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**The ESD of Subdivision -
An Assessment
Framework
for
Urban Development**

for the

TOTAL ENVIRONMENT CENTRE

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i. Background

The study is one of four studies commissioned by the Total Environment Centre, Project Manager for the Landcom ESD Study, under the auspices of the Mediation Committee comprised of United Residents Action Group Inc, other local residents, Landcom and the Hornsby Council.

The Mediation Committee was established to resolve disputes about the future of the Landcom development sites in the Hornsby Shire.

The purpose of the study is to develop a landuse/urban planning assessment framework based on ESD principles. It is intended to contribute to the resolution process for the Hornsby Landcom sites, and it is also intended to have much wider applications.

The development of an assessment framework based on ESD principles is important given the existing stresses on the urban environment in Australia, and the way in which urban development and consumption patterns stress the wider environment.

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ii. Foreword

Nowhere is the challenge of Ecologically Sustainable Development (ESD) more acute than in our cities, where the majority of Australians live and work.

The environmental and development challenges facing our cities are immense. Environmental quality continues to decline on many counts - increasing air and water pollution indicate that all is not well. Unfortunately, there are few signs of change on the scale required. In all of Australia's major cities dormitory suburbs continue to sprawl over the metropolitan fringes while freeway networks are being ploughed through established suburbs to link growth corridors.

Despite the impressive engineered infrastructure servicing our cities the quality of our lives is still very dependent on a range of indispensable ecosystem services, like those that deliver water and air, or disperse and assimilate pollution.

The population of Australia biggest city, Sydney, is expanding rapidly, predicted to grow by over one million people in the next 25 years. To date, much of the growing population has been housed in new or expanding suburbs on the urban fringe - the edge where city meets bush or farmland.

It is at the urban fringes that Australian suburban development has its bluntest expression. Land is usually converted to housing estates little different to the low density suburbs of the last forty years. Car dependent, and land, water and energy intensive, the consequences of these development decisions will last for generations. The physical development patterns are literally set in concrete, and it is these that determine many aspects of our suburban lives.

The oil crisis of the 1970s indicated that our sprawling cities faced important development choices. Over 20 years later the choices are still clear. On one hand, we can uncritically follow the profligate natural resource consumption patterns of the past: on the other, we can redesign our development and consumption patterns to meet the many challenges of ESD.

Ecologically Sustainable Development policies have been adopted by governments throughout the world due to increasing global recognition of the fundamental links between social and economic well being and a healthy environment. These policies attempt to give substance to the idea that "*Humanity has the ability to make development sustainable-to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs.*" (World Commission on Environment and Development 1987.) After almost a decade of ESD policy development, Australia has a suite of important ESD type policies and strategies (currently estimated at over 200). Some like the National Strategy for ESD have been endorsed by all Australian Governments.

Often it is through social conflicts that the nature of the choices promoted in ESD strategies come into stark focus. This study is the result of one of those conflicts. After years of campaigning, Hornsby Shire residents succeeded in obtaining a moratorium on further subdivision of Crown bushland for housing.

Here at the urban fringe, environmental and development policies collided. Like many locations on the edges of our major cities, there is a lot of development but we must ask is it consistent with ESD. This raises many important questions like:

- what does ESD mean for the future shape of Australia's cities?
- what constitutes appropriate subdivision in the era of ESD? And how can this be determined?
- how much current urban development is consistent with ESD policies, and how can we tell?

This study aims to answer these and other questions. It articulates an ESD based assessment framework for urban development. The frameworks are intended to inform planning and decision making processes, and help define the kinds of development consistent with internationally agreed ESD principles.

Australia's ESD policies are nearly ten years old. They must be supported by appropriate procedural and institutional arrangements if they are to effect any change in the way land is developed in Australia. If we are to meaningfully implement ESD policies a more systematic, holistic and comprehensive approach to environmental management and assessment is called for. This study is a starting point for the development, refinement and implementation of such an approach.

iii. Glossary of Terms

adaptive management - A management approach that pools the insights of diverse stakeholders to select the management actions most likely to succeed in improving the quality of an environmental system; monitors the actual results, analyses the monitoring data in order to decide whether the results are trending toward or away from the desired goal or target; and adjusts subsequent management actions, goals and targets in the light of real-world feedback, and changing understanding of the system.

baseline - reference point or standard against which processes and activities are assessed.

benchmark - a reference or standard as for baseline - except that a benchmark sometimes refers to a goal or a target, for example, optimum water levels in a wetland.

community environmental monitoring (CEM) - unpaid individuals, groups and networks who regularly record their environmental observations in order to understand natural processes, identify environmental problems or confirm the success or failure of environmental action programs.

environmental audit - the systematic examination of an organisation, facility or site, to determine to what extent it conforms to specified environmental criteria based on local or national standards, laws or regulations. An audit can serve as a source of baseline information for a monitoring program.

ESD - ecologically sustainable development as defined by the NSW Government in *Local Government Amendment (Ecologically Sustainable Development) Act 1997* (see section 1.6)

indicator - something that reflects the status of a system, like an oil pressure gauge on an engine, or the amount of solid waste going to landfill.

pressure, state and response (PSR) indicators -

- **Pressure indicators** represent key human activities that affect the environment.
- **State (or condition)** indicators are physical, chemical or biological measures that represent key elements of ecosystem processes or key aspects of environmental issues.
- **Response indicators** are indicators of actions taken by people in response to environmental problems. The PSR model is based on the concept of causality. Both pressures and responses affect the condition of the environment. Responses also affect the pressures on the environment.

interpretation - the analysis of the data, including trend analysis.

monitoring - repeated observation and recording of *findings* over time.

system - a set of component parts bound together by a set of relationships into a unified whole. System's health can sometimes be reflected (and thus measured) in the status of a key part of the system. (see indicator)

targets - after goals are established, targets specify measurable outcomes to be achieved within specified time frames. Targets permit managers to evaluate whether an agreed action has been carried out and its effectiveness in improving environmental conditions.

threshold - a point at which a system changes discernibly, often referring to the point at which a stimulus is strong enough to produce a response, or a border or limit at which effects are produced.

trend - the general course, tendency or direction of change, often determined by measurement.

triggers - are a unique form of target that will trigger future action to address a problem.

Executive summary

This study has developed a prototype of a landuse/urban planning assessment framework based on ESD principles. A brief history of ESD, a plain English guide to ESD principles, and more detailed analysis of how ESD relates to urban development are also provided.

A pair of decision frameworks based on ESD policy principles have been developed - one which focuses on broad, regional scale assessment of landuse options and a second which focuses on site specific assessments of urban development proposals.

The frameworks are intended to help identify development options which are consistent with ESD. They are designed to assist in organising the range and quantity of information needed to undertake a comprehensive assessment and relating this back to the explicit values inherent in ESD principles. Much of this information is currently gathered during existing planning process - eg. biological surveys, council housing studies etc - but is rarely organised according to ESD principles. With the recent inclusion of ESD principles in several pieces of NSW legislation it may become increasingly necessary for local government, and other responsible agencies, to organise their assessment and approvals processes in such a way that the relationship to ESD is explicit, and to provide documentation on how they have interpreted information in relation to the legislated ESD principles. The frameworks (or future refinements of them) should be able to assist in this task.

The project trailed the use of the regional assessment framework - *regionassess* - on four hypothetical urban development proposals in different locations:

- bushland fringe;
- farmland fringe;
- urban village consolidation; and
- urban centre redevelopment .

From this we concluded that while any low density, metropolitan fringe development is costly in environmental terms - particularly due to energy use and greenhouse gas emissions - development which converts intact bushland to housing estates has the added dimension of biodiversity loss, and is therefore the most costly or least desirable. Urban expansion of this kind is clearly contrary to many of ESD principles especially when other viable options exist. The frameworks allowed us to come to this conclusion with confidence, by directing our inquiries to the matters of principle and broad importance, not by demanding answers in minute detail.

We also concluded that a planning system which continues to sanction inappropriate forms of development needs to be dramatically overhauled. Therefore, while NSW may have had ESD principles incorporated in its local government legislation, unless these are also "hardwired" into the way the planning system operates (and thus is manifest in the nature and location of real world developments) there may have been little gained.

1. LANDCOM ESD STUDY 2 - Introduction

1.1. Background to the Landcom ESD study 2

The purpose of the study is to develop a landuse/urban planning assessment framework based on ESD principles. The development of such an assessment framework is important and timely, given the existing stresses on the urban environment in Australia, and the way in which urban development and consumption patterns stress the wider environment (Commonwealth 1996).

Examination of predicted population increases for the city of Sydney provides compelling evidence of the urgent need to minimise the impacts of further urban expansion. Sydney's population is predicted to increase by over one million people in the next 20 - 25 years. Much of the new housing to accommodate this expansion is expected to be placed in the already stressed Hawkesbury Nepean catchment. The need for a more coordinated approach to planning and development processes has been recognised in successive inquiries into the health of this important river system (for example the Healthy Rivers Commission 1997).

Disputes over urban development in the Hornsby Shire bring these issues into sharp relief. Here, the community is actively involved in bush care and catchment restoration, with the support of numerous local and state government agencies, and funding from Commonwealth environment programs.

Community and government have formalised their commitments to protecting the environment in the Statement of Joint Intent (1994). This "Community Contract for Berowra Creek" articulates their mutual intentions for environmental protection and restoration. However, despite this contract the community has found itself pitted against one of the signatories (Department of Urban Affairs and Planning - DUAP) over plans to convert bushland to housing estates in the catchment of this sensitive and already stressed Hawkesbury tributary. These proposals appear to directly contravene the stated intention of the signatories of "not undertaking development that was not in accordance with ESD principles". Thus, this study has arisen due to the need to define what urban development is in accordance with the principles.

The disputed land is a number of Crown land sites which were zoned for residential use in the early 1970s. Parts of these areas were then zoned to Open Space in the mid 1990s. The balance was zoned residential land that Landcom planned to subdivide into approximately 600 house lots. Of the sites where subdivision has not already been carried out, some have been approved under the development application process and others have been approved by the courts. Landcom has undertaken site-investigation processes for many of the sites: for others only feasibility studies.

Community opposition to the subdivision proposals has focused on:

- the responsibility of DUAP and Landcom to adhere to ESD principles under the Statement of Joint Intent (1994). This was of particular concern to the Berowra Catchment management Committee;
- the impacts on bushland, including native flora and fauna, some of which is rare or endangered;
- the impacts on water quality in the Berowra Creek and the Berowra Waters Estuary;
- the bush fire risks associated with the sites; and
- the quality and independence of previous studies.

As a result of community action a moratorium was placed on subdivision for all Landcom sites in Hornsby Shire until a resolution could be reached. All parties have demonstrated a commitment to the subsequent processes for resolving the dispute. This has included the establishment of a mediation committee consisting of representatives of the Shire, Landcom and the United Residents Action Group. This study is one of four studies commissioned by the committee and managed by the Total Environment Centre Inc (TEC).

The full brief for the studies were formulated by an extensive consultative process which involved the Mediation Committee, the local community and others interested in improving urban planning in NSW (TEC unpublished 1997).

The brief called for:

- establishment of “an ESD framework to guide landuse, development and protection...” and “evaluate subdivision proposals within the framework of ESD principles”,
- provision of “a framework for assessing the state of the environment and potential impacts of subdivisiona tool to be used for assessing sites, comparing sites and future decision making”;
- development of a model which is “flexible, open ended and interactive.”

1.2. The ESD decision support frameworks

In response to the brief, an assessment framework based on key questions and checklists was proposed. (A summary of the methods used to develop the framework is included in appendix 1.)

A pair of decision frameworks based on ESD policy principles have now been developed - one which focuses on regional scale assessment of landuse options and a second which focuses on site specific assessments of development proposals.

The frameworks are designed to assist in organising the vast amounts of information necessary to undertake a comprehensive assessment of urban development options. Much of this information is currently gathered as a requirement of the current planning process (biological surveys, council housing studies etc) but are rarely directly related to ESD principles.

Given the recent inclusion of ESD principles in several pieces of NSW legislation it may become increasingly necessary for local governments and other responsible agencies to provide documentation on how they have interpreted information in relation to ESD. The frameworks (or future refinements of them) may assist in this task.

Each framework is intended to address the planning issues at different scales. A generic framework - **Regionassess** - targets the regional or strategic scale, while **Siteassess** focuses on assessment of site specific proposals.

The reason for two frameworks is that at each scale the assessment process requires similar questions to be answered, but at different decision points, using information different in scope and detail.

The frameworks consist of key questions, references, and guidance on methods and current policies. They are intended for the assessment and refinement of policy, strategic and regional planning and subdivisional design, particularly for new suburban developments.

The stated purpose of the frameworks is to identify those development that are consistent with ESD, not those with no impacts. The frameworks are intended to help identify development options which have the highest ESD value for a region, catchment or locality - those that are both economically efficient and with the lowest environmental impacts - when these are assessed broadly in terms of themes or issues and over space and time. That is, the proposed assessment of environmental and economic factors is not limited to the sites directly effected by a proposed development, but includes consideration of a wide range of inter-related systems - eg. the catchment and bioregion and the functioning of a large urban system.

As a part of the project we trailed the use of the *regionassess* framework on four hypothetical examples -

- bushland fringe;
- farmland fringe;
- urban village consolidation; and
- urban centre redevelopment (see section 5).

This exercise allows us to state with confidence that while any metropolitan fringe development is costly in environmental terms - particularly due to energy use and greenhouse gas emissions - development which converts bushland to housing estates is the most costly, and therefore the least desirable. Urban expansion of this kind is clearly contrary to many of the ESD principles and the intent of many current policies. We are therefore also able to conclude that a planning system which sanctions this form of development needs to be overhauled.

It should also be noted that the use of the framework allowed us to come to this conclusion with confidence, by directing our inquiries to the matters of principle and broad importance, not by demanding answers in minute detail.

1.3. Background to the ESD principles

The concept of sustainability has gathered momentum since it originated in the 1980 World Conservation Strategy of the International Union for Conservation of Nature and Natural Resources (ICUN).

The ICUN promulgated sustainability as a strategic approach to the integration of conservation and development consistent with the objectives of:

- ecosystem maintenance;
- the preservation of genetic diversity; and
- sustainable utilisation of resources.

A suite of interrelated principles, such as conservation of biodiversity and the precautionary principle are now internationally accepted as the axiomatic basis of ESD.

Intergenerational equity - the rights of all future generations to equitable treatment - has also been recognised as a core ESD principle. It needs to become a principle guiding all responsible social organisations so that the present generation doesn't deny future generations their rights to a healthy environment.

Sustainability is a value-based concept that requires the moral choice of accepting intergenerational equity as an overriding ethic. Once this ethic is accepted the key questions relate to how to systematically manage information, technology, markets and social organisations to ensure that decision making processes foster sustainability.

ESD gives recognition to the central importance of economic activities which provide for human needs. However, it challenges the value of some activities or developments, because the value of a given activity may be less than the total costs, when the impacts of the activity to the wider physical or cultural environment are taken into account.

Therefore, to assess economic activities or development options we must ask in the widest sense, is the growth really making us (humanity) wealthier? Or, in other words "do the total benefits outweigh the total costs?"

To answer this important question detailed and multi-factor assessments are required that can take in historical, cultural and ecological factors. Accurately accounting for a full range of impacts and assessing the qualitative aspects of specific activities or developments becomes central to determining whether they are consistent or contrary to ESD principles.

Accurate assessment becomes increasingly important as growth in the physical dimensions of the economy pushes beyond optimal scales, relative to the biosphere's capacity to sustain that growth. When optimal scales are exceeded the growth actually makes us (humanity) poorer. Growth can cost more than it is worth at the margins.

1.4. International adoption of the ESD principles

ESD principles have received national and international endorsement. ESD is central to Agenda 21 - a global action plan for sustainable development to be implemented over the next decade and beyond.

Agenda 21 was signed by over 150 nations, including Australia, at the United Nations Conference on Environment and Development held in Brazil in 1992. Its 40 chapters represent the most comprehensive international strategy for combating the problems of poverty, development and environmental degradation (UNCED 1992).

Agenda 21 is a commitment, by the majority of the world's national governments, to the development of policies that will protect the environment and promote sustainable use and management of environmental systems and natural resources.

The international agreement is of a general nature, so the real test of Agenda 21 comes in transferring the broad policies to effective action within individual countries. Previous attempts to combat environmental and development problems are littered with well intended national and international plans but few on-ground successes (UNEP 1986).

Integration of economic, natural resources, and environmental policy is the hallmark of Agenda 21. It recognises that social, economic and ecological processes are interrelated. Implementation of Agenda 21 requires deliberate, managed reform processes within the economic, legal and administrative systems within each of the signatory countries.

Chapter 10 of Agenda 21 commits signatory countries to adopt an integrated approach to the planning and management of land and associated natural systems - rivers, biodiversity etc. It recognises that expanding human requirements and economic activities are placing increasing pressures on land resources, creating competition and conflicts, and resulting in sub-optimal use of both land and land resources. It calls for resolution of these conflicts and moves to adopt more effective and integrated landuse policies and planning systems in order to achieve more efficient use of land and natural resources.

Chapter 10 also obliges governments to consider the need for reorganisation and strengthening of current decision-making structures, and reforms to policies, planning and management processes. It recognises that such reforms are likely to be necessary to achieve an integrated approach to the planning and management.

In summary, in relation to planning and land resources, the signatory countries, including Australia, agreed to:

- the development of integrated goal-setting and policy formulation at the national, regional and local levels that takes into account environmental, social demographics and economic issues;
- the development of policies that encourage sustainable landuse and management of the land resources and take into account and the interests of the local population;
- the review of their regulatory frameworks, including laws, regulations and enforcement procedures in order to identify improvements;

- the application of economic instruments and the development of institutional mechanisms and incentives to encourage the best possible land use and sustainable management of land resources.

These are wide ranging commitments that chart a significant course of reform for landuse planning in Australia. If they are comprehensively acted upon they should result in substantial changes to way we do planning and resource management in all spheres of government.

Appendix 3 describes two further chapters of Agenda 21 that deal with the role of business and NGOs. These are relevant to the present study and to land use planning more generally because as the Hornsby dispute demonstrates there are important roles for community organisations (NGOs) and businesses in bringing about the changes that have been committed to by our Government with its signing of Agenda 21.

1.5. Australia's ESD Strategies

The National Strategy for Ecologically Sustainable Development (ESD), was endorsed by heads of Government in 1992 (Commonwealth 1991a). It outlines Australian Governments' (State and Federal) commitments to achieving sustainable development and followed the Commonwealth Government's ratification of Agenda 21 at Rio de Janeiro.

Paralleling the move toward ESD as a national and international policy framework has been the increased acceptance of the concept of local agenda 21, integrated environmental or natural resource management and integrated catchment management. This has sprung from the recognition of the integral nature of natural systems - that changes to one part influence other parts of the system. This is especially obvious in water resources management, where what occurs in one part of a catchment will ultimately effect conditions downstream.

Both Agenda 21 and integrated resource management now have local expressions - many local governments are adopting local Agenda 21 plans and numerous catchment communities are implementing integrated catchment management strategies.

The Hornsby Council has an Agenda 21 Committee and the Hawkesbury Nepean Catchment Management Trust and the Berowra Catchment Management Committee are leading examples of the kinds of catchment based and focused organisations involved in integrated resource management.

1.6 NSW Local Government Act and ESD

ESD is now the stated objective or focus of numerous pieces of legislation in various States of Australia.

The NSW *Local Government Amendment (Ecologically Sustainable Development) Act 1997* specifies that Local Government must have regard to 4 key ESD principles when carrying out their responsibilities:

- the precautionary principle;
- intergenerational equity;
- conservation of biodiversity; and
- improved valuation, pricing and incentives- (see box 1 below).

Box 1 below provides a plain English guide to these principles and their implications. These were developed as part of a comprehensive process used to generate the Northern Rivers Regional Strategy (Northern Rivers Regional Strategy Secretariat 1998). This guide to ESD principles and their implications for planning has been adapted from the Northern Rivers Regional Strategy's 1998 publication - *Guiding Principles for a Sustainable Future: Part I – Final Report for Phase One of the Northern Rivers Regional Strategy*.¹

¹Northern Rivers Regional Strategy Secretariat. 1998. *Guiding Principles for a Sustainable Future: Part I – Final Report for Phase One of the Northern Rivers Regional Strategy*, NRRS: Northern Rivers Secretariat, NSW.

BOX 1 - ESD in NSW Local Government Legislation	
<p><i>The Local Government Amendment (Ecologically Sustainable Development) Act 1997 specifies that Local Government must have regard to the ESD principles in column 1, when carrying out their responsibilities, including when determining applications for development approval .</i></p> <p><i>Column 2 provides an interpretation of the implications of these principles -</i></p>	
SUSTAINABILITY PRINCIPLES	IMPLICATIONS
<p><i>Precautionary Principle</i></p> <p>If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (or prevent immediate mitigation action).</p> <p>In the application of the precautionary principle, public and private decisions should be guided by:</p> <ul style="list-style-type: none"> (i) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and (ii) an assessment of the risk-weighted consequences of various options. 	<p>We do not always know what the effect will be of the things we do. Just because we are not sure of the extent of impacts does not mean that we should not put environmental safeguards in place. Policy and planning decisions should err on the side of caution, placing the burden of proof on the proponent to demonstrate that they are ecologically sustainable. If we choose to do things which could damage the environment we must take responsibility for ensuring that impacts are minimised and that the lowest risk options are chosen. There must be a readiness to deal with the impacts in an effective manner.</p> <ul style="list-style-type: none"> ◆ We must think before we act and take responsibility for what we do. ◆ We must take steps to ensure the prevention of serious or irreparable damage to the environment even in circumstances where we have no firm knowledge that significant damage will be done.
<p><i>Inter-generational Equity</i></p> <p>The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.</p>	<p>Everybody is entitled to the benefits that result from a healthy environment which give us important elements of our “quality of life”. Equally, future generations should not be prevented from having a high quality of life because of what this generation does.</p> <ul style="list-style-type: none"> ◆ Decisions should be made which benefit the whole community. ◆ We must ensure that our children's children are at least able to enjoy what we have – socially, economically and environmentally. ◆ All people have the right to an environment that supports and improves their health and wellbeing.
<p><i>Improved Valuation, Pricing and Incentive Mechanisms</i></p> <p>Environmental factors should be included in the valuation of assets and services, through applying principles such as:</p> <ul style="list-style-type: none"> (i) polluter pays - those who generate pollution and waste should bear the cost of containment, avoidance or abatement; (ii) full cost pricing - the users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste; (iii) environmental goals, having been established should be pursued in the most cost effective way, by establishing appropriate incentive structures, including market mechanisms. 	<p>The social and environmental impacts of goods and services should be paid for separately, and the charges should full costs of providing the good or service. For example, charges for waste services should reflect the real cost of operating the service and the any costs to the environment. While many environmental values are difficult to price in monetary terms, it is important that environmental values are reflected in the prices paid for goods and services. If social and environmental costs were included in the prices of goods and services, the balance of supply and demand would become much more realistic.</p> <ul style="list-style-type: none"> ◆ We should identify and acknowledge the real costs of what we do, including the costs of production, use, management and disposal. ◆ Our decisions need to recognise the full range of values, even if these cannot always be quantified. ◆ The community needs to be made aware of the full costs of developments and activities.

