PLANNING AND DESIGN STANDARD FOR IMPROVING SUSTAINABILITY OF NEIGHBOURHOODS AND PRECINCTS

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SUSTAINABLE TOURISM CRC

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ABSTRACT

The Precinct Planning & Design Standard is a tool for use in the master planning and design of tourism infrastructure on medium to large mixed use precinct development where stakeholders are seeking measurable ecological performance. The need for a tool for the planning and design of precincts has arisen in the course of improving the sustainability and reducing the environmental impacts of large comprehensive developments. Research work has involved the investigation of principles that might underpin such a tool, as well as the physical measures, such as green technologies and systems, that might be within its scope. Further research was undertaken to examine the range of tools available for planning and design, and how such planning and design tool might nest with the planning and design process. A programme is underway to test this tool on a number of pilot projects. The work reported here discusses some of the initial findings from this research and provides a discussion of future directions.

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SUMMARY

The development of environmental standards is a key part of the progression toward sustainability. Tools like the Green Globe Design and Construct Standard have been developed at the building level, but little work has been carried out at the scale of larger aggregations of buildings, such as precincts and cities. Tourism facilities are increasingly becoming part of more comprehensive developments, involving multiple land uses and multi-use facilities. Projects may now consist of hotel/motel units, residential development at varying densities, golf courses and other forms of open space, recreational facilities, shops and restaurants. A master plan is normally used to show land use and building disposition and the links that weave the components of the project together. Additional standards are becoming necessary to reflect these more complex forms of development so the standard has considerable potential for use by developers and local government.

Objectives of the Study

The aim of the project was to generate a new Green Globe product by creating a new standard, the Precinct Planning and Design Standard (PPDS). The PPDS has to be suitable for use with developments such as Salt and Sydney Olympic Park (SOP). The existing design and construct standard is too narrow to use in isolation for the Salt and SOP projects, since it is largely a building-oriented standard. The Salt/SOP developments are multi-land use and multi-functional and need to be tested by a more holistic product, such as the PPDS.

Specific aims include:

- Creation of a precinct planning and design assessment tool for tourism infrastructure, that can be used for multi-use developments;
- An environmental standard for the design and planning of multi-use developments that is consistent with Green Globe Asia Pacific methodology;
- Refereed paper(s);
- A handbook for developers and assessors;
- Case studies of two completed pilot projects; and
- Continuing professional development courses for design professionals.

Methodology

The methodology is built on the Design and Construct Standard process of scoping, tool development and diffusion. Tool development involved the selection of an indicator suite, followed by the development of benchmarks through analysis of case study projects. Case studies conducted include Salt and Sydney Olympic Park.

The project also involved the following tasks;

- A review of Sustainable Development Standards for national and regional level planning;
- A review of Sustainable Development Standards and initiatives worldwide;
- A comparative analysis of standards and initiatives;
- Defining the intent and scope of Green Globe Design based on national and international standards;
- Testing scope and intent against leading sustainable development tourism projects (Salt and others); and
- Refining, piloting and developing the standard, via Green Globe policy, sector benchmarking indicators (SBI) and the certification process.

Key Findings

The following deliverables were achieved through the project:

- A Precinct Planning and Design Standard consistent with Green Globe Asia Pacific methodology;
- A Precinct Planning and Design handbook for developers and assessors;
- Case studies of completed pilot projects (Salt and Sydney Olympic Park);
- Professional development courses for design professionals with indication of responses received; and
- Refereed papers.

Future Action

The development of environmental standards is a key part of the progress toward sustainability. Tools like the Green Globe Design and Construct Standard have been developed at the building level. Tourism facilities are increasingly becoming part of more comprehensive developments, involving multiple land uses and multi-use facilities. Projects now may consist of hotel/motel units, residential development at varying densities, golf courses and other forms of open space, recreational facilities, shops and restaurants. A master plan is normally used to design land use and building disposition and the links that weave the components of the project together. Additional standards are needed to reflect these more complex forms of development and this has been addressed by the development of the PPDS.

Initial work on the diffusion of PPDS has involved creating a web capability for marketing, educating and disseminating the project to industry globally. Additional research work is needed to build on the web capability to test the tool and to develop benchmarks for the standard.

Chapter 1

INTRODUCTION

While the scientific principles and technologies needed for 'green building' have been with us for centuries, the barriers to introducing environmentally sensitive master planning and design of large infrastructure developments are largely social and political (Mawinney, 2002). Tourism developers are moving ahead creating comprehensive developments, covering large areas of land, with multiple building types. These undertakings are formed into precincts or neighbourhoods with associated service infrastructure. The projects aim to address environmental issues, but they also go further, dealing with social and economic factors. Hence the scope of these developments, and their integrated nature and scale, have caused them to be classified more broadly as sustainable development, raising a number of questions for the property industry in general and the tourism industry in particular:

1. Are these large tourism developments 'really' sustainable; do they reduce environmental impacts?
2. What should be measured, and how, with respect to environmental impacts at this scale of development?
3. Can these developments be used to define a tourism industry standard of best practice?
4. What is a sustainable development, in the context of the travel and tourism industry?

First, are these large tourism developments 'really' sustainable; do they reduce environmental impacts? Addressing this question entails establishing a framework for environmental impact reduction. A 'principle to indicator' model (Mawinney 2002, p166) is proposed, whereby the environmental principles espoused are connected to environmental performance. This approach is preferred by many, as it forms a very logical route to environmental assessment.

A first stage of research would be to examine the extent to which the aims, strategies and scope of projects address issues of environmental impact. The framework used by Green Globe at present is derived from Agenda 21 (Brundtland Report); this can be used to assist in analysing the extent to which the 'project intent' includes these principles.

Chapter 1 examines this question through examination of sustainable precinct development.

Second, what should be measured, and how, with respect to environmental impacts at this scale of development? With regard to the 'principle to indicator model', Agenda 21 may provide the principles – but what should make up the indicator suite? Green Globe tools use Earthcheck as a primary indicator set, but sub-indicators will need to be developed that are specific to the scale and nature of these projects. A review of literature on indicators for this type of project should include the following:

- Sustainable Development Checklist, Building Research Establishment, United Kingdom;
- Sustainable Development Committee at the US Green Building Council;
- Social Capital, City Core Indicators, Robert Putnam, UK; and
- Coastal Guidelines for New South Wales.

The work of Guru Robert Putnam on 'Social Capital' is most useful. He defines this as "features of social organisation, such as trust, norms and networks that can improve the efficiency of society by facilitating co-ordinated actions". These have been translated into an indicator suite (Moore 2003).

A second stage plan would be to develop an indicator suite that pulls together the primary and secondary indicators to mesh with the scope of the projects to be assessed.

Chapter 2 provides the basis for this, in terms of the need for such a tool.

Third, can these developments be used to define a tourism industry standard of 'best practice' for planning and design of precincts? Criticisms of the 'principle to indicator' model are directed at its capacity to address the relationship between the principles, the choice of indicators and 'best practice'. To address this problem, the tool should be tested on a number of projects. Chapter 4 provides a case study of Olympic Park, and Chapter 5 provides a further case study of the Salt development.

Fourth, what is sustainable development, particularly in the context of the travel and tourism industry, with reference to development and the planning process? Improvement in the sustainability of the Australian tourism industry can be gauged by its standards and by the quality of its buildings and infrastructure, but moreover by studying the way it engages in the broader debate on sustainable development. The final part of this project will examine the context of the standards, and how they embrace the broader social, political and economic issues that are currently emerging.

Chapter 6 provides information on these points arising from workshops conducted with planners, developers and building design professionals.

Chapter 2

SUSTAINABLE PRECINCT DEVELOPMENT: ANOTHER TOOL?

Richard Moore

This chapter arises from the perception that, where sustainability principles are being applied to medium and large scale precinct developments, a way is needed to benchmark and certify their ecological performance outcomes in terms of industry best practice.

A further central theme is how to introduce and diffuse such a possibly innovative performance-based standard throughout the development and construction industries. The incentives for using such a new standard, and the mechanisms for accommodating it, within the existing suite of regulatory and other voluntary tools, also need to be explored. A major issue will be how to overcome probable high levels of uncertainty in the early stages, while avoiding any inappropriate experimental purchases that are likely to result.

Finally, what are the economic, social and technical barriers to be overcome, if a standard is to fulfil the major objective of helping the development and construction industries to achieve goals brought on by ever increasing pressures for sustainability?

Introduction: A Perceived Need and Understanding Sustainability

The built environment provides the context for most development and construction activity. The inception or development phase provides the managerial and organisational inputs, such as policy and strategic objectives, investment, land selection and master planning and design. The construction phase covers the mechanisms for delivering the physical outputs. To achieve the goals of sustainability, the total integration of development and construction processes is critical. Solutions will emerge from the overlapping and integration of disciplines and expertise. There will need to be a dynamic relationship between the inputs and outputs, on a macro and a micro scale, if the value of a built environment is to transcend mere financial accounting issues and offer true social and environmental responsiveness.

Accordingly, it is critical to recognise that the development and construction industries in all their guises play key roles and impact more than most other players on the often stated objective of progressing toward sustainable buildings, precincts and cities.

Sustainability is without doubt a complex subject; the term is often misunderstood and misused, particularly in the development and construction industries. For many it implies no more than being ‘environmentally friendly’. This limited view must be opened up and given a broader interpretation. Simply seeking reduction in energy usage, possible recycling of waste and protection of wildlife species will not be sufficient to aid the industry in its progress towards more sustainable patterns of development.

A more appropriate understanding includes the recognition that sustainability can be closely coupled with development and construction undertakings and that attention should be focused particularly on the critical activities of planning and design. It is also important for those involved in development and construction to accept sustainability as a dynamic process that offers the potential to improve the highly desirable quality of life of everyone, while simultaneously protecting and enhancing the interrelated support systems, whether environmental, economic or social.

Added to this understanding is the need to recognise that working for sustainability demands an awareness of how everything works, whether natural or man-made. Furthermore, there needs to be a similar understanding of the likely effects on the process and the outcomes of development planning and design decisions and actions. Without this understanding, it is not possible to overcome what is known as the “circle of blame” (Figure 1).

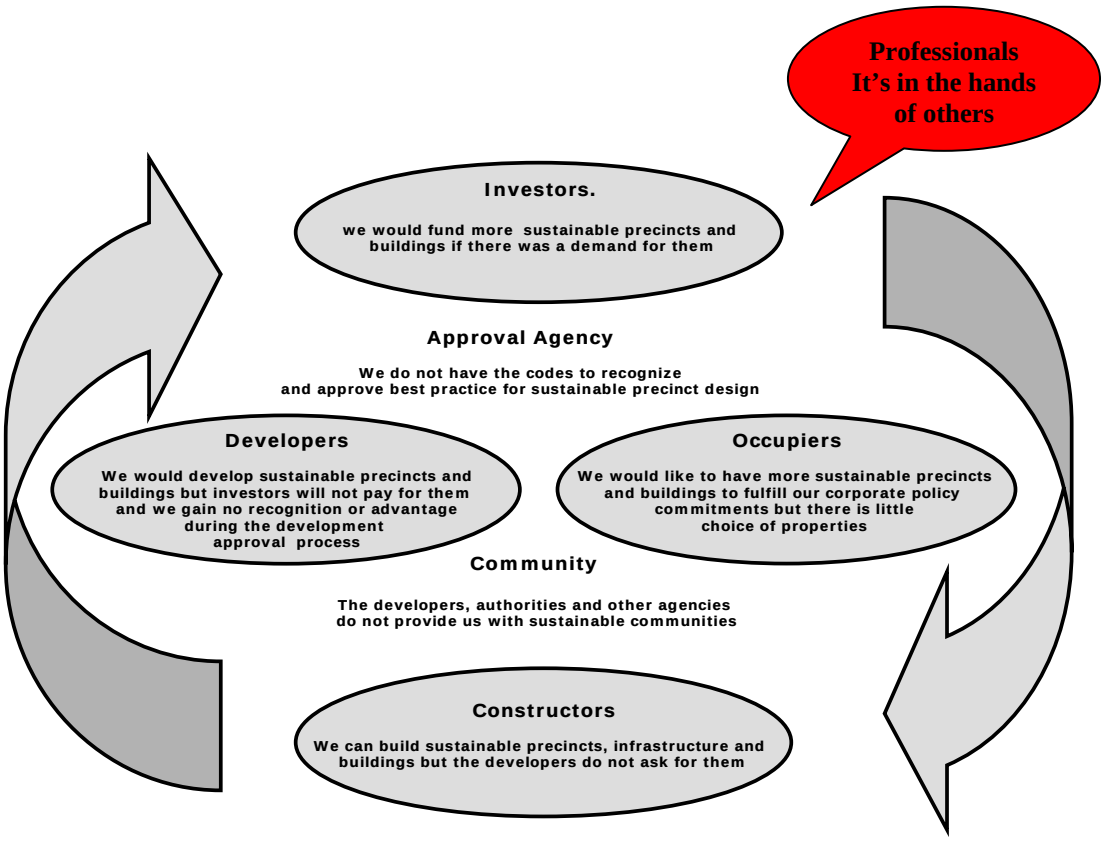


Figure 1: Circle of Blame

Source: Sustainable Construction Task Force 1998, p.1

This broader perspective and acceptance of responsibility by everyone involved in the development process is paramount for achieving sustainable planning, design and eventual building outcomes, because "sustainability is a fabric that must be woven through all aspects of our lives, constantly challenging us to apply new metrics and new solutions in the daily decisions that we make" (Anderson 2005, p.1).

Stimuli: Questions of Environmental, Economic and Social Demands

This chapter sets itself the task of raising the question: is there a need for a broad-based precinct planning and design standard? What is the stimulus that suggests a demand for an extra tool to complement or replace existing methodologies employed in current development processes?

It can be shown that the regulation of precinct development outcomes linking environmental, social and economic agendas is a significant topic of discussion at international, national, state, regional and local levels. Since the mid 1990s, there has been a prolific growth in sustainable strategies and policies. National consciousness has now been extended to cover a whole spectrum of 'realms of influence', from environmental stewardship, social equity, sustainable communities and economic ethics to sustainable industries. Many of the medium and long-term aspirations and their resultant initiatives have filtered down and been translated into sustainability indexes, quality of life plans, social and ethical standards, benchmarking and certification programmes, checklists and other equally aspiration-driven codes. Despite their numbers, the one common thread is that they are all seeking to respect the central tenet that "at the heart of sustainable development is the simple idea of ensuring a better quality of life for everyone, now and for generations to come" (DETR 1999, p.8). For the development and construction industries, this means "achieving social, economic and environmental objectives at the same time" (DETR 2000, p.7).

The noted growth of agendas aimed at embracing sustainable development is being led by the industrialised nations of Europe, North America and, lately, Australia and New Zealand. The emerging economies of Russia, China and India will soon be added to this group. Following closely behind these will be other nations seeking to raise their standard of living via economic development, some of which will be linked to tourism but mostly to industrialisation. Much of the built environment resulting from this demand will initially be influenced by the

structures and practices of the established development and construction industries of the more advanced industrialised nations. To achieve ecological equity, international coordination and mutuality must underpin such influences; this is critical if the prediction is to be confirmed that "by the 21st Century, 70 to 80 per cent of the world's population will live in concentrated urban centres" (Battle & McCarthy 2001, p.88); a majority of these will be employed in industrial or service-based activities.

Examples of the growth of sustainability agendas are readily available at international and national levels. Within many European countries, for example, there is a clear recognition that "environmental damage causes financial losses at a stupendous scale" (Winters 1999, p.17). Linked to this is an economic desire to attain an acceptable standard of living for all people throughout Europe, at the same time as conserving or restoring the viability of the natural environment, the very basis of human life.

There is also now an abundance of regulatory and advisory publications aimed at specifically identifying the role of the industry in this quest to achieve sustainable objectives, such as:

- Social progress which recognises the needs of everyone;
- Effective protection of the environment;
- Prudent use of natural resources; and
- Maintenance of high and stable levels of economic growth and employment.

Specific publications, such as the 'Building a Better Quality of Life' series, have spelt out the UK Government's requirement for the development and construction industries to take up the challenge of sustainability throughout all its activities. They offer frameworks within which industries can make a stronger contribution to the better quality of life strategies being signalled by the government. To drive the message home, the then minister responsible for the industry stated that this was a step "on the road to a more socially and environmentally responsible, better-regarded construction [*sic development*] industry" (DETR 2000, Forward).

While to many "a government smitten with the idea of joined-up thinking, something like sustainability which appears to offer a unified theory of everything, is inevitably attractive" (Reed 2000, p.1), others would suggest that there has to be more than theory to promote the radical change of attitude needed throughout the development and construction industries. To quell this sense of unattainable rhetoric, the notion has been put forward that "sustainable construction [*sic development*] is about competitiveness, survival, corporate responsibility and enlightened self-interest and that it makes good sense" (Reed 2000, p.1). Fortunately for governments, their development and construction industries normally deal in specifics and need to make practical sense of demands. On this front, governments have had plenty of help, because many in these industries are now required to take account of the increasingly stringent environmental liabilities to which they are becoming subject, in their international, national and local activity.

Further, the 1990s brought a wake-up call for many, when virtually any development activity made many developers into the environmentalists' most wanted villains. The moral high ground had to be reclaimed, and developers and large contractors began taking steps to introduce comprehensive environmental management systems into their management structures and processes. Unfortunately, industries at large have found that a business case for the social and some economic aspects of sustainability is difficult to develop. However, this objection holds little credence, given the known impacts on national and global resources and pollution made by the development and construction activity. For example, in the UK it is estimated that some 360 million tonnes of construction materials are used in its industry every year; more disturbingly, 70 million tonnes of this becomes construction and demolition waste, destined in the main for landfill (Movement for Innovation 2001, p.2).

A global perspective of the resources used and wasted is given in Table 1. There seems little doubt that a business case can be mounted; it just takes the right questions to be asked, particularly as many senior industrial leaders are suggesting that "the environment will provide the largest opportunity for technological and managerial innovation and profitable enterprise that the industrial world has ever seen" (Kiernan 1997, p.166).

Table 1: Impacts on global resources and pollution

Global Resource	***Building Use***	***Global Pollution***	***Building Related***
Energy	*50%*	*Air quality (cities)*	*24%*
Water	*42%*	*Global warming gases*	*50%*
Materials by bulk	*50%*	*Drinking water pollution*	*40%*
Agriculture land loss	*48%*	*Landfill waste*	*20%*
Coral reef destruction	*50% (indirect)*	*CFCs/HCFCs*	*50%*

Source: Edwards 2001, p.31

However, some developers and construction companies are responding by "recognising that relationships with clients, regulators, the public and suppliers can be improved with effective and more sustainable practices"; furthermore, legislators in the UK and Europe "are now increasingly applying financial incentive based on approaches to legislation, regulation and taxation" (Reed 2000, p.1). This, linked with the fact that investors, particularly the large funding institutions, are taking greater interest in environmental, ethical and social performance, has meant that many developers are being screened for their sustainability credentials. This is particularly evident for large government development and construction opportunities.

It goes without saying that there is no lack of need for building, both in social and economic terms, and in particular, for housing, schools and hospitals; these are givens for most large mixed-use precinct developments. It is suggested that, in Western European nations, Russia, USA and Japan alone, some 10 million homes are required annually. Link to this number the necessary infrastructure and the scale becomes staggering, particularly when one considers that this is but a single sector of the development industry.

Meeting the Demands: A New Tool?

The demands flowing from such legislative and moral imperatives, together with the scale of development potential generated by the growing demand from the established and emerging nations, are in themselves stimuli enough to seek sustainable solutions. The question is: how do developers deliver them on medium to large precinct developments? What tool do they employ to ensure that they meet the challenge that "has arisen from a number of forces at work within society to address concerns for the problems of environmental degradation of the planet" (Hyde 2005a, p.1)? This is particularly relevant because it can be argued that many existing standards, checklists and guides are limited in their ability to deliver meaningful performance-based outcomes. Few of the tools currently in use are able to provide meaningful evidence that environmental improvement of a development has been achieved.

This is evidenced by noting that even the highly regarded framework that is deemed most comprehensive for developers and local authorities, BRE's Sustainability Checklist for Developers (Brownhill & Rao 2002), limits itself to providing only a means of considering positive measures that can be taken to reduce environmental impact or to enhance social and economic benefits on large mixed-use schemes. It does not provide a mechanism within the tool with which developers or other stakeholders can measure the outcomes of their planning and design decisions. This is similarly true of many of the sustainability tools aimed at developers; most tend to use self-assessment point-scoring systems for environmental initiatives or impacts on individual buildings. Further, the third-party certification systems used by these tools normally only provide a reactive document-based process for reviewing the points claimed. These checklists and rating tools do not accommodate the broader approach, often quite difficult to translate, advocated earlier in this chapter. This is the also the case with Life Cycle Assessment, which it can be argued limits itself to environmental impacts and outcomes, and "should be used in conjunction with other environmental assessment, management and decision making tools" (RMIT 2005, p.4).

