

were critical in the consideration of the result. In this case, if the strategic planners had not had a clear idea of what was required to achieve good design, it is likely that neither of the two proposed amendments would have been adopted. They were able to overcome the natural inertial resistance to changing wording already carefully drafted. They also overcame the resistance of councillors liable to view any change with suspicion, lest it make life easier for any dual occupancy proposal. This is consistent with *enrolment* activity in an actor-network.

The two examples quoted above fared differently because they attracted the attention of the councillors' clearly expressed policy position in very different ways. The first one, which drew attention to the fundamental inequity between dual occupancy controls and equivalent single residential controls, would immediately have been identified as detrimental to the fundamental policy position. The latter was clearly no threat to the fundamental position, and could even be enrolled as an ally, in that it could be shown that the new policy was actually encouraging climate responsive and good neighbourly design.

This brief analysis has not included all of the actors present in the actor-network at the time, as not all were involved in dealing with the two submissions shown. The main point here is to identify the characteristics of actor groups involved in change within government bureaucratic bodies. That is:

- to identify the underlying policy position or attitude of the principle power brokers at the start of the process;
- to identify what characteristics of the change issues will easily assist the enrolment of any resistant actors;
- and most importantly, to recognise the need for champions to carry the issues and enrol the actors.

In summary then, it can then be shown that a *change champion* has the following characteristics and fulfils the following roles:

- is a critical catalyst in the process of organisational change;
- must be identified and supported by the organisation (council);

- has the primary task of enrolling other actors;
- will most likely be an individual with a detailed working knowledge of the breadth of the factual issues;
- will display strong networking abilities;
- will work from problematisation phase through to mobilisation.

That concludes the detailed discussions of the sustainability implications of the research findings. Chapter 6 follows, drawing together the conclusions from the research.

6 Conclusion

This chapter draws conclusions from the research, commencing with a discussion of the benefits the research provides, followed by a synopsis of the changes suggested in Chapters 4 and 5. The research concludes by identifying opportunities for further research.

6.1. What the research shows

This section draws together the key messages from the discussion around the findings and their implications. In answering the research question, it shows that PlanFirst offers an effective local planning template for encouraging sustainable development. PlanFirst may not have an ongoing role as a discrete policy, but its key elements remain relevant and applicable: they are practical and effective in assisting the creation of local planning policies and documents. The specific benefits are summarised below.

6.1.1. Benefits of the research to plan makers

The research will benefit both state and local government whose role it is to create local plans. It will also benefit the building designers and communities who are the end users of those plans. The changes outlined below provide a series of opportunities to restructure the making of local plans, with significant improvement in the sustainability outcomes. Use of familiar measurement tools enables planners and designers to understand the results and benefits, enabling a direct transition from old to new.

The importance of the research to the process of plan making is that it supports the position taken in the literature that without trust from within government and councils, as well as from the community and development industry, real sustainability gains are less likely to be made. A planning system that is transparent and inclusive, understood, trusted and ultimately embraced by all stakeholders, will result in accelerated adoption of ESD practices. This is the new paradigm envisaged by PlanFirst, and partly embodied by Pittwater 21.

6.1.2. Changes suggested – improving the current paradigm

PlanFirst is now just a label describing a collection of coordinated principles for the formulation and operation of planning policy at the state and local levels. It no longer exists as policy in New South Wales, due to political changes in the state government in 2003. The research shows that the lack of a regional strategy up to 2004 cost a significant opportunity for improving sustainability in NSW. Pittwater Council proceeded with a PlanFirst-based LEP, and has benefited from the experience, albeit with a substantially local focus.

This research focussed on local implementation of planning policy, and found that in the case study, the principles made a definite contribution to more sustainable outcomes. This was not universal though, and the factors limiting its potential were due in part to PlanFirst not being implemented as state-wide policy, and in part to the potential of the Pittwater 21 LEP/DCP community consultation not being pursued to the fullest extent possible. While the former reason is lamentable, the latter, in reality, is not unexpected, as the cultural inertia of society (Australian or otherwise) usually retards rapid change. The Pittwater 21 process should be credited with making significant progress in the face of this inertia.