<i>SUSTAINABILITY PRINCIPLES</i>	<i>IMPLICATIONS</i>
<p><i>Conservation of Biodiversity and Ecological Integrity</i></p> <p>Conservation of biodiversity and protection of ecological integrity should be a fundamental consideration.</p> <p>The non-evolutionary loss of species and genetic diversity needs to be halted and the future of evolutionary processes secured.</p>	<p>The natural environment provides society with a wide range of useful goods and services which are fundamental to life and economic activity. It also provides us with a range of intrinsic values which do not directly support human activities (such as genetic and species diversity in natural systems and habitat values). We must protect biodiversity and ecological processes in order to maintain healthy water, soils and air, and to maintain our economy.</p> <p>◆ A healthy environment means a healthy economy. ◆ Biodiversity and the web of life is worth protecting and conserving in its own right.</p>

The following ESD principles are in addition to those Local Government Authorities must have regard to when carrying out their responsibilities, as specified by the Local Government Amendment (Ecologically Sustainable Development) Act 1997. However as the analysis in Section 4 demonstrates many of these are closely related to the ones which are specified by the Act. The ESD principles which are not explicitly required by the Act are:

<i>SUSTAINABILITY PRINCIPLES</i>	<i>IMPLICATIONS</i>
<p><i>Global Perspective</i></p> <p>A global perspective is needed to ensure that Australia does not simply move its environmental problems elsewhere. This requires recognition and consideration of the ecological footprint of our activities and developments. We must share the global responsibility for action on greenhouse gases, ozone depleting substances, biodiversity and habitat protection and pollution reduction.</p>	<p>Some of the effects of what we do are felt outside our own region. For example, the non-renewable fossil fuels we use come from outside our region. Similarly, the air pollution we create by driving cars is dispersed beyond the boundaries of our region. The impacts of many individual developments or activities may not be noticeable on their own, however, the cumulative effects may be quite the opposite.</p> <p>◆ We should look beyond our own backyard; think globally, act locally. ◆ Our region is not an economic island (or an environmental one).</p>
<p><i>Qualitative Development</i></p> <p>Qualitative development requires an increase in the qualitative dimension of human welfare and not the quantitative growth in resource throughput as a key objective. Conservation of resources needs to be an integral component of the planning and implementation of development and activities. However, investment is needed to replenish and expand the capital base, and the human, technological and natural productive base should not be depleted.</p>	<p>Traditionally, we measure our progress in terms of economic growth, which is simply a measure of how many resources we use. Our wealth as a community also includes quality of life and our cultural diversity. A measure of development which includes quality of life factors will provide a much clearer overall picture of the prosperity and progress of a region. Sustainable economic development is defined as an activity that improves the prosperity within a region, or at least maintains it, without prejudicing the capacity for future generations to enjoy the environment.</p> <p>◆ Development means more than just economic growth. ◆ Development should enhance our quality of life, (recognising that this means different things to different people) without compromising our environment. ◆ Conservation of resources needs to be an integral consideration in the planning and implementation of development and activities.</p>

<i>SUSTAINABILITY PRINCIPLES</i>	<i>IMPLICATIONS</i>
<p><i>Limits on natural resources use</i> The scale and throughput of material resources needs to be limited by the capacity of the environment to both supply renewable resources and to assimilate wastes. For example, harvesting rates of renewable resources should not exceed their rate of regeneration.</p>	<p>Some resources, such as quarry resources and fossil fuels, are finite. Other "renewable resources", including agricultural, fisheries and forestry systems degrade or become less productive if they are overused or subjected to other negative influences. If we overuse our resources there will be none left for our children's children.</p> <p>◆ We should care for our natural and human resources: – We must use them efficiently – aim for the optimum sustainable yield and look for alternatives; – We must recognise our region's limited resources and its limited ability to assimilate waste.</p>
<p><i>Constant Natural Capital and Sustainable Income</i> Our stock of capital – natural environment, technology and knowledge – is required to sustain our lifestyles and activities. The natural capital (eg, biological diversity, healthy environments, fresh water supplies, productive soils) must be maintained or enhanced from one generation to the next. Only that income which can be sustained indefinitely, taking account of the biodiversity conservation principle, should be taken.</p>	<p>Some elements of our natural capital, such as life support systems (eg, biogeochemical cycling) are essential to our survival and cannot be substituted for by man-made capital. Other aspects include the ecosystems of our region (biological wealth) and the amenity or "non-use" values of our natural environment, such as landscapes and climate. Our lifestyle and wellbeing are part of the income we derive from this natural capital.</p> <p>◆ Our natural capital is part of our region's greatest assets. ◆ Development and activities in our region should not damage or deplete our natural capital.</p>
<p><i>Efficiency and Resilience</i> Efficiency of resource use must become a major objective in economic policy. Economic policy needs to focus on developing a resilience to withstand economic or ecological shocks. We should aim to establish a range of inputs and outputs in economic activities. Projects undertaken and processes used in production should be efficient; that is, they yield the greatest output per unit input.</p>	<p>The economy and social environment are complex networks of contact and exchange. Their resilience lies in the diversity of activities and the strength of the links between them.</p> <p>◆ Social, economic and ecological diversity and efficiency encourage resilience. ◆ Maximising our use of our resources will increase our efficiency – aim for the greatest output per unit input.</p>
<p><i>Community Participation</i> Strong community participation will be a vital pre-requisite for effecting a smooth transition to an ecologically sustainable society.</p>	<p>Informed community involvement is vital to ensure that what we do benefits the whole community. We need to develop mechanisms to ensure that we have representative levels of involvement and that participatory planning processes are not dominated by minority interests or professional or political guilds.</p> <p>◆ The community has a vital role to play in decision making. ◆ Education and access to information are necessary to ensure effective community involvement.</p>

1.7 Landcom's ESD Strategy

Landcom has an ESD strategy (Landcom 1996?). This strategy has been reviewed in light of the current project. The consultants found that the strategy provides a meaningful starting point for Landcom to incorporate ESD into its operations, however, the strategy is not comprehensive - it does not cover the full range of ESD principles. Perhaps more importantly, it appears (from the distance of this study) that Landcom has not done enough to "hardwire" the ESD principles into their operational procedures particularly in relation to their internal training or their development assessment processes².

1.8 The Green Olympics and ESD

The Sydney 2000 Olympics have been hailed as the green Olympics and have had, in varying degrees, the support of environment groups because they have attempted to blend ESD theory with the planning and execution of a major development. .

The Olympics developments have attempted to meet environmental goals and incorporate ESD principles. To this end a set of guidelines and criteria for the assessment of both the physical developments and the capacity of design and other contractors have been developed and applied.

In very broad terms the intentions of ensuring a "green Olympics" are outlined in the environmental guidelines. These describe environmental issues and nominate the ways in which Sydney is committed to addressing specific environmental goals. For example, the Olympic village "is planned as a prototype for energy efficient, medium density housing in Australia and internationally." (Sydney 2000 Environmental Guidelines 1993). These intentions have become manifest through detailed design for each of the Olympic developments.

The Guidelines cover important themes of environmental management:

- energy efficiency,
- protection of important natural and cultural environments,
- water conservation,
- waste avoidance and minimisation,
- air, water and soil quality,
- transport etc.

The Olympics experience provides an important precedent in incorporating wide ranging environmental considerations into development planning. This precedent is applicable to a wide range of new developments and demonstrates that the imposition of broad, environmentally focused design criteria is an important driving force in both achieving environmental outcomes and in fostering the innovation process. It should be possible to transfer this lesson to the improvement of planning systems throughout Australia.

² A thorough review of Landcom's ESD Strategy or of its implementation is well beyond the scope of this study, however, we believe that it is important to offer recognition of the fact that Landcom has adopted an ESD based strategy.

If the guidelines were applied to the developments proposed for the Landcom sites at Hornsby they would specifically rule out any development which threatened native plant communities (bush). The Sydney 2000 Environmental Guidelines (1993) states clearly that "Sydney is committed to: preservation and protection of the integrity of natural ecosystems ...including native bushland, forests and waterways ... and to ...landscape programs that minimise disruption of wildlife habitats, protect indigenous plants species "

While it is patently clear that the Olympics are not a typical development project, the environmental guidelines should make an important contribution to the evolution of planning and development guidelines. These guidelines were not directly transferable to the Hornsby situation (nor many others that involve urbanisation of green fields sites) because much of their focus is on the design and construction details rather than the assessment of land use options, land use allocation choices and the development approvals process.

Hopefully, in the future, we will see the application of ESD based planning guidelines that address all stages of the development process - from land allocation through to the technical details of design, construction and building technology.

2. THE ASSESSMENT FRAMEWORKS

2.1. The need for new environmental assessment processes

As stated in the introduction, the study has developed two frameworks for the assessment and refinement of policy, strategic and regional planning and subdivisional design, particularly for new suburban developments. They each consist of key questions, references, and guidance on methods and current policies (see section 5 and 6).

Each framework is intended to inform the planning process at different scales. Each is based on a set of common questions derived from an analysis of the ESD principles (see section 4). These are the kinds of questions that must be answered to achieve the sort of strategic environmental assessment described by Court, Wright and Guthrie (1996).

The need for such assessment processes is overwhelming, because established environmental impact assessment (EIA) processes have not adequately addresses ESD principles, and are failing in relation to the cumulative impacts of numerous separate developments. The limits of EIA processes are apparent when we examine their inability to address the cumulative impacts of urban or agricultural development, yet these are some of the processes generating the most profound impacts on the environment.

The introduction of systematic and holistic assessment systems faces many challenges, including opposition from vested interests - both commercial and professional; the need to operate with substantial scientific uncertainty; and a lack of established methods or processes for undertaking comprehensive ESD focused assessments. But by asking important question relating to ESD principles, major deficiencies in current methods or techniques for assessment may become apparent. Attempting to answer the questions may also give rise to many uncertainties regarding appropriate methodology.

Recognising this uncertainty, further refinement of the assessment frameworks is planned. The two frameworks developed are rough cast prototypes which will be refined through their use and through the contributions of many people with relevant expertise. Ultimately they should contribute to the development of flexible, adaptable and relatively simple tools suitable for wide application. The frameworks will be trialed, refined and tested publicly. The first testing will be the assessment of the Landcom sites in the Hornsby Shire.

The frameworks are intended to be applicable to a wide range of situations. The regional assessment framework has been designed to be sufficiently generic to have broad use for the assessment of suburban development options. The site assessment framework uses the same principles but translates these in to more detailed assessment criteria for use in the comparison and determination of the suitability of proposed subdivision sites. It is our view that any site scale assessment should be preceded or accompanied by comprehensive assessment at the regional scale.

2.2. Regional and site assessment

Sound planning requires the assessment of a range of options at a regional scale. This became obvious during the initial stages of the study and led to the development of - *regionassess*.

This assessment framework is focused on applying the ESD principles at the strategic scale eg. regional and local environment planning, catchment planning, land use zoning, infrastructure planning stages - and at the program stages (urban land release, management plans, and large projects or large subdivisions). This framework, as developed to date, is documented in section 5.

The site framework - *siteassess* - assumes a project feasibility, and/or subdivisional design and approval processes is being used, after a proposal has successfully been sieved from a range of options and has been selected as a location or development option that warrants further examination. When used for assessment in the development control stage of planning it may highlight factors that should have been picked up at prior decision making stages or indicate that site specific regulations or technology should be applied.

Ideally, it is only after a comprehensive regional assessment is undertaken to locate suitable locations for development that there is any assessment of specific sites, or that the application of site design or remedial technologies are used in an attempt to solve urban problems.

In the case of the Hornsby sites this was not possible because of the late intervention, but examination of the situation illustrates the need for the broader sieving of development options before detailed site assessments are attempted. The Hornsby sites, therefore, serve as a useful case study in the need to schedule the planning process in ways which include appropriate assessments at key stages.

A logical sequence for the assessment process is to firstly arrive at optimum sites for urban development, then undertake detailed local planning, and finally specify the application of site specific design and remedial technologies as required.

The two frameworks are intended to support this sequence. They are intended to:

- assist in locating suitable options and alternative sites for future housing;
- determine whether further detailed analysis should be used to support decisions on whether to proceed or not with subdivisions at the regional scale;
- following the first sieving determine the level of impacts involved with the development proceeding at a site scale; and
- determine whether specific conditions on the subsequent development are required to protect the environmental values identified.

The importance of this sequence and the attempt to select from a range of available options is that this allows for the identification of the specific options that should be subjected to detailed analysis, including Environmental Impact Assessment (EIA) and/or Benefit Cost Analysis (BCA). Thus expensive detailed investigations and analysis - including benefit cost analysis, or biological survey - are targeted to where they are likely to be useful and appropriate.

2.3. Community involvement and local knowledge

The frameworks are intended for use as a planning and development assessment by the range of parties involved in planning, environment and urban development decisions - state and local planning professionals, developers, community groups or catchment committees.

Community involvement in decision making is a central tenet of the ESD approach. Agenda 21 emphasises the importance of broad public participation in decision-making as a prerequisite for sustainable development. The European Commission (1991) defines this involvement as a combination of **cooperation** and **partnership** in decision making. Community involvement is also critical in harnessing the wealth of knowledge which resides in the community (Alexandra, Haffenden and White 1996).

At the both the strategic and the site scale (development control) the frameworks are intended to support negotiation processes and to assist in determining likely impacts by bringing forth relevant information.

The question lists in each of the frameworks aim to ensure that all important issues and impacts are adequately considered. Information to answer these must be derived from a variety of sources. These sources are likely to include the knowledge of the local community, expert opinion on economics or ecology, published reports, and/or information on trends derived from the use of indicators monitored and reported in State of the Environment (SoE) reports.

The way in which individual factors are weighted within a region must still be the subject of negotiation as is final determination of options. Sound decisions will inevitably require fair and transparent processes and detailed local knowledge. The capacity to predict impacts by using the framework will depend on the quality of that knowledge and the adequacy of the process. For example, the frameworks require analysis of SoE reports (where these exist) and other information in order to determine important trends, and the likely impacts of any large development or subdivision proposal.

Reflecting their origins in this particular dispute, the frameworks are oriented to fringe urban development, but even in this application many factors will vary according to the particular environmental circumstances involved. The potential for this variance requires assessment of key parameters, and estimates of emerging thresholds and environmental risks. In the case of the sites within the Hornsby Shire, water quality, biodiversity and urban air pollution are pronounced because of their location and its regional context - the fringes of Australia's largest city.

2.4. Integration with related processes

The frameworks are intended to support **reflective decision** making, acknowledging the existence of the wider policy environment. The frameworks allow for cross referencing to relevant policies and strategies applicable in any state, region or local government area. They complement SoE reporting, and other regional and catchment planning and assessment techniques.

Their use assumes that other traditional landuse planning tools operate in parallel to this process. These tools include: streetscape and view assessments; density controls; good design codes and engineering standards. These local, and often site specific, design criteria are also undergoing review throughout Australia, in response to increases in housing density, solar access regulations, and relaxation of strict landuse segregation rules.

The frameworks are intended to stimulate consideration of the many factors which influence urban form. While physical planning currently predominates in the design and development process, it is clear that greater integration is required across the whole spectrum of public policy processes because of the many complex interrelationships. Other factors exert powerful influences on the form of urban development. These include major infrastructure - sewerage systems, freeways, railways etc - and the incentive and disincentives inherent in the current taxation system, such as exemption of capital gains tax on the family home, and preferential treatment of primary production income. (Section 7 addresses issues of pricing, valuation and incentives in more detail).

The systemic reforms capable of addressing the full range of factors requires inter agency coordination and cooperation, but regardless of the specific agency responsible, it is clear that all major decisions which influence the future health of our cities require the discipline of a thorough assessment. This assessment should extend to reviews of the legal and administrative structures and arrangements, which currently hinders integrated management.

The sequential and fragmented nature of many government decisions is often the result of the involvement of numerous agencies. The framework is intended to assist in overcoming a fragmented approach to the planning processes. These fragmented processes have been recognised as one of the major barriers to implementing ESD policy, not only in Australia, but also overseas. In New Zealand and Canada, countries that share similar governmental and developmental characteristics to Australia there have been significant reforms designed to achieve greater integration of government processes. Alexandra (1994; summarised in appendix 4) describes the New Zealand reforms because of the importance of governmental processes which actively promote integrated approaches. While the general goals of greater integration is highly desirable, one danger of law reform processes intended to overcome duplication and fragmentation is that in attempting to introduce clarity and simplicity, there is potential for the loss of significant detail, which is explicit in current legislation.

3. ESD: FROM POLICY TO PRACTICE IN URBAN PLANNING

3.1. The planning context

The physical form of Australia's cities demonstrates that improvements in the quality of planning and decision making processes are required, if these processes are going to be able to incorporate ESD principles.

ESD demands that a wide range of social, economic and environmental factors are actively considered, yet many decision making processes are confounded by the complexity involved in applying ESD policies to specific sites or development proposals. Planning and development assessment processes have not proven to be readily able to incorporate this complexity, and thus, the transfer of policy to practice has been problematic in many sectors. Achieving the processes and planning frameworks which result in sound urban planning decisions should be considered an important test case of ESD policies.

ESD principles have been debated extensively and find expression in numerous strategies, but their practical application has been limited by a range of cultural and institutional factors (Dovers 1996). ESD policies and strategies articulate goals and approaches for achieving healthy cities, sustainable urban landuse and urban form, water quality, catchment management and the protection of biodiversity.

National commitments include:

- the National Strategy for Ecologically Sustainable Development (C'wth 1991a);
- the National Water Quality Strategy (C'wth 1992b); and
- the National Strategy for the Conservation of Biodiversity. (C'wth 1994)

In contrast to the enthusiasm with which governments around Australia, and the world, have stated their endorsement of ESD policies, the implementation of these ESD policies is proving slow and difficult. This is because the attempt often confronts values and assumptions, threatens vested interests and lowers expectations of profit. Thus the status quo can slow the necessary reform processes needed to deliver the stated goals of the policies.

The landuse planning and urban development industries with their attendant professions, plus those government agencies responsible for planning and land development must be recognised as potentially one of the major sources of the inertia. This is exacerbated by 'institutional capture'³. The relationship between the planning professionals and development industries and the State and local agencies responsible for urban development is established to such an extent that it could be described as mutually co-dependent. Professional cultures or guild connections are likely to remain a powerful influence. The increasing tendency to remove decisions from public scrutiny through appeals to technocratic or professional complexity or through the use of jargon runs contrary to the ESD principles of public participation and partnership with the community. The planning

³Institutional capture refers to the situation which can develop when an industry and its regulators develop such a close and well-established relationship that the regulatory agency fails to protect the wider public interest and sees industry advancement as its primary duty. Thus, it is "captured" by an industry.

dispute in Hornsby provides an example of how direct public involvement is a necessary complement to any ESD planning process.

Opportunities for public participation can be broadly categorised as:

- direct involvement - direct action etc;
- surrogate involvement through representative bodies; and
- representative democracy through the political process at local, state and national levels.

The political dynamics of the urban planning and land development sector are changing as a result of the involvement of vocal, independent community groups. The Hornsby example demonstrates the importance of community involvement in bringing about change. Action by community groups means that decision makers can be brought to account.

3.2. Improving urban form - consolidation and fringe expansion

The traditional quarter acre block remains the dominant model on the outskirts of Australia's major cities. This is despite the enthusiasm of planners and policy makers, and sympathetic policies by government supporting urban consolidation.

Urban consolidation - increasing the density within existing areas - has been hailed as the major alternative to relentless sprawl, but in Australian cities both are now occurring simultaneously. There are still large numbers of new fringe estates, while increasing numbers of high and medium density housing are being built in the established areas.

Alternatives to the traditional urban form of the low density suburb have been recognised as an important solution to several interrelated ecological and economic concerns (Newman and Kenworthy 1992). Some of these concerns include:

- costs of providing and maintaining urban infrastructure;
- efficiency of public transport systems;
- impacts on urban periphery catchment and land management;
- demand on limited land resources;
- reliance on private motor vehicles and damaging CO₂ and pollution emissions;
- dependence on imported fossil fuels and therefore pressure on balance of payments;
- urban isolation and scope for community contact; and
- the need for greater diversity of housing stock as national demographics change.

Policies supporting urban consolidation have been readily adopted by governments because of its capacity to address these kinds of ecological and economic concerns. However, while urban expansion on the fringe continues as a major component of Australia's housing stock a more rational approach to land allocation based on comprehensive assessment is required.

3.3. Bushcare, landcare and the changing planning context

The planning context is ever changing and new and emerging policies and community expectations must be debated and accommodated.

These changed conditions provide opportunities to examine fresh solutions to the Hornsby dispute. The resolution of the disputed development sites is not simply a matter of fine tuning the design or installing better remediation technology such as improved storm water management systems.