It should not be thought that these are criticisms of the tools themselves; their shortcomings are not least because of a shift in demands over the last two decades, and the resultant pressures being faced by the development and construction industries. This means that current best practice is not measured by actual performance but is more to do with predicted outcomes. Consequently, while there is a range of tools, it does not offer a whole-system view of the development process (see Figure 2), and therefore fails to provide a proactive, integrated and comprehensive common framework for developers, authorities and other stakeholders.

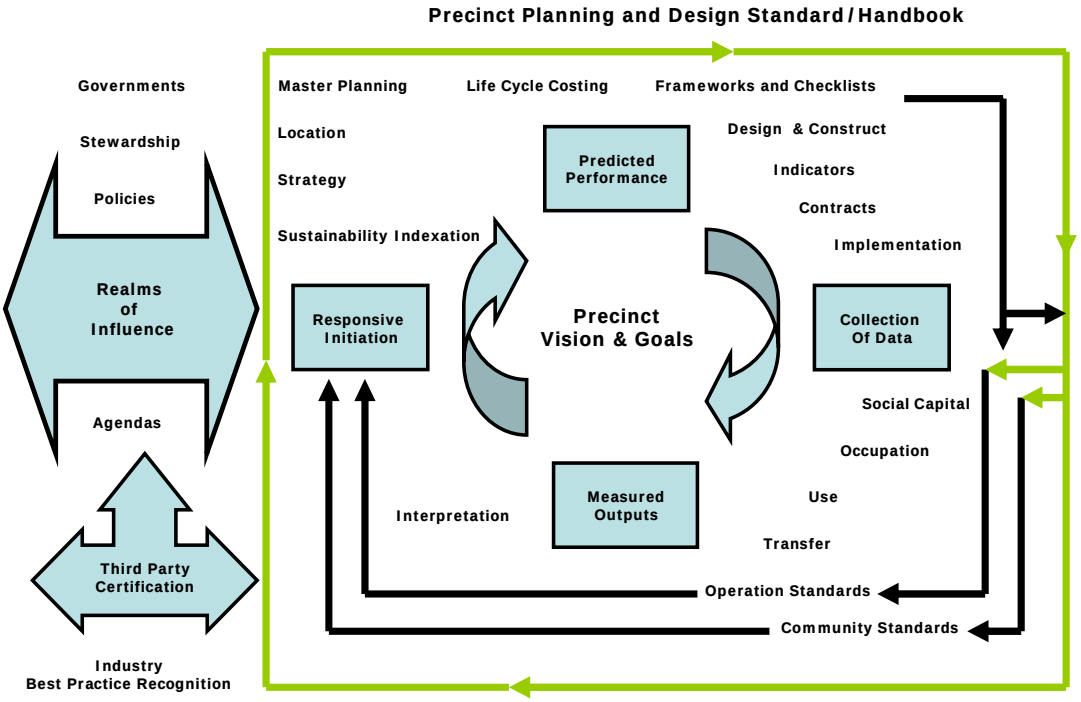


Figure 2: Whole system view of development process

Important to the evolution of a new tool are two questions. What would we want a new precinct planning and design standard to offer, in overcoming the perceived shortcomings of existing tools? Would a process-based planning and design standard, incorporating benchmarking and certification of best practice performance, provide a model for assessing progress in the delivery of sustainable developments?

Implicit to this chapter is the view that planning and design have a key role to play in resolving many of the conflicts that such precinct developments may generate. In the absence of good planning and design, there are evident risks that development will become unregulated, formless or haphazard, inefficient and likely to lead directly to a range of negative economic, social and environmental impacts (Williams 1998).

How developers (and in particular their advisors) respond to the challenge of achieving sustainability, when planning and designing new precincts or regenerating old ones, is of critical importance. To meet the underlying sustainability themes now laid down, the use of indicators is widely accepted as a practical and meaningful way to help developers progress towards sustainable outcomes. Further performance measurement and benchmarking, with their potential to bring greater levels of accountability and ideas for better ways of doing things, can provide one of the most effective drivers for improvement in areas of governance. While accepting that sustainability has a broad and complex nature that may make it difficult to reconcile all the endless possibilities for indicators, to be meaningful any new standard would need to subscribe to a common view regarding an appropriate level for it. Consistency with these views is necessary if the new standard is to be developed as a practical tool with indicators that measure the sustainability of a precinct development at several levels for both buildings and infrastructure (Brownhill & Rao 2002).

A new standard will need to provide guidelines and methods to help developers and their advisors achieve sustainable planning and design goals, while helping them conform to independent third party certification. A critical dimension of any certification should be ongoing participation in the developer's processes after the initial phase of planning and design. This will ensure compliance and maintain recognition, as the developer seeks to enhance its sustainability record. A further aspect will be integration with – and possible incorporation of – other instruments, such as construction, operational and community standards. The standard should provide essential sustainability information for developers, planners, designers and other stakeholders involved in the development process. This broad and inclusive approach may provide a means by which to secure early statutory approvals and development delivery; it will need to elaborate on the mechanisms of sustainability assessment and support tools such as possible sector benchmarking indicators (SBIs). It should describe the process and requirements for undertaking and obtaining benchmarking and certification status respectively. Finally, and most critically, it will need to provide a realistic picture of possible outcomes to developers and their advisors, by linking indicators to the development process and the crucial decision-making stages of planning and design.

A Framework for the Innovation, Adoption and Diffusion of a New Standard

While it is not the intention of this chapter to offer a rigorous discourse on the nature of innovation, adoption and diffusion, it is important to place the new precinct planning and design standard in a framework that will clarify certain actions, and to aid in its development and possible use. It is often claimed that the development and construction industries are slow to take up innovations in management and process-based technology. However, as noted, recent pressures are forcing a rethinking of the way the industries respond, particularly given their key roles in the built environment, with its significant impact on many sustainability issues. "Pioneering radical changes of attitude throughout the design and construction industry" are now becoming visible, with changes in "the establishment of a culture of measurement across all aspects of the industry" at the forefront of these (Movement for Innovation 2001, p.1). It has also been widely recognised that, besides purely environmental issues, social and economic indicators need to be incorporated into any performance indicator suite. A major problem has been achieving practical and quantifiable targets for these; a precinct planning and design standard would need to meet these targets and could then claim to be an innovative approach in resolution of this problem. It is important that such a claim be open to scrutiny with respect to the nature of innovation and the type of innovation being claimed. It is an important issue for possible adopters because where the innovation is flowing from will have an impact on their decision processes, as will be noted later.

There are reasonable working definitions of three distinct types of innovation. The first is what can be termed 'the complex system' that is "characterised by thorough, long-range planning that assumes that the requisite technologies will be available and that they will fit together when the final development is reached" (Marquis 1982). It is argued that examples of such innovations are not common, in that few enterprises, by themselves, are faced with the kinds of systems problems implied by the definition. The second type of innovation is represented "by the major, radical breakthrough in technology that turns out to change the whole character of an industry"; this sort of innovation, it should be noted, is "quite rare and unpredictable, and is predominately the product of independent inventors or of research by firms outside the industry ultimately influenced by it" (Marquis 1982). The third and last forms of innovation, unlike the other two that tend to come from outside, are those generated from within an industry. Most of these are apt to be in response to the preoccupations of short-term concerns or problems, which are normally handled by the technical competence that exists within the particular industry. These innovations as often referred to as the 'nuts and bolts' type that may be modest but are nevertheless essential for the average firm's survival. It is this last type of innovation that is most paced by economic factors (short-run costs and revenue calculations). Given that any new standard, although employing new approaches, would also be likely to adapt and refine existing tools, it is against this definition of innovation that such a standard most needs to be considered and measured. It is of critical importance here to recognise that adopting any innovation is inherently risky and disruptive to existing business activity.

The following definition of adoption is suitable because it reflects the nature of the development and construction industries. It is "the acceptance and continual use of a product, service or idea", referring "to a series of mental and behavioural states that a person (or group) passes through leading to the adoption or rejection of an innovation" (Koebal 2004, p.1). While any precinct planning and design standard resulting from this work may be seen as a tool primarily for planners and designers, it needs to target a much broader band of users, and be aimed at all those participating in the development team, as well as those stakeholders most involved or affected by a precinct undertaking. Accordingly, it is envisaged that the testing and adoption of the product that results will encompass a wide group of parties related in many ways to the planning and design process.

Another important aspect to consider is the diffusion of new techniques that can be defined as the spread of the innovation throughout the social system found in an industry. Given this definition, it is extremely important to determine how rapidly productivity increases in response to the diffusion, because this would seem to be essentially a learning process undertaken by the producers and users of the innovations. The first appearance of innovations tends to be viewed with high uncertainty and leads to experimental purchasing. Indeed, more research and development may be required before innovations are successful and, in some cases, even this will not lead to wholesale adoption of the new product or process. It is likely that early versions of an innovation may have serious technological problems that take time to eradicate, and that these modifications may be as important as the new product or process itself. The rate of diffusion of an innovation seems to be determined by the factors of economic advantage, levels of uncertainty and the rate at which this uncertainty is reduced, and lastly the extent of the commitment needed to try out an innovation; also critical to "the diffusion pattern at the industry level is the outcome of the distribution of individual firms" (Koebal 2004, p.1).

It is clear that any innovative standard that claims a role as a sustainability tool needs to address several issues to encourage its adoption. It needs to identify the possible risks and clearly state the competitive edge available to early adopters. The need to understand how the decision to adopt is taken must be recognised. A model that has reflected well on the manner in which a new standard must address the development and

construction industries will assume "that access to information is the principle determinant of the adoption decision, which is sequenced as follows:

- Awareness;
- Interest;
- Evaluation;
- Trial; and
- Adoption" (Koebal 2004, p.4).

The process to assure the adoption of a precinct planning and design standard, using these principles as guide, is discussed later. Regarding diffusion, as noted, this is more complex and beyond the scope of this chapter, but needless to say it is extremely important to have at least some feel for the determinants of adoption and diffusion.

Table 2 provides a comprehensive matrix of these determinants.

Table 2: Determinants of adoption and diffusion in the development industry

Adopter's Human Resources	**Adopter's Organisational Structure**	**Adopter's Organisational Culture and Decision Process**
• Skills • Motivation • Commitment • Specialisation and professionalism • Technical knowledge resources • Managerial attitudes and support	• Size and resources • Centralisation • Flexibility • Communication/administrative intensity • Complexity • Formalisation	• Innovation proneness • Organisational support for innovation • Technology champions • Cooperation and openness • Orientation (outward vs. inward) • Organisational position and role of decision maker
Adopter's Market Context	**Industry Characteristics**	**Communication Channels and Social Networks**
• Location • Competitive strategy • Market scope • Growth strategy • Knowledge of competitors' behaviour • Unionisation	• Regionalisation • Concentration • Heterogeneity • Inter-firm competitiveness • Growth rate • Wage rates • Government regulation	• Mass media • Word-of-mouth • Opinion leaders • Professional and trade associations • Boundary spanners • Informal and indirect links
Technical Attributes of the Innovation	**Economic Attributes of the Innovation**	**Supplier/Vendor Characteristics**
• Divisibility • Learning by doing • Complexity-crudeness • Type of innovation (process or product) • Complementarities required • Relative improvements in old technologies • Compatibility (values and practice) • Communicability • Relation to innovator product class schemas • High, medium and low tech • Radical vs. incremental	• Profitability • Uncertainty/risk • Expectations about future prices • Expectations about future tech trajectory of innovation • Labor saving vs. materials saving • Scale neutral vs. lumpy • Initial cost • Continuing cost • Rate of recovery of cost • Time savings • Start-up investment	• Technical capabilities and support • Communications skills • Expertise in monitoring deployment • Public relations

Source: Koebal 2004, p.5-6

In summary, a precinct planning and design standard will need to address and accommodate the following range of issues if it is to gain entry to the development industry's processes:

- The adopter's human resources, communication channels and social networks;

- Organisational culture and organisational structure;
- Market context and industry characteristics;
- Economic and technical attributes of the innovation; and
- Supplier/vendor characteristics.

Testing the Standard: Acceptance by the Development Team and Other Stakeholders

It is recognised that "communication from informal networks, supplier-adopter communications, technology demonstrations and communications with other adopters increases the probability of adoption" (Koebal 2004). To this end, a new standard will have to be presented on several fronts, both informally and formally. During development of the standard, drafts must be forwarded to potential adopters, including government officials working on strategic sustainable policy (particularly those who may be able to influence development approval), developers undertaking large mixed-use precinct developments, individual planners and designers and stakeholder groups such as community organisations. Specifically targeted industry conferences and workshops are normally an effective and practical means for information diffusion and for getting useful feedback, particularly when aiming to raise awareness of a new industry-based tool. Evaluation of its content and potential by approving bodies and development professionals will be critical; overseas input is also needed if transferability into international systems is sought. A further important area of testing will be case studies; appropriate projects should be identified as test models to evaluate whether the standard has the potential to encourage sustainable principles. Responses from workshops and case studies that are linked to benefits will be significant; especially those that are relevant to all stakeholders in the development of a precinct. Initially it should be offered as a 'new product', despite the risks implicit in a new tool, which can be marketed in terms of giving developers, planners and designers the following advantages:

Access to a knowledge base on 'Green Development': One significant barrier to 'green design' is the knowledge gap in finding appropriate systems and products; an indirect benefit of the standard may be access to information and expertise. This saves time and money in looking for knowledge databases, expert groups and supply chain information. The cost benefits are difficult to assess, but without this capability, 'going green' can extend project design time and costs to the point where green design issues are abandoned. Cost benefits should flow from this access, providing significant operational and capital savings.

Recognition and reward: Since the standard sets 'best practice' levels in planning and design, companies that use the standard demonstrate their ethical commitment to sustainability, thus improving their standing in that arena. An eco-profile for a company may be established, for example. Significantly, there is a possibility of encouraging approving authorities to recognise the best-practice capabilities of a company and in doing so improve the trust and confidence between the parties. Of particular relevance here is that, if the standard can draw on the services of a national or international third-party certification body, this will offer developers the opportunity to use an 'eco-label' that will give them wider industry recognition.

Design process efficiencies: Considerable efficiencies in the design management of a project may be achieved through the use of a process-based standard, that could provide a checklist of issues for the design brief, and environmental performance targets for the planning and design team, as well as a tool for reporting progress in the planning and design process. This could facilitate collaboration with local authorities in meeting code compliance issues in the sustainability area. The tool may complement existing ISO 9000 quality management systems by assisting in setting goals and objectives. Finally, it should be able to provide information on selected contractual obligations of builders and other providers to improve environmental performance during the eventual construction.

Barriers to Adoption: A Question of Why?

Barriers normally result from economic, social and technical factors, and are numerous in the development industry. The following are identified as some of the most critical (after Koebal 2004, p.8):

- The cyclical nature of development;
- A preponderance of small firms;
- Lack of integration of the industry;
- Diverse planning and building codes with local peculiarities in details and administration;
- Lack of product approval systems that establish and certify against well recognised performance criteria;
- Inadequate education and training on products and materials, installation techniques, and methods of operation and maintenance;
- Exposure to liability;
- Requirements for acceptance by the finance and insurance industries;

- Limited funding for research;
- Resistance to innovation by clients;
- Lack of clear ways of moving new technology from government and university research to field testing;
- Poorly developed links between universities and the development industry;
- Changes of ownership over the long service lifetime of developments; and
- Management ingenuity.

Several of these need further explanation, to provide a clear picture of the issues faced in overcoming barriers to innovation and to indicate the challenges a precinct planning and design standard has to overcome – and any other sustainability tool for that matter. Innovation presents risks that need not be taken; precinct development is one of the largest investments a developer, whether a private individual or an institution or company, is likely to make, so why should they take risks? Indeed, within some large institutions, there are positive barriers to innovation, in the form of accountability doctrines and administrative procedures. Further, given the current lack of positive responses to sustainable planning and design by development approval bodies, there is no true incentive to innovate.

As for design team members, such as architects, they may be keen to innovate within their sphere of responsibility but there is a tendency to restrict this desire to the drawing board or computer. Attempts to branch out into innovations in materials and components can be difficult and very risky, since many are not trained to appreciate the niceties of technological advance. This is because meaningful information on the properties of the technologically based products offered to adopters is generally lacking in real substance; the materials industry in particular has not yet really begun to help designers in a systematic way.

As for the builder of the eventual development, there is again hardly any incentive to innovate if a post-design tender system is used in the development process. Either the builder gets a design given to him for costing, or he quotes on a package; in either case, he is not over-enthusiastic about innovation, again because of the risks. The case for early involvement of the builder has been established for several decades and yet far too many are not involved early enough in the process, or allowed in part to design and produce to meet the client's overall concept on the basis of performance alone.

Conclusion: Achieving Tangible Benefits

As stated previously, the development industry deals with specifics. It is recognised that the benefits of sustainability are becoming more tangible, as developers and their advisors respond to the sustainability agenda and seek the economic potential inherent in its aims and objectives. However, developers will not innovate if they cannot predict its benefits, such as recognition and reward; further resistance is likely if major returns like earlier development approvals are not on offer. To meet this challenge a process-based standard must be linked to third party benchmarking and certification organisations, so as to achieve credibility. As well, the standard must use appropriate indicators as a mainstay for providing accurate information to aid in decision making, implementing solutions, and improving planning and also design and management outputs. However it must be recognised that indicators “are not a one-time procedure; they are most useful when measured repeatedly and consistently through long term monitoring programmes” (WTO 2004, p.462).

It is suggested that an innovative precinct planning and design standard that seeks to consider the sustainability of a whole area or community – rather than the impacts of individual buildings – is a tool worth investigating. Such a tool will need to be integrated into a whole-process view of development, and so must be able to adjust to a range of influences. In particular, it will need to respond to environmental, social and economic problems, which vary greatly from area to area, as do the answers. Such a standard needs to be a significant step in the development of sustainability tools, firstly to encourage adoption throughout the whole of the development industry, particularly at the interface between developers’ inputs and the authorities’ statutory requirements, and secondly to provide an integrated aid in meeting the increasingly critical tasks facing the development industry, as it comes under ever-increasing demands, with their accompanying pressures, to ensure that its future activities meet the growing call for ecologically sustainable outcomes.

Chapter 3

DEVELOPMENT OF A PLANNING AND DESIGN TOOL FOR ASSESSING THE SUSTAINABILITY OF PRECINCTS

Richard Hyde, Richard Moor, Lydia Kavanagh, Melinda Watt, Deo Prasad and John Blair

Environmental assessment is a methodology that has evolved to examine the impacts of human processes on ecological systems. This methodology has been integrated into a number of systems and tools for examining aspects of the built environment. At the core of most environmental assessment methodologies is the examination of a process. So for a building this can be the design process prior to construction or the operational process, post construction. The process can be examined in terms of the inputs to the process and the outputs from it, as well as activities that take place within the process. Environmental criteria can be used to examine all aspects of the process, the inputs, the activities and the outputs. This chapter describes research into the application of this approach in a planning context. A precinct can be defined as a part of a town designated for a particular use, for example it can be an area accessible only to pedestrians or a purpose-built area taking in many uses; there is a boundary marking out an area for the precinct, which conventionally surrounds a building or institution, such as a cathedral or college (Microsoft 1999). The tool to be discussed here assesses precincts and is linked to a benchmarking system developed by Green Globe (http://www.greenglobe.org) and Earthcheck (www.earthcheck.org). In this way a standard can be created for this type of development, hence the tool is called a precinct planning and design standard (PPDS). This system provides design targets as well as predicted performance benchmarks for both qualitative and quantitative measures.

The first part of the chapter examines the need for the tool, which arises from the need to reward 'best practice' in sustainable master planning and design of precincts. The impact of building development, and the pressure this is creating on the planet's eco-systems, has created an environmental imperative amongst designers to respond with new design processes and tools that can help to create a more sustainable ecological development (Papanek 1995). This transformation seems logical and self-evident, but it is constrained at present by a range of social and political barriers (Lavery 1998). For example, existing building codes often do not address the full scope of factors pertaining to sustainability, usually focusing mainly on energy. PPDS is seen as a tool that can assist with overcoming these barriers by facilitating changes in the areas defined by the European Union agenda (see a later section). Hence, the second part of the chapter discusses the development of the tool in relation to this EU agenda, through its link to principles, new technologies and the building development process.

The Need for the PPDS Tool

The demand for the tool comes primarily from the stakeholders, who can use it to assess the level of sustainability achieved in a project and gain recognition for achieving social, economic and environmental progress.

Rewarding 'Best Practice'

By way of introduction, the PPDS tool is similar in concept to other building environmental assessment (BEA) tools such as Green Star, LEED and the Green Globe Design and Construct Standard (Hyde 2005a). The difference is in the scale and character of the development that the tool assesses. Precincts or neighbourhoods are usually clusters of buildings, often of different types, created as a social unit or community within a rural area or city. The scale of this type of development, as compared to single buildings, offers significant opportunities for creating environmental benefits. This is evident from a number of recent projects such as BedZED – Beddington Zero Energy Development, Sutton, UK (BRESCU 2002) (Figure 3).