The operational energy of residential buildings, estimated in terms of space heating and cooling energy, was found to be slightly lower in the Pittwater 21 sample set than in the old Pittwater LEP 93 set. This is considered an indicative improvement, with limited statistical significance, due to the small sample set size. Although there was a trend toward to more sustainable building design apparent during the sample periods, most of the improvement can be attributed to the clear encouragement of climate responsive design. More of the Pittwater 21 sample set showed responses to the intent of the new DCP. These showed more consideration of orientation, better cross ventilation, and other subtle improvements, appropriate to a microclimate. The new DCP's encouragement of building forms which reflect the traditional 'Pittwater character' – that is, building forms that are appropriate to the coastal location – has had the desired effect. The role of place based planning controls is recognised as important in providing this outcome, and thus should form the basis of the content of any local planning process.

The potable mains supplied water consumption of the Pittwater 21 set also showed an improved result. This was also in the context of a community-wide change in attitude and behaviour in regard to water consumption, but the results outstrip this. Because the Pittwater 21 DCP controls relate only to external water catchment and use (rainwater harvesting, wastewater re-use, stormwater control and discharge, landscaped areas and species selection), some of this background trend which relates to indoor water use can be immediately discounted. Although the sample size is small, the result shows some statistical significance. Its requirement for landscapes to be designed with respect for, and in some cases almost total adherence to, the original floral communities of the Pittwater district, is a useful lever in reducing potential irrigation demand. Its allowance of volume credits from on site detention (OSD) towards rainwater catchment volumes is another positive step.

Car spaces requirements, as an indicator of the transport and amenity aspects of sustainability, showed little improvement between the old and new DCPs. The very small reduction in car spaces sampled has no statistical significance, and is likely the result of external factors. The case study's limited transport options are reinforced by the new DCP, whereas there is opportunity for local government to be instrumental in expanding those options, through such initiatives as community small bus transport.

Actor-network theory was useful in describing how the case study worked, demonstrating that change is possible at the local level, through the actions of a committed council, and the actions of 'change champions' supported by willing interest groups. Although limited, the change demonstrated in the case study is encouraging, and hints at what more can be achieved in future.

The case study proved the research propositions, that a PlanFirst-based local plan has the potential to improve sustainability outcomes, and that when implemented, results in measurable improvements. Thus, in conclusion, it is contended that the research question is answered in the affirmative: that PlanFirst offers an effective local planning template for encouraging sustainable development

6.2. Opportunities for future research

The research uncovered several areas where the literature does not provide a complete picture of the relationship between urban planning and the sustainability of the resultant built form, especially in the Australian context. Some opportunities for further research are outlined below, with each heading referencing the relevant Section number in the research. These would be most usefully researched if and when an integrated set of coordinated national–state–local planning policies is introduced.

i. How could improved representative and deliberative consultation methods assist planners achieve their goals? (Section 2.4)

There is a continued state of contention and controversy in the implementation of planning policy at all levels, including at the local Development Application level. The literature and the research indicate that representative – deliberative involvement will produce better results for both government and communities. There is a lack of experience on the use of the Four Step Model of community consultation described by Carson and Gelber, or similar models (Christoff 1999; Foster 1999a). In-depth community consultation is not well established in Australian political life, and people have little expectation that it will occur, displaying cynicism of government's ability and intentions when it does occur, as discussed in Chapter 2. The Four Step Model offers effective consultation techniques which, when combined with genuine policy responses, could significantly change the way all levels of government are perceived by the wider community. Pittwater 21 offered a glimpse of that potential, but much work remains to be done to see it fulfilled. Research should look for case studies that can be used to measure its effects.

ii. What is the optimal balance between detail and simplicity in planning control documents? (Section 5.1.2.1)

It is important for planning documents to contain enough detail to achieve the desired outcome, but not so many as while actually impede that outcome. The research identified that the use of effective planning control presentation methods (to applicant and building designer) is important for facilitating improved design outcomes, but the quantity of planning controls is probably still a complicating factor. Further research is

required to explore this issue, which crosses several disciplines, including psychology and learning, planning and systems, and the built environment. The enquiry may usefully focus on two levels: what effect does a large number of planning controls have on the design process, and how do designers deal with that; and, what impact do these factors have on achieving improved sustainability?

iii. How can a local plan find the best balance between preservation of tree cover and encouragement of the use of solar energy? (Section 5.1.2.2 and 5.1.2.3)