An understanding of the changing planning context and societal expectations is called for so that more appropriate planning processes are installed.

The context in which the current dispute in Hornsby has arisen is characterised by:

- continuing commitments to ecologically sustainable development and greenhouse gas reduction outlined in numerous national, state and industry strategies;
- ongoing controversy about future urban plans for the Sydney region;
- changing demographic and consumption patterns, eg. increasing demand for inner urban apartments, smaller families etc;
- increasing interest in urban vegetation; and the rise of the bushcare movement; and
- major efforts to improve the health of the Hawkesbury Nepean River system and the Berowra Creek and estuary as expressed in the various TCM strategies and the Statement of Joint Intent (Berowra CMC 1994).

Two social movements - bushcare and catchment management - are worth describing briefly because they indicate the rise of new community values and aspirations. They also demonstrate the power of voluntary activism in environmental management. In many ways they are urban parallels to the growth of landcare groups. Heightened environmental awareness has changed the dynamics of land management and environmental policies and practices in Australia. This is highlighted by the enormous increase in conflicts over managing land, water and biological resources sustainably.

Community enthusiasm for urban bushland is evidenced by the hundreds of bushcare groups in the Sydney region (90 in the Hornsby Shire alone) and the active interest and involvement in catchment care and water quality projects. Public appreciation of Australia's unique native flora is escalating as increasing numbers of people recognise the utility, biological and aesthetic value of native bush. Bushcare, with its potential to contribute to environments at a local and landscape scale, has become a focus for many people searching for achievable solutions within their direct sphere of influence.

Controversy about environmental management, including, controversy about the management of the Hawkesbury Nepean River system has been endemic for the last decade. The rise of the TCM movement is recognition of the seriousness of the problems, and a community government partnership aiming to address them. To honour these partnerships all arms of governments must be consistent in their actions.

3.4. National and global trends which have implications for ESD

The planning context not only changes because of various community transitions described above but also due to global and national changes. ESD principles require consideration of the global perspective and while we recognise that the frameworks aim to address local and regional planning issues this cannot, or should not be done without due consideration of the wider dimensions of decisions. For this reason we describe briefly, below some of the

broader trends which will influence planning decisions, and which should be considered when using the frameworks.

International trends include:

- GATT, 'free' trade, increasingly rapid information transfers and the increasing globalisation of the world economy, including the increasing influence of transnational corporations and globally mobile capital, all with implications for the type of investment likely in Australia.
- Global population growth, leading to increasing use and scarcity of resources and consequent pollution. This has many implications for large urban conglomerates, like Sydney.
- The increasing importance of international treaties, including global treaties on biodiversity and greenhouse as these are directly affected by urban expansion.
- A suite of possible changes resulting from greenhouse-induced climate change: greater severity of storms and runoff events, more floods, higher average temperatures, these have implications for factors such as building and road siting requirements, runoff rates, pest plant and animals, and fire risks.
- The increased movement of biologically active material around the world: plants, microbes, insects, etc. increases the likelihood of new pests and diseases (French 1993).

Significant national trends include:

- Decline in the health and integrity of river and catchment systems. The capacity of urban planning instruments to strategically locate or limit urban expansion in sensitive parts of catchments is being actively investigated in some catchments.
- The increasing recognition of the importance of native vegetation for biodiversity conservation, and corresponding attempts to regulate clearing, and the increasing recognition of the importance of bushland and other natural places in the protection of Australia's unique flora and fauna, including threatened species.
- Greater community involvement and appreciation of the bushland in, or close to major cities, leading the explosive growth in the bushcare groups (over 700 in the Sydney area).
- Increasing community concerns about the sustainability of urban expansion on the fringes of our cities.

4. DEVELOPMENT OF THE FRAMEWORKS USING THE ESD PRINCIPLES

In each of the frameworks a set of key questions which need to be answered for the assessment of urban development has been derived from our analysis of the ESD principles.

In this section, each of the agreed ESD principles is introduced and explained briefly, with particular emphasis on the relationships to urban expansion. Examples of the key questions follow the explanation.

The full list of questions, along with explanations, possible techniques and links to current policies are included in the two assessment frameworks in sections 6 and 7. We recognise that none of these are permanent, or final. They must and will be refined with use. They may also need to be modified depending on the bioregions in which the assessment is being conducted.

4.1. Codification of ESD Principles

Global recognition of the need to meet the needs of the present generation without compromising the ability of future generations to meet their's has led to the codification of ESD principles. To achieve this, it is necessary to ensure that the environment's capacity to sustain the quality of environmental services and production, biological diversity, and ecological integrity is sustained indefinitely. Thus ESD is a quantitative and qualitatively different policy framework, which demands entirely new approaches to effectively deliver policy outcomes.

Like most governments around the world, the Commonwealth has firmly committed itself to four fundamental goals for development in Australia. These goals have been endorsed by all States in the National Strategy for ESD, as well as several important strategy and policy statements such as the National Water Quality Strategy.

The NSW Government has also incorporated ESD in several pieces of relevant legislation including the Protection of the Environment Operations Act (1997), the Local Government Amendment (Ecologically Sustainable Development) Act (1997).

4.2. The precautionary principle

The precautionary principle requires an anticipatory and precautionary approach to policy and planning. Anticipation of the likely impacts and the magnitude of impacts is required.

The checklist in this framework attempts to guide the estimations of the impacts likely to result from specific developments along with estimation of the contributions of specific developments to cumulative impacts.

Uncertainty dictates that we should seek to maintain species and ecosystems as a hedge against future disaster. Thus, in assessing development proposals that involve land and water resources and/or potentially influence biological systems adversely, the cost of

environmental damage that is irreversible, or about which there is a high degree of uncertainty, should be heavily weighted.

The precautionary principle is a reversal of past decision-making processes which invoke environmental restraints only when irreversible losses could be proven.

This principle recognises that reactive policies are likely to be prohibitively costly or ineffective. Environmental rehabilitation, for instance, is unlikely to restore original ecosystems and will probably involve greater expense than the environmental protection that results from effective planning based on the precautionary principle.

The complexity of interrelationships in ecosystems needs to be factored into assessments particularly in attempts to determine important thresholds within ecosystems. Because ecosystems do not necessarily adhere to strict linear causalities, it is more important to determine if trends indicate whether the system may be approaching important limits rather than necessarily proving that the limit will be exceeded. For example, a minor increase in the quantity or form of nutrients entering a water body may dramatically increase the frequency and intensity of algal blooms. That is, a slight increase in the causal factor can result in a major change in the consequences. In some cases thresholds will be determined by reference to state or national standards, such as the ANZECC water quality guidelines, however in other cases detailed understanding of the functional characteristics of an ecosystem are required. Where there is insufficient information to determine thresholds or causality we must still act cautiously if we are to adhere to the precautionary principle.

4.2.1. Examples of questions derived from the precautionary principle

Irreversible impacts

Is the proposed development likely to have any irreversible impacts on the local, regional or global ecosystems?

Has the magnitude of these risks been determined?

Have alternative sites with lower risk potential been adequately considered?

Cumulative impacts

Is the development likely to contribute to any irreversible impacts, directly or indirectly?

Have the cumulative impacts of the development (when combined with other or anticipated developments) been determined in relation to:

- the water cycle/ the catchment system?
- the biological community effected?
- other effected industries?
- the functioning urban system?

Ecosystem limits and stresses

Are any of the ecosystems effected by the development showing signs of stress? Will the development add to these stresses?

Thresholds

Are any critical thresholds being approached or exceeded for:

- water systems?
- biological communities - terrestrial and aquatic?

- urban air quality?
- waste absorption or assimilative capacity?
- the capacity of other infrastructure?

4.3. Intergenerational equity

The principle of intergenerational equity requires that the present generation pass on an environment that maintains or improves the level of well-being experienced by future generations.

Application of the ESD principle of intergenerational equity requires that urban development and the consequent resource use, should not adversely impact on the environment in a long term or irreversible manner. For example, environmental degradation processes with long term negative consequences should be reversed.

The principle of intergenerational equity also requires that measures designed to ensure ecologically sustainable development should increase equity at both the national and international level.

The goal of the general ESD principle of intergenerational equity can be met by adopting the supporting or subsidiary principles of Qualitative Development, Constant Natural Capital and Sustainable Income.

To ensure that urban development meets this principle, these subsidiary principles and the checklists supporting them should be used to determine appropriate policy and planning frameworks.

4.3.1. Qualitative Development

Qualitative improvement in human life for this and future generations should be a guiding principle for the formulation of all government policies and for the assessment of specific development proposals.

The maintenance of clean air and water and productive ecosystems contributes to the health and quality of human life.

The conservation of cultural and natural sites, such as remnant wetlands, and bushland satisfies some of the aesthetic, recreational and spiritual needs of society.

It is often these later values which are hard to quantify and value using standard market valuations. Yet it is also clear that the market value for these intangibles is expressed in the real estate market by the willingness of people to pay significantly higher prices for house sites close to bush or water, with views, or close to areas with high recreation values. Thus the very desirability of these features can lead to over exploitation.

4.3.2. Constant Natural Capital

Some discussion of the distinction between natural capital and other forms of capital is required in the assessment of the sustainability of urban development proposals. While all human activities use land, not all land contributes equally to the healthy functioning of an

ecosystem. For example, bushland areas or wetlands may be valuable in many ways, including maintaining a healthy, functioning ecosystem. Where these are connected to rivers or corridors they may be even more valuable in this role. It is the system rather than the land itself which is best understood as natural capital.

Natural capital is distinguished from natural resources by the following five characteristics:

- **non-substitutability** - human-made capital cannot act as substitute;
- **uncertainty** - we are uncertain about its response to human activity;
- **irreversibility** - some changes such as the loss of ecological communities or extinction of species cannot be reversed;
- **multi-functionality** - it serves several ecological and economic functions and thus is difficult to fully value; and
- **scarcity** - the combination of non-substitutability, increasing demands and/or reduced stock means that it is in short supply (Hare et al 1990).

All the above points are of great significance to the assessment of the urban development options. While specific parcels of land are a substitutable resource - that is one parcel can be substituted for another for a particular purpose - the ecosystem processes which support the capacity of individual parcels of land to be used for specific purposes cannot be substituted.

Urban planning systems should ensure that natural systems and processes (natural capital) are not destroyed or irreversibly degraded. They need to be maintained as 'constant wealth' to be handed on to future generations.

Adherence to the principle of Constant Natural Capital would, for example, result in measures to protect estuaries, because they are fundamental to ongoing tourism and recreation and provide feeding, breeding and nursery areas for many species of fish, and play a key role in the trapping and recycling of nutrients.

Estuaries are sensitive to changes in water quality factors such as nutrients and turbidity. Activities such as the construction of new urban estates should be restricted where they place additional burdens on the capacity of the estuary to maintain its functional health and to support ecosystem productivity and the associated dependent industries like tourism, recreation and fisheries.

Importantly for the economic assessment of the role of estuaries, the closer the estuary is to populated areas the higher current and future value will be. The same applies to wetlands, rivers and urban fringe bushland. Therefore the same estuaries and bushland that are likely to be adversely effected by urban development are also those which demonstrate the highest economic value in terms of use and service to a large number of people.

4.3.3. Sustainable income

Sustainable income is defined as income from natural resources and natural capital that does not reduce or degrade the stock of natural capital and so can be sustained over an indefinite time period. Thus, in using natural systems as waste sinks, the nature and volume of emissions should have no adverse effects on biodiversity, and water, air or soil quality. This is currently not the case for waste discharges to water through either the sewerage systems or from diverse sources such as urban stormwater. The elimination of non-assimilable waste or the reduction in nutrient load to a level that a particular system can handle without adverse effects, is a necessary step in the conservation of natural capital.

As an example, if the principles of constant natural capital and sustainable income are applied to questions of urban landuse planning and water resource management the result will be systems which ensure the full protection of Australia's remaining estuaries and wetland, and areas of intact bushland.

Estuaries and wetlands meet all five criteria of Natural Capital:

- there is no adequate man made substitute for estuaries and wetlands;
- we are uncertain as to the long-term effects of pollution and changing flow regimes on estuaries and wetlands;
- the multiple functions of estuaries and wetlands include nutrient filtering, stormwater retention, providing habitat, and human uses such as recreation, education, and aesthetic appreciation;
- changes to estuaries and wetlands such as 'drainage, infill and reclamation' are irreversible; and
- estuaries and wetlands suitable for recreation are increasingly scarce due to human demands and impacts.

Similarly areas of intact bush also fit the definition of natural capital:

- there is no adequate man made substitute for bushland ecosystems;
- we are uncertain as to total areas of bushland required to sustain ecological communities over time;
- the multiple functions of bushland include important contributions to the air and water cycle, carbon sequestration, habitat, and human uses such as recreation, education, and aesthetic appreciation;
- changes to bush as a result of clearing, disturbance and urban development are effectively irreversible; and
- intact bushland close to population centres is increasingly scarce due to human demands and impacts.

4.3.4. Intergenerational equity and urban development

Greenfield sites around a city the size of Sydney are a scarce resource. Therefore, they should not be the first to be developed, as the principle of intergenerational equity requires that future options should be maintained rather than foreclosed by decisions taken by this generation.

With Sydney's population expected to increase by 1 million within the next 25 years there is likely to be increasing pressure on the systems which maintain environmental quality.

Application of this principle demands that:

- the ecosystem processes which support environmental quality in a city like Sydney are recognised as natural capital for which there is no viable substitute;
- land, biological communities and ecologically functional bushland, estuaries and wetlands are also recognised as natural capital which also have high economic values;
- a long term view is taken (intergenerational);
- there is respect for the needs of future generations, and that changes in community values in the future are likely, therefore keeping landuse options open should be given high priority;
- costs borne by future generations are anticipated (both financial and environmental costs); and that
- a comprehensive assessment process is used to assess alternative sites for, or approaches to development.

4.3.5. Examples of the questions derived from the ESD principle of intergenerational equity

Is future generations' access to a healthy, diverse and productive environment maintained or enhanced by the development?

Would the use of alternative sites for the proposed development maintain or enhance future generations access to a healthy, diverse and productive environment?

Would the use of alternative development models achieve the same purpose while maintaining or enhancing future generations' access to a healthy, diverse and productive environment?

Will the proposed development close off future options for the use of the site or related ecosystems for other purposes into the foreseeable future?

Does the development contribute to the restoration of the local or regional ecosystem or contribute to the restoration of the environment in any way?

Does the development establish a pattern of non renewable resource use depletion which will deny future generations access to these resources - eg. is it highly fossil fuel dependent?

Are any significant cultural values depleted by the proposed development?

Are there significant costs to the current generation of not proceeding with the development immediately? Or will the value of the development or the development potential of the site improve with time?

Is there any agency which can act as a surrogate for the interests for future generations? What is their view of the development?

Are there any existing or potentially important industries that are likely to be affected by the development? Is their growth likely?

Does the development generate long term economic gains? Is this represented in employment and productivity growth in the short or long term?

4.4. ESD principle - conservation of biodiversity and ecological integrity

The conservation of biodiversity and maintenance of ecological integrity is essential to ESD.

Protection of biodiversity has ethical as well as utilitarian dimensions, as all species and native ecosystems have intrinsic value, and are therefore worthy of conservation. Healthy ecosystems also provide us with services which are indispensable. They are the life support system of the planet, and therefore critical for human survival. Viable communities of species living in healthy ecosystems provide the oxygen we breathe, recycle nutrients, cleanse our water supplies and ultimately, stabilise the climate.

The retention of native bushland is crucial to the maintenance of biodiversity. The harsh physical conditions of the ancient Australian landscape, with its characteristically low nutrient soils and generally scarce water, led to the evolution of a highly specialised and unique fauna and flora. Hence Australia's species display a high degree of endemism. This gives Australia an international responsibility to protect and encourage the survival of our country's native species. This responsibility has not been executed well to date, with large numbers of extinctions and many species now being threatened.

The long term protection of Australian ecosystems is critical to the maintenance of ecological integrity and protection of biodiversity. This will be achieved in part by:

- establishing an adequate reserve system;
- off reserve conservation based on both voluntary and regulated measures (Young and Binning 1996);
- adequate planning and legislation to protect sensitive and threatened habitats/communities, the status of rivers, native vegetation, wetlands, and estuaries; and
- stringent regulation of pollution.

Development and management of the urban fringe has important implications for biodiversity and ecological integrity. These include actual and potential impacts on:

- fresh water, coastal and marine ecosystems through the elimination or physical degradation of habitats, impacts on water quality and the introduction of exotic species;
- bushland through direct clearing of vegetation for suburban housing and indirect impacts through clearing of fire breaks, cool burning, impacts of domestic pets and weed escapes. For example, the simple introduction of mains water can change vegetation communities; and
- the habitat of threatened species and communities, or through the extension of threatening processes which further increase the dangers of extinction.

The responsibility for protection of biodiversity and ecological integrity extends across all scales and jurisdictions. At the national scale the identification of bio-geographic provinces is now regarded as the most useful basis for the selection of representative reserves and off reserve incentive and regulatory measures. However there are frequently species or communities of significance at the local and regional scale which need to be protected by local and regional measures.

Protection of biodiversity through prevention is widely recognised as more effective than attempting to rescue species from the brink of extinction through captive breeding or other

specialist activities. While the latter is necessary, it is more effective to ensure protection through maintenance of habitats, particularly through restricting the clearing of bushland and other processes which fragment or destroy habitat.

In light of climate changes due to the greenhouse effect the provision of continuous habitat along the range of environmental gradients will be essential for the preservation of biodiversity. Many species can be expected to become even more vulnerable. Not only does the retention of native vegetation ameliorate the problem of the greenhouse effect through its role as a carbon sink, it also assists the preservation of biodiversity by enlarging and linking fragmented habitats.

Clearing of native vegetation is the greatest threat to Australia's flora and fauna. Attempts to protect many plant and animal species may be next to useless unless this threat is overcome. Apart the direct impacts of habitat loss, fragmented habitats support feral animal and weed invasions. While parks and reserves are important, biodiversity conservation cannot be achieved in our parks alone.

4.4.1. Examples of the questions derived from the ESD principle of conservation of biodiversity and ecological integrity

Is the proposed development likely to affect biodiversity or ecological integrity adversely?

Have alternative options or sites for the development been assessed? Has the no development option for a site been assessed?

Is the site or the surrounding system important for biodiversity conservation? Have potential on site or off site risks been assessed? (Off site effects may be due to changes in fire or water regimes, increased risk from exotic invasions, or impacts of pollutants).

Have any biological surveys been undertaken? Have these included assessment of organisms other than vertebrates?

Are any threatened species or communities likely to be present in the area? Have they been recorded in the area? How will the development effect them?

Is there a large degree of uncertainty about the impact on threatened or endangered species or communities? And if so should the precautionary principle be invoked to over ride any further development?

Have the effects on biodiversity and ecological integrity that are directly related to the site been identified and assessed?

Have prior examples of similar developments been examined to identify likely effects of the developments? And how might these be rectified/minimised? Have the effects been minimal, major or catastrophic?

Does the development aim to enhance the conservation of biodiversity and ecological integrity?

Is the development, site/location significant at a bioregional scale?

If the development is to proceed are any design or regulatory requirements required to minimise adverse impacts on species or community on the site or in the area?

What kind of enforcement regimes/incentive regimes are required to ensure that design restrictions/criteria or site specific regulations/rules are implemented?

Is there sufficient capacity and/or organisational continuity to ensure that these are implemented/enforced?

- in the development phase?
- in the occupancy or operational period?

What method of accountability will be used to ensure compliance?

4.5. ESD principle - community participation

Governments should adopt efficient, transparent and non-discriminatory processes to facilitate community participation in decision making. This is critical to the acceptance and effectiveness of new policies, plans and programs. Participation is a far more inclusive concept than community consultation, as the later can involve merely telling the public of the government's plans.

The community's cooperation must be enlisted to achieve the changes in lifestyle and commerce vital for the transition to ESD. As most people are unaware of their opportunities to influence urban planning decisions, or of how their actions affect these systems, changes to the way urban planning is undertaken will be essential to facilitate community participation. Information campaigns to raise the profile of community involvement in local and regional planning will be useful. More extensive processes of community based regional planning are proving valuable in addressing many regional resource management and economic development needs (see ALGA 1997, & Dore and Woodhill 1998).

The European Sustainable Cities Report makes it clear that participation is one of several critical factors in the transition to sustainability. (See appendix 3 for a brief summary of the report).

The following criteria can be used for evaluating the quality of community participation processes:

- genuine opportunities for public participation which will influence outcomes;
- open and inclusive processes for involving communities;
- recognition of community expertise and concerns;
- financial or other resourcing and/or facilitation of public involvement and established processes for involvement; and
- translation and demystification of expert jargon/ and expert processes.

4.5.1. *Examples of Community Participation question⁴*

Will or can community participation make any difference to the outcome of decisions?

Is community participation legislated for or required in statutory planning processes? Have these requirements been met?

Are the timing and periods for consultation conducive to community involvement?

Are there open and inclusive processes for involving communities in the development and assessment of regional planning and urban design options?

Do the processes explicitly recognise and draw on community knowledge and expertise?

Is community participation in planning financially resourced and facilitated by the government agencies responsible?

Do the planning agencies make an effort to translate expert jargon and/or demystify expert processes?

4.6. ESD principle - improved valuation, pricing and incentive mechanisms

The low or zero pricing of environmental values has encouraged ecologically unsustainable levels of exploitation. Environmental values which have been inappropriately priced include:

- aesthetic, cultural and amenity values;
- intrinsic biological values;
- environmental services, such as pollution dispersion and assimilation; and
- many natural resources.

Markets have consistently failed to value these and this frequently leads to their abuse and over use. The tragedy of the commons is often the result of failing to value them appropriately. Application of this ESD principle will be central to directing the activities of the market economies to more sustainable practices. The use of pricing and incentive mechanisms are potentially very powerful ways to change behaviour (Young and Binning 1996).