Figure 3: BedZED – Beddington Zero Energy Development Sutton, UK

Source: BRESCU 2002

This development demonstrates the advantages of making areas of a city more autonomous in terms of their services and also making better use of the resources available to the community. For example, Beddington Zero is a zero energy project, that is, the renewable energy generated on site balances the energy drawn from the grid to create zero net carbon emissions. Beddington Zero also addresses social and economic issues, what Yenchen and Davidson call "the three pillars of sustainability: environmental social and economic parameters" (2000). They also recognise a fourth pillar, culture (Yenchen & Davidson 2000). The four-pillar approach underpins much of the work at BedZED and has led to an operational theory for sustainability called 'balance theory' (Mawhinney 2003). Balance theory proposes that to achieve sustainability of developments such as BedZED, an optimisation of the four pillars is needed. The past emphasis on environmental issues has often meant sustainable objectives have been unworkable in the design of a development, because it has meant trading off environmental parameters for social, economic and cultural ones. It is argued that with balance theory optimisation can be achieved. Hence, in BedZED, economic parameters support environmental parameters, which in turn support social progress. For example, the use of retail units within the housing development is aimed at subsidising the housing rental; and the multi-use – retail and housing – strategy creates a scale effect that supports the cogeneration of energy, leading to the zero energy capability of the scheme. While there are many theories and much debate about sustainable development (Mawhinney 2003), the development of PPDS has followed the balance theory paradigm, and hence its development attempts to work from a broad base of issues, rather than confining its scope mainly to environmental ones. In fact, research into PPDS has been initiated and supported in part by a developer in the travel and tourism industry, who wished to plan, design and develop a sustainable precinct. The purpose of this initiative was to assist with demonstrating that the developer had adopted environmental measures of a higher standard than normally found. This early finding led to research into the changing landscape of the building development process to identify the drivers of this change (Moore 2005, forthcoming) and to the development of the research hypothesis that a tool would provide a means of demonstrating 'best practice' precinct planning and design for developers.

Addressing the Barriers to Ecologically Sustainable Development

The response of the building development industry to sustainability has been patchy at best; a study in the UK into sustainable housing reveals the extent of the problem. Work in the UK by the World Wildlife Fund (WWF) has suggested a number of barriers, which span social and economic factors and are indicative. From this, two major barriers are seen to be inadequacies in planning regulations and standards for sustainable development (Wheeler 2003) (Figure 4). Currently, according to evidence from Wheeler's study, it is the lack of evidence for environmental improvement of a development that forms one barrier to sustainable development. Other factors, such as political and social barriers, are very real issues for implementing sustainable development. The focus of this chapter is with the social context. It has been recognised that the social paradigm regarding sustainability is changing as further evidence of the effects of the environmental impacts areas:

- Planning and design principles;
- Tools;
- Technologies; and
- Processes.

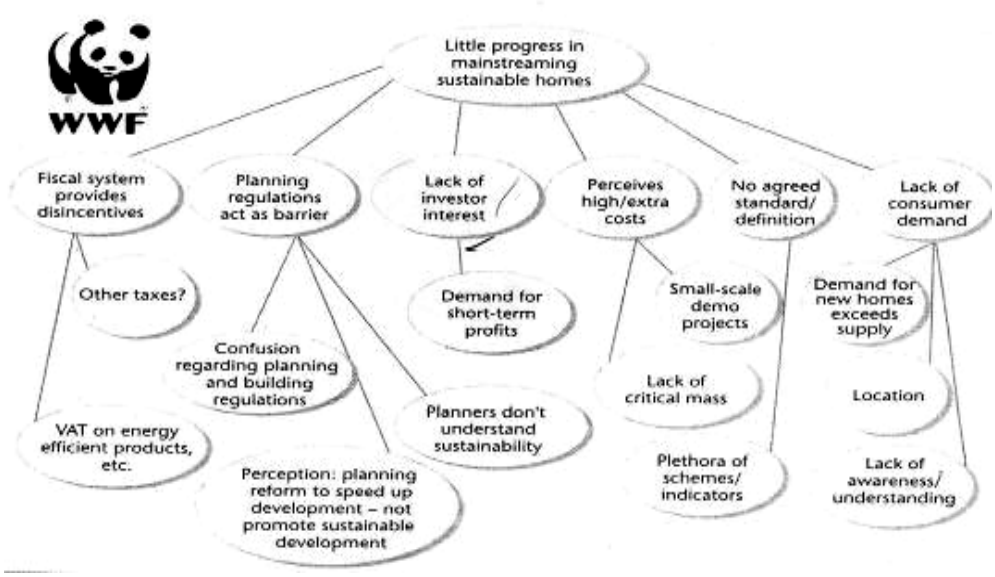


Figure 4: Barriers to sustainable homes, from a study in the UK

Source: Wheeler 2003

The PPDS Tool

The development of the tool is discussed in relation to these areas of change.

'Principle to Indicator' Methodology

The development of the PPDS tool closely followed existing methodologies for environmental assessment. A 'principle to indicator' method (Mawinney 2002, p.166) was used, in which the environmental principles espoused are connected to environmental performance. This approach is a route preferred by many for this type of tool, as it uses a very logical approach to environmental assessment. The chief criticism of the 'principle to indicator' methodology concerns its capacity to address the relationship between the principles, the choice of indicators and 'best practice' (Mawhinney 2002, p.166.) The central argument revolves around whether the principles used in the system are adequately mirrored in the indicators, and whether data on these indicators can be collected. It is recognised that whereas principles can be very abstract concepts, indicators need to be both measurable and manageable in terms of empirical data-gathering systems and comparative analysis techniques. Furthermore, a source of benchmarks is needed to represent best practice. The limitations of the 'principle to indicator' method are not easy to address with regard to the planning and design of precincts, as will be seen in relation to the development of the tool.

Principles Underlying PPDS

Principles for creating sustainable solutions can be acquired from many sources; a number of these were examined. Three have been selected to show the wide range of principles available to designers (see Table 3):

- In the design of buildings Breda and Robert Vales developed one example in their book 'Green Architecture' (Vale & Vale 1991). This appears to be related to buildings although the set of principles are discussed in a range of different contexts;
- The main principles derived from the aims of BedZED are specific to the precinct in London in the UK; interestingly these cover social, economic and environmental criteria; and
- Agenda 21, sourced from the Brundtland Report, provides a broader, perhaps more universal set of principles, in the sense that these cover a range of processes other than those that are building specific.

Table 3: Comparison of principles from three sources that were used to underpin the PPDS tool

Vales – related to buildings	BedZED – related to a precinct	Agenda 21 – universal principles
▪ Respect users ▪ Respect the site ▪ Work with climate ▪ Conserve energy ▪ Conserve resources ▪ Holism	▪ Reconcile high-density living with an improved quality of life ▪ Protect agricultural and green belt land from urban development ▪ Reduce global environmental impact of urban regeneration ▪ Support local economies and communities ▪ Source good materials and energy within the local bioregion	▪ Policies for improvement ▪ Land management ▪ Ecosystem conservation and management ▪ Energy efficiency, conservation and management ▪ Air quality protection and noise ▪ Energy efficiency, conservation and management ▪ Freshwater resource management ▪ Storage and use of hazardous substances ▪ Waste management and minimisation ▪ Improved social and cultural interactions

Five main principles were distilled from this review that appeared relevant to the scale and scope of the PPDS tool:

1. Create an improving quality of life for occupants and users;
2. Protect and conserve ecosystems through a respect for the site;
3. Reduce global and local environmental impacts through conservation of energy and resources;
4. Support local communities and economies; and
5. Source materials and energy within the local bioregion.

Tool Development

In conjunction with the review of design and planning principles, tool development involved consideration of how best to implement the principle to indicator approach. A number of different tools, ranging from ISO 14000 systems to benchmarking tools, such as Green Globe and rating tools such as Green Star, were examined for applicability to the principles as summarised by Table 4.

Table 4: A simplified mapping hierarchy of sustainable development in relation to available tourism standards

LEVELS	DESIGN	OPERATION
Level 1: Macro	**Sustainable Cities/ Regions**	
Standards/Tools	None	Eco Footprinting
Level 2: Meso	**Sustainable Neighbourhoods/Precincts/ Mixed use development**	
Standards/Tools	Precinct Planning & Design Standard (proposed) BRE Sustainable Development Rating	Eco Footprinting ISO 14000 Green Globe Community Standard
Level 3: Micro	**Sustainable Buildings**	
Standards/Tools	Green Globe 21 Design and Construction (Tourism buildings) Green Star (Offices, schools and other types)	ISO 14000 Green Globe Company Standard NABERS (houses and offices)

Review of existing tools

Two key questions on the applicability of these tools arise: first, are the tool and systems aimed at the design or operation of the building or precinct? As the primary aim of the tool is for planning and design, not all

operational tools may be relevant. Thus, it was found that GG21 has a tool for precinct operations through its Community Standard but this does not cover design and planning (see Table 4).

A second question was aimed at the scale of development; are the tools aimed at the environmental performance of buildings or at larger aggregations of buildings and areas within the development?

A simple matrix was developed (see Table 4), that places the tool according to the scale of development – city, precinct or building – and whether the tools are for post-construction assessment or for assessment during planning and design. The tools and standards that are currently emerging come from a number of sources, but increasingly the industry groups in the private sector are playing a role in the process of their development. The Property Council, through the Green Building Council of Australia, is developing voluntary standards and tools (Green Star) for sustainable development. In the Travel and Tourism Industry voluntary standards for the design and operation of tourism related buildings have been developed (Green Globe and Earthcheck); these are called Building Environmental Assessment (BEA) tools, and are different from ISO 14000 Standards. Rogers (2002) carried out a comparison between ISO 14000 and the BEA tools found in the Green Globe system. He concluded that the ISO 14000 series standards provided organisations with tools to manage their environmental performance (Rogers 2002). He argues that there is an inherent problem with the ISO 14000 approach; as currently written, it is limited in its ability to deliver improvements in environmental performance, because its emphasis is on improving the environmental management system, which in turn is expected to lead to improved environmental performance (Rogers 2002). He suggests that tools are more effective if they examine the outcomes from the process, rather than the management of the activities within the process, He cites Green Globe as an example, as it sets definitive performance outcomes, in terms of indicators in areas related to tourism. Certification to this standard is possible under similar rules to that currently used by the Joint Accreditation System of Australia and New Zealand. However, the proposed system will contain improvements aimed at ensuring the maintenance of a high standard of certification (Rogers 2002). In summary, limitations found with the ISO 14000 Environmental Management Standards are:

- Absence of links with Agenda 21 and sustainable outcomes;
- Emphasis on legal requirements as a basis for performance;
- Limited involvement of interested parties (stakeholders) in the setting of performance outcomes;
- Concentration on process rather than on actual outcomes; and
- Perceived application of the standard to industrial rather than service sectors.

The argument arising from this discussion is focused on establishing common performance outcomes that apply to similar processes. This will allow processes to be benchmarked against a common standard. Although there is debate about this approach, the outcomes from this research have shown that any tool, ISO or otherwise, can be used to assess a process. The important issues from the research are twofold: first, there is a need to establish meaningful environmental criteria to apply to the process; and second, the criteria must be sufficient in scope to embrace both the underlying principles and the variations in the types of projects that will be assessed using the tool. So, the questions emerge as to how the indicators match the principles, and how the indicators apply to a wide range of precincts.

Matching principles and indicators

The matching of principles to indicators is shown in Table 5, which represents the first level of matching (there is in fact overlap between indicators). Tables 6 and 7 show the sub-indicators and measures and from these a second level of matching can be made out. For example, Indicators 4 and 2 cover the issues associated with energy conservation. Applying this indicator suite to different scales and types of projects is in progress, as part of the test process. Some initial work was carried out on the Salt project in New South Wales, Australia (Moore 2005) and the BedZED project (Hyde 2005b) to assist with defining the indicators. Initial outcomes for BedZED are described below.

Table 5: Matching principles to indicators

Principles	PPDS Indicators
1. Create an improving quality of life for the occupants and users 2. Protect and conserve ecosystems through a respect for the site 3. Reduce environmental global and local impacts through conservation of energy and resources 4. Support local communities and economies 5. Source materials and energy within the local bioregion	Indicator 1: Sustainable master planning approach Indicator 2: Precinct Location and Siting Planning Indicator 4: Energy Efficiency and Conservation Indicator 5: Water Conservation and Management. Indicator 6: Solid & Other Waste Management Indicator 8: Chemical Use Indicator 10: Storm water Management Indicator 3: Social commitment. Indicator 11: Economic commitment Indicator 7: Resource Conservation (Materials)

Table 6: Indicators and measures

INDICATORS AND MEASURES
Indicator 1: Sustainability Master Planning Approach *Indicator Measures* ▪ The Master Planning Project brief, which includes sustainable goals, objectives and performance targets ▪ A Community Consultation Plan ▪ A multidisciplinary planning and design team with experience in sustainable master planning ▪ An Architectural and Landscape Code, which integrates local mandatory and other voluntary environmental standards ▪ The legal integration of environmental standards including PPDS within the precinct's title ▪ The adoption of environmental design and operational standards for enabling infrastructure and buildings
Indicator 2: Precinct Location and Siting Planning *Indicator Measures* ▪ Precinct location rating ▪ Habitat conservation ratio ▪ Public open space ratio ▪ Building footprint ratio ▪ Environmental landscaping rating ▪ Site disturbance ratio
Indicator 3: Social Commitment *Indicator Measure* ▪ Planning and design strategies for social progress ▪ Encouragement of the community's understanding, involvement and integration with the natural, built, economic and social environments being developed or extended
Indicator 4: Energy Efficiency and Conservation *Indicator Measures* ▪ Total predicted energy consumption per year/predicted occupancy levels per year ▪ Total predicted carbon dioxide emissions per year from energy consumption ▪ Predicted percentage of renewable energy consumed per year ▪ Use of energy-sensitive site planning and design techniques ▪ Application of passive building design ▪ Predicted percentage of total energy consumption produced from a cogeneration facility ▪ Percentage improvement in energy efficient equipment used in buildings and infrastructure
Indicator 5: Water Conservation and Management *Indicator Measures* ▪ Total predicted precinct water consumption per capita (kL/person per year) ▪ Water management plan in place ▪ Predicted volume of auxiliary water supplied/ total predicted water consumed (kL/year)
Indicator 6: Solid & Other Waste Management *Indicator Measures* ▪ Predicted volume of waste to landfill (m^3) per occupant A Waste Management Plan to be implemented

Source: Hyde, Moore, Kavanagh, Watt, Prasad & Blair 2005

Table 7: PPDS Indicators and measures

INDICATORS AND MEASURES
Indicator 7: Resource Conservation (Materials) *Measures* ▪ Specification of locally available materials has occurred ▪ Predicted proportion of locally recycled or reclaimed materials used / Total materials used ▪ Structural and cladding materials selected will have a BRE Summary Rating and Recyclables Rating of at least Level "B" ▪ Percentage of green components and systems used ▪ A green materials procurement policy has been developed and adopted

Indicator 8: Chemical Use
Measures
- A Biodegradable Chemical-use plan is in place

Indicator 9: Wastewater Management
Measures
- Predicted volume of wastewater treated on site/total volume of wastewater generated per year
- Predicted volume of wastewater reused for non-potable purposes/total volume of wastewater generated on site per year
- Use of separate wastewater collection systems and decentralised systems
- Predicted volume of wastewater sludge used sustainably (both on and off-site)/total volume of wastewater sludge produced
- Application of strategies/policies to secure the quality of local groundwater and surface water

Indicator 10: Storm water Management
Measures
- Predicted volume of storm water runoff collected, treated and reused/total predicted volume of runoff per year
- Capacity of passive treatment systems (detention ponds, reed beds etc.)/total predicted volume of runoff per 10 year event
- Application of strategies/policies to secure the quality of local groundwater and surface water
- Proportion of permeable surface to total site area
- Safety measures installed to prevent accidental public ingress

Indicator 11: Economic Commitment
Measures
- Inward investment to the area during and after development of the Precinct
- The increase in the business base of the area, particularly new businesses
- Improvement of the viability of the existing businesses in the area of the development
- The numbers of permanent and part time employment opportunities to be created by the development at all levels of operation
- Training and long-term career opportunities for local people particularly young persons and the disabled
- Environmental and social linked job opportunities

Source: Hyde et al 2005

Indicators and application to the precinct master planning and design process

This section examines the indicators in PPDS (Hyde, Moore, Kavanagh, Watt, Prasad & Blair 2005). Tables 6 and 7 show the indicators, split into two sections to fit in with the chapter structure. Precincts such as BedZED result from a housing delivery process that is unique to the UK and very different from that used in Australia and elsewhere. In Australia, the delivery process tends to be more fragmented; a developer purchases the land, forms the precinct and then sells parcels of the land to sub-developers, who can be house owners or owners of other building types such as hotels, shops and so on. In the UK, the use of Housing Trusts, as in the case of BedZED, allows a high degree of control over the delivery process, the administration of tenure and the ongoing operation of the development. Local government can either assume control of the legal title of the precinct, or this can remain in the control of the developer and sub-developers/owners (called a community title). The first indicator in the tool examines ways in which the structure, title and planning of the precinct can be assessed. The crux of the problem lies in the master planning approach taken: whether there are environmental goals used in this process, and whether there is a sufficiently experienced multi-disciplinary team to implement these goals. A factor often omitted in the master planning process is a community consultation plan for social improvement.

With the BedZED project, this approach was used to create a ‘neighbourhood renewal agenda’. This ranged, from the creation of private and public green sunspaces, to community facilities and healthy lifestyles (BRESCU 2002, p.26). Social issues in the PPDS tool are examined in Indicator 3. Social progress is only one of many master-planning strategies used in BedZED. There are a range of others particularly related to the architectural design and landscaping of the project. It is beyond the scope of this chapter to detail all of these, but rather to note that this forms the basic model for the precinct; BRESCU argues that the BedZED planning and design approach provides a model for sustainable housing development that can be used in different circumstances. The PPDS tool recognises that developers create models for their development that are translated into documentation for marketing, or codes for regulating sub-developers. These Architectural and Landscape Codes are useful for assessing the level of sustainability mandated by the developer and hence form a sub-indicator for Indicator 1. This chapter does not go through how each indicator was developed, but instead demonstrates how the indicators were arrived at by examining the precinct master planning process.

An important issue with regard to social progress in the BedZED project was the use of economic strategies to improve the income stream. A proportion of the housing in the project is for low income families, so finding a way of supporting these families though alternative economic measures, rather than government subsidies, was investigated through the inclusion of a business case for the project. This incorporated the use of mixed-use buildings, which have an industrial function. Often in housing projects mixed-use can lead to conflicts in the needs of the business and the housing owners and lead to incompatibility. Yet, in the BedZED project, this conflict was avoided through selection of compatible businesses, careful planning and design. The use of an economic indicator was therefore elected for the PPDS tool, as seen in Table 5.

Benchmarks and defining 'best practice'

A benchmarking system has been devised by developing a metric for calculating qualitative benchmarks for the indicators. This metric involves modelling the energy, water and waste systems to generate the benchmarks. Quantitative data for the benchmarking process for PPDS can also be stored. This involves working to define sectors comprising different scales of precinct and then developing theoretical benchmarks for the project. Since PPDS is a planning and design phase tool, the use of theoretical benchmarks, produced by a standardised calculation method, is feasible for quantitative benchmarks. The work on this type of metric will involve customisation of an existing calculator/database system to achieve this goal. It is anticipated that once developed, a simplified version of the calculator will be available for potential developers, planners and designers to calculate their quantitative benchmarking data. Customers could purchase this software to facilitate compliance to PPDS. In addition to developing the theoretical benchmarks, empirically derived benchmarks will also be used from 'best case' examples. For example, in the case of BedZED, a number of indicators were established that included quantitative data. BedZED set a quantitative benchmark of zero net CO_2 emissions as well as qualitative measures for water saving and onsite waste treatment (BRESCU 2001, p.32).

From the BedZED case study, it is noticeable that while the creation of 'best practice' is the result of planning and design strategies, it is also a result of the use of new technologies such as photovoltaic cells and cogeneration systems powered by renewable sources (see Figure 5).

The PPDS tool is shown, in the dotted box, running in conjunction with planning and design. A third-party benchmarking process is used to assess the planning and design of the precinct. Developers become affiliated with Green Globe/Earthcheck at the beginning of the project, carry out benchmarking and are certificated at the design approval stage of the planning process.

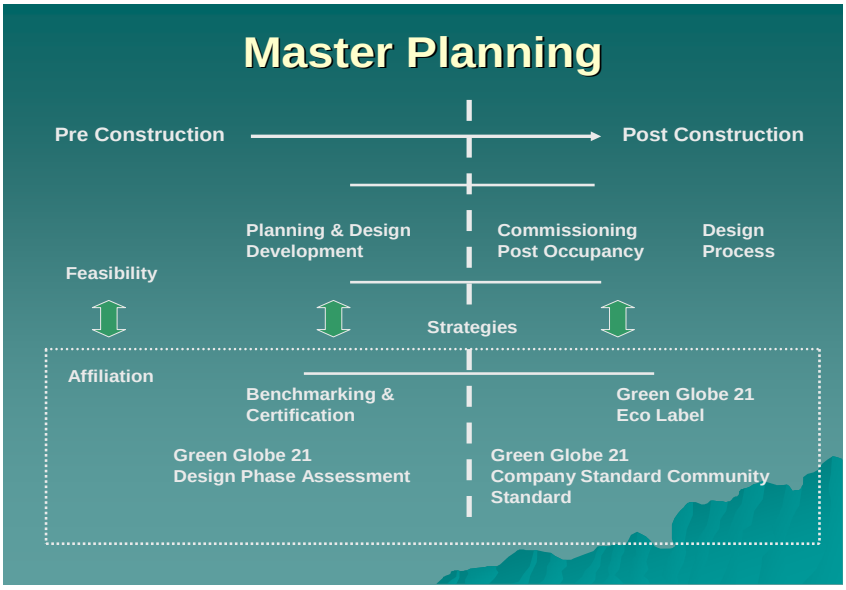


Figure 5: Possible nesting of PPDS in the planning and design process.