Finding a balance between different aspects of sustainability can be difficult for local government planners and building designers to achieve. Conflict can arise between planning controls, which individually provide improved sustainability, but which may require opposing design responses. A common example is the desire of most local governments to preserve tree cover (for both visual amenity and preservation of biodiversity) and the need to provide solar access for passive solar heating, as well as a renewable energy source. Approximately 13% of Australian urban areas exist within forested areas, and much more in remnants of forests, in which there is a need to preserve biodiversity (Department of Environment & Heritage 2006). Increasing emphasis on tree preservation policies, including within highly developed urban council areas, adds to this, with likely benefits for biodiversity. However, tree cover often prevents useful solar access to dwellings. Lack of solar access increases the need for artificial heating, with associated greenhouse emissions having negative sustainability impacts. Shading from tree canopies also effectively eliminates the possibility of incorporating photovoltaic panels in these urban areas, thus adding another barrier to their widespread uptake.

This introduces a dilemma for planners: is the potential climate change impact from increased greenhouse emissions worse than any immediate impacts caused by loss of habitat, or reduction in restoration rates of habitat? Additional factors to be considered here are carbon balances and the likely increase in cooling loads as the climate warms generally, which may benefit from additional tree cover.

iv. What affect do social demographics have on the sustainability impacts of building design? (Section 3.5)

Most 'sustainable buildings' in Australia have so far been built by innovators and the relatively wealthy, individuals who may not be representative of the wider community. Several commentators have underlined the self-evident need for sustainable building practice to become the domain of the masses to be sustainable at all, yet there is little literature on what how different socio-economic groups within Australian society select their preferred building design types, and what the sustainability impacts of those are. This consideration should also consider different cultural expressions in architectural style, which can have a direct bearing on such things as the embodied energy, thermal performance and water conservation of buildings. How local government planning policies take account of this, and how state planning agencies allow for it in vertical integration of planning policy, calls for further research.

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8 Appendices

Appendices referred to in the text are contained here.

8.1 Appendix to 4.1.2.3

This appendix presents the timeline for the formation of Pittwater Council.

1966 Pittwater Shire Ass'n – proposal to divide Warringah Shire into 2 sections

1967 April Warringah Council Dismissed

1969 October Local Government Boundaries Commission inquiry

1985 Catalyst controversies:

Peninsula Plaza, "Delmege" building – Mona Vale

Blueberry Ash development – Palm Beach (since demolished)

1986 Warringah Council dismissed again

1990 July Local Government Boundaries Commission Hearing

1991 May 2 Referendum announced

1991 June Poll held by non-compulsory postal vote for the ratepayers of A Riding only of Warringah Shire

1991 July 4 Minister for Local Government announces secession

1991 September Pittwater Provisional Council established

Local Government elections, councillors elected for A riding:

Robert Dunn, Eric Green, Ron Starr

1991 November 14 Pittwater Provisional Council first meeting

1991 December 20 Council Offices opened in Mona Vale

1992 May 1 Pittwater Proclaimed, Constitution Day ceremony

1992 May 8 First Cheque from Warringah Council of $6.8 million

1992 October 24 First election for Pittwater councillors

1992 November 3 Pittwater Municipal Council's first meeting

1993 July Council offices move to Warriewood

1993 December Final assets and liabilities judgement

1994 April 8 Final payment from Warringah Council of $4.6 million

2004 November New council offices and library opened at Mona Vale

8.2 Appendix to 5.1.2.2

This appendix presents the four individual planning controls discussed in Section 5.1.2.2. For convenience, the discussion surrounding each control (taken from the MasterPlan search on the writer's property in the Elanora Heights locality) is expanded here.

Example 1

P21 Control A4.5 Elanora Heights Locality

"Land within the Locality Land within the Elanora Heights Locality is identified on the Elanora Heights Locality Map.

Desired Character … will remain primarily a low-density residential …. Future development in the locality will be consistent with public infrastructure capacity and… will maintain a distinct height limit below the tree canopy, and reflect the predominant scale and setbacks of existing development..."

The key elements of the Locality Statement are found in the Context and Desired Character sections, which are discussed below, highlighting salient characteristics.