A key to achieving ecological sustainability in land and water management is to ensure that environmental services and values and natural resources are no longer treated as free (or cheap) goods. For example, urban development rights, water use and waste water services, transport services (car based or public), and penalties for pollution should all be priced in a way which accounts for the social and environmental impacts of resource allocation and use.

In practice, it is impossible to fully define the monetary value of intangible properties such as the intrinsic biological values of species or ecosystems, or the impact on health of

⁴ note that community participation must occur in a genuine way, not merely a cynical exercise in community rubber stamping. There is growing literature about accepted practice in community involvement in planning but this appears to be primarily exercised in Australia in the catchment management and landcare arenas, and less so in urban planning and land allocation (see Woodhill and Dore 1998 for a recent review of community based regional planning).

pollution. Furthermore, we presently have no mechanism in place to appropriately account for the externalities of pollution, especially those derived from diffuse sources such as storm water. For these reasons, a mix of pricing, regulatory and other policy instruments is required to induce ecologically sustainable levels of resource use.

This ESD pricing principle requires that the prices paid for the new suburban land should recognise that land and associated biological systems are not an unlimited resource. The application of the user and polluter pays principles means that the price should therefore include:

- the cost to the environment of the development, for example, the impacts on water systems;
- the cost of the infrastructure for servicing additional housing eg. the costs of water and waste water infrastructure, including capital and operating costs;
- similar cost for all other urban services; and
- the costs of land, the right to pollute or modify natural environments including the externalities of water and air pollution.

All the costs should be calculated on the basis of cost or depletion of the 'natural capital' values associated with hydrological, biological and climatic processes and features – as well as the full cost recovery of service provision and management.

The social equity ramifications of adoption of such measures will need to be taken into account in order to achieve the desired level of resource use at the least social cost.

Section 7 examines the issues of pricing and incentives in more detail.

4.6.1. Examples of questions derived from the ESD principle of pricing and incentives

Have the impacts of the development on environmental values been appropriately costed?

Include costing for any loss of:

- aesthetic, cultural and amenity values;
- intrinsic biological values; and
- environmental services, such as pollution dispersion and assimilation.

Does the development involve the privatisation or appropriation of publicly owned resources or valued attributes? For example is any resource which is currently owned, used or valued by the community for low or minimal charges being converted to a private resource - include views, recreation facilities etc.

Does the development receive any direct or indirect subsidies? Include infrastructure and incentives available through preferential treatment in relation to rating, taxes and charges?

Does the development generate any significant externalities? (see section 7 for examples) and is there any provision for payment or compensation to those effected?

What principles or systems have been used to estimate and attribute costs of externalities? How are the cost attributed - user pays, polluter pays etc?

4.7. ESD principle - applying a global perspective

Human society, the market economy and the natural world are irrevocably inter-connected. A global perspective is required. Most of the global issues are covered under the other ESD principles but some relate specifically to this one.

What are the global implications of the project?

Does the project meet the goals or intent of national and international policies?

4.8. ESD principle - limits and efficiency of natural resources use

Efficient resource use minimises environmental impacts, maximises output per unit of input and ensures that resources are allocated so as to provide the greatest overall benefit to the community.

The use of natural systems should not exceed bio-physical limits as doing so usually reduces the capacity of the system to support life at all scales. The capacity of many urban and urban fringe environments to assimilate waste and to sustain the current rate and scale of natural resource use is being approached and in some cases exceeded. The health of the Hawkesbury Nepean River system is an example of excessive use of natural resources. It becomes inefficient to continue stressing this system because doing so will almost certainly ensure that costs exceed benefits. In many cases the benefits will be captured by the private sector while cost will remain a public responsibility.

Due to uncertainty, the precise identification of bio-physical limits is difficult, if not impossible - in most cases we do not know the assimilability status of receiving environments or the full consequences of resource exploitation. An adaptive management or ecosystem approach is required, based on ongoing environmental assessment and adaptive responses. This adaptation should build on the understanding of bio-physical limits, environmental variables, and ecological interactions.

The establishment of comprehensive urban, water, and coastal environmental monitoring and recording systems are required. National indicators for State of the Environment reporting are being developed which build on efforts at a range of scales to monitor environmental change. Environment Australia (1998) has produced a series of reports - Environmental Indicators for National State of the Environment Reporting - these document the indicators which have been deemed the most useful for national SoE reporting.

As a part of this series Alexandra, Higgins and White (1988) provide a description of the current applications of environmental monitoring at a local and regional scale. This study found significant potential for the use environmental indicators, as well as significant limitations. In most situations there appears to be inadequate information to assess limits and thresholds accurately. Improvement in monitoring systems and knowledge of ecosystems is generally required before trend data and an understanding of the ecosystem implications of the trends can be established.

Given the myriad of competing uses of land, establishing efficient allocation processes for land resources deserves comprehensive assessment. *Regionassess* is devoted to improving

the allocation tasks through ensuring the full range of factors is considered. The efficiency of the allocation should probably be tested in terms of the impacts on other systems - biotic, aquatic, social etc and the intensity of use of other resources like energy to support and maintain a housing estate over its life. In other words full life cycle analysis is required for the end use of the land as well for the impacts of changing its use.

4.8.1. examples of questions derived from the ESD principle - limits and efficiency of natural resources

Does the development involve or effect any natural resource system which may be approaching critical thresholds or resource use limits? (Eg. airshed, water shed or river, high value agricultural land, fishery or forest.)

Has a full life cycle analysis been used to assess the impact of the proposal?

How have the fossil energy use figures been calculated? What are the implications of the development for greenhouse gas emission?

What will the impacts on regional air quality or atmospheric conditions be?

How will the development contribute to the efficiency of natural resource use?

Has the development been designed to maximise the efficiency of energy and other natural resource use?

Should specific design constraints/standards be applied to improve energy efficiency?

4.9. ESD principle - resilience

An ecosystem is composed of a complex web of energy, soil, nutrients, water, plants, animals and micro-organisms. Equilibrium is maintained amongst these components when they all operate in dynamic balance with each other.

Resilience is the ability of an economic or ecological system to maintain equilibrium, and thus to withstand adverse impacts that result from either natural or human-induced perturbations, stresses or shocks.

Economic resilience is also important in overcoming economic or ecological shocks. Economic diversification is an important requirement for resilience in an ecologically sustainable economy.

Urban systems are the main consumers of many resources in Australia. They are also productive in many ways supporting a wide variety of productive commercial and domestic enterprises. They are the centres of cultural and educational diversity, and are clearly attractive to many people.

The maintenance of this diversity will hinge on the ability and willingness of consumers and producers to adopt sustainable patterns and practices. This will be facilitated by

implementing appropriate regulations and standards, introducing incentives to direct market activities, increasing community awareness, and by training and reskilling.

4.9.1. Resilience - external balance

External balance in Australia's national accounts will minimise pressure to deplete natural resources and natural capital. If an economy is running a high level of foreign debt, it is likely to be experiencing pressures to depreciate capital - in particular natural capital - for short run debt relief.

Improving urban planning contributes to improving micro and macro economic performance, the development of value-added products and further diversification of our economic base. For example, urban systems with high motor vehicle use will contribute to foreign debt due to the increasing reliance on imported fuels in Australia.

4.9.2. Resilience checklist

Does the development promote or enhance ecological resilience?

Alternatively, does the development deplete the capacity of the ecological system to maintain resilience?

Does the development promote or enhance economic resilience?

Does it have significant implications for Australia's foreign exchange balance?

5. THE “REGIONASSESS” FRAMEWORK

In this section we present the strategic or regional assessment framework. We have used this framework to compare four hypothetical examples of a 600 lot housing development. Recognition of the limited nature of suitable locations, cost of planning and infrastructure, adherence to state or local standards and use of best management practice are all assumed as given for each example.

The key characteristic of the four examples are briefly described below. For each option best design and management practices are assumed as a standard feature, eg. we assume that any development will equal or better any applicable design codes eg. solar and energy efficiency and waste water and storm water management and will adhere to best management practice guidelines. In this way we can concentrate on the aspects of the decision that relate to site choice rather than attempt to compare best design with standard design features of a particular development.

The description of the characteristics is followed by a sketchy attempt to compare the options using the framework developed. This comparison is hampered in part by the theoretical nature of the exercise. Given a real world location many more details could be completed. While such an exercise is supported it is well beyond the limits of this report.

In the framework below, little reference is made to the usual steps of the planning processes that relate to development consents, development approvals etc. This is a result of the framework being developed from theoretical principles. It is our expectation that substantial further work will be undertaken to graft the kind of assessment proposed here into the codified procedures of any applicable local government or planning act in any of the States in Australia. It is also understood that legal and planning reforms in NSW are the focus of Study 4. Therefore it is our intent here to articulate the range and nature of the issues requiring assessment at the regional scale in order to compare options in the hope that this may provide a foundation for more comprehensive assessment and planning systems in the future.

5.1. Description of generalised development options for assessment

These options are generalised from the existing conditions and opportunities found throughout the outer urban fringe areas of Australian cities and contain the following characteristics.

1. Bushland fringe

- physically located at the edge of urban serviced areas, adjacent to or transforming bushland (in public or private ownership) with moderate to high biodiversity value to low density residential land.
- surrounding urban area has low work opportunities and low level provision of social and physical infrastructure or aging infrastructure.
- the population make up is similar to the average metropolitan profile with middle to low income households.

- the existing urban form is dominated by a car based low density dormitory form.
- existing road networks have poor permeability to pedestrian and public transport movement.

2. Existing local urban hub

Local neighbourhood shopping centre, perhaps prewar, or early sixties site situated at a modal interchange of buses, main roads and or a railway station.

- predominantly supportive function for weekly needs; some specialist functions such as schools, light industries and entertainment;
- easy access by bus, taxi, cycling and walking.

3. Consolidation of existing major commercial centre through addition of medium density housing

- situated on a major regional modal interchange preferably at a railway station.
- high level of employment opportunities and specialist and selective retail activities including entertainment, serving a catchment of approximately 100,000 population.
- upper level residential redevelopment of commercial and older industrial sites - eg the construction of multi storey apartments over retail car parks or retail centres.

4. New suburb (modest extension of urban fringe and infrastructure into green fields)

- based on existing arterial road network and modal interchange, extending existing urbanisation and attendant infrastructure linked to district centres and transport hubs via bus networks or new rail links.
- utilises elements of early settlement heritage for hubs.
- converts agricultural land (preferably of low to medium value for production, but frequently mistakenly assumed of intrinsically high value due to its close proximity to urban markets, levels of capitalisation and taxation distortions).
- allows numerous opportunities for excellent planning and urban design.
- allows for best available infrastructure, waste water treatment and new water sensitive design techniques.
- can be subjected to numerous design guidelines for infrastructure and building construction.
- application of sound urban design principles can minimise “new suburb malaise”.

- a diversity of residential and commercial opportunities can be designed in, to create a living village.
- appropriate layout maximises solar orientation of housing.
- parkland and bicycle tracks can be designed in, buffers for streams etc. also designed from outset.

5.2. Conclusions from the hypothetical use of the Regionassess framework

By attempting to answer the questions in the framework, even as a hypothetical exercise with very limited information, it is clear that the conversion of bushland to suburbs runs contrary to spirit and principles of ESD policy. It is the least desirable option given the opportunity to construct housing on land already cleared for agriculture or use opportunities for urban infill or the redevelopment of commercial or industrial areas.

Clearly there can be viable alternatives to development in the bush land fringes. Only a small percentage of Sydney, Melbourne, Adelaide or Perth is unallocated bushland on crown land. These areas or significant percentages of them could be quarantined from urban development. They would become increasingly valuable for recreation, nature conservation etc. Alternatives include urban consolidation and renewal, urbanisation on fringe agricultural and hobby farm areas etc.

While any new suburb on the fringe has high environmental costs, including high energy operating costs over its lifetime, those that destroy bushland add an additional dimension to these costs which should no longer be acceptable in the era of ESD. This situation is in part due to the historical circumstances that have led to the clearing of the majority of bush, and therefore the high value of any bushland that remains. It is also because of the inherent biological and ecological values of bushland. Several of the ESD principles point to the importance of protecting these values. Furthermore, given the predominance of low density suburbs in Australian cities, it is vastly more appropriate to concentrate development within the existing boundaries of the suburbs, and on the redevelopment of industrial and commercial land than it is on further expanding the fringes of the city into the remaining bush.

A simple system for using *regionassess* is favoured. The use of Geographic Information Systems (GIS) or simple map overlays should allow for identification of prospective urban development areas which are suitable for more detailed assessment and/or detailed planning. If this kind of approach had been used we doubt that the Hornsby/Berowra sites would have been selected for any further consideration. For example, a simple biodiversity overlays would highlight the importance of new housing developments avoiding sensitive or high value sites such as most urban fringe bushland, wetlands, stream sides and/or lake and estuary frontages.

The fact that these kinds of sites are regarded as highly desirable locations by the market should not be taken as an indication of the societal costs or benefits of permitting their development. The attributes which make them desirable for private house sites are similar to the attributes that make them publicly valuable. It is here that the planning system should mediate the dispute between private and public benefits of a given set of choices.

In conclusion, trialing the use of the framework on these hypothetical examples allows us to state with confidence that while any urban fringe development is costly in environmental terms, development which converts bushland to housing estates is the most costly, and therefore least desirable. It is clearly contrary to many of the ESD principles and policies and therefore the planning system which sanctions this form of development needs to be overhauled. Finally it should be noted that the use of the framework, allows us to come to this conclusion with confidence, by directing our inquiries to the matters of broad importance, not by demanding answers in minute detail. This conclusion confirms that urban consolidation strategies embodied in the Hornsby Shire Housing Strategy, and similar strategies adopted by many other local governments and/or state planning agencies are appropriate.

A suggested refinement of the regionassess framework is to incorporate a weighting system - such as giving each answer a score or rank between 1 and 10 - to assist in the selection or assessment process. This may prove useful and could be incorporated as a result of future efforts to refine the approach.

5.3. Framework for assessment - the Precautionary Principle

ESD Questions Precautionary principle	Guide to questions including notes on criteria, indicators or techniques for assessment. ⁵	1. Bushland fringe urban development	2. existing suburb - village hub medium density	3. service and transport hub, redevelopment	4. suburban development on cleared agriculture land
<p>PP 1. Irreversible impacts -</p> <p>1.1. Is the proposed development likely to have any irreversible impacts (local, regional or global)?</p> <p>Is the development likely to contribute to any irreversible impacts, directly or indirectly?</p> <p>1.2 How have these risks been determined?</p> <p>Have alternative sites with lower risk potential been adequately considered? ⁶</p>	<p>Expert assessment</p> <p>Analogy - examination of similar developments and their effects</p> <p>Provide evidence of how risks were determined.</p> <p>The template requires that alternative sites which can achieve the same societal goals must be adequately considered.</p>	<p>YES</p> <p>exposes the development site and larger adjoining areas/aquatic systems to potentially irreversible impacts</p>	<p>POSSIBLE</p> <p>exposes adjoining aquatic system to increased run off due to increase population and increase in hard surface</p>	<p>NO</p> <p>uses site already fundamentally altered</p>	<p>POSSIBLE</p> <p>impacts highly dependent on design principles applied and quality of waste technology applied.</p>

⁵ When attempting to answer these questions any underlying assumptions and sources of information should be made explicit where possible.

⁶ This framework requires that alternative sites which can achieve the same societal goals must be adequately considered and that the possibility of no development for a given site is considered as an option.

<p>PP 2. Cumulative impacts</p> <p>Have the cumulative impacts of the development (when combined with other planned or anticipated developments) been determined in relation to:-</p> <p>2.1 • the water cycle/ the catchment system?</p> <p>2.2 • the biological communities effected?</p> <p>2.3 • other effected industries?</p> <p>2.4 • the health of a functioning urban system.</p>	<p>The combined effects of many small actions result in a cumulative impact.</p> <p>Traditional EIA EIS usually fail to take account of the additive effects of many related actions/developments taking place over decades and over extensive areas eg. a catchment or bio region.</p> <p>Examples in Sydney include the impact of storm water on the HN or the impact of cars on air quality</p> <p>Refer to the measurement techniques for monitoring SoE indicators for human settlements, inland water, biodiversity and atmosphere (Commonwealth of Australia 1998)</p>	<p>YES</p>	<p>more detailed information required</p>	<p>more detailed information required</p>	<p>more detailed information required</p>
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<p>PP 3. Future remediation costs</p> <p>3.1 Are there likely to be environmental remediation costs involved as a result of the development?</p> <p>3.2 If so have these been calculated and who pays?</p>	<p>While it is recognised that there are likely to be some remediation costs associated with most developments, it is useful to attempt to estimate the likely levels of costs and whether responsibility for meeting these costs has been determined. Eg. Construction on steep sites requires specialised storm water traps which have limited life expectancy without maintenance and renewal, and limits to effectiveness (design limits). There needs to be appropriate monitoring and accountability structures in order to maintain these systems - by answering this question we are able to determine whether these issues have been planned for and who is paying over the life of the development.</p>	<p>YES</p>	<p>NO</p>	<p>NO</p>	<p>YES Impose high standards for STP stormwater Design to above AWRC national water quality standards.</p>
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<p>PP. 4. Ecosystem stresses Are any of the ecosystems effected by the development showing signs of stress? Will the development add to these stresses? Are there any worrying trends?</p>	<p>Refer to information in recent SoE reports for signs of environmental stress. Eg. Many urban waterways and estuaries are already severely stressed by pollutants and nutrients from urban run off, air pollution is becoming a problem in most metropolitan airsheds etc. Determination of the overall pressures on these systems is necessary to determine likely impacts. [Note - the level of impact on water and air are dependent on access to transport and effective waste water treatment plants]</p>	<p>Urban bushland Sydney air quality. Urban stream water quality. Estuarine and coastal water quality</p>	<p>Sydney air quality Urban stream water quality Estuarine and coastal water quality</p>	<p>Sydney air quality Urban stream water quality Estuarine and coastal water quality</p>	<p>Sydney air quality. Urban stream water quality Estuarine and coastal water quality</p>
<p>PP 5. Thresholds Are critical thresholds being approached/exceeded? for : <ul style="list-style-type: none"> • water systems, • biological communities - terrestrial and aquatic; • urban air quality; • waste absorption or assimilative capacity; • the capacity of built infrastructure. How are thresholds being determined? Is further data required? Are measurement procedures subjected to quality control or independent scrutiny?</p>	<p>The precautionary principles demands that decisions are taken before the environment has been crash tested. The question of thresholds therefore relates more to identifying movement towards an important threshold rather than attempting to determine an absolute limit.</p>	<p>H2o Biodiversity Air pollution</p>			

<p>PP 7. Monitoring data, and trend analysis</p> <p>Is there any long term environmental monitoring data available in order to determine long term trends in the relevant ecosystem?</p> <p>Are the areas subjected to any systematic monitoring? eg. SOE reporting, water quality monitoring.</p> <p>Is further data required? Are measurement procedures subjected to quality control or independent scrutiny?</p>	<p>SoE Reports and other environmental monitoring should be able to provide information on trends that should be taken into account when considering the impacts of a proposal.</p>				
<p>PP 8. Synergistic and catalytic effects</p> <p>Have the impacts results from synergistic and catalytic effects of the development been adequately considered?</p> <p>What kinds of risks have been subjected to a risk analysis?</p> <p>Is further testing or independent review and evaluation required?</p>	<p>See Canadian literature on sustainable development.</p> <p>Determination of the likelihood of significant synergistic impacts is very dependent on adequate knowledge of the dynamics of the systems involved.</p>				

5.4. Intergenerational Equity

ESD Questions Intergenerational equity (IE)	Guide to questions including notes on criteria, indicators or techniques for assessment.	1. Bushland fringe urban development	2. existing suburb - village hub medium density	3. service and transport hub, medium density redevelopment	4. New village suburban development on cleared agriculture land
IE 1. rights of future generations Are future generations' access to a healthy, diverse and productive environment maintained or enhanced by the development.	Intergenerational equity questions are difficult to answer because they often involves ethical issues over long time scales. Some innovative approaches are being proposed to answering these kinds of questions. One is the use of citizens juries.	NO Excepting residents on new blocks	YES	YES	
IE 2. Alternative locations Would the use of alternative sites for the proposed development maintain or enhance future generations access to a healthy, diverse and productive environment? Rank development being assessed.	Assessment of the way in which alternative sites will enhance or maintain future generations access to a healthy environment. 1= highly desirable 4= low	4	3	1	2
IE 3. Alternative models Would the use of alternative development models, achieve the same purpose while maintaining or enhancing future generations access to a healthy, diverse and productive environment?	The development model is a function of the design and technologies chosen. Conceptual plans are required, as a minimum to answer this question	more detail is demanded to answer this properly	more detail	more detail	more detail
IE 4. Future options Will the proposed development close off future options for the use of the site or related ecosystems into the foreseeable future?	Some landuses can be considered as way of holding land for the future while other foreclose future options	YES	NO	NO	YES

<p>IE 5. Restoration Does the development contribute to the restoration of the local or regional ecosystem or contribute to the restoration of the environment in any way?</p>	<p>It is possible to use the development process to restore damaged environments or upgrade infrastructure. This question allows for an explanation on how the development will be used to enhance or restore the environment.</p>	NO	?	?	?
<p>IE 6 Thresholds Are critical parameters of environmental health reaching important thresholds - eg water quality, air quality? (refer to pp 5 above) Will the development contribute to a total load/cumulative impact/for system which is already close to or has exceeded a critical threshold? Specify how thresholds are being determined?</p>	<p>The answer should focus on thresholds from an intergenerational equity perspective. The potential for changes that will impact on future generations must be foremost.</p>	more info			
<p>IE 7 Resource use patterns Does the development establish a patten of non renewable resource use depletion which will deny future generations access to these resources - eg. is it fossil fuel dependent?</p>	<p>see PLACES Model or the work on urban villages. More detail is provided in the <i>siteassess</i> table</p>	<p>YES Urban form determine many of the energy relationships for the life of a house. Assess energy use patterns determined by transport</p>	<p>YES x-10%</p>	<p>YES x-50%</p>	<p>x</p>
<p>IE 8 Biological values Are there important biological systems/resources depleted/degraded by the development?</p>	<p>Refer to biological surveys and advice from conservation or wildlife agencies</p>	YES	NO	NO	NO