New Green Technologies and 'Best Practice Design'

An issue that emerged from examination of 'best practice' buildings was the relationship between the indicators and new technologies. Hence, measures are included in the indicators suite to assess the use of new technologies. Indicator 4, Energy Efficiency and Conservation, includes elements such as renewable energy systems and onsite cogeneration of electricity. In addition to the inclusion of new technologies, best practice design for active and passive building and service design is recognised. This is also included with respect to water and waste which are addressed by Indicator 5: Water Conservation and Management, Indicator 6: Solid & Other Waste

Management, Indicator 8: Chemical Use and Indicator 10: Storm water Management. In summary, the development of the tool seeks to address principles for sustainable planning and design as well as to adopt sensitivity to new technology and best practice. Yet, the final and most important question concerns integration of the PPDS tool within the planning and design process. Does the adoption of the tool support or enhance the existing planning process in its desire for more sustainable outcomes, and can it draw from existing design practice as defined by professional groups such as the Royal Australian Institute of Architects (RAIA) and other building design professionals?

The Planning and Design Process

Nesting PPDS in the Design Process

Research into the design process has revealed that not only must designers respond to new performance standards but also shift their priorities and carry out new activities during design, in order for their buildings to meet the emerging environmental standards such as Energy Codes (Hyde 2005b). Evidence of this change is also manifest in the policy of the RAIA. There are two initiatives identified that provide a framework for design, as seen in the RAIA's documentation. First, a policy document on strategies for ecological sustainable development (ESD) provides a design checklist for architects to use when designing a building to meet ESD requirements; this identifies key questions to be addressed at different stages in the design process. Second, the RAIA, in conjunction with other groups of building design professionals, has developed the Environmental Design Guide, which presents principles, concepts and methodologies for this form of enquiry. In addition, best practice buildings are described which give examples and case studies (RAIA 2005). Hence, the structure of the tool has been devised to draw on strategies and outcomes that come from the RAIA process. Figure 5 shows how the PPDS tool might fit into the planning and design process. Workshops with design professionals have been used to test this process to gauge how the tool may nest in the design process. At these workshops, a questionnaire is given out, which asks the delegates to critically reflect on their response to the tool. This work identified of a number of benefits:

- The design phase assessment can have a number of cost benefits;
- The tool integrates with the designer's quality management process and provides measures under ISO 9000, Quality Management;
- The process uses evidence from the design process to assess the level of sustainability in the project; and
- The process helps define benchmarks for a project, which would otherwise be difficult to achieve.

Supporting Evidence-Based Planning Policy

A similar process was undertaken with local authorities to gain advice on planning issues. Workshops are underway with developers, planners and local authorities, which will follow a similar methodology to that undertaken with the design professionals. The initial outcomes suggest that, although the PPDS tool will not replace the planning process, it could be integrated with it to improve the quality of decision-making. This can be achieved by providing a structure to facilitate Code compliance by use of an alternative route for compliance, in addition to providing an industry standard to measure performance under Agenda 21. In Australia, many local types of council are adopting these principles, and so tools that link to this policy can aid their planning and design processes. Furthermore, much of the planning legislation that uses Agenda 21 as a framework lacks measures to evaluate the proposals submitted by proponents such as developers.

Work is under way to examine the benefits of the tool in practice, through a case study of a developer and local council who wish to enhance their evidence-based planning policy. The aim is to use the tool to predict environmental performance of the development and thus enhance the quality of the evidence used in the decision-making process. The benefits of reduced risk to the developer and less time dealing with ambiguous information could lead to an enhanced planning process.

Conclusion

The movement to ESD requires new principles, tools, technologies and processes to achieve its goals. The development of the PPDS tool is aimed at addressing this need by adopting appropriate principles of ESD, being sensitive to new technologies, and assisting with changes to the planning and design processes that are being used to address ESD issues. The PPDS tool has been developed using the 'principle to indicators' methodology current in the environmental assessment field. Research has led to addressing weaknesses in this methodology by means of its capacity to address the relationships between principles, choice of indicators and 'best practice' (Mawhinney 2002, p.166.) These limitations have been catered for in the research by providing a design

framework grounded in the international policy issues, as found in Agenda 21. Further extension of the methodology is envisaged through examining linkages to policy issues developed by organisations using this methodology.

The indicator suite and measures draw from projects that demonstrate improvements in social, economic and environmental performance both in the process of planning and design and in outcomes. More work is needed to test the integration of the tool in practice, but initial work indicates there are benefits in quality management of design and in local authority planning through improvement in the quality of evidence brought to decision-making.

Chapter 4

CASE STUDY – SYDNEY OLYMPIC PARK, HOMEBUSH BAY, SYDNEY

John Blair

Overview of the Project

Environmental assessment is a methodology that has evolved for examining the impacts of human process on ecological systems, and has been integrated into a number of systems and tools for examining aspects of the built environment. At the core of most environmental assessment methodologies is an examination of both outcomes and processes. Environmental criteria can be applied to all aspects of process, inputs, activities and outputs, as it is with the Green Globe Precinct Planning and Design Standard (PPDS). The purpose of presenting the Sydney Olympic Park Authority (SOPA) case study here is that it portrays an excellent example of how to approach development at the scale of the precinct or neighbourhood within the context of sustainability.

In planning terminology, a precinct is a part of a town often designated for a particular use or combination of uses; it can be an area accessible only to pedestrians or a purpose-built area containing many activities. A precinct usually has a boundary, whether notional or physical, marking out its area. Conventionally the area might surround a building or institution such as a cathedral or college (Microsoft 1999). The PPDS tool assesses precincts, and is linked to a benchmarking system developed by Green Globe (http://www.greenglobe.org) and Earthcheck (www.earthcheck.org/). This system provides design targets as well as predicted performance benchmarks for both qualitative and quantitative measures.

The Sydney 2000 Olympic Games provided the catalyst for the transformation of the key Olympic site at Homebush Bay from a badly degraded area into a world-recognised environmental showpiece (see Figure 6). It was a huge and complex task, not the least because all construction undertaken had to be based on ecologically sustainable development (ESD) principles. Previously the location for abattoir, factories and uncontrolled industrial dumping, Homebush Bay was transformed into one of the world's great sporting and recreational parks through the most extensive remediation project in Australian history.

Figure 6: The main stadium at Olympic Park, only 200 metres from the rail station

The Sydney Olympic Park Authority has an unusually high profile and a particularly proactive stance in implementing development and management solutions that are extremely responsible environmentally[1]. The socio-environmental themes and indicators are pursued at Olympic Park in considerable depth, although they are not quite as broadly based as the measures in the Green Globe Precinct Planning and Design Standard (PPDS). In many ways, this project remains a model approach for planning and development, almost ten years after the start of the design process. Moreover, SOPA is now building on the success of the 'green Olympics' to demonstrate a triple bottom line model (TBL) of what can be readily achieved in the social, economic and environmental areas. The TBL approach applies to all new multi-land use and multi-facility development in

[1] There are two key sources for the material in this case study. The first is the document "Towards Sustainability: Sustainability Strategy for Sydney Olympic Park", December 2002, produced and published by the Sydney Olympic Park Authority. The second document is "State of the Environment Report, 2003-2004", undated, produced and published by the Sydney Olympic Park Authority.

complexes that have sufficient land to manage and treat all wastewater and storm water without discharge off-site.

As the pacesetter for the Sydney Olympic Park township, SOPA's TBL approach to sustainability integrates the responsibility for achieving environmental best practice within a framework of social and economic sustainability. This approach is informing Vision 2025, which will provide the blueprint for ESD in the Park until 2025. To this end, partnerships with several local councils have been strengthened with a view to identifying key areas where Sydney Olympic Park's connection to its surrounding communities can be reinforced.

The following material details Sydney Olympic Park's achievements, with occasional references to two phases of development. The first was the development activity to prepare the site and venues for the 2000 Olympic Games; the second phase is ongoing and concerned with balancing the sporting, recreational and entertainment focus of the site by transforming it into a fully developed community in the heart of the Sydney Region.

The case study material is aligned with Green Globe's goals for the PPDS and the individual indicators in that standard. Each indicator starts with a qualitative statement of SOPA's performance that often displays best practice. The Green Globe measures used in each indicator follow (in italics) the entries and are generally being more quantitative. There are numerous data gaps, however, since SOPA does not always have comprehensive or sufficiently disaggregated data that could be cited as best practice, or even baseline performance guidance at the level of the individual measure. Note that the term 'predicted' occasionally appears in an individual measure because the PPDS is a design rather than an operational standard. The material entered as part of the case study is current or existing data and information nevertheless.

Project Details

Project description

The Sydney Olympic Park Authority was established in the immediate post-Olympic Games period (July 2001) with responsibility to manage developments and promote the public assets of Sydney Olympic Park. The majority of those assets were established for the 2000 Olympic Games (e.g. Figure 6), but development of the 626-hectare area (see Figures 7 and 8) into a dynamic 'city within a city' is an ongoing process. SOPA continues to develop Vision 2025, a comprehensive long-term urban design process that builds on the existing Sydney Olympic Park Master Plan (2002). Vision 2025 will guide sustainable urban development within the Park for the next 20 years and beyond. It proposes that Sydney Olympic Park retain its current amenity and event capacity while incorporating a residential population of some 16,000 people, a daily office worker population of 15,000 and a daily retail worker and educational institution population of 3,000. There will also be commercial and mixed-use developments that will increase the Park's economic and social viability, activate the precinct and make it a more balanced place to live, work and visit.

Project team

A vast range of professional, technical and administrative help was necessary to prepare the 622-hectare site for Olympic Games readiness. Many of the professional and technical disciplines still remain on the site and form the Park's planning and management team for what will become a major residential and business hub as well as a regional and national recreational and entertainment focus.

Figure 7: The Olympic Park site today and current boundaries of SOPA's administration

Figure 8: Aerial oblique of the Olympic facilities and some of the surrounding parklands

Location and climate

Southern hemisphere warm temperate coastal climate, at 34^0 south latitude, with mild winters and warm summers and an average rainfall of 1200 mm per year.

Precinct Form and Design

Design approach and sustainability

All planning and design considerations and all construction activity were undertaken within the context of ecologically sustainable development (ESD) principles. Key ESD initiatives for the Olympic Games phase of township development included:

- Cleaning 160 ha of waterways and surrounding areas to remove 9 million m^3 of rubbish;
- Developing the 450 ha Millennium Parklands that include 40 km of pedestrian and cycle trails;
- Planting 100,000 shrubs and 7,000 trees at Homebush Bay, the key Olympic site;
- Building the largest solar powered suburb in the world, using photovoltaic cells on all permanent houses in the Olympic Village at Newington;
- Avoiding PCBs in developments entirely and minimising the use of PVC;
- Using recycled and purified sewage and storm water for toilet flushing and landscape watering;
- Making extensive use of natural light and natural ventilation in building design;
- Protecting native flora and fauna, including the preservation of the rare Green and Golden Bell Frog;
- Making extensive use of recycled building materials; and
- Extensive solid waste recycling was achieved (over 2.9 million kg of building waste was recycled) during construction and in the operational phase of the Games.

These initiatives resulted in major environmental achievements such as a reduction in greenhouse gas emissions by about 10,000 tonnes a year compared to similar facilities. In addition, the measures ensured that around 500 million litres of potable water a year are saved from Sydney's main supply.

Siting issues

Previously the location for abattoir, factories and uncontrolled industrial dumping, Homebush Bay was transformed into one of the world's great sporting and recreational parks through the most extensive remediation project in Australian history. Despite the site's degraded condition, there are high conservation values that are being protected by SOPA management strategies.

Infrastructure

- Development of a major train station in the centre of the urban core capable of moving 50,000 people per hour during major events and reducing reliance on private transport;
- Installation of a dual water reticulation system throughout the site to facilitate the use of recycled water for non-potable uses;
- Constructed wetlands designed and installed throughout the site to capture and treat storm water runoff; and
- De-channelisation of concrete storm water drains to return natural flow regime to Haslams Creek (the major creek that runs through the site).

Applying PPDS

The Green Globe Precinct Planning and Design Standard (PPDS) is a global environmental standard for the sustainable precinct planning, design and infrastructure construction of travel and tourism developments. It is the document used by Green Globe to set out the environmental criteria against which developers are benchmarked and certified to use the Green Globe logo. The Green Globe PPDS has the following central requirements:

- commitment to a sustainable ethic for the planning, design and construction of tourism infrastructure;
- commitment to improving relevant key performance areas; sustainable planning, design and management systems are of particular importance here;
- compliance with relevant environmental legislation and regulations; and
- multi-lateral communication with key stakeholders, including staff, customers and key suppliers.

The Green Globe PPDS is set within a context of sustainability. It uses a prescriptive approach to establish early planning and design processes and decisions, and uses a performance-based approach to assess, benchmark and reward positive environmental performance (actual or potential). This would include measured or predicted reductions in the generation of greenhouse gases. The result is an enhancement of the developer's planning and design performance and improved environmental, social and economic outcomes for a tourism-oriented precinct. The key components of the Standard are introduced below. This includes the sector benchmarking indicators. The complete copy is available from Green Globe (customer.services@greenglobe.org) or can be viewed on the web (www.greenglobe.org).

Indicator 1: Sustainability Master Planning Approach

The Sydney Olympic Park Authority (SOPA) was guided by five management systems, all of which articulated SOPA's vision and corporate objectives. One of the five was an environmental management system (EMS). The EMS consisted of:

Environmental guidelines: The guidelines outline ESD in terms of:

- protecting biological diversity;
- energy conservation;
- water conservation;
- waste avoidance and minimisation;
- protecting significant natural and cultural environments.

The environmental guidelines act as the sustainability goals. They are being revised to align them with the next phase of the Park's development – the creation of a sustainable town – by considering social and economic matters as well as environmental ones.

Sustainability policy: This consisted of an organisational statement of SOPA's commitment to the principles of sustainable design, development and management. The commitment is illustrated in many ways in the form of plans, codes and guidelines, as well as holding and sponsoring 'green' conferences and workshops and employing strategies to build a green economy at Sydney Olympic Park.

Sustainability strategy: This provides a practical interpretation of the Environmental Guidelines and Sustainability Policy and acts as a blueprint for the integration of ESD at Sydney Olympic Park

Operational compliance: This consists of implementation of management processes (training programs, monitoring and reporting systems, data management, audits, incident management, corrective action, etc) to ensure ongoing environmental due diligence and compliance with all relevant NSW and Commonwealth environmental and planning legislation.

Environmental communication strategy: This takes the form of a suite of specific communication tools that promote the environmental features and future innovations of Sydney Olympic Park, heighten environmental awareness and actively encourage exploration and participation.

SOPA is currently developing its EMS to be consistent with the international quality standard. The EMS was developed and implemented during the Olympic Games period. Adaptive management processes will further support the EMS and ensure that SOPA's commitment to continuous improvement and best practice environmental management are achieved.

In particular for the Olympic Games development phase there was:

- A multi-disciplinary team;
- A series of codes and/or guidelines for urban design, solar access rights, OHS, and especially lighting and noise;
- a series of contractual agreements;
- Compliance with environmental legislation; and
- A broad land use and conservation plan.

For the next (township) phase of development, the same requirements will apply but master plans for the long term growth of the Park will be made publicly available for comment and reaction.

The Master plan will be subject to public exhibition and comment.

Measures

The master planning project brief, which includes sustainable goals, objectives and performance targets, is in place.

The next evolution of Master Plan will be:

- Integrated as part of the broader Metro Strategy for Sydney
- Contain mixed use community residential / working / visiting population: ~ 40,000/day
- Attract annual visitation of: ~ 7-10 million
- Achieve modal split increase from 35% to 50-55%

The Master Plan was the base planning document describing development and land uses; it included sustainability objectives that were linked to the 'Homebush Bay Development Guidelines – Volume 1 Environment Strategy'. The environmental guidelines act as the sustainability goals; they are basically the internal environmental standard that was applied to Olympic projects and facilities. Infrastructure workshops will be held for the new Master Plan, with invited experts used to determine how to best to address sustainability principles. The workshop outcomes will be incorporated in the new plan.

A community consultation plan in place

The environmental guidelines have recently been reviewed by a panel of experts including representatives from environmental NGOs. They should be finalised by the end of the year.

A multidisciplinary planning and design team with experience in sustainable master planning is in place

A fully multi-disciplinary team is in place.

An Architectural and Landscape Code, which integrates local mandatory and other voluntary environmental standards, is in place

Comprehensive landscaping and architectural guidelines are in place, plus:

- Unified signage;
- Underground electric wires and telephone lines;
- Fences; and
- Overall neighbourhood design buffers.

The legal integration of environmental standards is in place

An Environmental Communication Strategy is in place for all future development.

The adoption of environmental standards for the design, construction and operations of enabling infrastructure and buildings for the precinct are in place

Environmental standards for protecting biological diversity, energy conservation, water conservation, waste avoidance and minimisation and protecting significant natural and cultural environments are in place.

Indicator 2: Location and Siting

Protecting the natural heritage values of the site is a paramount concern. The parklands of the site have high diversity and abundance of species, including some of local, national and international conservation significance. There is an extensive multi-element conservation plan which engages in long term ecological monitoring and which protects:

- Sydney Turpentine Ironbark Forest, an endangered ecological community of Cumberland Plain woodland;
- Breeding populations of regionally rare White-striped Mastiff Bats, White-fronted Chats and Red-rumped Parrots;
- One of the largest populations of the endangered Green and Golden Bell Frog in NSW;
- High abundance and diversity of small passerine birds such as the Superb Fairy Wren which are disappearing from surrounding urban habitats;
- Extensive waterbird breeding, feeding and roosting habitats, including those used by internationally-protected migratory birds, such as Sharp-tailed Sandpipers;
- *Wilsonia backhousei*, through a specific management plan approved under the Threatened Species Conservation Act 1995; and
- Local mangroves through a Mangrove Management Plan issued with a permit under the Fisheries Management Act 1994.

The multi-element conservation plan also covers the built environment:

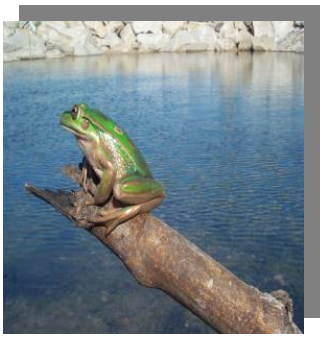
- Heritage buildings, areas and artifacts within Sydney Olympic Park are assessed for their heritage value and will be conserved for the use, understanding and benefit of present and future generations.

To achieve these goals it will be necessary to develop management protocols that deal with adaptive reuse of buildings and conservation of heritage landscapes, cataloguing heritage artifacts and educational displays/programs. It will also be necessary to develop and monitor cultural, heritage and environmental education programs on:

- The site's cultural history and heritage areas of significance;
- The value of ecologically significant communities onsite;
- The Authority's approach to best practice sustainable design; and
- Development and environmental management at the Park.

Landscaping throughout Sydney Olympic Park must be in accordance with the Landscape Strategy, which has several important features:

- Use of best practice techniques for landscape management and parklands development to reinforce the conservation plan;
- Predominantly native species must be used, including those local to the area. The native biodiversity of constructed landscapes of Sydney Olympic Park is consistent with the Landscape Strategy and supports a rich variety of fauna;
- Taking opportunities to enhance fauna habitat values by providing structural complexity in future plantings; and
- Training more than 90 landscape, construction and security contractors in habitat management, again to reinforce the principles behind the conservation plans.



Measures

Precinct location rating

Rated according to the PPDS handbook: score is 89%.

Habitat conservation ratio

- Area of the site in public open space – 426 hectares;
- Total site area (excluding Newington residential area, now part of Auburn local government area) – 622 hectares;
- Proportion of site as open space – 68.5 %; and
- Proportion of site in biodiversity (81 has/622 has) – 13%.

The 426 hectares of public open space occurs in three forms:

i) closed off for conservation reasons (effectively not public open space): 54 hectares;
ii) dual use (passive recreation, conservation, education): 27 hectares; and
iii) used for active and passive recreation: 345 hectares.

Public open space ratio

Currently there are so few permanent residents on site that the planning norm of 2.84 hectares per 1000 people (active and passive recreation space) barely applies. When the maximum residential population of 30,000 is reached (in 2025) the ratio of open space provision will still greatly exceed the guideline.

Building footprint ratio

Not available but, given the size of the site and the large proportion of open space, the ratio must be very small.

Environmental landscaping rating

Rated according to the PPDS handbook: score is 91%.

Site disturbance ratio

Not available.