Context – this part of the control sets out the geographical, and historical setting, with details of the existing building typologies, land uses and commercial activities. This affects subsequent controls relating to height, building colour and materials, and site coverage. It has the potential to inhibit passive design by requiring dark colours with high absorptance[47], which increases the heating loads on buildings. This increases the likelihood that mechanical cooling will be used, with attendant energy and greenhouse impacts.

Desired Character – this part sets out in quite definite terminology how the locality is expected to look and function, and is derived from the *Context* section. This is fundamental to the place-based planning regime promulgated in PlanFirst, and was informed by the public consultation in the drafting of P21. The sustainability impacts of the various Desired Character statements are varied. Two examples are worth noting:

[47] Absorptance - The ratio of absorbed to incident radiation.

1. Shade devices are explicitly mentioned as desirable, which will encourage designers to incorporate these basic passive design features into their concepts, thereby reducing the likelihood of mechanical cooling being used, with its associated greenhouse emissions (Reardon 2001; SEDA 2000).

2. Buildings are encouraged to address the street, which is intended to create social sustainability through street security and a perceived sense of community for pedestrians (PlanningNSW 2002). This may work against good orientation for solar access and cooling breezes, if designers do not satisfy these dual orientation requirements appropriately.

There is a potential conflict between these two requirements, and a design response which gives preference to street presence over solar access would likely result in poor passive design, which would then fail to meet the sustainability objectives of the LEP.

Example 2

P21 Control B6.4 Off-street parking requirements

"Minimum 2 parking spaces are to be provided for each dwelling… minimum dimensions are to be 3m x 6m."

Mandating two large car spaces does not encourage more sustainable practices. Pittwater has limited transport options at present, and a higher rate of car ownership than the Sydney average, yet 37% of Pittwater households have one or no cars (Pittwater Council 2002a).

Pittwater's transport context is typical of Australian outer urbanisation: highly car dependant, with limited availability of public transport options. Road transport contributes 14.5% of total Australian emissions, and the evidence suggests that Pittwater is representative of this (Australian Greenhouse Office 2005; Pittwater Council 2002a). Public transport options are bus routes to the city, with limited routes to other destinations to the west. This is a strong driver for the use of cars, with increasingly detrimental impacts on emissions and amenity, yet the literature finds that public

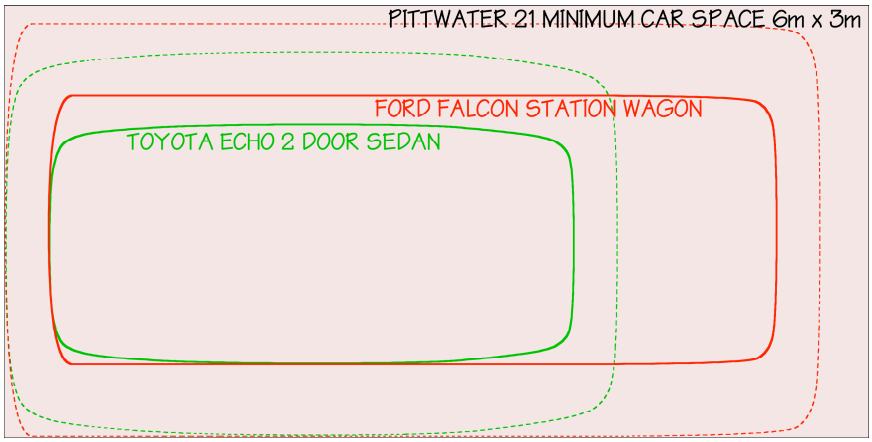
transport is best for improving sustainability (Australian Greenhouse Office 2005, p.11, 21). Transport is largely a state government responsibility, but there are opportunities for local government to take the initiative in providing alternatives, outside the conventional model of heavy buses, predominant in NSW.