<p>IE 9. Cultural significance Are there any culturally significant values depleted by the proposed development?</p>	<p>Refer to Heritage Councils, Aboriginal land councils, museums, state environment and heritage departments eg. NSWNPS and/or local governments</p>	<p>YES</p>	<p>Impacts dependent on the built or natural heritage & the specifics of a given development</p>	<p>Possible impacts dependent on the built or natural heritage depending on the specifics of a given development</p>	<p>Possible impacts dependent on the built or natural heritage depending on the specifics of a given development</p>
<p>IE 10. Timing Are there significant costs to the current generation of not proceeding the development?</p>	<p>Questions of timing are central to the assessment of intergenerational equity. If there are significant doubts about a project but no great costs of not proceeding immediately, then there is time for the more detailed investigations necessary. CBA should be used to shed light on the economic of infrastructure utilisation/renewal and capacity</p>	<p>YES or No depending on questions of underutilised infrastructure etc. NO not if using underutilized infrastructure</p>	<p>NO not if using underutilised infrastructure</p>	<p>NO underutilised</p>	<p>NO ?</p>
<p>Will the value of the development or the development potential of the site improve with time?</p>		<p>but YES if using new infrastructure</p>	<p>YES</p>	<p>renewal opp.</p>	<p>YES</p>
<p>IE 11. Further information Are further studies required to determine future impacts on future generations?</p>		<p>?</p>	<p>?</p>	<p>?</p>	<p>?</p>
<p>IE 12. Surrogates Is there any agency who can act as a surrogate for the interests of future generations? What is there view of the development?</p>	<p>The advice from agencies established to protect the environment should be sought. Include community based organisation eg. catchment committees. The use of citizens juries could be tried as a means of determining what is in the best interests of future generations.</p>				

<p>IE 13 Impact on productive industries - economic assessment Are there any existing or potentially important industries that are likely to be effected by the development? Is their growth likely? How have the potential economic costs to other industries been determined? Is more economic analysis required?</p>	<p>Include assessment on a wide range of industries that may be affected by the development.</p> <p>Detailed bio economic assessment may be required to answer this and the next question.</p>				
<p>Does the development generate long term economic gains? Is this represented in employment and productivity growth in the short or long term?</p>	<p>Assessment should attempt to address long term ecological and economic consequence of the proposed development</p>				
<p>IE 15 Maintenance costs Does the development impose lasting maintenance costs which will fall on future generations?</p>	<p>Refer to accounting and asset management techniques used by LGA's and infrastructure agencies The cost of maintaining roads, fire trails and water and waste water treatment systems needs to be included in the assessment with clear allocation of who pays</p>				
<p>IE 16 site limits Are any design criteria, site specific limitations or regulations required to protect the interests of future generations, in the site or within the region or the catchment?</p>	<p>If specific design guidelines or regulations are to be used to protect the interests of future generations these must be specified clearly, along with maintainance and enforcement regimes.</p>				

5.5. Protection of biodiversity and ecological integrity

ESD Questions Protection of biodiversity and ecological integrity (BD & EI)	Guide to questions including notes on criteria, indicators or techniques for assessment.	1. Bushland fringe urban development	2. existing suburb - village hub medium density	3. service and transport hub, redevelopment	4. new suburban development on cleared agriculture land
BD&EI 1. likely effects					
Is the proposed development likely to adversely affect biodiversity or the ecological integrity ?	As this is a preliminary assessment new detailed surveys etc are not required to answer this question. Refer to existing studies and the expertise of appropriate agencies and community groups	YES	NO	NO	YES
BD&EI 2. Alternatives					
Have alternative options or sites for the development been assessed, with a view to minimising impacts on biodiversity?	For any proposed development a series of options should be examined.	NO			
BD&EI 3. Risks					
Are there any reasons why the development may pose a risk for biodiversity conservation? (see also PP 1)	Use analogue or precedents of the development.	YES	NO	NO	YES
Is the site or the surrounding system important for biodiversity conservation?	Refer to responsible agencies	YES	?	?	NO
Have potential on site or off site risks been assessed? (Off site effects may be due to changes in fire or water regimes, increased risk from exotic invasions, or impacts of pollutants).		YES			
BD&EI 4. Biological survey					
Has there been any biological surveys undertaken?	Check with NPWS to determine if bio survey have been undertaken	YES	NO	NO	NO
Have all relevant source of biological information been checked? - include all relevant agencies and community /residents groups.	Other less formal sources can be important	YES			

Are there any threatened or endangered species likely to be present in the area?		YES			
Are there any threatened or endangered species recorded in the area?		YES			
Are there any threatened or endangered communities likely to be present in the area?		YES			
Are there any threatened or endangered communities recorded in the area?		YES			

Are more surveys required? YES
 Is there significant uncertainty about the risks to biodiversity and therefore should the precautionary principle be invoked? YES
BD&EI 8. Precedents Have prior examples of similar developments been examined to identify likely effects of the developments? and how these might be rectified/minimised? Have the effects been minimal, major or catastrophic? A common sense approach to the task of assessment is to find precedents and use these examples to determine levels of impacts, and opportunities for reduction of impact etc
BD&EI 10. Enhancement Does the development enhance the conservation of biodiversity and ecological integrity? The development may plan to protect and enhance important habitats, restore riparian veg etc. NO NO NO NO/?
BD&EI 14. Any other factors Are there any factors which may make the site significant locally, regionally or globally?
BD&EI 15. Design issues If the development is to proceed are there any design or regulatory requirements required to minimise adverse impacts on species or community on the site or in the area? describe the site regulations or design guidelines being used to minimise impacts on biodiversity in the area
BD&EI 16. Enforcement requirements What kind of enforcement regimes/incentive regimes are required to ensure that design restrictions/criteria or site specific regulations/rules are upheld? describe the enforcement regimes that will be used to enforce the regulations or guideline in use.
 Is there sufficient capacity to ensure that these are implemented/enforced? - in the development phase? - in the occupancy period?

5.6. Limits and efficiency of natural resources use

ESD Principle -

limits and efficiency of natural resources use (LE) Guide to questions including notes on criteria, indicators or techniques for assessment. 1. Bushland fringe urban development 2. existing suburb - village hub medium density 3. service and transport hub, redevelopment 4. new suburban development on cleared agriculture land
LE 1. Critical limits or thresholds Does the development involve or effect any natural resource system which may be approaching critical thresholds or limits? (Eg airshed, water shed or river, high value agricultural land, fishery or forest.)

(refer to the question thresholds above) Focus on the effects on natural resources - those components of the ecosystem that have value as resources. YES YES YES YES
LE 2. full life cycle analysis

Has a full life cycle analysis been used to assess the impact of the proposal? full life cycle analysis is used to determine the operating cost over the life of development, as well as the development costs
LE 3. fossil energy and greenhouse

How have the fossil energy use figures been calculated?

What are the implications of the development for greenhouse gas emissions? .

[CO2 per household is a useful aggregate measure of energy consumption.] Estimates can be based on models such as PLACES and LAND.

Energy consumption in Australian cities is largely a result of car based travel which is determined by proximity to employment and services and the availability of public transport. Energy use directly correlates to urban density and diversity (Newman and Kenworthy 1992). see also Australia's Greenhouse Challenge commitments, Kyoto Convention and the National Greenhouse Response Strategy 1992

LE 4. Will the development contribute to more efficient use of natural resources? rank efficiency of natural resource between a group of options being assessed. Low medium or high efficiency L. L./M. M./H. L. LE 5. What will the impacts on regional climatic/ air quality or atmospheric conditions be? Refer to question PP 4

High, medium or low H. M. M. H. LE 7. Has the development been designed to maximise the efficiency of energy and other natural resource use? design factors are important for both transport efficiency and for solar access of building NO YES/NO YES YES LE 8. Should specific design constraints/standards be applied to improve energy efficiency? Solar access codes and building thermal efficiency codes can be used to improve energy efficiency

5.7. Improved valuation and assessment

ESD Questions

Improved valuation (IV) Guide to questions including notes on criteria, indicators or techniques for assessment. 1. Bushland fringe urban development 2. existing suburb - village hub medium density 3. service and transport hub, redevelopment 4. suburban development on cleared agriculture land IV 1.

Comprehensive valuations

Have the impacts of the development on environmental values been appropriately costed?

Include costing for any loss of:

symbol 183 \f "Symbol" \s 10 \h aesthetic, cultural and amenity values;

symbol 183 \f "Symbol" \s 10 \h intrinsic biological values;

symbol 183 \f "Symbol" \s 10 \h environmental services, such as pollution dispersion and assimilation. Correct methods for the

valuation of environmental attributes is hotly debated amongst economists. In this case all we are looking for is the ability to compare various options.

IV 2. Privatisation or appropriation

Does the development involve the privatisation or appropriation of publicly owned resources or valued attributes?

For example is any resource which is currently owned, used or valued by the community for low or minimal charges being converted to a private resource - include views, recreation facilities etc.

If the development privatises a publicly owned or valued environmental attribute than this must be taken into account. The loss of the public assets should be account for. an obsession with monetary factors and market economics has seen a spate of privatisation occur in recent years.

IV 3. Subsidies

Does the development receive any direct or indirect subsidies?

Include infrastructure and incentives funded or made available through preferential treatment in relation to ratings, taxes and charges? Prior studies indicate that average public subsidies for new house lots on the Sydney fringe are in the order of \$50000 (1992 dollars) see Winning Back the Cities - Newman and Kenworthy 1992

IV 4. Infrastructure costs

What is the total public subsidy per lot of infrastructure? Is this apportioned according to individual site costs or averaged? Calculation based on local and regional infrastructure costs include roads and other transport, sewerage,

IV 5 . Maintenance costs

Will development generate infrastructure maintenance costs to the community/shire or state government? Refer to accounting and asset management techniques used by LGA's and infrastructure agencies

IV 6. Economic costs

Will development impact on other industries eg. tourism, recreation and fishing industry? Assessments based on detailed bio-economic analysis is required...This should focus on long term effects

5.8. ESD principles - Community participation

This ESD principle is fundamentally different to the ones addressed above as it relates almost entirely to public processes. It is therefore inappropriate to use the questions derived from this for a comparison of options. More importantly public participation processes must be included in the planning processes used to assess the options. The questions are included here to remind readers of the necessity of having effective community participation in planning processes.

Will or can community participation make any difference to the outcome of decisions?

Is community participation legislated for or required in statutory planning processes? Have these requirements been met?

Are the timing and periods for consultation conducive to community involvement?

Are there open and inclusive processes for involving communities in the development and assessment of regional planning and urban design options?

Do the processes explicitly recognise and draw on community knowledge and expertise?

Is community participation in planning financially resourced and facilitated by the government agencies responsible?

Do the planning agencies make an effort to translate expert jargon and/or demystify expert processes?

BOX 3 SoE, Indicators and regional goals.

The following table provides examples on the use of indicators and opportunities for linking regional planning, and SoE reporting processes. (See Alexandra, Higgins and White 1998) for more details)

the nature of the issue

the cause of the issue, noting the indicator

the current condition of the environment, noting the indicator

the objective for the issue, as outlined in the regional strategy

A reasonable target within your overall objective; quantified if possible

Actions to meet this target

The measures which show you are carrying out appropriate processes to address the issue

KEY ISSUE OR ENVIRONMENT-AL VALUE

CAUSES OF THE ISSUE

(pressure indicator)

CURRENT CONDITION AND TREND

(condition indicator)

OBJECTIVE/ GOAL

TARGET

STRATEGIES AND ACTIONS

PROCESS

(response indicator)

Examples:

Declining water quality in Berowra Creek and Estuary

see TCM strategy

Stormwater runoff from upstream urban areas - quality of stormwater runoff

leaking septic tanks,

- number of leaking septics

sewerage treatment plant overflows - number of days/volume of overflow

Water quality indicators show generally poor conditions throughout the system (see Hornsby SoE report) a

Restoration of water to quality in the Estuary suitable for contact recreation eg. swimming

Restoration of water quality achieved for 90% of the time by 2000

Improve quality of urban stormwater runoff by retrofitting older urban stormwater systems. Installation of trash racks wetlands and sediment traps.

Septic system checks yearly.

Sewerage plant upgrades

Amount spent on storm water improvement. Annual inspections of licensed septics. Compliance with EPA conditions for STP

All works licences to have stormwater conditions attached.

Number of schemes of nutrient rich water re-cycling in intensive agricultural areas

Extend open space in selected key areas

Loss of open space to competing uses

(expanding housing due to increasing population numbers)

Incremental losses, especially in coastal and bushland areas

(% area open space)

Extension of open space to Open Space Scheme concept

Reverse current trend of loss by 2005

- establish land acquisition within OSS zones as Council policy
- recognise this policy on planning documents
- number of Councils within the region adopting this policy

6. THE SITEASSESS FRAMEWORK

6.1. The site assessment template

The framework (below) is designed for the assessment of specific sites being planned for development. It should preferably be used after assessment of regional conditions using the broader assessment framework (above). Many of the criteria lend themselves to presentation by mapping features using GIS or McHargian overlays.

The site template will be trialed on the Berowra and Hornsby Landcom sites. Each group of sites will be assessed using information from a wide range of sources, including Study 1.

The proposed framework was provided to the Total Environment Centre for testing and further development and the final version appears in TEC's recommendations report. As a result of this testing the TEC added to horizontal axis the following categories:

Status Summary - [does the value/feature exist]

Impact - [is impact of development positive or negative? High, medium, low]

Whole of site affected? - [extent of impact of development on feature/value]

Part of linked system? - [acknowledge & address cumulative impact on adjoining or down-stream land and species territory]

Sources of information - [make transparent the data relied upon]

Research tools - [techniques used to produce information]

Further comments - [important additional information].

Those wishing to use the framework should refer to the TEC report

6.2. The site template

The column on information sources, policies and or referral agencies is intended to facilitate cross referencing to ensure that the assessment is undertaken in a way cognisant of the current policy framework and/or relevant information sources. To complete this table properly there must be reference given to all of the local, regional and state planning policies that effect the sites in question.

Due to the nature of the trial location much information relating to the shire has been included. This would obviously need to be modified in other locations.

Please note:

The four empty columns headed "Further assessment requirements, opportunities for site specific design or mediation technologies, recommendations and conclusion on likely levels of impacts" are to be used to log information as it is recorded for each of the sites or groups of sites.

Framework for the assessment of specific sites
BIODIVERSITY & ECOLOGICAL INTEGRITY
Measurement techniques
Explanations
Information sources, policies and referral agencies
Further assessment
Design/ technology requirements
Recommendations
Impact of development

SITE NUMBER OR REFERENCE

SITE CRITERIA

1. RARE AND THREATENED SPECIES

1.1 presence of any threatened species
or species or communities of local, regional or national significance

1. biological survey

2. analogy - by reference to comparable systems. (If unknown or uncertain invoke precautionary principle or commission further studies)

3. provide as minimum the required information under the species impacts statements

Assessment required by law [additional refereed comment is possible re new data, Study 1 does this].

The National Strategy for the Conservation of Australia's Biodiversity.

National threatened species strategy? NPWS. NSW Threatened Species Act. local conservation groups

1.2 Are there any threatened communities; or communities of local, regional or national significance

as above

as above

as above

1.3 Does the site provide feeding, breeding or other important habitat to rare or threatened species

as above

as above

as above

1.4 How wide is the riparian buffer (include permanent and temporary drainage lines)

distance to drainage line x slope based on topographic map site plans etc, varying according to erodability of soils

riparian buffers can greatly influence the levels of storm water transported pollutants

NSW Dept. of Land and Water Conservation.

Catchment plans/

Hawkesbury trust.

LWRRDC Riparian Zone Management Program.

Local governments.

2. BUSHLAND

2.1 Estimate edge area ratios - length of bushland fringe to number of house sites ratios

Ratio based on plans.

(Definition of bushland is that used for SEPP 19 but irrespective of tenure.)

Important as a determinant of the effects of suburbs on surrounding bushland. Also important for fire protection

SEPP 19

Council planners.

Fire officers

Bushcare groups

2.2 What is the degree of current site disturbance of bushland; note viability & current state. Can it be readily regenerated? Estimate area of bushland converted per lot; include all infrastructure

Individual site assessment using biological science and bush regeneration expertise

Quantify loss of bush, total area, fragmentation and corridor impacts should be specified.

Bushcare groups

Shire, DUAP, NPWS, local conservation groups

2.3 Assess fire risk to site

Site plans and designated building envelope, out buildings, landscaping and driveways

fire control plans

fire reduction burn records

2.4 Would there be disturbance from development on adjacent bushland from:

- infrastructure;

- hazard reduction;

- pets and weeds;

- recreation;

drainage; and elevated nutrient runoff

distance to bushland,

calculation based on development plans

paired catchment studies bush/new suburb

nutrient models

Risk assessment based on terrain and proximity of wetland/bushland

Many factors influence the distance of travel of weeds and pets. Intrusion processes vary depending on distance of buffer zones, edge and island effects

critical factor on steep sites where weeds capacity to travel by wind and water is increased edge

Catchment nutrient modelling. water quality monitoring programs

bush care groups

SUMMARY COMMENTS

3. SITE SPECIFIC REGULATION

3.1 Is there a need for site specific regulations to protect flora and fauna from:

- weeds;
- pets;

- elevated nutrients;
- toxins etc

distance to bush, sensitivity to disturbance etc

Specific regulations can be used to reduce the impacts of urbanisation close to bushland. This criteria is included to draw out the need for the use of these to protect the bush from urban disturbance

local government,

EPA, NPWS,

licences

3.2 What is the enforcement effort required to ensure compliance with above regulations

Compliance costs as dollars per household pa.

Regulation requires enforcement. The effort needed to enforce any specific regulation must be estimated

local government

EPA, NPWS,

licences

What is the capacity to enforce site specific regulations

expert reference group,

legal and/or community advice

the who, and what of the enforcement effort - does the agency have the capacity to undertake the necessary enforcement over the life of the development

INTER-GENERATIONAL EQUITY

Measurement techniques and methods

Explanations

Information sources, policies and/or referral agencies

Further assessment

Design/ techn'gy require
ments

Recom-mend's

Impact of develop-ment

SITE CRITERIA

1. Assess impact of development on hydrological/
catchment system

1. modelling of catchment processes and role/impact of development sites

2. monitoring trends in water quality (see Indicator for SoE in Australia Commonwealth 1998) and Hornsby Water Quality Monitoring program
Annual Report 1996)

3. meeting existing targets for water quality in receiving and recreational waters (ANZECC 1992)

Most urban water systems in Australia are showing various signs of stress

NSW SREP 20 - Hawkesbury Nepean River.

Statement of Joint Intent for the Berowra Creek.

Catchment Remediation Program five year plan

(Hornsby shire 1997)

Water Quality Monitoring program Annual Report 1996
(Hornsby Shire 1996)
Sustainable Water Control Plan
(Hornsby shire 1997)
Storm water Catchment Management plans

2. FUTURE OPTIONS

2.1 Closing off future options for use of the sites

Comprehensive regional landuse and land allocation assessment (see Victorian LCC studies)

Comprehensive and transparent assessments of the values and competing uses for public lands are required before decisions to allocate are taken which exclude possibly important future uses such as recreation and tourism, conservation and fisheries.

Healthy Rivers Commission 1997.

NPWS

DUAP

2.2. Would the development close off future options for use of adjoining land
as above
particularly important for access to and enjoyment of current and future parkland
Berowra CBA 1998

INTER-GENERATIONAL EQUITY

Measurement techniques and methods

Explanations

Information sources, policies and/or referral agencies

Further assessment

Design/ techn'y require-ments

Recommend's

Impact of

Develop-ment

2.3. Would the development contribute to ecosystem restoration or remediation of past impacts
expert reference,

use of appropriate design and

Benefit cost analysis to help determine trade offs.

some development may provide important opportunities for restoring or remediating critical impacts of past developments

Statement of Joint Intent for Berowra Creek

2.4. Would the development establish patterns of non renewable energy resource use combined energy use for transport and housing measured as CO₂ /kg per household energy and greenhouse gas emission are very dependent on urban form and the resultant housing and transport patterns established

PLACES 3

SEDA

Energy Victoria Guidelines for solar Efficient residential subdivision 1998

Winning back the Cities (Newman and Kenworthy 1992)

Urban Villages Project - encouraging sustainable Urban form Energy Victoria et al 1996)

2.5. Are there sites of cultural significance

1. aboriginal culture

2. views

3. historic

4. recreational value

1. archaeological survey

2. view shed analysis - from and to sites

3. heritage assessment

4. recreational assessments

Some of the criteria and assessment techniques are derived from local community values - existing and emerging - and knowledge

Australian Heritage Commission.

NSW Heritage Act 1977.

National Trust.

Aboriginal Land Councils.