Respecting landform and drainage

Not available.

Respecting surrounding areas

Integrating Sydney Olympic Park with neighbouring communities through cultural, physical, social and economic interaction is a development objective of the Master Plan. The objective continues to be implemented, for example by developing Statements of Cooperation with Auburn and Parramatta Councils that identify shared social priorities and express a wish to strengthen ties with neighbouring communities. The cooperative statements will lead to greater economic development, improved services to the region and a range of regional planning, marketing, tourism, recreation, education and environmental initiatives.

Indicator 3: Social commitment

A key objective of SOPA's 2025 Vision is to maintain Sydney Olympic Park as a highly desirable recreational, environmental, educational and cultural experience for those who live, work in or visit the site. The programs and activities at Sydney Olympic Park and the Parklands foster environmental awareness and community understanding of ESD which helps people work towards sustainability. The approximate total of visits to the Park in 2004/5 was 6.8 million. Segmented visitor numbers are:

- 2004/5: 1.5 million to major SOPA-supervised events (excludes numerous minor events);
- 2004 calendar year: 1.18 million to the Parklands; and
- 2004 calendar year: 27,200 cyclists.

The Statements of Cooperation that have been developed with Auburn and Parramatta Councils are intended to strengthen ties with SOPA's neighbouring communities. The cooperative statements are likely to lead to greater economic development, improved services to the region and a range of regional planning, marketing, tourism, recreation, education and environmental initiatives.

SOPA has four specific target groups for raising environmental awareness – stakeholders, Authority personnel, future developers and the community at large. SOPA recognises a commitment to raise environmental awareness through a number of tactics:

- Establishing Sydney Olympic Park Visitors' Centres;
- Providing information on environmental issues on the website;
- Hosting 'neighbours days' and other community forums;
- Producing a variety of publications that detail the sustainable development of Sydney Olympic Park;
- Putting an Environmental Communication Strategy (ECS) in place as part of SOPA's overall Corporate Communication Strategy; the ECS includes public reporting, videos, public announcements, specific events/tours and market surveys;
- Publishing an annual State of Environment (SOE) report that details environmental initiatives and sustainable management activities at the Park. The SOE report contains information relating to land, air, water, biodiversity, waste, noise, aboriginal and non-aboriginal heritage;
- Including an annual environmental audit is as a component of the annual SOE report;
- Providing all Visitors' Centres with information (brochures, videos) on the environmental and ecological features of the site;
- Developing self-guided and guided interpretive tours;

- Establishing environmental education programs on the site's history, the value of the ecologically significant communities on site, the Authority's approach to integrating ESD, sustainable waste management and the value of using public transport;
- Seeking visitor feedback;
- Encouraging future developers and commercial operators to promote their environmental programs/initiatives to the broader community through public forums, participation in 'green dates', the annual State of Environment report and other reporting mechanisms;
- Participating in State/Federal environmental policy development and information sharing processes;
- Liaising with environmental non-government organisations and community based groups to communicate environmental initiatives occurring at Sydney Olympic Park;
- Developing and implementing environmental awareness and due diligence training for personnel, contractors and subcontractors;
- Including environmental management responsibilities for concessionaires in any concession agreements;
- Using the Access Guidelines developed during the Olympic Games to ensure that all facilities are accessible for people with disabilities; and
- Developing a social strategy to recognise these groups; on completion the strategy will be incorporated into the Master Plan.

Measures

Master Plan was available for comment

The 1995 Master Plan was on public exhibition and subject to wide consultation. The 2002 Master Plan had two public exhibition periods and is being developed in consultation with stakeholders, SOPA personnel, future developers and the community at large.

Housing affordability

Proportion of housing proposed in Master Plan which is designated as affordable – 3%.

Design to foster community

- At a regional level SOPA worked closely with Auburn and Parramatta Councils to develop Statements of Cooperation that identify shared social priorities and strengthen ties with neighbouring communities; and
- In a local sense, there has not been application of community design principles, since the Park has not been regarded as a residential neighbourhood. Active plans to provide housing for 30,000 people means that sense of community will need to become an important criterion in the design process.

Design to foster safety

- Safety oriented features associated with pedestrian bikes and vehicles are in place;
- Crime prevention through environmental design (CPTED) techniques have not been applied;
- There are a large number of security cameras on site because it is a major event precinct; and
- The site is designed to allow ease of access for all.

Social issues

Sydney Olympic Park is now generating a strong commitment to principles of social equity. Social sustainability is a key element in planning the township and the Authority has started development of a Social Plan for the Park.

In late 2003, SOPA developed a draft Social Plan that identifies key principles for social sustainability covering:

- Social infrastructure (facilities, services etc);
- Social diversity (including housing mix);
- Community engagement and participation through numerous outreach activities;
- Amenity safety and well-being;
- Regional leadership;
- Social equity and accessibility;
- An expert panel has been convened to develop the Social Strategy that will be incorporated into the new Master Plan; and
- Access guidelines developed during the development for the Olympic Games ensures that all facilities are accessible for people with disabilities.

SOPA currently:

- Applies public consultation processes to ensure comments relating to development applications and management frameworks, such as the Master Plan and the Plan of Management for the Parklands, are captured;
- Promotes the unique ecological diversity of the Parklands through participation in public forums, seminars and conferences;
- Integrates cultural, heritage and sustainable elements of the site into interpretive tours and educational programs;
- Monitors level of visitor satisfaction with programs, tours and website;
- Develops and implements an internal people movement strategy for Sydney Olympic Park including bicycle and pedestrian access;
- Implements an environmental communication strategy that incorporates information on best practice sustainable management via the website, interpretive tour programs, educational programs, onsite promotions and external presentations at seminars and forums; and
- SOPA pays particular attention to the cultural richness of the environment. As well as highlighting its Indigenous, colonial, pastoral, naval and post-industrial past, there is an equal commitment to build on this heritage by engaging with contemporary community groups.

Indicator 4: Energy Efficiency and Conservation

All new development, including infrastructure and activities (including events and asset management) within Sydney Olympic Park require energy design briefs which use the best available environmental design principles, technology and management practices to reduce energy consumption and greenhouse gas emissions, especially in relation to lighting, heating and cooling systems.

- Sustainable internal transport options for Sydney Olympic Park are encouraged in the Master Plan e.g. a target of 30-35% of all journeys to work to Sydney Olympic Park is to be by public transport. The Master Plan contains strategies to increase the use of internal public transport systems, walking and cycling including the establishment of bicycle hire and storage facilities. Currently 72% of all visitors to major events arrive by public transport;
- An Energy Management Plan is being implemented which aims to reduce energy consumption and greenhouse gas emissions. For example priority is now given to procurement of a vehicle fleet with enhanced emissions control systems, alternative fuelled, hybrid 'flexi-fuel' systems or vehicles with smaller engines;
- SOPA will continue to implement energy strategies that:
    - Priorities the use of renewable energy sources;
    - Conserve energy in management and development practices;
    - Reduce greenhouse gas emissions;
- A lighting strategy will be developed and implemented for Sydney Olympic Park that illustrates the principles of sustainable design and energy conservation and prioritises:
    - Energy efficiency;
    - Operational efficiency;
    - Design excellence; and
    - Considers opportunities to maximise the use of renewable energy sources in lighting systems.

Measures

Predicted infrastructure energy consumption per m^2 per year for precinct uses

Not available (public domain consumption not yet separated from SOPA-owned building energy consumption).

GHG emissions from a)

Not available.

Predicted % energy from alternative sources (incl. co-generation)

Green power purchases account for a minimum 25% of power consumed.

Detailed data is not available. Includes fountains, street lighting, infrastructure pumps and lighting. Excludes buildings and rail station

SOPA obtained 25% of its energy needs from renewable sources – but only for the Olympic Games stage of development. The proportion gained now is about 23% but an objective is to increase the proportion back to the 25% level:

- There is PV in a number of places and on some buildings – but it tends to be only a token;
- There are rooftop solar hot water systems and solar water pumps within the Parklands;

- Much of the street lighting is photovoltaic (see Figure 9); power is fed back into the grid during daylight hours;
- There is extensive use of natural lighting and ventilation;
- A 4.5 star SEDA energy efficiency rating is mandated for new commercial development; and
- Energy efficient appliances will need a 4.5 star rating.

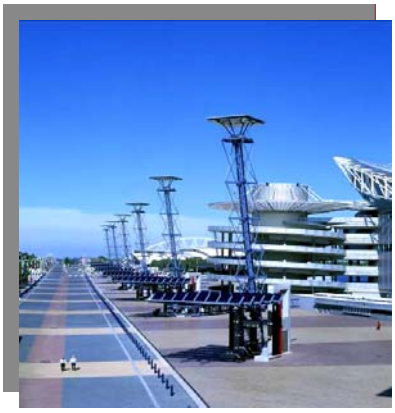


Figure 9: Photovoltaic towers for street lighting

Use of urban form design techniques

These were applied to the development of the Athlete's Village, now the suburb of Newington.

Application of passive solar design (lot and building orientation)

This was applied to the development of the Athlete's Village, now the suburb of Newington. Passive solar design for heating and light was integral. For all future residential and commercial development at Homebush Bay, passive solar design will be a strong design factor

Predicted % of total energy consumption produced from a cogeneration facility

No co-generation facilities available.

Planned use of energy efficient equipment in infrastructure

None at this point.

Indicator 5: Water Conservation and Management

All new developments and activities (including venues, facilities, events, landscaping and asset management) at Sydney Olympic Park must:

- Minimise potable water demand from Sydney Water's mains supply and use best practice sustainable design principles, technology and management practices to conserve water;
- Connect to the Water Reclamation and Management Scheme (WRAMS) (Figure 10);
- Maximise opportunities to harvest and conserve rainwater by requiring design briefs which address storm water collection and management; and
- Monitor potable and recycled water consumption at Sydney Olympic Park.

Figure 10: WRAMS – the first large scale urban water recycling system in Australia

WRAMS incorporates the collection and treatment of sewage and storm water, and supplies recycled water for non-drinking uses to all residents, commercial premises, sporting venues and for irrigation of parklands and playing fields. The WRAMS scheme assists enormously in reducing demand for potable water (see Indicator 8).

Sydney Olympic Park Authority aims to maintain its status as a regional role model and promote water conservation and its long-term benefits, using urban water recycling systems such as WRAMS. SOPA's promotional efforts are aimed especially at local government, industry and the broader community through participation in public forums, conferences and seminars. SOPA:

- Monitors potable and recycled water consumption at Sydney Olympic Park;
- Continues to give priority to the use of drought-tolerant native species for landscape plantings, monitors the use of irrigation systems and minimises the need for irrigation systems as far as practicable; and
- Uses only recycled water or harvested storm water for irrigation.

Recent figures for water consumption by type at Sydney Olympic Park are in Table 8. The data are for SOPA activities only – irrigation of the public domain, public toilets and drinking fountains, SOPA offices and events and facilities. Many activities at Sydney Olympic Park are not within SOPA control, so data are not available. Consumption for individual major venues is also not available. Although total visitor numbers are available for the periods in the table below, per capita figures have not been calculated, because water consumption only relates to a proportion of the site. Note that the reduction in water consumption is due to several factors, the chief one being the introduction of water restrictions that led to a number of system improvements bringing a significant drop in water use.

Table 8: Water use

Year	WRAMS (Ml)	Storm Water (Ml)	Potable Water (Sydney Water) (Ml)	Total (Ml)
2003-2004	413	365	57	835
2004-2005	200	388	22	610

Although water use restrictions do not apply to recycled water, SOPA:

- Recently reviewed its irrigation requirements, reprogrammed irrigation times and durations, and restricted irrigation to plant survival requirements to reduce consumption;
- Audits Bicentennial Park water usage and has reviewed and upgraded the irrigation system; and
- Now uses recycled water in public fountains and water features, following approval by NSW Health; the operating times of water features were also adjusted to reduce water loss due to evaporation.

Measures

Total predicted water consumption per capita in precinct – all uses and activities (kL/ppyr)

Data incomplete (see notes above in introduction to indicator).

Details of water management plan in place

- 93% of all water used is recycled water;
- 40% is used for toilet flushing and 60% for irrigation and operational wash-down activities; and
- Dual plumbing is used for all public toilets and in the main visitors' centre.

Volume of auxiliary water to total water consumed

In 2004-2005, 25 megalitres or 4% of water out of a total of 610 ML was supplied by Sydney Water as auxiliary water (obtained off-site). 96% of all water use is sourced from WRAMS (33%) and storm water collection (63%).

Indicator 6: Solid Waste Production

The greatest opportunities at Sydney Olympic Park for minimising waste and maximising recycling are in the areas of construction and demolition activities, landscaping, event management and administrative services.

A Waste Reduction and Purchasing Plan (WRAPP) has been in operation since 2002 (Figure 11). It is designed to:

- Minimise the generation of waste;
- Separate the wastes generated by all activities for re-use and recycling;
- Encourage the purchase of products with recycled and/or low waste content, wherever they are cost and performance competitive.

Figure 11: The Waste Reduction and Purchasing Plan (WRAPP)

Examples are:

- Recycled cardboard print spools (2.4 metres in length) used to create an exciting and sustainable interior design feature in an office building (Figure 12);
- All bollards in the park contain 50% recycled aluminium (Figure 13).

Minimal use of PVC, prioritised use of non-ozone depleting substances, sustainably sourced timber, life cycle analysis, embodied energy calculations, recycled and recyclable materials, non-toxic materials and natural materials were applied to the Olympic Park site

Figure 12: Recycled cardboard spools used as a feature

Figure 13: Bollard from recycled aluminum

Measures

Predicted volume of waste landfilled per capita and per m2/m3 per use class

Not available. SOPA's performance in solid waste is modest; volume data is very unreliable, though weight-based data is acceptable – on a weight basis about 18% of solid waste is recycled.

Strategies in the implemented waste management plan

- Maintain waste disposal bins, which are colour-coded with signs to encourage full understanding of the difference between recyclables and general waste;
- Monitor waste recycling volumes in public areas of Sydney Olympic Park;

- Require designers and contractors to minimise the use of materials that create pollution in their manufacture, use or disposal;
- Provide guidance to developers regarding the use of recycled materials and strategies to separate and reduce waste, such as timber, glass, bricks, concrete, steel and other materials throughout the construction;
- Require developers to minimise construction waste through careful ordering and agreements with manufacturers to minimise packaging;
- Produce mulch from processing vegetation wastes collected from landscaping activities;
- Encourage independent venue operators to implement waste management and monitoring strategies that will maximise recycling by patrons and their commercial operators; and
- Establish public education programs on waste management and recycling for visitors, workforce and residents at Sydney Olympic Park.

Strategies for composting onsite

None currently in effect. However, wood waste from the site is chipped and used onsite in the public domain as mulch.

Solid waste generated per capita and per m2/m3 per use class

Not available.

Solid waste recycled/re-used to total solid waste per capita and per m2/m3

SOPA's performance in solid waste is modest. Volume data is very unreliable though weight-based data is acceptable. On a weight basis about 18% of solid waste is recycled. However, about 60% of recyclable containers in public domain waste stream is collected and sent for recycling. A major problem is the level of contamination by the public, which can cause loads to be rejected at recycling centres.

Indicator 7: Resource Conservation (Materials)

Wherever practicable, the selection of materials for use in new developments and the modification, maintenance, repair and/or refurbishment of existing assets within Sydney Olympic Park will consider whole-of-life impacts on the environment. For example, life cycle analysis was considered in the selection of porous pavers at Sydney Olympic Park (see Indicator 9).

Development, events and management practices must also minimise the use of materials that deplete natural resources or create toxic pollution in their manufacture, use or disposal. Accordingly, the following materials strategies and actions are significant:

- SOPA works with a range of government, environmental and industry representatives to develop clear and consistent advice regarding sustainable materials selection for:
    - Refrigerants;
    - Timber;
    - Other materials that are renewable, non-toxic in their manufacture, use and disposal;
- Selection of materials must be consistent with SOPA's *Environmental Guidelines* and, where relevant, consider life-cycle assessment including:
    - Impact on natural ecosystem from which the material was extracted or grown;
    - Embodied energy;
    - Energy consumption;
    - Greenhouse gas emissions;
    - Toxicity of material in production, use and disposal;
    - Recyclable content and potential for end-of-life reuse or recyclability;
    - Nature of waste generated by disposal of the product;
    - Transport and distribution requirements;
    - Operational effectiveness;
    - Maintenance;
    - Durability;
    - Impact on project cost and delivery;
- Sustainable materials selection is a key consideration in the assessment of new development proposals. Specific clauses on sustainable materials selection are included in all minor and major works contracts, cleaning, waste, and landscape and pest management contracts;
- SOPA's urban design manual specifies sustainable materials, and they are also prioritised in the Authority's asset management plans as part of asset maintenance and/or refurbishment;
- Recently SOPA made changes to its procurement strategy to ensure greater uptake of environmentally superior products:

- Developing a prototype for an ecologically sustainable shade umbrella which applies durability principles;
- Using environmentally superior alternatives to vinyl for large-scale graphic reproduction; and
- Designing and manufacturing merchandise from recycled materials, such as paper, hemp, vinyl and fully recycled plastic.

Measures

Specification of locally available materials

Not specifically considered except through the strategies in the preceding paragraph.

Predicted proportion of locally recycled or reclaimed materials used/total

SOPA's policy is to promote and maximise use of locally recycled and reclaimed materials but the proportion is not specified. See also Indicator 6.

Predicted proportion of green materials used to total materials used

SOPA's Sustainability Strategy requires:

- Sustainably sourced timber;
- Consideration of life cycle impacts and materials with a low embodied energy;
- Maximising opportunities for use of natural, recycled and recyclable materials;
- Maximising the use of non toxic, non off-gassing materials;
- Minimal use of PVC; and
- Non-use of ozone depleting substances.

A green materials procurement policy has been developed and adopted

Green procurement is encouraged but the proportion achieved is not known.

Indicator 8: Chemical Management

SOPA does not currently have a specific integrated pest management (IPM) strategy although the Environmental Guidelines and the Sustainability Strategy contain an objective to "minimise the use of materials which deplete natural resources or create toxic pollution in their manufacture, use or disposal".

There is not a comprehensive chemical use strategy but there are acid sulphate soil maps and an acid sulphate soil management plan. When naturally occurring sulphides (from acid sulphate soils) are disturbed and exposed to air, oxidation occurs and sulphuric acid is ultimately produced. It can drain into waterways with severely detrimental environmental effects. Tactics for handling sulphated soils are presented in Indicator 11, Water Quality.

Measures

An integrated chemical use strategy is in place

There is a chemical use strategy in place but it is limited to acid sulphate soils.

A chemical use strategy will result in a set target of 50% biodegradable chemicals (for external cleaning, pesticide and herbicide application)

Not applied at Sydney Olympic Park yet.

IPM strategies in place

IPM principles are being incorporated into management strategies such as minimising the amount of pesticides. Low impact techniques are now used to reduce mosquito breeding in the wetlands using biological control. Other tactics include:

- Using biological methods for managing pests where possible;
- Using low toxicity non-persistent herbicides and pesticides where biological controls are not appropriate; and
- Keeping up to date on best practice weed and pest management programs and assessing their applicability for Sydney Olympic Park.

Indicator 9: Wastewater Management

SOPA has a complete discrete-area water management system (WRAMS) encompassing storm water harvesting, improving storm water quality for irrigation needs, water treatment infrastructure, water supply infrastructure and sewage treatment. The sewer mining function of WRAMS diverts a significant volume of sewage from ocean outfalls.

Measures

Predicted volume of wastewater treated on site to total per year

100%.

Predicted volume reused for non-potable purposes to total volume of wastewater generated on site

100%.

Use of separate wastewater collection systems and decentralised systems

WRAMS is a self-contained wastewater and storm water management system. It is fully decentralised with all wastewater treated on site and re-used for irrigation and other non-potable purposes including fountain and water feature operation.

Predicted volume of wastewater sludge used sustainably (on and off-site) to total volume of sludge

The wastewater sludge is sent off-site for treatment and then into landfill. SOPA may take action so that it can be recycled.

Applying strategies/policies to secure the quality of local ground and surface water

Results of regular monitoring reflect the consequences of long term dumping and a heavily degraded area. Most tests show that the New South Wales EPA's water pollution guidelines are exceeded. There is an agreement with the EPA that there will be no deterioration beyond current pollutant loads as a result of park activities.

Indicator 10: Storm Water Management

The storm water storage capacity of WRAMS minimises storm water pollution, provides valuable habitat for fauna and is used in the water recycling process. The Brickpit at Sydney Olympic Park contains a 300-megalitre storm water storage reservoir for WRAMS. Water quality control ponds with *macrophyte* plantings also remove nutrients and sediment loads from storm water runoff.

Measures like the selection of drought tolerant native species for planting, harvesting storm water from roads, pavements and rooftops for local irrigation, and the use of permeable pavers and porous gravel, all help to reduce storm water run-off as well as the need for frequent irrigation.

Sydney Olympic Park has 40 storm water traps and floating booms on creeks that filter out gross pollutants. The storm and creek water traps collected 237 tonnes of litter, vegetation and sediment that would otherwise have entered the onsite water collection ponds or local waterways.