The current needs & aspirations of Pittwater residents are reflected in two ways. Firstly, they can be seen to be manifest in the current pattern of car ownership, where 56% of households contain 2 cars or more (Pittwater Council 2002a). This reflects the heavy reliance upon cars for immediate transport needs. Secondly, they can be seen in the historical background to the current control, which exists in response to longstanding community perceptions about the need for car parking. These include a perceived need to reduce the number of cars parked on the street, entrenched expectations of 'what a house should have in it', lack of public transport as an alternative to private car use, and a real or perceived need for storage space, which is often provided by default in a garage or carport (Clarke2003a). Most houses in Pittwater have at least two car spaces, either enclosed (in a garage) or behind the front building line (in a carport or open car stand, or a combination of these). The size of car spaces has not traditionally been seen as having any impact on sustainability. Notions of status and convenience have traditionally been associated with cars, especially large ones, and these are reinforced by a motor vehicle manufacturing industry which depends in large part upon high rates of vehicle ownership regardless of ecological and personal economic impacts (Campbell 1989; Frank & Engelke 2001; McCleave 2003; Transport And Traffic Planning Associates & Sims Varley Traffic Systems Pty Ltd 2001; Warren Centre for Advanced Engineering. et al. 2002)

The question to be considered here is how might an LEP and/or DCP resolve these issues, when it is primarily dealing with issues of the built form? Any response can at best be complimentary to other council plans and actions. These actions should result in less demand for private vehicle trips, and include strategies such as local community transport schemes, such as hop-on/hop-off mini-bus routes, centred on local schools, district shopping centres and recreational or sporting venues. The opportunities for a planning instrument, then, are to be found in the way it mandates the minimum number and size of car spaces. The fact that 37% of Pittwater households contain one car or less, indicates that a fair proportion of residents do not require two car spaces, although storage space may be another need which needs addressing.

Pittwater 21's response fails to encourage change in the vitally important transport sector, due to the continued mandating of two large car spaces. There is opportunity for the planning controls to remove the minimum requirements on both size and number of car spaces. The size of the average Australian car is decreasing; the stated aim of Pittwater 21 is to provide housing choices in size and type, which is consistent with the literature on sustainable communities, and with government policy. Improved sustainability would be achieved by a reduction in minimum requirements for both number and size of car spaces, with separate additional minimum storage requirements based on occupancy. Smaller vehicles not only use less space, but also have lower greenhouse emissions, thus having lowered ecological impact. Figure 8-1 below shows the outline of the largest and the smallest cars commonly found in urban areas, demonstrating the potential space saving if the smaller car is used. It is therefore argued that a reduction in size could be made for one or both car spaces, with the effect of encouraging the purchase of smaller vehicles.

Figure 8-1 - Plan view of required car space with large and small car, and the hatched clearance outline beyond each (0.5m on each side, and 0.3m at each end)



Example 3

P21 Control C1.1 Landscaping

*"**Outcomes***

A built form dominated and complemented by landscaping.

"Controls

All canopy trees, and a majority (more than 50%) of other vegetation, shall be locally native species.

A range of low-lying shrubs, medium-high shrubs and canopy trees shall be provided to soften the built form.

At least 2 canopy trees in the front yard and 1 canopy tree in the rear yard are to be provided on site, where no canopy trees are present on a site.

Landscaping (of the area between the front boundary and any built structures) shall screen the buildings as follows:

(i) 60% - for a dwelling-house or dual occupancy and/ or

(ii) 50% - for all other forms of residential development…"

and

P21 Control C1.4 Solar access

*"**Controls***

The main private open space of each dwelling and the main private open space of any adjoining dwellings are to receive a minimum of 3 hours of sunlight between 9am and 3pm on June 21st.

Windows to the principal living area of the proposal, and windows to the principal living area of adjoining dwellings, are to receive a minimum of 3 hours of sunlight between 9am and 3pm on June 21st (that is, to at least 50% of the glazed area of those windows).

Solar collectors for hot water or electricity shall receive at least 6 hours of sunshine between 8.00am and 4.00pm during mid winter.

Developments should maximise sunshine to clothes drying areas of the proposed development or adjoining dwellings."

The landscaping control C1.1 establishes minimum standards for locally indigenous species, which can be expected to have water demands suited to the natural rainfall of the Pittwater area, thus reducing irrigation demand from mains supplied potable water. The improved water scores of the P21 results presented in Chapter 4 reflect this

emphasis. The term *landscape* is an identifier for a plethora of controls and requirements, the result of which is a floral environment that provides benefits of shade, biodiversity, soil moisture control, visual amenity and wind protection. Its requirement for the location of canopy trees and street screening has mixed potential for sustainability, depending upon site aspect and building design, and is discussed further below, following the discussion of solar access.