Community recreation groups

Local planning schemes

2.6. Timing - would there be significant costs burdens as a result of delaying the development
CBA

Proper assessments of the factors to be included in the CBA are important. These may include optimum utilisation of infrastructure- social and physical, cost of sunk capital, expectation of certain population levels and anticipated future values of the development

2.7. Surrogate - has an agency acting as surrogate for future generations got referral powers?

The legitimacy of statutory organisations to act in the interest of future generations as prescribed by statute or democratic designation							
2.8. Will development impact on other industries such as tourism, recreation and fishing industries	Establish processes for consulting with industries that are likely to be effected. Follow up with medium to long term assessment based on economic analysis	Assessment should attempt to address long term ecological and economic consequences of the proposed development	Berowra CMC CBA Read Sturgess methods for assessing the value of catchment management				

<p>2.9. Maintenance costs- will development generate infrastructure maintenance costs to borne by the wider community, the Shire or the State Government</p>	<p>Refer to accounting and asset management techniques used by LGA's and infrastructure agencies</p>	<p>The cost of maintaining steep roads, fire trails and sediment traps needs to be included in the assessment with clear allocation of who pays</p>	<p>Refer to Competitive Tendering specifications, infrastructure management techniques developed by various agencies and fire hazard reduction costs</p>				
<p>2.10. Fire prevention - will development on the site require increases in the area and/or frequency of cool burning for fire control and other types of fire risk reduction?</p>	<p>Standard techniques (eg Bryrams fireline intensity equation) for assessment of fire risk combining slope, aspect and fuel loads. Use expert reference to identify likely increases in area or frequency</p>	<p>Site assessment requires an understanding of current and future fire risk reduction requirements - these include physical strategies and community preparedness. The increased risk reduction may be a result of building on steeper slopes or aspects that are fire prone.</p>	<p>Refer to Shire of Hornsby Sensitive land Use study page 50 and 51 Refer to local expertise about fire patterns refer to Pynes Burning Bush 1984</p>				
<p>2.11. Fire prevention - will the costs of fire risk reduction resulting from the development be borne by the owners or the community at large?</p>		<p>determination of who pays for the hazard reduction is required from the outset of the proposed development</p>					

<p>2.12. Infrastructure cost - what is the total public subsidy per lot of infrastructure? Is this apportioned according to individual site costs or averaged?</p>	<p>Calculation based on local and regional infrastructure costs include roads and other transport, sewerage,</p>	<p>DUAP. Sydney Water. Prior studies indicate that average public subsidies for new house lots on the Sydney fringe are in the order of \$50000 (1992 dollars) see Winning Back the Cities - Newman and Kenworthy 1992</p>					
<p>2.13 Are there additional infrastructure costs - estimate</p>							
<p>2.14 Will the development and infrastructure costs be recovered by government from sale of the lots</p>							
<p>SUMMARY COMMENTS</p>							

EFFICIENT NATURAL RESOURCE USE	Measurement techniques and methods	Explanations	Information sources, policies and/or referral agencies	Further assessment s	Design/ technolo gy require- ments	Recom mend's	Impact of develop -ment
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<p>1. ASSESS TRIP DISTANCE (amalgamate to one concept unless behaviour patterns known</p> <ul style="list-style-type: none"> - to public transport hub - to primary school - to secondary school - to small shopping centre - to major service centre - average distance to employment - to recreation facilities 	<p>estimated vehicle kilometres by trip number using above models</p>	<p>sites and subdivision design that emphasis walking, cycling and public transport achieve greater energy efficiencies</p>	<p>as above</p>				
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<p>2. SOLAR ACCESS Are the sites suitable to achieve passive solar access (for internal heating, water heating etc</p>	<p>Topographic maps for slope and orientation analysis</p>	<p>Estimates must include both heating and cooling functions required for housing in temperate climates.</p>	<p>NSW SEDA, Newcastle or Victorian Guidelines for Solar Efficient Residential Subdivision - see also various solar design models</p>				
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⁸Note that any efficiency gained that can be achieved by passive solar house design etc are available to all suitably located house in the shire/region and are dependent on building codes etc not the sites. Some site however preclude solar design due to orientation etc

<p>3. ASSESS GREENHOUSE GAS AND ENERGY EFFICIENCY</p>	<p>CO2 per household pa. based on models such as PLACES and LAND</p>	<p>CO2 per household is an aggregate measure of energy consumption. Energy consumption in Australian cities is largely a result of car based travel which is determined by proximity to employment and services and the availability of public transport. Energy use directly correlates to urban density and diversity</p>	<p>Winning back the cities Newman and Kenworthy 1992. Transport energy conservation policies for Australian cities. Newman and Kenworthy 1990 Urban villages project - encouraging sustainable urban form 1996 Energy Victoria et al see also Australia's Greenhouse challenge commitments, Kyoto Convention and the National Greenhouse response strategy 1992</p>				
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⁹ **PLACE 3 S** is an acronym that stands for **Pl**anning for **C**ommunity **E**nergy, **E**conomic and **E**nvironmental **S**ustainability. It is the name of a *method* of planning developed cooperatively by the state energy offices in California, Oregon and Washington and consultants Criterion, Inc. and McKeever/Morris, Inc., both of Portland, Oregon. The PLACE 3 S method is in the public domain. Implement the PLACE 3 S method. Please direct questions about using the PLACE 3 S name to Nancy Hanson, California Energy Commission, 916-654-3948

SUMMARY COMMENTS							
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COMMUNITY PARTICIPATION	Measurement techniques and methods	Explanations	Information sources, policies and/or referral agencies	Further assessments	Design and technology requirements	Recommend's	Impact of development
1.1.opportunities for participation	Extent to which PP is legislated for or required in statutory planning processes.	Document process to identify where and how communities and their representative bodies are given opportunities for participation	Refer to the NSW Environmental Planning and Assessment ACT 1979. Local Regulations/ best practice. Note: an object of the Act is to increase opportunities for public involvement and participation.				
1.2 public involvement in assessment of preferred design options	document involvement at an early stage in the process	stage of involvement is a critical determinant of the success of PP in planning processes					
1.3 recognition of community expertise and concerns	document stage of establishment of community consultative committee	as above					

¹⁰ Note that community participation must occur at the broader regional scale of assessment and decision making firstly. If it only occurs around a limited set of design option this is merely tokenism after the critical decision have been made.

1.4 resourcing and/or facilitation of public involvement	document level of support or resourcing	the amount should be sufficient to obtain independent advice					
1.5 impact and influence of participation	<p>Will or can participation make any difference to a specific decision?</p> <p>Has the participation resulted in recognition of the issues in subsequent processes? - eg has a policy resulted which pre-empts the conflict or problem</p>						
1.6 translation and demystification of expert jargon/ and expert processes							
1.7 functional representative democracy	<p>Are existing policies and statutory target and procedures being implemented?</p> <p>Or are decisions being taken by technocratic elites which run contrary to the spirit of the policies of the elected representatives?</p>	community participation is critical to the performance of the useful role of "watchdogging"					

1.8 is an integrated, systematic and interdisciplinary approach being taken to decision making that allows for input from the community?							
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7. PRICING, INCENTIVES, AND TRADEABLE RIGHTS

7.1. Applying ESD pricing principles to the urban fringe

Pricing and incentives mechanisms are central to the allocation and utilisation of natural resources, including urban land. They are fundamental determinants of the patterns of urban development that emerge from within the Australian economy.

Landuse planning processes are by no means the only influence on urban development - powerful incentive mechanisms shape current patterns of urban and economic development. Therefore, no analysis of the factors influencing urban development at the fringe would be complete without also looking at the pricing and incentive mechanisms which shape the choices made.

In this section we discuss prices and incentives for the allocation of land for subdivision, and the public pricing policies for the infrastructure which makes land suitable for urban development. We attempt to illuminate some of the factors which could influence a more ecologically rational approach to pricing urban development.

A rational framework for pricing and allocating natural resources is an important prerequisite to sustainable management, as pricing has an enormous influence on private sector investment decisions. For example, if the costs of polluting water were paid for through appropriate prices, then land with different storm water characteristics would be priced quite differently. At present the low or zero prices for using or polluting water not only stimulates increased consumption and pollution, but also acts as a disincentive against investment and expenditure in alternatives such as recycling and water conservation technology.

Similarly, land suitable for urban growth around our major cities is - and has been - seriously under-priced when environmental values and consequence are taken into account. The planning system has proven unable to address the cumulative environmental impacts that are the result of the urbanisation process over decades.

Clearly, more rational approaches to pricing, and the way in which land is allocated and rezoned (the creation of development or property rights) are urgently required. There are also important opportunities for defining and redefining property rights systems and allowing markets to set prices by trading.

The use of market based mechanisms for allocating and improving management of natural resources has been advocated by many economists. Young and McCoy (1992) document a variety of tradeable rights systems in use around the world. These are primarily used for common property resources like fisheries, forestry and water resources, and for tradeable pollution rights, but the principles used in such systems could be applied to urban land development rights. Mant (1996) documents the successful use of tradeable development rights in a number of urban planning situations.

Modifications to the prices, and the imposition of terms and conditions on the use of resources is the most direct way for governments to apply the ESD principle of appropriate pricing and incentives.

Incentives operate in many ways, some direct and some indirect. Young and Binning (1996) have documented a wide range of incentives (and disincentives) which effect the management of remnant vegetation and biodiversity in Australia. Similar detailed analysis of the incentives effecting urban development is overdue.

The Australia taxation system provides many examples of the kind of incentives which affect urban development decisions. The influence of the taxation system as a determinant of urban form should not be underestimated. The incentives produced by taxation arrangements leverage an enormous influence on the physical processes of urban development. The twin factors of excluding the family home from capital gains tax, and the taxation treatment of primary production income and expenditure, significantly distorts land based activities at the fringes of our cities.

7.2. Recognise the distortionary influence of infrastructure subsidies

Many billions of dollars of State and Commonwealth funds have been spent on urban infrastructure - for example, provision of roads, water and waste water treatment and energy networks. Revenue from infrastructure charges often falls well short of expenditure, and for many decades there has been limited provision for depreciation (Johnson and Rix 1992). While the choices of the day were to invest public funds in urban infrastructure, these funds could have supported other social or economic activities. More recently, considerable sums are being directed at programs to mitigate the effects of the development processes - eg. the range of landcare, environmental and catchment management initiatives in both rural and urban areas. While this is much needed, most funding has been made available without due reference to whether this expenditure is required to redress environmental externalities created by poor planning and therefore whether other opportunities exist to address the problem, such as more stringent regulation, or more effective planning processes.

Huge sums of public money have been invested in urban infrastructure - over 80 billion dollars on urban water systems alone (Johnson and Rix 1992). Much of the cost of the new infrastructure required to expand the fringes of our cities is still borne by the public purse. Newman and Kenworthy (1992 *Winning Back the Cities*) estimate that average public subsidies for new house lots on the Sydney fringe are in the order of \$50 000 each (in 1992 values).

Continuation of these subsidies is sometimes still demanded in the name of equity – the previous generation received it, so why shouldn't the current generation? Counter arguments reflect concern over rational pricing, environmental and energy costs of urban sprawl and the future costs of infrastructure maintenance.

Provision of subsidies for urban infrastructure has not only had a detrimental impact on the environment, but has imposed a growing financial burden on the public, as it is only relatively recently that governments have begun accounting for depreciation and renewal costs of long lived urban infrastructure, such as water and sewerage systems (Johnson and Rix 1992).

Government subsidies result in low priced infrastructure for urban expansion on the fringe. This, together with the lack of an adequate framework to attribute and recover environmental costs, impacts on sustainable development by:

- symbol 183 \f "Symbol" \s 10 \h distorting markets for land;
- symbol 183 \f "Symbol" \s 10 \h directing government expenditure away
from other responsibilities; and by
- symbol 183 \f "Symbol" \s 10 \h failing to attribute or internalise the costs of
environmental impacts of developments.

This ESD principle implies that the markets for land, housing and urban development must be led by appropriate pricing and incentive regimes, which take full account of social, environmental and economic factors. While the economic and social importance of the affordability of home ownership must not be underestimated, the application of this ESD principle means shifting from the expectation that governments will continue to subsidise urban fringe infrastructure to one where the full cost of provision of infrastructure, plus the environmental costs are internalised. Adoption of this principle has important intra generational equity considerations that are beyond the scope of this report.

7.3. Clarify the benefits and costs of alternative patterns of urban development

Application of this ESD principle requires transparent and rational approaches to pricing, recognising the role that this can play in inducing more sustainable urban development. Clearly determining the benefits and costs of alternative patterns of urban development is therefore central to governments being able to apply rational pricing policies.

There are arguments for and against government intervention in the market for urban land in the large Australian cities. Leaving prices entirely to market forces is politically unpopular because of the importance placed on home ownership in Australia, and because this may force housing costs in the cities to a level which many people can't afford. This would further accentuate the dramatic price differences between metropolitan and non metropolitan house prices.

Regardless of whether governments intervene to stabilise prices they must intervene to minimise the costs of poor planning. There are ways to minimise costs to the wider community of poorly planned urban development. One clear justification for planning processes that intervene in market activities, is that, planning is, or should be, a pre-emptive approach to minimising social and environmental costs from development.

Governments, representing the interests of the wider community, have a mandated responsibility to control how cities form and how natural resources are used, at least to the extent necessary to protect the community's interests. Failure to do so, means that the community suffers in the form of environmental degradation, or pays the cost of remediation either now, or in the future.

Urban development on the fringe often appropriates the public goods of space, clean air, rights to pollute etc. and converts these to marketable goods in the form of new house blocks. Attempting to limit expansion to where it is socially optimal and environmentally responsible (as possibly determined by reference to assessment frameworks like those

described here or by some other means) is by no means straight forward because of opposition from the political, cultural and financial interests involved.

At the crux of the debate about community versus private interests are the issues of defining rights and responsibilities, identifying the public and private benefits, and attributing costs accordingly. However the recent debate on controlling broad acre vegetation clearing in rural NSW demonstrates the potential for outrage by affected parties when governments attempt to protect the wider public interest by use of regulation, or by the resumption of assumed property rights (Alexandra J. 1995).

7.4. Costing the benefits to future generations

Many interests benefit directly from unsustainable exploitation of natural resources, including unsustainable urban growth. "Markets", those increasingly powerful and dominant forces in global affairs, have by nature, short term horizons. Getting the highest possible returns on investments shapes many decisions and expectations in governments and corporate boardrooms. Markets are by nature, blind to the long term (Ralston Saul 1994).

Many of the costs and benefits of urban development decisions are long term with consequences for future generations. However, we have little ability to determine their capacity to pay for, or realise these costs and benefits.

A sense of responsibility to future generations characterises conserver societies. In a functional society this should override short term interests. If the abundant "goods" or endowments provided by nature - fossil fuels, fisheries, minerals, high quality agricultural lands, clean water and healthy functional ecosystems - are recognised as the gifts or generational endowments of nature, central to national or community wealth, why do our consumer or industrial economies appear hell bent on using these things up as quickly as possible? Is the economic principle of "discounting the future" central to depriving our children and our children's children of the natural abundance we have inherited?

7.5. Ecological footprints and externalities

The concept of the ecological footprint is gaining currency. Using this concept, loads placed on the entire ecosystem by a typical Australian consumer are "mapped". In this way the demands on the environment exerted by an average Australian are identified. Predictably these demands are more far reaching than the area occupied for domestic activities - the quarter acre block. The load includes the land needed for food and water supply and waste dispersion and assimilation.

While many factors must be included in any analysis of ecological footprints, the impacts on fresh water and estuarine systems are an example that demonstrates that the effects are not limited solely to the land used for urban development.

Many factors contribute to the deteriorating health of our urban rivers and streams including:

- agricultural runoff;
- sewage effluent;
- urban stormwater;

- water extractions for urban consumption reducing flows; and
- pollutants such as salts, nutrients, pesticides and suspended solids (contributed via the storm water and sewerage system).

The nature and extent of urban expansion has been a highly significant factor in the degradation of freshwater and riparian ecosystems. Urban areas contribute to a range of economic and environmental costs, including:

- increased costs in the treatment of urban water supplies and waste water systems;
- the cost of developing and implementing water quality monitoring and management strategies; and
- reduced in-stream biomass resulting from increased turbidity, and (possibly) reduced native fish and invertebrate populations.

Increasingly, recognition is being given to the need to 'internalise' externalities by measures such as infrastructure charges, catchment levies, tradeable and non-tradeable pollution licences, and taxes. The basis for collecting such levies must be rational, and funds raised must be spent in an accountable and transparent way.

A list of the nature and extent of environmental externalities attributable (after Fisher) to urban expansion could look like this:

EXTERNALITY	COSTS INCURRED
<ul style="list-style-type: none"> • ecosystem decline attributable to changed flow regimes 	<ul style="list-style-type: none"> - costs of implementing and managing environmental flow regimes - increased costs of managing &/or rehabilitating particular areas (eg. river frontages, wetlands, national parks) - reduced tourism/eco-tourism - impacts on commercial fishing industry - impacts on recreational fishing
<ul style="list-style-type: none"> • stormwater and nutrient loads 	<ul style="list-style-type: none"> - remediation works - a range of measures to manage in-stream nutrient levels - direct impacts on downstream users (eg. reduced productivity due to algal blooms)
<ul style="list-style-type: none"> • water quality impacts 	<ul style="list-style-type: none"> - loss of tourism and recreational opportunities - cost of monitoring programs etc.

Application of the 'polluter pays' principle is a relatively straight forward example of appropriate pricing for environmental services. The case for the use of levies to assist in redressing these externalities, both from developers and residents is straightforward. The 'polluter' pays both for the right to use the assimilative capacity of a particular system, and for the cost of mitigating against its impact. In the case of the environmental impacts derived from diffuse sources like storm water, accurately identifying individual polluters and determining the extent to which they pollute is not easy.

If the 'polluters' pay the cost of fixing a problem, the cost should flow through to the price of the product, eg. the cost of a new block of land. In other words, when the polluter pays, so does the ultimate beneficiary, or the end consumer.

Application of approximated or averaged environmental levies is not new. Urban stormwater levies and rates have been the primary means of financing drainage works and more recently, of reducing stormwater pollution.

Services such as stormwater management are impossible to commercialise. There are no individual customers as such, and the benefits of managing stormwater in built-up areas are clearly collective, public benefits in the true sense. The only effective way to finance stormwater services is by levies and rates.

There is a clear need therefore to ensure that the collective responsibility for storm water management is not abused by inappropriate planning decisions. Sites with high risks of contamination or steep slopes should be avoided for urban development.

7.6. Development rights, property rights, tradeable rights and the environment

Natural resources management systems must transcend distinctions between private and public property, because they are linked by ecosystem processes. Resources which are predominantly private property, such as freehold land and those which are common property like water, forests and fisheries are linked by ecological relationships which cannot be ignored. Essentially they all form part of an interlinked and interdependent ecological systems. Once these links are recognised a comprehensive approach to the economic and ecological assessment is required.

As discussed above externalities generated from the management of private property must be recognised and internalised - nobody should have the right to export their environmental problems. Economic systems must reflect this principle through accounting for the external costs of all activities. Externalities of urban land development that are not currently accounted for include impacts on other industries such as tourism, recreation and fisheries, as well as non market environmental impacts. Comprehensive approaches to land use planning and allocation which is capable of dealing with multiple - and often competing - resource uses and resource-based industries.

One area of particularly rich opportunity for improving allocation is the redefinition of property rights and the use of tradeable rights (Young and McCoy 1992 and Mant 1996). The challenge is to design and implement a property rights system which is flexible and adaptable, and results in efficient allocation processes whilst improving environmental management. Young and McCoy (1992) have documented a range of such systems in place around the world illustrating the wide range of opportunities for designing property rights systems.

The right to use a common property resource, like a development right in an already stressed catchment, entails certain responsibilities. It is essential that the terms or conditions of the "right" and the opportunities and rules for trading are explicit and clearly defined.

In Australia the grant of an urban development right is usually regarded as a permanent or perpetual bundle of rights, with limited conditions and few opportunities for trade or redefinition.

It is not inconceivable that tradeable development rights systems could be introduced as one means of coping with the cumulative impacts of multiple development rights being exercised in a stressed river system like the Hawkesbury.

Tradeable development rights may be used as an interim measure to assist in relocating inappropriate development to more appropriate locations. The rights may be sold so as to avoid compensation being paid by the agencies responsible. It may also be used as a means of capping total population growth within a catchment, or part of a catchment (see Mant 1996).

The establishment of trading rules and accompanying redefinition of these “property rights” will define the kinds of responsibilities or conditions applied to the right to develop urban land. More importantly this redefinition will determine the capacity and flexibility of future generations to redefine conditions or reallocate use rights. The recognition that urban development rights are able to be redefined in line with contemporary policy goals is important, because:

- the specification of development right will, in part, determine land prices, and prices, in turn, will help determine the value of the right;
- there is a wide range of development right systems which have different management implications. Some offer greater future flexibility, market certainty and capacity for the system to adapt, while others will be more rigid and less adaptable to future needs;
- the property rights system needs to be linked to the capacity of the system to support further housing pressures, and the nature and extent of environmental impacts of more urban growth;
- some development rights models run contrary to the public interest, potentially imposing huge costs on the public, either now or on future generations, or by institutionalising environmental degradation;
- defining the nature of development rights for private use requires consideration of rights for the environment. The latter are currently insecure, poorly defined, and poorly represented in law; and
- property rights cannot be considered in isolation from regulation, planning and pricing issues. All require rigorous assessment prior to determining any new property or development rights trading arrangements.

7.7. Conclusion

The ESD principle on environmental pricing must be tempered by the precautionary principle and other ESD principles. However, appropriate pricing and incentive mechanisms are important for modifying market based activities and allocating costs to those directly responsible. This approach recognises the limitations of the public purse and of public responsibility for redressing the environmental costs incurred as a result of private economic activities.

There can be no economy without the environment. Currently the environment supplies many ‘free services’ upon which economic activity is dependent. Recognising these environmental services and their limits, and developing appropriate management is a societal imperative.

If the Australian economy is to approach ESD principles of appropriate resource pricing considerable changes are required. The changes must involve the formal recognition of the economic costs and values associated with urban development patterns, and how these interact with important natural resource and ecological systems. It is apparent that many

of the costs which are currently unaccounted for must be included in new pricing and accounting systems.

When we attempt to apply this ESD principle several conclusions can be drawn:

- where the costs of mitigating against environmental externalities can be approximated, the 'polluter' should be expected to pay for these, as well as the costs of monitoring, appraisal and a share of the associated management costs;
- in the case of environmentally-related works programs which benefit developers or are needed because of development (eg. they lower developers costs or environmental responsibility), public funding should only be made available commensurate with the extent of public benefit, and all other cost should be internalised to the development;
- pricing and allocation frameworks should be developed which explicitly define private and common property rights, along with principles for redefinition, re-allocation and rules for trading;
- the aim of efficient management and allocation of urban land should be to maximise social well-being whilst minimising environmental degradation and resource depletion.