A significant problem is the legacy of past large-scale industrial development on the site. It has resulted in some 9 million cubic metres of domestic, commercial and industrial waste being dumped legally as well as illegally. Leachate from the dumping has caused significant soil and water pollution. About 25 per cent of the site (160 hectares) required some form of remediation, including some pioneering work treating chemical waste onsite (Figures 14 and 15). A unique on-going bio-remediation technique using microorganisms found naturally on-site is being applied to break down hydrocarbon contamination in the soil and groundwater.

Figure 14: Remediation and restoration, including extensive leachate management

Figure 15: Remediation at Olympic Park was extensive for the 2000 Games and is still ongoing

Measures

Predicted volume of storm water runoff collected and reused/total runoff per year

100%.

Capacity of passive treatment systems/total predicted runoff per 10 year event

100% (by using retention tanks, the Brickpit and a greater than average proportion of permeable paving).

Proportion of permeable surface to total site area

Excluding the parkland of 426 ha, the urban core is 196 ha within which there is some porous hard surface and extensive plantings of shrubs and trees with mulching on permeable surfaces:

- Fully porous surface (soils and mulch/grass) – 107.2 hectares;
- Semi-porous surface (e.g. pavers) – 12.75 hectares; and
- Total permeable surface – 120 hectares or 61.2%.

Application of strategies to secure quality of local ground and surface water

- All storm water generated in public areas of Sydney Olympic Park flows through storm water quality improvement devices, which filter out gross pollutants before flowing to one of three on-site water quality control ponds. The ponds contain water plants that filter the storm water by removing nutrients before the storm water is either re-used onsite for irrigation or overflows into adjacent creeks;
- SOPA continues to give priority to storm water management and regularly monitors water quality in the various ponds, wetlands and adjacent creeks. The results help to make environmental management decisions and in reporting on the health of the various water bodies;
- The Master Plan for Sydney Olympic Park contains a number of design initiatives to minimise storm water run-off. In addition, the Plan of Management for the Parklands contains methods of storm water management and ways to improve water quality at Sydney Olympic Park:
  - ✓ Water quality and landscaping practices at Sydney Park include the use of engineered soils, permeable pavers and porous gravel especially in pedestrian areas;
  - ✓ Biological methods used for managing pests where possible; use low toxicity non-persistent herbicides and pesticides where biological controls are not appropriate;
  - ✓ Keep up to date on best practice weed and pest management programs and assess applicability for Sydney Olympic Park; implement the WRAPP;
  - ✓ Implement the Plan of Management for the Parklands to ensure erosion of landforms is addressed;
  - ✓ Landscape design techniques consider management of rainwater infiltration and slowing peak storm water velocities;
- All developments comply with the Landscape Strategy and master Plan statements regarding the impacts of storm water and water quality such as the following:
  - ✓ Minimising paved areas to increase absorption;
  - ✓ Pre-treating storm water on site from any area which contains livestock or has the potential to discharge oils or litter;
  - ✓ Conveying storm water via ditches and swales (rather than gutters and drains);
- Controlling several areas of naturally formed acid sulphate soils in the Parklands. Where acid sulphate soils have been excavated, they are:
  - ✓ Transported;
  - ✓ Consolidated in deep pits; or

  - ✓ Used as landfill mounds and covered so that acids will not leach into local waterways. SOPA continues to adopt a sustainability approach in the management of potential or actual acid sulphate soils;
- To prevent future contamination of soil:
  - ✓ Imported fill must meet EPA criteria for surface soils;
  - ✓ Management activities must be aware of proposed end use of materials, pesticides/herbicides, fertilisers, plant species, appropriate storage of chemicals and paints, and runoff controls and management of wash down areas.

Safety measures installed to prevent accidental public ingress

None.

Indicator 11: Economic Commitment (Elective)

Sydney Olympic Park plays a vital role in hosting iconic sporting and entertainment events and supports the state's ability to host national and international events that reinforce Sydney's profile and the realisation of economic benefits for the NSW Government.

The level of inward investment to the area during and after development of the precinct

Future investment levels will be very large from commercial and residential development but data is not available yet. See below.

The increase in the business base of the area, particularly new businesses

SOPA currently covers 42% of its operating expenditure from income sources like car parking revenue, property rentals and commercial interests. It will continue to seek opportunities to increase this percentage by improving its revenue base and reducing costs, where it can be achieved without undue impact to service levels.

By 2010 SOPA aims to increase annual visitation from 6.8 (2004-2005) to 10 million people. By 2015 the aim is to generate $200 million of revenue from land and property sales and facilitate $2 billion of private sector investment in the Park. There will ultimately be 15-20,000 new residents, 10-15,000 students and about 15,000 workers onsite. These targets will improve economic and social returns to NSW, generate increased revenue for SOPA, result in less reliance on budget funding from NSW Treasury and have a measurable influence on the economic base of the area.

Improvement of the viability of the existing businesses in the area of the development

There are many visible signs of an economic ripple effect extending from Sydney Olympic Park to surrounding areas. There is substantial redevelopment activity, old industrial areas are regenerating to residential land uses and the Rhodes peninsula with its new shopping centre are all symptomatic of a regional vitality partly stimulated by the Park. Sydney's metropolitan strategy recognises the Park's current strength and future potential as an important magnet for the region.

The Statements of Cooperation with Auburn and Parramatta Councils will strengthen ties with SOPA's neighbouring communities. Cooperation is likely to lead to greater economic development, improved services to the region and a range of regional planning, marketing, tourism, recreation, education and environmental initiatives. All will produce a dynamic city inside the Olympic Park site and economic development opportunities for surrounding communities are potentially significant.

The numbers of permanent and part time employment opportunities to be created by the development at all levels of operation

Data in preparation – not yet available.

Training and long-term career opportunities for local people, particularly young persons and the disabled

In 2004-05 under the Disability Action Plan, SOPA:

- Created a new section on Disability Access on the SOPA website;
- Held a way-finding workshop;
- Reviewed and endorsed new Sydney Olympic Park developments;
- Initiated a companion document to the Access Guidelines;
- Carried out Access Audits and rectification programs of the natural and built environment; and
- Implemented the Human Resources Policy requiring the mainstreaming of employment for people with disabilities.

Environmentally linked job opportunities

There are eight staff members in formal environmental management roles in the organisation. The range of environmental duties includes remediated landfill management, energy and water management, general environmental management, environmental policy development, sustainability, flora and fauna management, wetlands management, environmental research and environmental business development.

There are also three full-time and two part-time educational staff (mainly teachers) engaged in the school's environmental education/excursion program.

Drawing Lessons from the Case Study

The Sydney Olympic Games site at Homebush Bay is in many ways atypical of the vast majority of precinct-oriented tourism developments. First, SOPA turned a badly degraded area with abattoirs, factories and uncontrolled industrial dumping into a world-recognised environmental showpiece. It was a huge and complex task and the investment needed for the exercise would not be available to most projects being undertaken by tourism developers. Second, the original functions of the Homebush Bay sites were transformed, bringing into being one of the world's great sporting and recreational parks. Tourism projects, even at precinct scale, rarely aspire to provide that kind of national and international dimension. Third, SOPA has an unusually proactive stance in implementing development and management solutions that are exceptionally responsible environmentally. This is partly because SOPA has a perspective that is greater than local or regional, even today, six years after the Sydney 2000 Olympics. Moreover, SOPA is also not exclusively profit-based, so some of SOPA's valued functions as a metropolitan, state and national recreation and entertainment complex would not be tenable in strict commercial terms.

Despite these qualifications, the Olympic Park site remains a model approach for the planning, design and development process. There are a number of lessons that can be drawn from the exercise which are applicable to the relatively modest precinct tourism projects generally undertaken by developers.

1. Perhaps the key lesson of the SOPA experience is that a 'culture of sustainability' must exist in an organisation or project if environmental responsibility is to ensue. Sustainability cannot be viewed as an 'add-on' if project strategies – especially environmental ones – are to be successful. The ongoing success of SOPA and the site is partly connected with its unusual functions – for the 2000 Olympics. This is not an advantage available to commercial precinct developers;
2. SOPA now applies a triple bottom line approach to the development of the site, as a result of which it will perhaps become a highly sophisticated and ethical multi-land use and multi-facility community in the heart of the Sydney Region. While commercial tourism precinct developers cannot hope to match the scale of Sydney Olympic Park, what seems to be the case is that triple bottom line approaches to community development are generally highly successful. From the narrow perspective of the developer, that could be seen as an immediate financial advantage;
3. There are several specific achievements at the Olympic Park site that could be emulated everywhere for greater sustainability. Some initiatives focus on pollution prevention but most are resource minimisation tactics:
    a) Perhaps the greatest resource minimisation triumph of the Olympic site – the extensive use of recycled and purified sewage and storm water for toilet flushing and landscape watering; only 4% of total water needs are now obtained as auxiliary potable water, from Sydney Water;
    b) Avoiding PCBs in developments entirely and minimising the use of PVC;
    c) Making extensive use of natural light and natural ventilation in all new building design;
    d) Making extensive use of recycled building materials;
    e) The high conservation values of the site are fully protected by SOPA management strategies;
4. Sydney Olympic Park is atypical, insofar as many of the original multi-disciplinary design team still work on site for SOPA in a management capacity. Nevertheless, the principle remains valid that the management and operations phase of development are as important as the original planning and design stage, and it is important to retain a professional environmental presence to ensure continuing implementation of the environmental management system;
5. Precinct location is an important determinant of modal split. Precincts that are located on the periphery of an urban area may be able to link to a public transport route. The greater the distance from an existing urban area, the less the likelihood of public transport being available – remote locations cannot expect public transport to be available;
6. If the precinct is located to take advantage of local environmental, cultural or historic attractions, a visitor centre or display area, perhaps with ancillary activities, will add to visitor interest and the attractiveness of the precinct in general;
7. A precinct constructed on a sustainability platform will tend to act as a regional role model. It will influence, to a degree, how all development projects in the area are viewed and how they function; and

8. Perhaps the only 'negative' lesson from the SOPA experience concerns post-development monitoring and data collection. SOPA's operational data is far from comprehensive and is not gathered in a standardised manner. For example, water data for some activities is in terms of financial years and for others it is by calendar years. It would be very useful to generate a data collection system at the design phase, and ensure that it operates on a standardised basis. Normally this will not be a problem where Green Globe annual certification is concerned, since operational data is required for the benchmarking re-assessment process.

SUMMARY OF INDICATORS

Indicators and Measures

Indicator 1: Sustainability Master Planning Approach
Measures
- The Master Planning Project brief, which includes sustainable goals, objectives and performance targets;
- A Community Consultation Plan;
- A multidisciplinary planning and design team with experience in sustainable master planning;
- An Architectural and Landscape Code, which integrates local mandatory and other voluntary environmental standards;
- The legal integration of environmental standards including PPDS within the precinct's title;
- The adoption of environmental design and operational standards for enabling infrastructure and buildings.

Indicator 2: Precinct Location and Siting Planning
Measures:
- Precinct location rating;
- Habitat conservation ratio;
- Public open space ratio;
- Building footprint ratio;
- Environmental landscaping rating; and
- Site disturbance ratio.

Indicator 3: Social Commitment
Measures
- Planning and design strategies for the social progress; and
- Encouragement of the communities understanding, involvement and integration with the natural, built, economic and social environments being developed or extended.

Indicator 4: Energy Efficiency and Conservation
Measures
- Total predicted energy consumption per year/predicted occupancy levels per year;
- Total predicted carbon dioxide emissions per year from energy consumption;
- Predicted percentage of renewable energy consumed per year;
- Use of energy sensitive site planning and design techniques;
- Application of passive building design;
- Predicted percentage of total energy consumption produced from a cogeneration facility;
- Percentage improved in energy efficient equipment; and
- Used in buildings and infrastructure.

Indicator 5: Water Conservation and Management
Measures:
- Total predicted precinct water consumption per capita (kL/person per year);
- Water management plan in place; and
- Predicted volume of auxiliary water supplied / total predicted water consumed (kL/year).

Indicator 6: Solid & Other Waste Management
Measures
- Predicted volume of waste to landfill m^3/occupant; and
- A Waste Management Plan to be implemented.

Indicator 7: Resource Conservation (Materials)
Measures
- Specification of locally available materials has occurred;
- Predicted proportion of locally recycled or reclaimed materials used / Total materials used;
- Structural and cladding materials selected will have a BRE Summary Rating and Recyclables Rating of at least Level "B";
- Percentage of green components and systems used; and
- A green materials procurement policy has been developed and adopted.

Indicator 8: Chemical Use
Measure
- A biodegradable chemical-use plan is in place.

Indicator 9: Wastewater Management
Measures
- Predicted volume of wastewater treated onsite;
- Total volume of wastewater generated per year;
- Predicted volume of wastewater reused for non-potable purposes / total volume of wastewater generated onsite per year;
- Use of separate wastewater collection systems and decentralised systems;
- Predicted volume of wastewater sludge used sustainably (both on and off-site) / total volume of wastewater sludge produced; and
- Application of strategies/policies to secure the quality of local groundwater and surface water.

Indicator 10: Stormwater Management
Measures
- Predicted volume of stormwater runoff collected, treated and reused / total predicted volume of runoff per year;
- Capacity of passive treatment systems (detention ponds, reed beds etc.) / total predicted volume of runoff per 10 year event;
- Application of strategies/policies to secure the quality of local groundwater and surface water;
- Proportion of permeable surface to total site area; and
- Safety measures installed to prevent accidental public ingress.

Indicator 11: Economic Commitment
Measures:
- Inward investment to the area during and after development of the precinct;
- The increase in the business base of the area, particularly new businesses;
- Improvement of the viability of the existing businesses in the area of the development;
- The numbers of permanent and part time employment opportunities to be created by the development at all levels of operation;
- Training and long term career opportunities for local people particularly young persons and the disabled; and
- Environmental and social linked job opportunities.

Chapter 5

CASE STUDY – SALT

Richard Moore

Introduction

The development was being used as a Green Globe Design and Construct (D&C) Standard pilot study. A review of the proposed Outrigger Resort was at the centre of this work. It soon became clear that because of Salt's location, size and likely impacts over time that this standard would not be appropriate in the benchmarking and certification of this type of coastal development or its major buildings. The D&C Standard is primarily aimed at single buildings and their immediate infrastructure. It is clear that a large mixed use precinct such as Salt is far more than its individual parts.

The creation of a new standard known as the Green Globe Precinct Planning and Design Standard (PPDS) had started in 2004. The tool was aimed specifically at medium to large mixed use precinct developments with travel and tourism facilities and infrastructure. The perception is that when sustainability principles are being applied to such precinct developments, there needs to be a means by which the outcomes of such drivers can be benchmarked and certified as industry best practice for ecological performances on a much broader scale. PPDS is a response to this need for an integrated and comprehensive framework within which developers, their planners and designers can achieve sustainable outcomes (Figure 16).

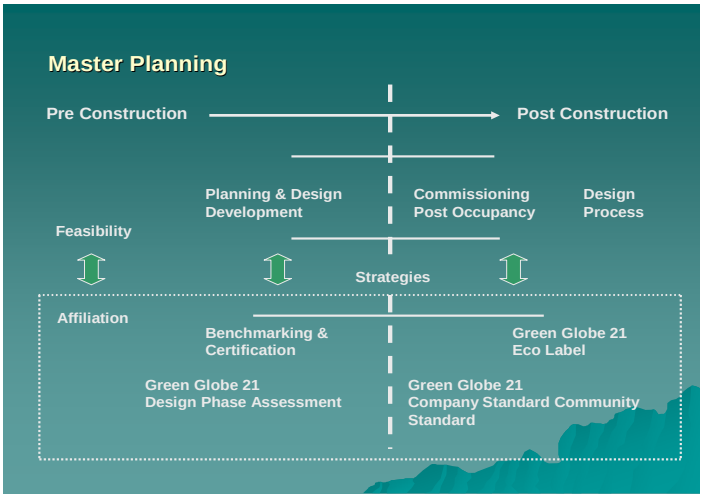


Figure 16: Master planning relationship of Green Globe Standards

For the noted reasons Salt was considered an appropriate development to test PPDS against. Whilst it was seen as being late in the planning and design process it was felt that important data and reflections would still be gained from the study. Negotiations with the developer lead to PPDS being used as a post planning and design tool to review the standards goals, aims and objectives against what is becoming a major trend in development activity, namely large coastal precinct developments. The following is an assessment of planning and design decisions and management processes employed on this large mixed use precinct development which has major travel and tourism facilities. The assessment considers how the development responded to sustainability agenda impacts. Further, what were critical areas of environmental, social and economic activity in the development's planning and design process, and how did the developer and advisors respond? What are the major planning and design decisions taken to achieve the developer's and other stakeholder's primary goals, aims and objectives?

Other important areas of interest included the effectiveness of a pre-commitment questionnaire, documentary evidence requirements, appropriateness of sector benchmarking indicators (SBIs), and effectiveness of the standard's examples such as the compliance templates and the data collection methods. How such a standard accords with or can operate within the existing statutory development approval process was a further area of critical interest.

Location and Project Details: *Salt is seeking to establish itself as a village by the sea*

Salt is a large, mixed use precinct with travel and tourism facilities, located on the northern Tweed Coast of New South Wales south of the coastal town of Kingscliff within a 30 minute road journey of Byron Bay and 15 minutes to Coolangatta Airport.

The climate for Tweed Coastal areas is categorised as Coastal Temperate, which has warm/hot summers and cool/cold winters. The average daily maximum temperature in summer is 25.5ºC, while in winter the average daily temperature is 18.6ºC, with an average annual rainfall of 1315mm.

Located within its 73ha perimeter is a 346 room, 5 star Peppers Resort Hotel, a 318 room 4.5 star Outrigger Resort Hotel, providing between them, conference and board room facilities, resort pools, internal gyms and tennis courts. A health spa and fitness club is also provided. At Cudgen Creek a jetty and boatshed is provided to give recreational water activity access. A further 400 room lodge-style hotel resort, targeted to be a 3 to 4 star operation, is under negotiation. A total of 433 residential lots provide the opportunity of land and build packages. These offer an average plot size of 743m² for beachfront lots and Cudgen Creek lots averaging 645m². Medium density residential property provision in the form of apartments is planned, providing some 250 units. A possible 170 unit retirement option is being planned. The mix creates a scheme density ratio which is low in terms of the local plan. The social infrastructure facilities include a Village Centre with an oceanside tavern, restaurants and cafe, shops, a central park with an amphitheatre and a Surf Life Saving patrol for the beach front and surf related events. Peppers and Outrigger are complete and operating. The third hotel is currently being designed and prepared for development approval application. It is scheduled for completion and operation by the end of 2007. Residential properties total 135 starts and completions with a further 120 properties having achieved developer approval and now subject to development approval application. Most of the development's remediation works and major civil infrastructure, including large areas of open space landscaping, have been completed.

Project inception was mid-2001 with the critical due diligence process taking place between September 2001 and December 2001. The development application was lodged in August 2002 with approval being granted in April 2003. Off plan sales marketing had begun prior to the approval in October 2002. Site clearance began in July 2003 with the Outrigger building works beginning in September 2003 with Peppers starting 12 months later. The estimated development value for Salt is $1 billion with a phased construction programme that started in 2003 and is scheduled for completion by approximately 2010.

Main Members of the Development Team

Client	South Kingscliff Developments Pty Ltd
Project Managers	The Ray Group Pty Ltd
Financial Manager	The Ray Group Pty Ltd
Architect/Master planner	ML Design
Statutory Planning	Darryl Anderson Consulting
Landscaper	EDAW Gillespie (Aust)
Monitoring & Assessment	The Ray Group Pty Ltd
Hydraulic Engineer	Cardno MBK
Civil Engineer	Cardno MBK
Transport Consultant	Eppell Oslen
Ecology/Environmental Consultant	Aspect North
Mechanical Engineer	EMF Griffiths
Electrical Engineer	EMF Griffiths
Quantity Surveyor	Napier Blakeley Pty Ltd
Civil Contractor	South East Excavations
Building Contractor Resorts	Barclay Mowlem Constructions Ltd

Given the scale of Salt and the importance that design was given, the main advisors and professionals list indicates that a wide skill base was assembled for the master planning (Figure 17) and other related activities that are undertaken at the inception stage of the development process. It is easy to recognise that care had been taken to ensure the formation of a highly skilled, multidisciplinary and integrated planning and design team.

What is not shown is the involvement of others such as stakeholder groups, i.e. local planning officers, community groups, etc., this dimension of a development team was not requested at the pre-commitment stage. It is a function of the related questionnaire, described later in this report, to consider how the developer is addressing the inherent integrated process model that is now being determined by other research to be critical to the structure and use of PPDS. This issue has been addressed by a review of the pre-commitment questionnaire content.

Aged Residential Units Proposed Hotel Medium Density Buffer Zone Cudgen Creek

Dune Rehabilitation Outrigger Social Hub Peppers Beachfront Beachside

Figure 17: The Salt Master Plan

[It is argued that the plan uses a number of new urbanist town planning principles relating to pedestrian permeability, open space accessibility and the creation of identifiable neighbourhood precincts]

The Process of Development and the Role of PPDS

Important to the development of PPDS were these questions: What would we require a new PPDS to offer in overcoming perceived shortcomings of existing tools? Would a process based planning and design standard incorporating benchmarking and certification of best practice performance provide a tool for delivering a sustainable development? What process based development model needs to be employed to ensure the most efficient use of PPDS and other related standards?