The solar access control C1.4 is inherently sustainable, providing maximum amenity and natural comfort to the proposed building, while also maintaining the same benefit of solar access to adjoining buildings. This reduces the operational energy demands of both proposed and neighbouring buildings. The results of the case study discussed in Chapter 4 are consistent with the nature of this control. The critical provision of solar access is spelt out in ways that can be understood and correctly interpreted by any competent designer. Lay people may not be able to calculate precise sun angles etc, but will understand what the end result should be. Importantly, controls such as this establish minimum standards for the ongoing protection of passive solar buildings, which is essential in the long term, if passive design is to become the norm. It establishes the same protection for solar boosted energy systems and services. On sites where solar access cannot be provided due to landform, vegetation, or neighbouring buildings, yet sustainable design techniques can be employed, through variations assessed on a merit basis (Bunker & Holloway 2003; Clarke RJ 2003b; Reardon 2001, pers. comm. 10/3/2005; Rodger, Prasad & Divakarla 2002; SEDA 2000).

The solar access control C1.4 allows landscaping considerations of C1.1 to take priority over solar access. This responds to the established notion reinforced during the P21 consultation process that Pittwater should have “houses amongst trees, not trees amongst houses” (Pittwater Council 2005b). This may seem an appropriate response to consultation, but it does not guarantee the most sustainable outcome. The consultation process may have benefited from more information. The protection of landscape (shade, visible green space, and biodiversity) must be balanced with other impacts caused by human development, specifically increased heating energy use induced by lack of solar access to passively heated buildings. Enhanced greenhouse-induced climate change may pose a greater threat to biodiversity than urban land clearing (Hare 2003). For example, a typical suburban 300 sq.m house using space heating energy at the rate of 200MJ/sq.m/year (Sydney average) would consume 16,670 kWh per year, producing

765 tonnes of CO2 over its lifetime (average 45 years (Warringah Shire Council 1998)), assuming NSW electricity (predominantly black coal) as the fuel source for heating. The same amount of stored carbon is found in 1530 tonnes of timber, which, when lost oxygen production is accounted for in the ratio of 44/12 for every unit of stored carbon, requires 5,610 tonnes of timber to be grown, equating to 130 mature Sydney Bluegums (Brand 2000). Such a forest can only be maintained on a few very large sites, and so it follows that for the majority of suburban lots, the benefits of solar access in providing zero-greenhouse heating can be expected to outweigh the loss of tree cover, unless critical biodiversity is under threat. P21's specific treatment of spotted gum forest communities is such a case, but since this does not apply to the Elanora Locality example here, solar access should take precedence.

In conclusion, the control has significant positive benefits for sustainable development, but consideration should be given to the balance between the need to encourage "landscape" and the energy cost of limiting solar access to dwellings. These are extremely complex considerations, and further research is necessary to provide definite data. The results of Chapter 4's case study indicate that the balance may have been well struck, but it should be noted that the thermal performance modelling software used takes limited account of shade caused by trees, and so it is possible that both sample set results are more adversely affected than is apparent from the heating and cooling loads themselves. It is likely that a modification of the current blanket preference for tree cover be reversed in favour of solar access, except on environmentally sensitive sites (such as spotted gum forest communities) where local biodiversity needs are critical. This change could be made in the light of the community consultation findings which indicated that a 'perception of green' is the main driver behind community concern for landscape controls, rather than an informed understanding of biodiversity.

Example 4

P21 Control D5.9 Site coverage

"On land zoned Residential, the site coverage shall be in accordance with the following table.

Maximum site coverage (%)	Minimum landscaped area (%)
40	60

Areas less than 2m in dimension will not be included as landscaped area.

The use of porous materials and finishes is encouraged where appropriate."

Control D5.9 limits the proportion of site area which can be covered by "development", in this case defined as a man-made non-pervious structure, with certain clarifications. The desired outcomes are expressed in place management terms, focussing on the character of the locality in the built form, protection of amenity, vegetation and biodiversity. The site coverage limits in the Elanora example is 40%, or 60% landscaped area. The stated definition excludes areas of less than 2m in width, so the landscaped area may actually be more than 60%, but the intent of this is to maintain a visual green presence.

The outcomes are in keeping with the Key Objectives of the LEP, which reflects the PlanFirst pattern. However, when implemented with controls C1.1 and C1.4, there is no certainty that the balance between reduced operational energy and protection of landscape (as defined above) will be achieved.