To achieve progress in meeting the ESD principle of resource pricing will not only require clarity of analysis and orderly policy development, but also require adopting an appropriate framework for establishing the ecological values and attributing costs and benefits. All of this, while urgent, still requires considerable work.

BIBLIOGRAPHY

- AACM International (1996) *Cost Sharing Frameworks for On Ground Works*, Murray—Darling Basin Commission. Canberra
- Alexandra J. 1992 in Water and the Environment in Australia, *Water In Australia*, Edited by Johnson, M. and Rix, S. Pluto Press, Sydney, Australia.
- Alexandra J. 1994 New Zealand Legislates for Sustainable Development - Lessons for Australia Australian Conservation Foundation, Melbourne
- Alexandra J. 1995 Bush Bashing. *Habitat* ACF. Melbourne, Australia.
- Alexandra J. and Fisher T. (1996) ACF submission to Industry Commission State Assistance Inquiry Australian Conservation Foundation, Melbourne. Unpublished
- Alexandra, J. 1995. Wilderness - Cultivated Myths and Colonial Battle Grounds. Proceeding of the First Australasian Ecological Economic Conference, Coffs Harbour 1995. University of New England, School of Resource Economics. Armidale.
- Alexandra, J. Higgins, J. and White, T. Environmental Indicators for National State of the Environment Reporting - community and local use. Environment Australia SoE Unit. Canberra Australia.
- Alexandra, J. Haffenden, S. and White, T. 1996 Listening to the Land: A Directory of Community Environmental Monitoring Groups in Australia. Australian Conservation Foundation, Melbourne, Australia.
- ANZECC, AWRC, 1992, National Water Quality Management Strategy, Policies and Principles - A Draft Reference Document, ANZECC, AWRC, Canberra.
- Australian Local Government Association (1997) Choosing and Using Environmental Indicators Canberra: Commonwealth Department of the Environment, Sport and Territories.
- Australian Local Government Association (1997) Regional Environmental Strategies—How to prepare and implement them ACT: ALGA.
- Berowra Catchment Management Committee (1997) Berowra Creek Water Quality Management Strategy
- Caton, B. and Molye, D. Environmental Studies Research Group Flinders University (1997). State of the Environment Indicators for the Southern Region.. Southern Region of Councils. South Australia.
- Commonwealth of Australia, (1983b), National Conservation Strategy, AGPS.
- Commonwealth of Australia, (1990) Decade of Landcare Plan, AGPS.
- Commonwealth of Australia, (1990) The Criteria for the Register of the National Estate Canberra: Australian Heritage Commission.
- Commonwealth of Australia, (1991) Ecologically Sustainable Development Working Groups: Draft Report-Executive Summary Canberra: Australian Government Publishing Service.
- Commonwealth of Australia, (1991a) The National Strategy for Ecologically Sustainable Development, AGPS, Canberra
- Commonwealth of Australia, (1991b), Ecologically Sustainable Development - A Commonwealth Discussion Paper. AGPS Canberra
- Commonwealth of Australia, (1991c) Report of the ESD Working Group on Energy Use
- Commonwealth of Australia, (1992) Intergovernmental Agreement on the Environment Canberra.
- Commonwealth of Australia, (1992a) National Water Quality Management Strategy. AWRC and ANZECC, Canberra
- Commonwealth of Australia, (1995) Better Cities: National Status Report 1995 Canberra.

- Commonwealth of Australia, (1996) Australia: State of the Environment Canberra.
- Commonwealth of Australia, (1996b) The National Strategy for the Conservation of Australia's Bio Diversity Canberra.
- Court J., Wright C., and Guthrie A., 1996. Environmental Assessment and Sustainability: Are We Ready for the Challenge? Aust. Journal of Environmental Management, Volume 3, 1996
- CSIRO, 1989, Australia's Natural Resources and Environment: An Outlook. INRE, Canberra
- Dore J., and Woodhill J., Essential Characteristic of Regional Natural Resources management Strategies. Greening Australia, Canberra 1988
- Dovers S. 1996 'Processes and Institutions to Inform Decisions in the Longer Term', in *Tracking Progress*, Proceedings of the Australian Academy of Science Fenner Conference on the Environment, Oct 1996, Institute of Environmental Studies (ed). UNSW, Sydney.
- Environment Australia (1998) Environmental Indicators for National State of the Environment Reporting. Department of the Environment, Canberra
- French H. 1993 The GATT: Menace or Ally? *World Watch*. Sept/Oct 1993 pages 12-19. World Watch Institute Washington USA
- Government of New South Wales (1995) Cities for the 21st Century Sydney: DOP Publications.
- Government of New South Wales (1995) The State of the Environment: 1995 Chatswood.
- Government of New South Wales (1996a) Landcom: Environmental Policy Sydney: Landcom.
- Government of New South Wales (1996b) Landcom: ESD Background Report Sydney: Landcom.
- Government of New South Wales (1996c) Landcom: ESD Strategy Sydney: Landcom.
- Government of New South Wales (1996d) Sydney as a Global City Sydney: Department of Urban Affairs and Planning.
- Government of New South Wales (1997) A Framework for Growth and Change: The Review of Strategic Planning: The greater metropolitan region Sydney: Department of Urban Affairs and Planning.
- Government of New South Wales (1997) Energy Smart Homes Sydney: Sustainable Energy Development Authority.
- Government of New South Wales (1997) Hawkesbury-Nepean Regional Environment Plan Number 20 Sydney: Department of Urban Affairs and Planning.
- Government of New South Wales (1997) Outcomes of the Review of Total Catchment Management in New South Wales
- Government of Victoria (1996) Urban Villages Project: Transport and non-Transport Energy Melbourne.
- Hamblin, A. Proposed Indicators of Land Resources for National State of the Environment Reporting. CRC for Soil and Land Management. Adelaide SA 1997
- Hare W.J., Marlow, J.P Gray F, Ledger R and Raem L, 1990, Ecologically Sustainable Development: A Submission, ACF, Greenpeace Australia, The Wilderness Society, World Wide Fund for Nature Australia, Melbourne.
- Hawke R., 1989, Our Country - Our Future - Statement on the Environment, AGPS.
- Hawkesbury-Nepean Catchment Management Trust (1997) Metal, Organochlorine and Nutrient Contaminants in the Sediments of the Hawkesbury-Nepean River Hornsby.
- Healthy Rivers Commission of New South Wales (1997) Independent Inquiry into the Hawkesbury-Nepean River System
- Hornsby Shire Council (1994) Berowra and Cowan Planning Report Hornsby: Hornsby Shire Council.

- Hornsby Shire Council (1994) Draft Soil and Water Management Policy and Calculation of Storm Water Connection Fee Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1994) Fauna Corridors and Vegetation Links in Hornsby Shire Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1994) Low Density Multi Unit Housing Development Control Plan Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1995) Draft Hornsby Shire Energy Efficient Housing Policy Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1995) Residential Subdivision Development Control Plan Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1995) Water Quality Monitoring Program Annual Report Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1996) Berowra / Cowan Development Control Plan Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1996) Berowra Valley Bushland Park Plan of Management, Stage Two Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1996) Housing Strategy: Stage One Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1996) Model Stormwater and Catchment Management System Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1996) Sensitive Urban Land Study Hornsby.
- Hornsby Shire Council (1996) State of the Environment Report 1995/96 Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1996) Water Quality Monitoring Program: Annual Report 1996 Hornsby.
- Hornsby Shire Council (1997) Catchment Remediation Program Five-Year Plan Hornsby.
- Hornsby Shire Council (1997) Draft Sustainable Water Development Control Plan Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1997) Dwelling House Development Control Plan Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1997) Housing Strategy: Stage Two Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1997) Review of the Statement of Joint Intent for the Berowra Creek Catchment: Final Report Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1997) State of the Environment Report 1996/97 Hornsby: Hornsby Shire Council.
- Hornsby Shire Council (1997) Sustainable Water: Best Practices Hornsby: Hornsby Shire Council.
- Industry Commission draft report into 'State, Territory and Local Government Assistance' 1996
- Johnson M and Rix S (ed), 1992, Water in Australia, Pluto Press.
- Joint Statement of Intent (1994) Community Contract for Berowra Creek
- Landcom, NSW 1996. ESD Strategy - Landcom Landcom, Sydney
- Lockie S., and Vanclay F., 1997, Critical landcare, Charles Sturt University, Wagga NSW.
- Ministry for the Environment, 1991, New Zealand Resource Management: Regional Policy Statements and Plans, New Zealand.
- Ministry for the Environment, 1991, New Zealand Resource Management: Guide to the Act, New Zealand.
- Ministry for the Environment, 1991b, New Zealand Resource Management: Regional Policy Statements and Plans, New Zealand.

- Ministry of Environment 1996 The Monitoring Guide - A Practitioner Guide to Section 35 of the Resource Management Act, 1991. NZ Ministry of Environment 1996
- Newman and Kenworthy 1992, *Winning back the Cities*.
- NSW Government, 1989, NSW Catchment Management Act, Government Printer, Sydney
- Ralston Saul J., Unconscious Civilisation, Penguin Books, 1994
- Read Sturgess & Associates (1992) Evaluation of the Economic Values of Wood and Water for the Thomson Catchment. Melbourne, La Trobe University
- SA Government, 1989, SA Soil Conservation and Landcare Act, Government Printers.
- Sachs W., 1992 *Development a Guide to the Ruins*. New Internationalist. June 1992.
- Salter R, 1991, Water Allocation for the Environment, UNE, Armidale
- Saunders, D. Margule, C and Hill, B. Environmental indicators for national state of the environment reporting on biological diversity. Department of the Environment and CSIRO Division of Wildlife and Ecology 1998
- Senate Standing Committee on the Arts, Sport, Recreation and the Environment, 1993, Final Report on Water Resources/Toxic Algae, AGPS.
- Senate Standing Committee on the Arts, Sport, Recreation and the Environment, 1993, Final Report on Water Resources/Toxic Algae, AGPS.
- Sivertsen D, (1994), *The Native Vegetation Crisis in the Wheat Belt of NSW*, in Search magazine, Vol. 25, No 1 Jan/Feb. Journal of the Australia and New Zealand Association for the Advancement of Science.
- Standing Committee on Agriculture, 1991, Sustainable Agriculture, AGPS.
- Sydney 2000, 1993. Environmental Guidelines for the Summer Olympic Games.
- Thorman, R. and Heath, I. March 1997. Regional Environmental Strategies: How to prepare and Implement them. Australian Local Government Association.
- Total Catchment Management Services Pty Ltd (1997) Review of the Statement of Joint Intent for the Berowra Creek Catchment: Final Report Sydney: Minister for the Environment, NSW.
- Total Environment Centre Inc. Hornsby Landcom ESD Study Briefs for Consultants December 1997. TEC Sydney. Unpublished.
- UNCED, 1992, Agenda 21, UNEP
- UNEP, 1986, The Encroaching Desert, Zed Books, London.
- Ward, T. Butler, E. and Hill, B. May 1997. Environmental Indicators for National State of the Environment Reporting on Estuaries and the Sea. CSIRO Marine Research.
- World Commission on Environment and Development (Brundtland Commission), 1987, Our Common Future, Oxford University Press, Oxford.
- Young M. D. and McCoy. B. J. 1995 'Building Equity, Stewardship, and Resilience into Market Based Property Rights Systems', in *Property Rights and the Environment*. Canberra, CSIRO Wildlife and Ecology
- Young M. D., and Binning C., 1996 - Reimbursing the Future CSIRO Canberra

Appendix 1 APPROACH AND METHODS USED

The following is based on the work program presented to the project steering committee. It provides an outline of the approach and methods used.

	Task outlined in work program	Brief description
1.	Define scope of work - meet with clients and relevant stake holders ASAP - clarify project outcomes and agreed on scope and methods	Meetings held with TEC, Landcom, community groups, Berowra TCM committee, HNCMT, Hawkesbury Council and DUAP.
2.	Conceptual development - undertake limited literature review of nominated references and ESD and urban planning arrangements	Relevant literature from above sources reviewed, internet used to source relevant international material
3.	DSS reviews - review relevant decision support systems or planning and assessment methodologies which incorporate ESD - eg the Land Use Planning and Information System (LUPIS) developed by CSIRO and the Adaptive Environmental Assessment and Management (AEAM) model developed at Melbourne University.	LUPIS and AEAM models reviewed in some detail, planning and assessment frameworks being used or developed overseas reviewed
4.	Develop conceptual framework for an ESD assessment framework	framework developed based on client needs and literature reviews
5.	Produce prototype framework - produce framework in a form which makes its application relatively straight forward.	prototype framework documented in this report
6.	Framework application guide - provide guidance on how the framework can be used to assess various options and identify where detailed economic analysis or further environmental investigations are required.	Documentation on the use, context and limitations of the framework drafted and included in the draft report. A more detailed users guide will be formulated based on the trial applications of the framework
7.	Submit draft report and prototype framework - meet with TEC management group and seek feedback on refinement of framework (end of January 1988)	Draft report submitted prior to management meeting on the 18/2/98. (Time line varied by agreement with project manager)
8.	Workshop framework application - in conjunction with the TEC management group the consultant would hold a half day workshop in Sydney with selected participants to expose them to the framework, explore and refine its applications.	A small workshop was held after the first draft of this report was submitted
9.	Submit final report for Study 2 -	Final report submitted
10.	Implementation - trial framework in Study 3* (Provide advice to consultant undertaking Study 3 on the use of the framework and refine it subject to its application, or preferably, jointly conduct Study 3 - see attachment 1)	
11.	Assess trial application with particular reference to the strengths and weaknesses of the approach and its usefulness in comparing and contrasting options and identifying further requirements for cost benefit analysis of options.	
12.	Refine framework based on experience of using it for assessment of the Hornsby Landcom sites as per 7 above.	

Appendix 2 ESD PLANNING TOOLS AND FRAMEWORKS REVIEWED

(note internet addresses are needed for referencing this section)

Introduction

Sustainable land use planning generally requires the analysis of a vast array of data. Below are innovative methods, computer software applications, and resources for interpreting land use data and evaluating planning alternatives from the point of view of ESD Principles

European Sustainable Cities Report

The Expert Group on the Urban Environment was established by the European Commission in 1991. In 1993 the Expert Group, consisting of national representatives and independent experts, launched the Sustainable Cities Project. The main output of the project, the European Sustainable Cities Report, is concerned with identifying the principles of sustainable development and the mechanisms needed to pursue it.

The report focuses on the capacity of local governments to deliver sustainability. It provides a framework for local action and identifies a set of principles to use in setting goals and in evaluating and monitoring progress towards sustainability in urban areas. The EU principles are:

1. The principle of urban management

Management for sustainability is essentially a political process which requires planning and has an impact on urban governance. The process of sustainable urban management requires a range of tools addressing environmental, social and economic concerns in order to provide the necessary basis for integration. By applying these tools, urban policy making for sustainability can become broader, more powerful and more ambitious than has been generally recognised.

2. The principle of policy integration

Coordination and integration are to be achieved through the combination of the subsidiarity principle with the wider concept of shared responsibility. Integration should be achieved both horizontally, to stimulate synergetic effects of social, environmental and economic dimensions of sustainability, and vertically, between all levels of the European Union, Member States, regional and local governments to achieve greater coherence of policy and action and to avoid contradicting policies at different levels.

3. The principle of ecosystems thinking

Ecosystems thinking emphasises the city as a complex system which is characterised by flows as continuous processes of change and development. It regards aspects such as energy, natural resources and waste production as chains of activities that require maintenance, restoration, stimulation and closure in order to contribute to sustainable development. The regulation of traffic and transport is another element of ecosystems thinking. The dual network approach, which provides a framework for urban development at regional or local level, is based on the principles of ecosystems thinking. Ecosystems thinking also includes a social dimension, which considers each city as a social ecosystem.

4. The principle of cooperation and partnership

Sustainability is a shared responsibility. Cooperation and partnership between different levels, organisations and interests is therefore crucial. Sustainable management is a learning process, within which 'learning by doing', sharing experiences, professional education and training, cross-disciplinary working, partnerships and networks, community consultation and participation, innovative educational mechanisms and awareness raising are key elements.

Sustainable urban management should challenge the problems both caused and experienced by cities, recognising that cities themselves provide many potential solutions, instead of shifting problems to other spatial levels or shifting them to future generations. The organisational patterns and administrative systems of municipalities should adopt the holistic approach of ecosystems thinking. Integration, cooperation, homeostasis, subsidiarity and synergy are key concepts for management towards urban sustainability. Existing tools developed in relation to environmental action need to be extended to address the economic and social dimensions of sustainability.

Sustainable management of natural resources requires an integrated approach to closing the cycles of natural resources, energy and waste within cities. The objectives of such an approach should include minimising consumption of natural resources, especially non-renewable and slowly renewable ones; minimising production of waste by reusing and recycling wherever possible; minimising pollution of air, soil and waters; and increasing the proportion of natural areas and biodiversity in cities. These objectives are often easier to achieve on a small scale, which is why local ecological cycles can be ideal for introducing more sustainable policies for urban systems. Local government therefore plays a crucial role.

Sustainability is strongly linked to socio-economic aspects of cities. There is a need for the EU and Member States to create the conditions in which businesses can profit by operating in more environmentally-sound ways. Regional and local authorities should explore ways of creating employment through environmental measures, encourage better environmental performance in existing businesses and encourage industry to adopt an ecosystems approach. Authorities should strengthen the well-being of the population and promote equality and social integration by ensuring that basic services and amenities, education and training, health care, housing and employment are available to all. Resisting recent trends of ignoring environmental and social risks while concentrating on accumulating material wealth requires changes to the underlying values in society, as well as to the basics of economic systems.

Achieving sustainable urban accessibility is a vital step in the overall improvement of the urban environment and maintenance of the economic viability of cities. Meeting environmental and transport objectives requires integrated approaches combining transport, environmental and spatial planning. Achieving sustainable urban accessibility requires the development of sustainability goals and indicators, target setting and monitoring, along with policies aimed at improving accessibility and not simply movement. Reconciliation of accessibility, economic development and environmental objectives should be the primary objective of a city's transport policy. An integrated multi-modal urban transport system is required, where complementarity rather than competition between modes is promoted.

Spatial planning systems are essential for the implementation of city-wide policies for sustainable development. Existing spatial planning systems should be strengthened by encouraging ecologically-based approaches and a move away from a narrow land use focus. The identification of environmental objectives at an early stage in the planning process, the use of targets and indicators, improved forms of public involvement in planning and the potential linkage of spatial planning and Local Agenda 21 processes are encouraged. Environmental carrying capacities at local, regional and global level should be accepted as the guiding principles within which other considerations may be traded off.

Urban regeneration should be used to meet goals of sustainable development through the recycling of previously developed land or existing buildings, the retention of green field sites and protection of countryside and wildlife. Detailed sustainability objectives, including the establishment of ecological links, improved accessibility, energy efficiency and community participation, should also be pursued. Decontamination of polluted soil, a major concern in many urban regeneration projects, should be seen as part of an integrative approach which provides the possibility for achieving cross-subsidy between sites.

Tourism and leisure activities can have significant impacts on the quality of a city's cultural heritage. Planning for tourism, leisure and cultural heritage should be integrated in national guidelines and regional policies addressing economic, social, environmental and cultural aspects. In addition, tourism, leisure and cultural heritage issues should form an integral part of the spatial planning process.

The sustainable city process is about creativity and change. It challenges traditional government responses and seeks new institutional and organising capacities and relationships.

Planning for Community, Energy, Economic, and Environmental Sustainability (PLACE3S)

A land use and urban design method created specifically to help communities understand how their growth and development decisions can contribute to improved sustainability.

PLACE3S has been an invaluable tool for making the benefits of coordinated land use and transportation planning strategies come alive to local officials and citizens throughout the San Diego region. It has also been very helpful in furthering the implementation of these components of the Regional Growth Management Strategy. PLACE3S particularly reduces ESD indicators to energy and non-renewable resource criteria in the analysis of urban form at a regional and site specific subdivisional level.

PLACE3S will be used to analyse the environmental and economic effects of implementing NAFTA on the environment and economy of region. The net effect of having an established, geographically-related energy database is that the San Diego region will have a more complete view of the long-term effects of international development proposals and, thus, be in a better negotiating position. Also, the PLACE3S database will be a useful research tool for determining when and where to add new energy technologies to most efficiently service the growing boarder economy.

Seeds for Change - Creatively Confronting the Energy Crisis

This seminal energy conservation and socially convivial planning model for Melbourne was developed in 1978. It proposes modest changes to Melbourne's urban form to achieve significant energy savings and improved living. The model is a precursor to the Urban Villages model promulgated by Newman and Kenworthy in the mid 1980's and which features in the Green Villages projects and Urban Villages Policy of the Victorian State Government in the early 1990's. The SEEDS model is particularly distinguished by its adherence to achieving a socially equitable and enjoyable city life whilst responsibly reducing energy demand.

Smart Growth Network

An information network coordinated by US EPA to assist private sector, public sector, and NGO partners in creating smart growth in neighbourhoods, communities, and regions throughout the country. The network facilitates information sharing on financing for infill and brownfields redevelopment, tools for evaluating development options, and pilot money-saving investments which reap economic and environmental benefits.

Land Use Planning Information Network (LUPIN)

California's on-line tool available for planners, local and regional governments, conservationists, developers, landowners, and others involved in planning. LUPIN provides an aggregate view of information relevant to land use and environmental planning.

City Green

A Geographic Information Systems (GIS) software program for mapping, measuring, and analysing urban ecosystems.

AtKisson and LaFond's S-I-C Scale · Global Action's EcoTeams

Alan AtKisson and Michael LaFond developed a set of criteria and a rating system for measuring the sustainability of proposed projects. The rating system involved three scales (S-I-C) on which a project was ranked:

- Sustainability, or the extent to which the project addresses integrated environmental, social, and economic well-being.
- Institutionalisation, or the extent to which the project is adequately supplied with resources, well-conceived, politically viable, etc.
- Comprehensive and integrated, having to do with more subjective assessments of the elegance of the project's design

Each scale has 10 separate criteria in checklist format to guide thinking, and allow you to assign numerical scores. It has been used to evaluate a number of projects including ones in Washington State and sustainable development options for the Amazon. It's a framework that can be adapted, with as much quantitative rigour as needed.