Implicit to the development of PPDS is the view that planning and design has a key role to play in resolving many of the conflicts that such precinct developments may generate. In the absence of good planning and design there are evident risks that development will become unregulated, formless or haphazard, inefficient and likely to lead directly to a range of negative economic, social and environmental impacts (Williams 1998). For Salt this meant a review of the decisions and outcomes implemented against the criteria of a newly developed and process based methodology (Figure 18). Interviews were held with the developer and assessment of a range of issues is reported in this study.

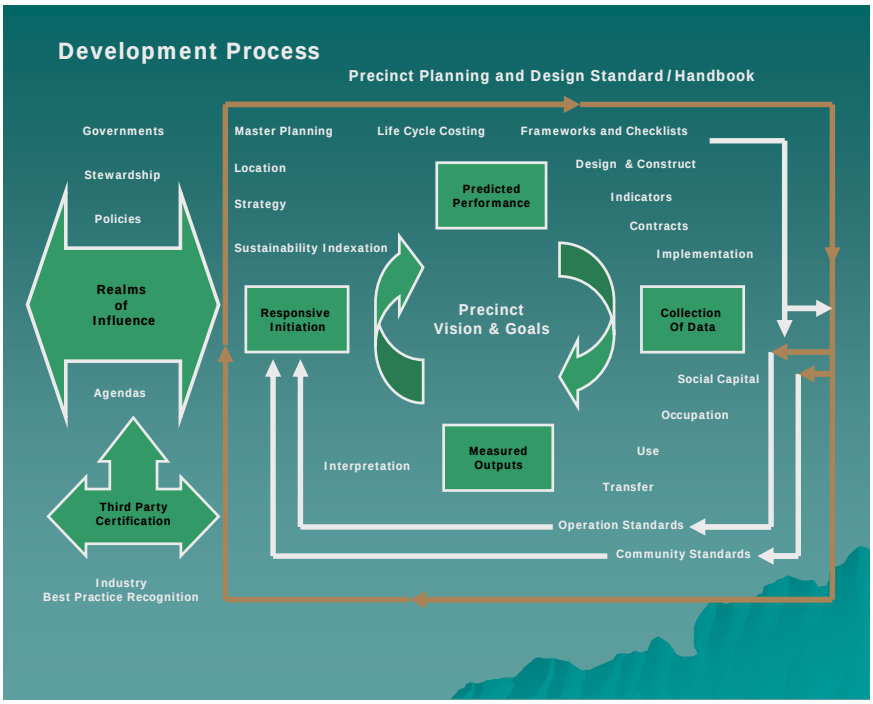


Figure 18: The process of development and the role of PPDS

Interpretation of the Sustainable Agenda into Development Goals, Aims and Objectives

Pre-Commitment

The use of a pre-commitment questionnaire aimed at determining the suitability and readiness of a development project to undertake Green Globe benchmarking and certification has been recognised as an important step in this exercise. The developer completed the earlier D&C Standard version and from this input a revised questionnaire for PPDS was evolved. The new questionnaire now reflects broader and more complex environmental, social and economic issues faced by medium to large, mixed use precinct developments.

A further outcome from continuing work on the standard and contact with the developer has been the recommendation that earlier discussions take place between Green Globe assessors, developers and their advisors, to determine the nature and status of the development and which of a range of Green Globe Standards would be appropriate. This recommendation has been acted on.

Development goals, aims and objectives

The overall goal of the PPDS is to facilitate environmentally sustainable planning, design and infrastructure construction of travel and tourism developments.

Its key supporting aims and objectives are to:

- Provide developers with the fundamental guidelines for facilitating responsible and environmentally and socially sustainable planning, design and infrastructure construction from the initial design stage;
- Assist state and local authorities with the assessment of medium to large mixed use precincts;
- Provide developers with an assessment of their performance, and encourage continual improvement;
- Provide consumers and travellers with the means to recognise and choose sustainable travel and tourism operations;
- Protect local ecosystems and the global environment, through realising best practice planning, design and infrastructure construction procedures that minimise environmental impacts;
- Design for healthy and natural living in a range of contexts and for a variety of future customers;
- Provide facilities that have educational, health and technological benefits for guests and employees; and
- Improve profitability through reduction in waste and energy savings.

Developer's objectives

The developer was asked to provide as an overview the primary sustainability planning and design aims and objectives of the development. This is now requested at a pre-commitment stage to ensure that consideration has been given to whether there is synergy between the aims and objectives of the standard and those of the developer and other stakeholders. Examples are provided to encourage the developer to identify an overall ethic and/or ethos for the development that accords with giving consideration to the pressures reflected in many of the policies and strategies emanating from national and local governments who are seeking to achieve sustainable developments.

These examples are;

a) To set new standards for precinct development by using a totally inclusive planning and design approach; or
b) To pursue a 'whole systems' approach in planning, design and infrastructure construction so as to reduce resource consumption throughout the life cycle of the development.

The developer stated that the development goals, aims and objectives were;

- To create a 'world's best practice' integrated resort and residential seaside village; and
- To develop and deliver a master planned community that exceeds the normal standards and initiates innovation.

It can be seen that these are in accord with the ideals of PPDS and reflect what responsible developers should be seeking to achieve where the sustainable agenda is critical element of the development. The alignment of goals may help to dispel the claim that developers in the main are simply eyeing quick profits, with little regard for environmental consequences. Importantly, compliance to the goals, aims and objectives will need to be visible throughout the documentation supplied for benchmarking by the developer and their advisors.

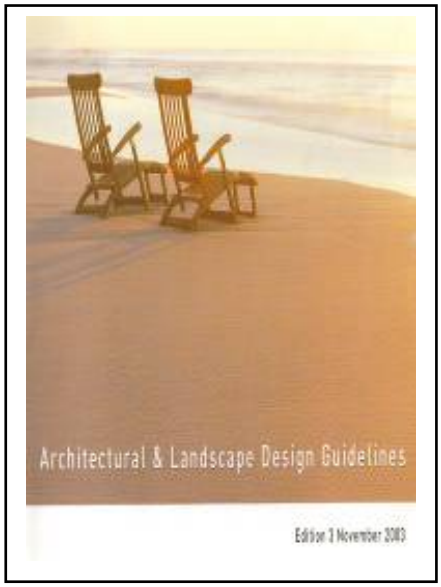
An issue arising from discussions with the developer and approving authorities is recognition of the long term commitment needed by developers in achieving stated goals, aims and objectives. Many outcomes are only likely through ongoing inputs and possible adjustments as the economic and social demographics of the development change over time. Accordingly, compliance will require on-going monitoring at each revalidation of the initial benchmarking and certification. This is being recognised as a critical issue for the ongoing development of PPDS in that it may be a tool that can be shaped and used to secure confidence with approving authorities that long term implementation can be measured and sustained. Recognition in terms of a developer's ecological performance profile and rewards in terms of speedier and more appropriate development approval outcomes may result.

Documentary evidence

Analysis of the documentary evidence proffered by the developer indicated that, as would be expected, considerable material in terms of planning and design details and supporting information exists, albeit scattered throughout documents such as planning briefs, planning reports, impact statements, master plans and some detailed drawings regarding infrastructure. As to policy documentation regarding goals, aims and objectives, heavy reliance is placed on the already noted documents to convey the aspirations of the developer. This is an issue a developer and its advisors will need to address if seeking to ensure that a long term commitment to a sustainable agenda is to be fully implemented. Development of specific policy documents that ensure correct interpretation and compliance of their sustainability agenda may need to be added to the information requirements of the development. The payback may again be recognition by approving authorities of the determination of those involved to achieve measurable ecological performance outcomes. This again should lead to environmental, social and economic gains for all the stakeholders involved.

Examples of such documents at Salt are the Architectural & Landscape Design Guidelines and the Salt Collection of Homes. The first of these documents seeks to provide legally enforceable guidelines that "are intended to provide appropriate development controls and design criteria to assist architects, designers, developers and homebuilders in achieving a high quality and sensitive building development in an environmentally unique area". Of interest here is the layer of encouragement and enforceable control placed by the developer on the existing statutory approval path that will still need to be undertaken by the purchasers of residential building lots. Criteria within these guidelines provide enforceable covenants regarding nonperformance. This is regarded as clear indication of the developer's intent on ensuring compliance to the developments goals, aims and objectives. It should also be viewed by approving authorities as a means of ensuring that standards and specific performance are achieved.

- **Compliance with statutory authority requirements**
- **Residential character – architectural forms and landscaping**
- **General guidelines**
- **Building and siting orientation**
- **Climate design**
- **Privacy design**
- **Landscape design**
- **Roads and driveways**
- **Fences**
- **Building characteristics, colours, materials**
- **Ancillary structures:**
  - **Visibility, plant, equipment, retaining walls, etc.**
- **Specific guidelines for medium density**
- **Architectural Review Committee (ARC)**
- **Architectural review procedures**
- **Approval process:**
  - **Documents, construction document review, etc.**



Architectural & Landscaping Design Guidelines

The second of these documents seeks to provide a visual means by which interpretation can be given to the architectural design and environmental aspirations of the development. It offers a range of homes for potential purchasers to use or model their own designs on when approaching the issue of either beach or estuary foreshore design interpretation. Whilst it seeks to remain style neutral for the whole of the development, it is providing some of the contextual issues regarded as important for appropriate responses to coastal climates and living.

Clearly, preparing this type of documentation takes time; however this early investment may bring dividends. For example, monitoring and enforcement becomes easier for the developer, also during any approval compliance process the clear message of dedicated development controls should lead to fast tracking an application. Further, there is evidence that the quality of the development will benefit and that this is recognised by potential stakeholders seeking long term assurance of the intent to maintain development standards. As noted, such guideline development takes time, there is a high degree of professional and technical collaboration required. The cooperative spirit and partnership needed takes time to engender but for the long term participations of a development team the improved outcomes should provide a consensual buy-in of measurable achievement (CABE 2005). It has to be commented upon that these guidelines are aimed only at those involved in residential lots development. The issue of the hotels at Salt is discussed later.

The Precinct Planning and Design Standard

Sustainable Precinct Planning and Design Policy

It was recognised that how such objectives are translated into the development brief and other planning and design documents will become a crucial benchmarking exercise. To this end the standard now seeks a formal policy statement describing a developer's commitment to a sustainable precinct planning and design approach. The policy should assist in clarifying and declaring the planning and design intentions and having a well-documented commitment to the goals and objectives as set out immediately from the outset of the development process.

Regulatory framework

This section raised several critical issues for the research team and the developer. Compliance with legislation is taken as a given for development. However, in some areas of current legislation sustainable planning and design is not measurable or noted in codes and deemed to satisfy provisions. Therefore conflict may arise for Green Globe and developers committed to using PPDS when they seek to ensure that there is compliance with the relevant legislation, local plans, regulations and other commitments. It is recognised that thorough inclusion and accountability to statutory authorities will need to be aligned with the goals, aims and objectives of the PPDS and its content. Adoption of PPDS by a developer as a tool which responds to the critical need for responsible economic, social and environmental infrastructure development of a precinct should somehow be recognised by statutory authorities in the approval process. This issue will need to be addressed during the diffusion of PPDS and is likely to be the subject of further research and development work.

Discussions with the developer clearly indicate that resolution of this matter would be a major incentive for the take up of a tool such as PPDS. Developers seeking to reduce development approval periods and uncertainty identify that delay in approvals is the single most pressing issue for them at present. For certainty of outcome and reduction of approval periods it is believed that there is a willingness to accept stricter compliance measures. This positive attitude should allay the concerns of councils regarding delivery of all the promised elements of such large developments. Such measures could be applied through development approval conditions employed by approving authorities and via other jointly developed and agreed documentation similar to the noted Architectural & Landscaping Guidelines. Accordingly reasonable trade-offs and agreed compliance processes could become critical to the success of a precinct seeking to implement a sustainable agenda within a sustainable timescale. This type of strategic conditioning was seen at Salt where the developer and shire council negotiated a percentage completion of the Outrigger prior to any residential land titling. This ensured in the minds of many that the critical hub of the scheme would be delivered before major residential occupancy.

Environmental and social performance (data collection)

A systematic and planned approach for the collection of data is fundamental to the use of PPDS. Help is given in the form of a website and explaining the requirements, the indicators and the processing of data collected. Collection data documentation in the form of spreadsheets is also supplied. It was noted following discussions with the developer that this area causes considerable difficulty given the pressures of ongoing project management and difficulty in post engagement briefing of a design team in terms of the data required. Further, if assessor involvement is undertaken when the planning and design stage is well underway the task of data collection is likely to present logistical problems. This is because retrospective data collection can prove difficult given the fragmented nature of planning and design inputs to development. Accordingly it is recommended that data collection should be written into the tasks or engagement conditions of all those involved in the planning and design process. This should ensure that the data will be available at whatever stage in the process PPDS is employed.

Research has shown however that the task of using the spreadsheets, and the collating and interpretation of the spreadsheet requirements, may be a task better suited to collection agencies, e.g. Earthcheck. These organisations have considerable experience in benchmarking data collection and its interpretation. This involvement will need to be a feature of the agreement reached between all parties involved in the PPDS process.

Economic sustainability

Tweed Shire Council claims "the Tweed has a unique social, economic and physical environment. At the same time, strong pressures for development including economic and social change are being experienced throughout the shire. Consequently, we the community must identify those elements of the Tweed environment which are important to us and determine our vision for the next 10 years to identify the kind of Tweed Valley we want".

The Economic Commitment Indicator was initially viewed as a possible elective consideration which would mainly focus on temporary and long term precinct employment. However, following discussions with the developer and some limited research in the adjoining coastal towns of Kingscliff and Cabarita, it became clear that broader views of the impacts of inward investment should be developed. It was believed that positive and negative impacts and outcomes of the economic relationship between a new precinct development and its demographic area should be measured. Also there must be some form of recognition given to the relationship between the developer's economic goals aims and objectives and those of a local community's representatives, in this case Tweed Shire Council.

Developers would do well to undertake studies of an area's existing economic profile, particularly businesses and employment. In the case of Tweed Shire much of the necessary information was available in the noted report.

As noted, Salt adjoins several small coastal towns and inland settlements, of major interest would be the impact on existing travel and tourism facilities, employment, job skills and services. To this end, PPDS now encourages those developers encompassing the triple bottom line principles implicit in the standard to take the opportunity to show that their projects will bring sustainable economic prosperity to the existing and proposed communities. This can be done by either using the compliance template developed for the indicator or by the developer showing (with adjustments to the template or other means) what economic benefits the development will or has brought to the area. The types of outcomes measured on Salt are be discussed later under the indicators heading in this chapter.

Management systems for planning, design and construction

To assist in establishing systems, procedures and assigning responsibilities that ensure the environmental vision is fully integrated into the planning and design development process and eventual infrastructure construction process, recognition must be given to the fact that planning and design, and eventual construction are closely interrelated. Efficient systems will undoubtedly lead to obtaining high performance levels during the final planning and design stages and when implementation of infrastructure provision takes place. Having an efficient sustainable precinct planning and design management system (SPPDMS) is important to an integrated approach. The early design decisions in a development process are crucial for the overall performance outcome of the design. The SPPDMS assists in establishing the goals and tasks, organising resources and responsibilities for implementing these and documenting the process for detecting shortcoming and facilitating improvements. It is clear, given the scale and the timeframe of Salt, careful planning and design was not only important regarding eventual environmental outcomes but also regarding delivery of the scheme's infrastructure and buildings.

Whilst it is recognised that the PPDS Handbook benchmarking and certification process is primarily aimed at planning and design outcomes (not actual physical implementation), impacts of planning and design decisions on precinct infrastructure cannot be ignored in the assessment. A sustainable infrastructure construction process management system (SICPMS) is seen as a sustainable approach for the eventual day-to-day management of the project and therefore is essential in maintaining and achieving a precinct's sustainable vision. Specifically, it is suggested that it helps in identifying the roles, responsibilities and goals for the whole infrastructure construction process and outlines the tasks and actions to implement the system.

It is clear that at Salt extensive structural infrastructure was implemented at an early stage of development (see Figure 19). Large areas of spine roadway, drainage swales and landscaping had been built prior to any commercial and residential occupancy. This is a major investment for the developer and not without risk, however there are significant advantages to be gained. Creating a sense of place is achieved, which allies with marketing and economic potentiality. Infrastructure engineering can be evaluated with amendment being undertaken if necessary at a much earlier and less disruptive stage. Landscaping can establish subject to management processes for its protection being in place. There is a cost for this strategy but the developer utilised site areas for early nursery planting which is an effective and economic method of securing sustainable planting. However success will depend on the husbandry strategies employed. It is this information and detail that should be seen in the management policies of this section and provided to the assessor.

Figure 19: Precinct infrastructure at Salt

Stakeholder Consultation and Communication

This section focuses on the importance of dealing with stakeholders and customers along with social and economic issues. Aspects of social and economic commitment are present in all sections of the standard in some way or other, because it is a critical area in terms of meeting the requirements of Agenda 21.

Establishing effective consultative mechanisms and strategies to ensure all sections of the community are able to participate in developing and implementing environmental, social and economic strategies is seen as an important issue for the long term success of the development. A major issue for Salt and other similar undertakings is which community do they communicate with, the existing or the proposed, the investor or the occupier, the long term resident or the visitor? This presents a considerable dilemma for developers, other stakeholders and interested parties.

It can be argued that obtaining an initial consensus based on a limited community profile may not benefit the long term sustainability of a development. This issue has generated considerable discussion with the developer

and others involved in the development process. It is clear from the discourse that guidelines for this initial stage of the development process will need to be developed. The development of these is now the subject of research being conducted by the research team. This research work will need to consider how guidelines can provide mechanisms to achieve the stated aims of communicating to the appropriate stakeholders in a simple, clear, obvious and regularly updated manner. In the meantime the Social Commitment Indicator (Indicator 3) will be used to engender questions that will seek commitments to the principles of consultation and communications. Also it will determine how effective the developer's communications are in presenting their environmental, social and economic performance. How Salt undertook to inform and consult and how effective the communications were are discussed later.

Specific Indicators

For the most part the content of the indicators that make up the PPDS Handbook is predetermined. This is seen as an effective way of ensuring best practice consistency throughout developments undertaking performance based benchmarking and certification. However, indicators can be amended to accommodate local conditions of individual developments. This is because the need to integrate into a whole process view of development will require the indicators to be able to adjust to a range of influences. In particular it will need to respond to environmental, social and economic problems which vary greatly from area to area, as will the answers. Any amendment must be agreed, so the sector benchmarking can be adjusted to allow for accurate data measurement and interpretation. Only the more qualitative social and economic indicators which utilise commitment templates can be significantly modified or replaced by agreement with forms that better reflect the development and its location.

The use of Salt as a case study provided yardsticks against which the proposed content of individual indicators could be tested, evaluated and amended as required. The following are some of the observations felt to be important.

Indicator 1: Sustainability Master Planning Approach

Reliance was made on extensive planning documentation submitted during the development approval process to identify the goals, aims and objectives of the developer and local authority. The documents were, as expected, couched in the complex and somewhat legalise language of planning. Whilst this is a recognised and appropriate method under the current legislative procedure, it is felt that it does not fully reflect the full ethos or intent of such a large precinct. It is generally agreed that a separate document (or documents) that pronounces on the ecological, social and economic principles should be prepared for use with and by the planning and design team. This document could also serve as a powerful means of interfacing with stakeholders such as the planning authorities and local community.

The consultant listing indicated that an integrated and very professional team was employed on Salt. What was not noted or recorded were other stakeholders and local interest groups and communities. This omission became the subject of consideration regarding a further amendment to the pre-commitment questionnaire. The question to be resolved is, should it be amended to make note of such parties, or should there be a separate reporting mechanism to ensure participation by such parties? Initial testing of a revised form which adds a request for other stakeholder's details is underway.

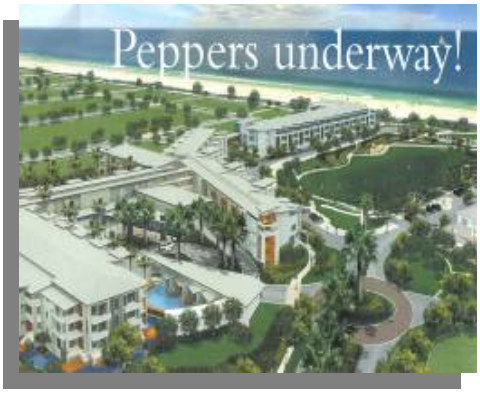
A strategy for ongoing monitoring and environmental performance appraisals to ensure continuing improvement has become a major area of focus for the research team. Previously it was proposed that the project would move from PPDS onto other Green Globe Standards for individual buildings and operational activity. This is still foreseen; however it is felt that some form of continuing assessment using the criteria of the PPDS needs to be undertaken, given the dynamic demographics of precinct development. Again this issue is being reviewed by the research team and is likely to form the agenda for future trials on other pilot study projects.