Eco Village Assessments · Izaak Walton - Monitoring Sustainability · Northwest Policy Centre Sustainable Community Checklist

For individuals and households, Global Action Plan has developed a workbook for groups of measure and work on lessening their individual household's impact on the earth's ecosystem.

The Global Eco-village Network has developed an Eco-village Audit for measuring the sustainability of villages and communities.

A number of organisations have developed checklists for communities to start thinking about how to measure sustainability. Two of these are the Izaak Walton League and the Northwest Policy Centre.

Ecological Footprints as a measure of sustainability is discussed in the book "Our Ecological Footprint".

Bellagio Principles · Hart Indicator Checklist

Another set of criteria for evaluating indicators is the Bellagio Principles. These were developed by an international group of measurement practitioners and researchers. "These principles deal with four aspects of assessing progress toward sustainable development:

Principle 1 deals with the starting point of any assessment - establishing a vision of sustainable development and clear goals that provide a practical definition of that vision in terms that are meaningful for the decision-making unit in question.

Principles 2 through 5 deal with the content of any assessment and the need to merge a sense of the overall system with a practical focus on current priority issues.

Principles 6 through 8 deal with key issues of the process of assessment.

Principles 9 and 10 deal with the necessity for establishing a continuing capacity for assessment."

Appendix 3 INTERNATIONAL OBLIGATIONS ON LANDUSE AND RESOURCE PLANNING UNDERTAKEN IN AGENDA 21

Agenda 21 is global action plan for sustainable development to be implemented over the next decade and beyond. It was signed by over 150 nations, including Australia at the United Nations Conference on Environment and Development held in Brazil in 1992. Its 40 chapters represent the most comprehensive international strategy to date for combating the problems of poverty, development and environmental degradation.

The international community has made a commitment to the development of policies that will protect the environment and promote sustainable use and management of land and water resources. Many aspects and numerous individual chapters of Agenda 21 are relevant to the management of land and water resources. The following summaries give an indication of those relevant to improving landuse planning, and catchment management in Australia.

Chapter 27: Strengthening the Role of Non-Governmental Organisations: partners for sustainable development

This chapter emphasises the key role that non-governmental organisations (NGOs) should play in the implementation and review of environmentally sound and socially responsible development. Signatory nations have agreed to improve the formal arrangements for the participation of NGOs at all levels of decision-making from policy formulation to implementation. Specific activities towards this end include:

- increasing financial assistance to NGOs to enable them to augment their role as social partners;
- providing NGOs with access to accurate and timely information to improve the effectiveness of their programs to promote sustainable development.

Chapter 30: Strengthening the Role of Business and Industry

This chapter argues that business and industry, have a major responsibility to promote sustainable development and to reduce impacts on resource use and the environment by recognising environmental management as one of the highest corporate priorities. Signatory nations agreed to use regulatory measures, economic incentives and legislation to promote cleaner production and responsible business.

With respect to promoting cleaner production, signatory nations have an obligation to encourage business and industry:

- to report annually on their environmental records, as well as on their use of energy and natural resources;
- to adopt and report on the implementation of codes of conduct promoting best environmental practice.

The objectives of promoting responsible business are:

- to encourage the concept of stewardship in the management and utilisation of natural resources;
- to increase the number of entrepreneurs engaged in enterprises which promote sustainable development.

Appendix 4 NEW ZEALAND'S REFORM PROCESS - WHAT CAN AUSTRALIA LEARN? (adapted from Alexandra 1994)

1. A law reform exercise to overcome fragmentation and lack of integration

The New Zealand Government attempted to remedy the problems of confusion and fragmentation in environmental and resource management by "clearing the slate" and creating a new framework for resource management. The resultant Resource Management Act (RMA) established, in law, the principles of ecologically sustainable management of natural resources, along with an administrative system for implementing the principles.

New Zealand began its natural resource and local government law reform simply because the old system was failing miserably. Like Australia, and many other parts of the world, resource management, planning and environmental law had evolved in a piecemeal and reactive fashion. Complex, ineffective, overlapping and sometimes conflicting rules lead to confusion, delays, inaction and inadequate environmental outcomes.

In general the problem areas were:

- **high costs of working with the current laws.** The many different institutions and processes significantly increased costs of planning and development.
- **lack of integration.** The existing laws often had conflicting objectives and were often inconsistent.
- **unreasonable delays.** Multiple consent processes, operating on different timetables, delayed many developments.
- **inadequate regulations** of new activities and new issues. Wastes and hazards were inadequately treated under existing legislation. There was no capacity to take account of new issues such as those resulting from global warming and changing climatic conditions.

In response to these problems, a law reform exercise was undertaken. It was started with no preconceived outcomes. All law and administrative arrangements relating to natural resources, planning and the environment were reviewed. The result was the New Zealand Resource Management Act.

2. The New Zealand resource management act

2.1. The act - in summary

The Resource Management Act simplified and consolidated the legislation formerly contained within numerous separate Acts which governed planning, environmental and resource management in New Zealand.

In introducing this Act, the New Zealand Parliament revoked 167 separate acts. The Act amalgamated all planning, water, air and soil legislation. Parts of the fragmented legislation had been reviewed previously but this was the first attempt to align and integrate all relevant legislation.

The Act establishes processes which simplify the allocation and use of natural resources and is aimed at achieving greater efficiency, accountability and clarification of the role and relationship of agencies (Ministry for the Environment, 1991). In associated reforms of local government, over 700 statutory authorities from harbour management trusts to drainage boards were abolished and regional councils based on catchment boundaries were established.

Reform was based on re-assessing all statutes dealing with the management of natural or physical resources. The initial direction of the reform was a complete re-thinking of the role of government with a strong predisposition to remove government involvement unless compelling reasons for retaining it were demonstrated. This would seem to promote a free market ideology with subsequent regulatory problems, but it must be remembered that any activity relating to the environment (excluding mineral mining) must conform to national policy, regional policy, national regulatory standards and possibly district or regional rules and regulations.

These many levels are designed to be congruent, and complementary and not obstructive and conflicting. Undertaking an activity that will possibly affect the environment requires a consent, or permission from the correct governing body (regional, district, city council) as it did in the past. The critical difference is that there is now only one process treating all activities, from subdivision to commercial recycling. The focus is on the effects of an activity and not the activity in itself.

All planning documents and resource use and development consents are now measured against the purpose of the Act. (see below)

The RMA represents a paradigm shift in the approach to resource management whereby the emphasis is on the *effects* of a development rather than the development itself. The RMA places the emphasis on everyone in the community to take responsibility for resource management. People or organisations applying for consents are obliged to be very clear about the activity being undertaken. Open consultation by the “developing” party with neighbours, other affected parties and competing users is mandatory. A dialogue is encouraged whereby all parties can contribute to gaining a common understanding of how the resource should best be managed within the bounds of the principles of sustainable management.

2.2. Purpose

The purpose of the Act is to promote sustainable management of natural and physical resources, excluding minerals. ‘Sustainable Management’ is defined as the use, development and protection of natural and physical resources such that people and communities are able to provide for their social, cultural and economic well being and health and safety while:

- sustaining the potential of natural and physical resources (except minerals) to meet the reasonably foreseeable needs of future generations;
- safeguarding the life supporting capacity of air, water, soil, and ecosystems, and

- avoiding, remedying or mitigating adverse effects to the environment.

2.3. Local and Regional Government

Parallel to the formation of the Resource Management Act, the Local Government Commission worked on re-organisation of local and regional government. This reform resulted in a completely new system of local government under which the RMA Act could operate.

New Zealand's Regional Councils regions now conform, as far as practical, with catchment boundaries. Each region consist of a number of districts, and district boundaries are congruent with those established for regional councils, thus a group or cluster of districts fits neatly into a region.

An integrated system of hierarchical government exists. Each level has different functions but a continuity of purpose, direction and strategy has been put in place. The basic hierarchy of government looks something like this:

CENTRAL>>>	REGIONAL (13)>>>	DISTRICT (73)
GOVT.	COUNCILS	COUNCILS

Within a clearly defined hierarchical framework of national and regional policies, the Act specifies the development of regional and district plans. These plans are consistent with and apply national and regional policy within the regional or district context, through specifying practical parameters for land and water use, pollution, etc. (Salter, 1991). The Act also provides a standardised and integrated consent process that covers land and water use, subdivision, coastal waters and discharges to the environment. Also covered are heritage issues, appeal provisions, monitoring and enforcement.

2.4. Matters of national importance

The Act sets out matters of national importance. All persons exercising functions and powers under the Act shall recognise and provide for the following matters of national importance:

- preservation of natural characters of the coastal environment and other water bodies;
- protection of outstanding natural features and landscapes;
- protect areas of significant indigenous vegetation and significant habitats of indigenous fauna;
- maintain and enhance public access to and along coastal marine areas, lakes and rivers;
- relationship of Maori and their culture and traditions with their ancestral lands, water, sites and resources (waahi tapu and other taonga).

Those who exercise powers and functions must have particular regard to;

- Kaitiakitanga (traditional guardianship);
- efficient use and development of natural and physical resources;
- maintain and enhance amenity values;
- intrinsic values of ecosystems;
- recognition and protection of the heritage values of sites, buildings, places or areas;
- maintain and enhance the quality of the environment;
- any finite characteristics of national and physical resources;
- protection of the habitat of trout and salmon;

- principles of the Treaty of Waitangi.

2.5. National Policy Statements

A hierarchy of policy statements and management is put in place by the RMA. The Minister for the Environment produces national policy statements on matters of national significance. The public are made aware of the proposed statement and invited to comment. Once this has occurred the proposed statement is publicly notified and a Board of Inquiry is appointed. The Board considers all submissions and produces a report. This report is made public and then the Minister is required to consider the report and make recommendations that he or she thinks fit. The Governor General will then approve the national policy statement at the recommendation of the Minister. The Minister may review, revoke or change the statement by following the same procedure mentioned above for initiating a national policy statement.

3. Regional Planning Arrangements

Regional Councils have the pivotal role in resource management administration. They have primary responsibility for the management of water, soil, geothermal resources and pollution control. Each regional council must establish regional policies and plans that set the objectives for the integrated management of resources in their area.

Regional and district policies and plans must be consistent with national policy statements. The RMA sets out the matters to be considered by authorities when establishing their respective policies.

Regional plans are optional (except regional coastal plans), and focus on more specific resource issues that require more detailed policies and rules. The RMA lists the issues to be considered when preparing the regional plans. The plans may include rules which regulate, prohibit or allow activities. Regional plans are designed to assist a regional council in carrying out its functions. Regional councils are the pivotal regulatory agencies for resource management, and in particular perform the functions of catchment management authorities.

District plans are mandatory and are designed to assist territorial authorities in carrying out their functions under the Act. The Act sets out the matters to be considered by the territorial authority in preparing plans. District plans must be consistent with regional policy statements or plans. District plans may include district rules that can prohibit, regulate or allow activities.

The Act sets out the requirements about the provision of information to the public. It removes some of the previous formality in public hearings, and allows that hearings and evidence may be heard in Maori native language. There is a commitment to open government with freedom of information, but protection of sensitive information (eg. trade secrets or sacred Maori information) is allowed for under the act.

Policy statements and plans are to be reviewed in full at intervals no more than ten years. The policy statements and plans continue to be in operation whilst in review.

4. Monitoring

Monitoring is carried out to assess the suitability and success of particular policies. Thus regional policies and plans ought to be defined clearly enough to determine whether they have been successful or not. The cost of monitoring a particular option must also be included in the process of selecting the most appropriate activity. The Act provides for dynamism in that a constant process of review and monitoring ought to occur.

5. Consents

The regional management plans provide the rules for the use of the natural resources in any region. Anyone intending to undertake a resource use activity should refer first of all to the relevant management plan. Various consents are provided for in the Act. These are required when an activity contravenes restrictions and when a plan states that consent must be sought. Five types of consent exist:

- land use consent
- coastal permit
- discharge permit
- sub division consent
- water permit

There is one standard consent process for the 5 types mentioned above. For instance a single coastal consent replaces the numerous permissions previously required to undertake activities on the coast.

The Act classifies activities into several categories relating to the granting of a consent. These are:

- permitted activities where the Act or plan states that no consent is required.
- controlled activities that subject the granting of the consent to conditions specified in the plan.
- discretionary activities where the full discretion of the council (regional or district) is exercised in accordance with criteria set in the plan.
- non-complying activities where an activity contravenes a plan but is not prohibited
- prohibited activities for which no consent can be sought (stated in the plan).

The essence of the consent system is flexibility, although it is up to each community or regional council to define an “absolute limit”. Performance standards are used to apply necessary controls to permitted activities.

The consent authorities are able to require further information relating to the application to enable better understanding of the nature of the activity. Any person may make a submission on a resource consent that is notified (made public). Pre-hearings are arranged to clarify, mediate or facilitate resolution of any matter or issue. It is presumed that a hearing need not be held unless the consent authority considers it necessary or an applicant or any person making a submission requests this.

Various conditions may be attached to resource consents if they are granted. These may include a financial contribution, bond, covenant, administrative charge and in the case of discharge, a condition related to the best practicable option.

Landuse and subdivision consents are attached to the land with the exception of activities relating to river and lake beds. Regional plans contain the specifics relating to the transfer of the various types of consent.

The maximum period for consents is 35 years, however land use consents, reclamations and subdivisions are unlimited unless otherwise specified in the consent. If no period is specified in the consent, the duration is 5 years. The Act allows for the review, suspension and cancellation of consents. This may arise from changes in the manner in which the consent has been used, the future viability of the consent, illegal practices and the like.

At periods agreed to in the consent, reviews of the consent are undertaken by the consent authority.

5.1. The "Call In" procedure

The Minister for the Environment has the power to 'call in' applications (for consent) of national significance. This serves to lift the application out of the local arena and place the decision making process into the national level. The following criteria may be used to determine whether an issue is of national significance:

- has there been public concern/interest regarding its effects on the environment?
- has the proposal involved or is likely to involve significant use of resources?
- effects of the proposal on any structure/place etc. of National significance.
- is it likely to be significant in terms of the Treaty of Waitangi?

The consent authority has an obligation to notify all people involved once the application has been called in. The Minister is now responsible for the consent process. The standard resource consent process still applies thus avoiding any suggestions of bias. A Board of Inquiry is appointed to consider the application. Public submissions on the proposal are taken and provisions are made to ensure that regional and local interests are well represented on the Board. The Minister must make a decision on the report within 20 working days. The right of appeal (against the Minister's decision) to the Planning Tribunal is standard.

6. Declarations, enforcement's and ancillary powers

Disputations over consents or any environmental conflict can be resolved through various mechanisms that the Act provides for. The Planning Tribunal has the anchor role in dispute resolution but provisions are made for alternatives such as pre-hearing conferences, mediation and conciliation.

The Act promotes a "user-friendly" type of tribunal whereby parties before the tribunal will be able to be represented by someone other than a lawyer, the hearing shall take place as close as practicable to the site of the issue, and written evidence in Maori will be permitted as long as translation is available.

7. The planning tribunal

The Planning Tribunal hears appeals, makes enquires under the Act and issues enforcement orders. It had a similar function under pre-existing law but now there is more emphasis on the enforcement aspect of environmental control. It is made up of 5 planning judges and up

to 10 planning commissioners. The Governor General appoints one of the judges as the Principle Planning Judge. Alternative planning judges, deputy commissioners and special advisers can be appointed. The Ministers of Justice, Environment and Maori Affairs consult over the appointment of Tribunal members. The Act specifies the criteria needed to appoint assessors, and the Tribunal is able to appoint special advisers.

The Act allows for planning judges to deal with specified tasks sitting alone and some assessors can do likewise with some matters under the direction of the planning judge.

The Tribunal has the powers of the District Court but can regulate its own proceedings such that formalities are waived if it is fair and efficient to do so. If a number of proceedings relate to the same matter then they can be heard together. The hearings will, in general, be in public but evidence can be heard in private and its publication restricted or prohibited, as the Tribunal sees fit.

Appeals before the Tribunal are heard *de novo* (ie. afresh). The Tribunal can direct local authorities to change plans and policy statements. Where there are inconsistencies between national policy statements and regional policy statements or plans, or between a regional policy statement or plan and a district plan, the Tribunal has the power to order changes to correct the problems.

The Tribunal can review a decision if new important evidence is made available or there has been a change in circumstances that might have affected the decision. Appeals against the Tribunal decision on points of law are heard in the High Court.

It seems that the Planning Tribunal is an all-powerful body that can over-ride the Minister, virtually run environmental enforcement, and control the direction of environmental policy. The conservation movements held these types of fears when the Act was in its submission phase. Previous experiences with the "old" Planning Tribunal left many people cynical and disillusioned with the mechanisms open to them to resolve resource issues. Current reports from New Zealand, however, show that the number of cases reaching the Planning Tribunal is at an all time low and the provisions for alternative dispute resolution are very popular (pre-hearings, consultations). Early consultation is saving money and time once the statutory processes begin. Examples of this are the Wanganui sewage discharges, Mangahao power scheme and the renewal of ECNZ's water rights on the Lower Waitaki River. These major projects have been resolved through consultation and lengthy hearings were not required.

Appendix 5 PROFILE OF CONSULTANCY TEAM

Profile Jason Alexandra - Alexandra and Associates Pty Ltd

Alexandra and Associates Pty Ltd. is a consulting company which specialises in environmental and resource management work.

Jason Alexandra has considerable experience relevant to the Landcom ESD Studies, including experience in:

- land and water resources management and conservation;
- development and application of ESD principles to land management;
- R&D planning, administration and evaluation through his role as a Director of the Land and Water R&D Corporation (LWRRDC);
- developing methods for monitoring and reporting on the environmental and resource conservation impacts of projects; and
- working for NGO, government and private sector organisations.

As the Sustainable Landuse Coordinator at the ACF (1990 -1996) Jason developed and implemented a program designed to assess the effectiveness of Australia's land and water management policies and programs from an ESD perspective. This involved a number of regional case studies and several projects examining specific issues and options. Jason has considerable experience in community involvement in environmental and resource management. In 1995 and 1996 he undertook the first national review and evaluation of community or participatory monitoring programs in Australia (*Listening to the Land - a Directory of Community Environmental Monitoring in Australia*. Alexandra, J and White, T. ACF 1996).

Other recent relevant experience includes provision of consulting services to the:-
The SoE Unit of Environment Australia - management and implementation of a major consultancy on developing an effective national framework for regional and local environmental reporting (SOE Reporting). This involved pilot projects in all Australian States and cooperation between local, state and Commonwealth agencies.

Greening Australia Ltd - Consultants report on management of privately owned native forests in Australia. This report provided an overview of the status of private native forest management, the opportunities for improvement and the potential for GA involvement .

Profile Peter Atkins

Peter Atkins is a planner with considerable experience in urban and environmental planning.

He has experience working for local and state government, community groups and in teaching planning at a tertiary level. Peter was a founding member of the EDO in Victoria and is currently the deputy president.

Peter has been an environmental and urban planner for numerous community groups Local Government Authorities and State Government Agencies in Victoria. He was a lecturer at the Royal Melbourne Institute of Technology's (RMIT) Department of Planning Policy and Landscape, 1990 - 1995.

In the late 1980's Peter was the planner at outer urban Shire of Sherbrooke in Melbourne's Dandenong Ranges and a project officer for the Conservation Council of Victoria on sustainable urban form.

These roles involved resolution of many bushland and biodiversity issues on Melbourne's urban fringe. Sherbrooke is renowned for its bushland parks, lyrebirds and easy access to Melbourne's Eastern suburbs. It has been a pace setter in urban and environmental planning and due to its proximity to the city and suburbs it has been under intensive urban development pressure.

Peter has experience in community consultation and dispute resolution. He has worked as an advocate for numerous community organisations in planning disputes and is a trained mediator. He worked in a dedicated community consultation and dispute resolution unit established by the Victorian State Government to develop a solutions to environmental disputes including the Richmond to Brunswick Powerline Dispute and the Eastern Freeway dispute. The proposed high voltage powerlines along the Yarra corridor was opposed by residents groups and the power authority claimed there were no other options. The Unit consulted widely, examined all options and finally recommended on an alternative which was satisfactory to all parties.

Peter is currently the Development Projects Coordinator for the new City of Maribyrnong in Melbourne's western suburbs. This involves regional park planning and major urban development planning.

Profile Mike Read - Read Sturgess and Associates Pty Ltd

Mike Read of Read Sturgess and Associates is an economist specialising in the economic analysis of policy initiatives and practical aspects of environmental and natural resource management.

Areas of specialisation include:

- catchment, land, forest and water resources management;
- greenhouse issues;
- pollution control;
- ecologically sustainable development;
- fisheries, estuarine and marine environments;
- econometric and bio-economic modelling.

The company has worked on these other issues for a great diversity of organisations including - government departments, statutory authorities, ministerial enquires, royal commissions, employer organisations and unions.

Mike Read has worked extensively using economic evaluations to improve land and natural resources management. Some of specific studies undertaken by Read Sturgess relevant to the Landcom ESD study include:

- economic evaluations of options and strategies for allocating reef sites to tourist operators in the Great barrier reef Marine Park;
- assessment of economic benefits of nutrient reduction in numerous Victorian Streams and rivers;

- economic evaluations of catchment management plans;
- preparation of a generalised methodology for evaluating resource conflicts involving public land;
- a review of water and waste water services provided by Melbourne Water;
- development of a framework for assessing the socio-economic impacts of Action Statements arising from Victoria's Flora and Fauna Act;
- economic evaluation of the possible strategies for forestry and water supply in the Thomson Catchment, one of Melbourne's major water supplies;
- studies on economic impacts of greenhouse induced climate change; and
- evaluation of renewable energy options in Australian agriculture.