One of the most positive observations resulting from the pilot study at Salt was the use of the Architectural & Landscaping Design Guidelines. Discussion regarding the impacts of this document occurs throughout the report. Here reference is made to the use of title agreements to ensure compliance to not only mandatory requirements but also to the development's planning, design and construction approach for all individual residential lots.

The use of legally binding covenants to ensure not only design compliance but also construction outputs within reasonable timeframes is seen as beneficial to the overall environmental, social and economic performance of the development. Whilst the regulatory clauses do not override statutory requirements, there is a mutuality agreement between the developer and the shire council. This provides clear direction in ensuring planning and design compliance compatibility between the precinct and the local authority. Further, the issue of land speculation and ultimately affordability is dealt with positively and efficiently. Lot purchasers are obligated to comply with strict design approval and building procedures. This means that a regulatory tool which is readily understood and easy to enforce determines the pace of development. Purchasers cannot speculate on the lots because if they do not build within the timescale of 18 months the land reverts to the developer at the original

purchase cost. Clearly there is intent on the part of the developer to ensure that the delivery and quality of the development is maintained.

Outrigger under construction May 2004 completed 2005



The 5 Star Hotel Peppers completed Christmas 2005

One matter that needs to be addressed by developers is their relationship to the large commercial clients such as, in Salt's case, the Outrigger and Peppers Hotel Groups. It would be naive to suggest that such entities can be readily dictated to regarding compliance to further layers of planning and design regulation, much of which would be imposed outside of the regulatory system. Further, these major elements of the project may well be the critical drivers for the economic and social viability of the scheme. Accordingly, developers exercise tremendous care and usually put great effort into securing commitment from these organisations, a fact often underestimated by others, particularly local authorities.

This issue is clearly one that will need further consideration by all the possible stakeholders involved in these types of development. It may well have to be addressed on a broader scale than the single project. However what should be recognised is that many organisations (particularly those involved in travel and tourism) are very aware that the regulation of precinct development outcomes linking environmental, social and economic agendas is a significant topic at international, national, state, regional and local level. Increasingly, statutory regulation will be imposed if mutually beneficial approaches are not readily adopted by developers and the major commercial entities they involve in their development activity.

Indicator 2: Precinct Location and Siting Planning

It is recognised by the PPDS that the location of the Precinct with respect to regional services and infrastructure has a major bearing on its environmental impact in terms of resource use i.e. energy, water, waste and transportation. The site selection of precincts is therefore a crucial part of achieving sustainable development. Regarding Salt, several matters arise that reflect the complex and interrelated nature of development. Critical to the process of development are its relationship with location, the condition of the site and stakeholder perceptions. The coast road site now known as Salt was noted by Tweed Shire in several investigations and reports as being prime land suitable to facilitate sustainable tourist orientated development.

What the site should be used for becomes then a matter of perceived need shaped in the harsh world of economic reality when private intervention appears the only viable route left open. Financial modelling for uses such as golf course related tourism did not appear to provide the necessary returns to justify the major investments required to remediate or service the site. To reinforce this point the site had a development approval for travel and tourism use but had lain undeveloped for some 12 years before the involvement of the developer. Another factor was the approval of a further tourism and residential mixed use precinct development not far from the Salt site and along the same coastal stretch between South Kingscliff and Cabarita. Accordingly, a planning resolution which would have been needed at some stage to repair the lack of control over land use that has been the legacy would seem to have been predetermined. This is particularly so when measured against the precedent established by earlier approvals. Other proposed schemes for the site would almost certainly have followed a similar development profile. For many, the use of major developments to clear, repair and establish environmental, social and economic capital on a underutilised brownfield site in a region suffering social and economic depredation would be seen as a major opportunity. For others it appears as market driven forces that do not fully reflect regional needs or character. The resolution of this debate at Salt and the adjoining sites was for approvals that reflect models likely to be repeated throughout the Coastal regions of Australia. The question

is becoming less about whether should they be allowed and more about how best to achieve the most sustainable outcomes when faced by increasing socioeconomic demands for this type of development.

A major issue was that the site had been impacted on by sand mining for some 30 years. Radioactive ilmenite deposits had been left in the ground because of their low economic value at the time. It appears that no remediation or meaningful ecological restoration works had been carried out since the cessation of mining in the early 1980s leading to a major infestation of an aggressive declared Class 1 weed, Bitou Bush (Figure 20). The weed covered some 90% of the site, causing issues at the dune and creek edges. It is suggested that this bush is out of control in NSW and has already degraded some estimated 60% of the coastline. Arguably the site could not be left in the prevailing planning limbo or physical condition if Tweed Council were to achieve their stated objective of regional regeneration by ensuring that prime sites are developed through the most effective land use and the primary objective of encouraging integrated tourist development and uses associated with, ancillary to or supportive of the tourist development, including retailing and service facilities.

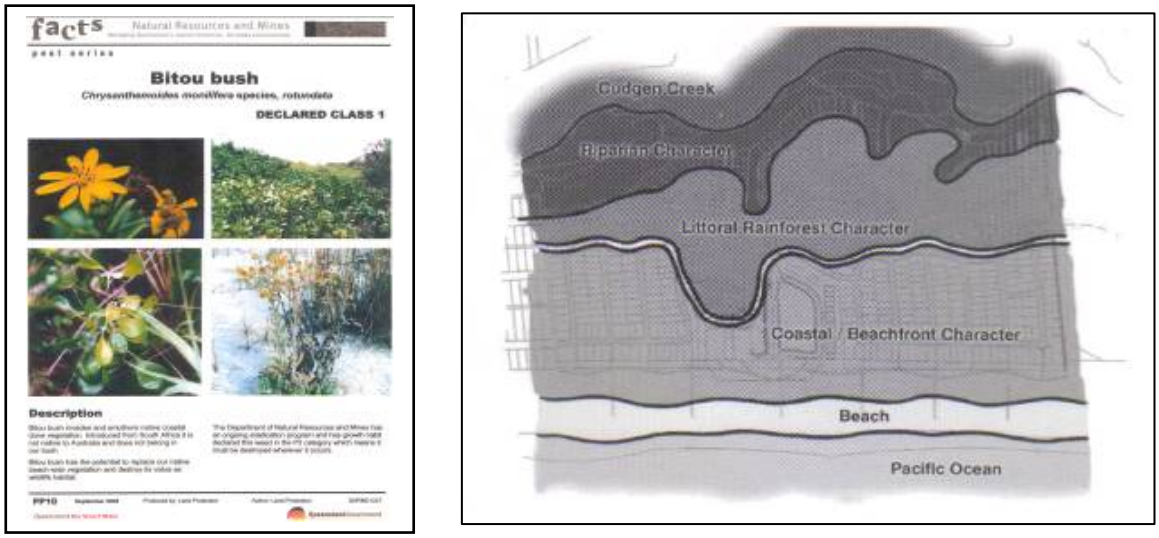


Figure 20: Declared Class 1 Pest and the strategic landscaping character

Master Plan zoning will reflect the environmental siting of buildings and infrastructure which can have major impacts on the reduction of native habitat and loss of biodiversity. Hence the planning and design process must examine the loss of the natural environment to the built environment, or conversely, for brownfield sites, the restoration of biodiversity and use of existing site areas, as was the case at Salt. A way of designing buildings to mitigate loss of ground-based habitats is to consider the area occupied by the building and the extent to which it touches the ground, that is, its footprint. Again, the positive use of the Architectural & Landscaping Design Guidelines is evidenced at Salt. Total site coverage as a ratio is low. Residential lots are limited to not exceeding 50% coverage of the site area. This includes all garages, carports, verandas and covered pergolas. This restriction on built environment coverage has a beneficial byproduct regarding solar access, which is discussed later along with residential areas biodiversity.

Research has suggested that many species of birds, mammals and small invertebrates benefit through the planting opportunities of extensive yard (garden) areas and infrastructure features such as planted road kerbs and drainage swales. This is particularly evident when native plant species that encourage the re-establishment of previous landscaping character (Figure 20) are used. This practice is clearly envisaged in the landscaping philosophy of the Salt residential guidelines and the actual infrastructure landscaping already implemented.

Infrastructure landscaping and the creation of over 16.5 hectares of public open space and their relationship to buildings are an important element of microclimate control, the mitigation of heat island effects and improvement of social amenity. There is clear evidence at Salt that the added value of infrastructure landscaping and the role that open space has to play was not underestimated. Environmental buffer zones have been employed at the beachside and along Cudgen Creek. Extensive restoration of the dunes has taken place, with some 65,000 new plants with a $2.5 million cost being used in the planting strategy employed. Earlier planting in nursery areas has been used to bring species on to a semi mature status, increasing their chances of establishment and survival. Further, there is an excess of open space requirement under statutory obligations. This voluntary provision has an interesting aside for the developer who, by providing the greater ratio of open space to development area, can find themselves providing a larger contribution to the local authority. Such infrastructure charges are not specific to a development or its infrastructure maintenance but tend to be lost in the general collection of local authority charges. Thus larger contributions do not guarantee increased or improved

facilities service by the authority, they are distributed throughout the authority's region. This can be a major source of irritation for developers and occupiers of developments. At Salt, as will be found on many major developments, developers seeking to maintain standards particularly through the implementation and marketing phase of a development undertake to maintain infrastructure landscaping and roadways themselves. Unfortunately when they leave the project, inevitably the maintenance teams go with them and standards fall. The use of designs and planting that reduce maintenance requirements help, but local authorities or the newly created community need to address this issue, particularly as in the case of Salt where contributions are in excess of $10 million.

Disturbance to a site through changes to the topography and natural environment is one of the major negative impacts of development. Site development processes which include large terra-forming exercises and clear felling of vegetation are to be avoided. However, as noted, sustainable development is complex, and in many cases this ideal may not be achievable because the starting point is not always without previous impacts. As mentioned, Salt was a brownfield site. Removal of the soil contamination hotspots and mixing with clean imported sand was chosen along with the removal of weed cover. This would have been regarded as a reasonable course of action in most cases where large numbers of residential lots are being created. The issue that arose at Salt was the raising of site levels. Capping the contamination would probably have resulted in a similar levels outcome given the likely depth of any resultant remedial mixing requirement and additional soil importation. The environmental, social and economic costs of this type of remediation work are not to be underestimated. The onsite extraction of the contaminant and mixing with clean soils (sand in the case of Salt) is a well established methodology, however importation by lorry and the resultant traffic impacts on existing infrastructure can not be environmentally justified. Lorry movements for a development the size of Salt would have probably been in excess of 125,000 thousand over a three to four year period. To reduce what would have been major impacts, hydraulic pumping was chosen once a local source (8km away) at Duranban became available. An interesting aside of this action has been that the demand by Salt has meant that on completion of works at the supply source for the sand, which was an existing extraction quarry, will be closed (it is estimated some 10 years early) and restored under the extraction approval given by Tweed Shire. What the possible environmental and social benefits of this outcome are of interest when seeking to aggregate impacts on developments and adjoining areas.

There is no doubt that economic viability plays a major role in large precinct development design decisions where mutuality linkages exist between major elements. Clearly the decision to raise the levels was not limited to environmental pressures alone. Whilst the increase in site levels did have technical merits it also accorded with the perceived added value aims of offering clear avenues of visual access to the sea. The developer acknowledged that the value of sea views from parts of the site, particularly Outrigger, was taken into account when projecting the scheme's returns and ultimate viability. This again relates to the pressure that developers come under from purchasers in the commercial and residential markets. Whether such pressures are detrimental to sustainable processes is a major question. The resolution of this issue must be on an individual development basis and should always be related to the location and nature of the individual development. This direction should be chosen above the simply instinctive 'not to change' any existing condition. For Salt, there were obviously environmental, social and economic benefits for both the developer and the community.

Regarding environmental or social impacts, it is difficult to identify any damage having been caused. This is due in part to the accompanying of the raising of the site levels with an implementation of a considerable non building zone between the development's buildings and the beach. Also, a major dune re-planting project has already been completed to protect the beach amenity. Physical and visual access would appear to have been considerably improved, with extensive coastal footpath and cycleway provision within the non building zone. The network, which links Kingscliff, Salt and, when completed, Cabarita, provides for unrestricted beach access along its entire length.

Again, the complexity of these large developments can be seen when reviewing the decisions reached regarding site levels and sea views. An immediate impact that had to be addressed was overshadowing of the beach and landscape areas. The buffer zones obviously become an important part of the strategy as do the heights of the buildings. Considerable commentary on these matters exists and other issues are available in the planning documentation. The impacts of the resultant provisions agreed upon from the extensive planning and design responses are discussed under following Indicators.

Indicator 3: Social Commitment 'Quality of Life' Approach

The new community being created at Salt will initially, and possibly in the medium to long term, have different characteristics to the existing communities of the adjoining towns and immediate region. This is due in part to the region's history and the sum of lifestyle choices on offer and being made by the potential community members of the new precinct. Whilst all communities evolve over time, they do so with either positive or negative outcomes dependent on the vision or characteristics which reflect community perceptions and attitudes. The complexity and, it might be argued, the contradiction that surrounds Salt and other similar developments are in their very natures. The development had specific socioeconomic goals. They are on one hand destination based transitory community facilities offering short term coastal experiences. On the other hand, because of the

residential offers, they prefer the opportunity to undertake a 'seachange' based on a permanent community lifestyle adjoining the beach. Salt therefore represented an interesting case study for the introduction of this indicator because added to the social commitment complexity of Salt is the close proximity of existing communities at Kingscliff and Cabarita, and the equally new and evolving precinct resort and residential development known as Casuarina Beach just a kilometre along the coastal road. It is without argument that all will be directly affected by Salt as they in turn will impact on Salt. This fact is not missed in the planning statements accompanying the development application which notes the possible impacts on the adequacy of existing community and welfare services. These include medical practitioners, hospitals, local shopping centres, recreation facilities, schools, colleges and library services. Existing road networks and services are also cited as areas for due consideration. That there is recognition of the need to ensure that provision is available or requires improvement and possible enlargement obviously indicates an awareness that the communities will have to integrate and have mutuality regarding the sharing of facilities.

What the impacts are, and how to encourage or mitigate their effects, is a major issue for all new developments, particularly medium to large mixed use precincts. For many, the contribution payments normally conditioned by local authorities seeking to lessen impacts should be sufficient. This is likely not to be the case simply because they are standard charges not normally based on any needs analysis. From discussions with the developer it appears that attempts have been made to create, develop and maintain positive, productive and sustainable social contributions at the new Salt precinct development. Whilst these have been aimed primarily at Salt, several will directly affect the adjoining communities. The challenge for the developer was how to translate the social commitment noted in the socioeconomic report into hard foundations to the benefit of Salt and the communities beyond its boundaries. Planning and design decisions reflected in a range of 'social capital' provisions should provide for a better quality of life for everyone, now and for generations to come at Salt. However, as commendable as the list is it will not guarantee success. Interestingly, the developer, like others, is aware that the elusive community glue needed will only come about through long term commitment on their part. Several aspects of the continuing involvement offer interesting insights to the need to encourage an evolving social capital approach in the search for successful community building. One of these arose out of the legal covenant regarding the planning and design of residential lots described under the previous indicators. The consultant primarily engaged in this process established strong social links with and enjoyed considerable trust of many of the purchasers during the process has now moved into a role that can be best described as a community estate manager.

Social Capital – Hard Foundations at Salt

- **Development approval compliance measures;**
- **Contributions to infrastructure augmentation;**
- **Improved coastal road;**
- **Public transport improvements;**
- **Extensive infrastructure landscaping provision;**
- **Preservation of sensitive habitat;**
- **Protection for environmentally sensitive zones;**
- **Rehabilitation of dunal and creekside areas;**
- **A wide range of lot sizes and types of housing choice;**
- **Key crime prevention elements incorporated in the design;**
- **Extensive beach access;**
- **Extensive footpaths and cycleways;**
- **Car parking facilities for beach with disable access;**
- **Public toilet and beach changing facilities;**
- **Surf Life Savers Club;**
- **Access to new recreational facilities i.e. health club;**
- **New village green with concert facilities;**
- **A programme of concerts and other events;**
- **Increased open space with playground facilities;**
- **Employment opportunities;**
- **Training opportunities; and**
- **Considerate contractor measures.**

Note: Further Social Capital provided at Salt and by the broader region is to be found in Appendix D. These are more distinctly aimed at day-trippers and short to medium stay community visitors. Of interest are the wider travel and tourism needs of these groups and the possible integration of the capital into a permanent residential coastal precinct community.

Accordingly, 'hard foundation' social capital will only offer a measurable number of elements that contribute to the social capital of the development. Other equally meritus inputs are not noted and come about in the main more by the opportunity that is created by the catalyst that is Salt than by deliberate actions. Examples of these, like the changing role of the aforementioned consultant, can be termed soft foundations. They are seen in the opportunities flowing from the use of the social hub areas such as the Village Green and concert area (see Figure 21), the beach and in particular membership to the Salt Surf Life Saving Club, the open space and adjoining child play areas, the resort facilities and clubs such as tennis and sports. The resultant social intercourse can be a powerful force in creating the social glue that brings together groupings within the communities to share experiences and take an active part in its development. Whilst this suggests that an almost infinitely extendable

list of desirable characteristics can be provided, any of which would help to make them more sustainable, there are key elements that must be incorporated. Some of these are clearly in evidence at Salt and in the wider regional area.

Figure 21: Social hubs – The Village Green

Any list that is formulated should reflect the goals, aims and objectives of the development and act as a checklist of its translation into what can be termed hard or soft foundations. These foundations or physical and soft policies are seen as being essential to the creation of a sustainable community leading to an improvement or maintenance of 'Quality of Life', meaning a shared vision of the future for the whole community. As noted earlier, a difficulty arises here when determining what the community is. Is it the transitory community of day trippers and/or short to medium stay visitors? Or is it the permanent residents that will occupy the development all year round? Each of these community groups will have legitimate demands on the community. Issues to be resolved are the variances in expectations and how these differences can be reconciled. Work at Salt has lead to amendment of this indicator. One of the changes was the introduction of a need to conduct a needs assessment of the existing and proposed communities. This is recommended because such an assessment can provide a basis on which to create social capital foundations. However, it must be noted that these measures do no guarantee success, primarily because whilst the developer can promote the ability for the community to make connections through measurable hard foundations, the community itself must be willing to engage and invest in the relationships and activity that underpins social capital.

At Salt there were attempts to assess what the proposed community would require through targeted user group workshops. This is likely to accommodate for the needs of the new community but is not likely to identify the aspirations of the existing adjoining communities. However, this type of information and data is usually available where Agenda 21 objectives are written into the policies of the local authority. Local research is normally well established and offers a good insight into the goals of that community. The already mentioned Tweeds Futures was asking the local community in 2000 what it wanted in terms of regional developments. Use of the data and information obtained from this exercise may have proved useful.

The suggested needs analysis is critical in providing a sustainable vision and future for the precinct, travel and tourism facilities and community. However, it is recognised that this is a difficult area. The possible attributes listing and compliance template provided in the PPDS Handbook are by no means definitive. The content of both requires development by the developer and other stakeholders giving due consideration to the social, economic and environmental imperatives of the precinct development, particularly its size, context and location, i.e. urban extension or rural new build. This is an area where early involvement by consultants experienced in this profiling would prove useful.

It is critical to ensure that precinct developments address the key issues of and are supported by any existing community or proposed community, with particular reference to respecting local traditions and customs. Salt generated extensive interest from early on in the development process not least because of its location and size but also because of local political divisions. This is a common feature of many large precinct developments and is one that must be addressed with transparency if local stakeholder support is to be achieved. Encouragement and facilitation of an active participation by existing and proposed local community committees and organisations in the development of the precinct is one such method.

Salt did attempt this in several ways, firstly through the already mentioned focus groups. Secondly, extensive meetings involving a wide range of local stakeholders were a feature of the pre application process. Thirdly, the use of an interpretation and marketing centre based in the High Street at Kingscliff offered every opportunity to inform the existing community. Finally, the powerful tool that is the media was employed via web based information pages and a regular newsletter (Figure 22).

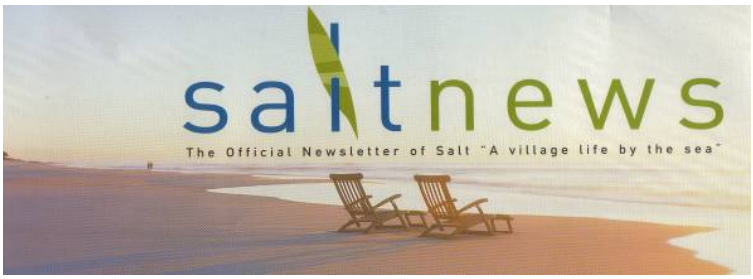


Figure 22: Media – Salt News

The content of this publication suggested an admirable attempt at involving the existing and potential communities in the evolution of Salt. There was a clear consultation strategy reflected in the publication. The content, whilst market orientated, did note significant environmental and social commitments. It is without doubt that these communication tools can provide a means by which community buy-in is encouraged. For example, the newsletter could be developed into a continuing tool by which the community can participate in creating its identity through a broader based content including reporting, advertising and general local interest article inputs.

A final area that is measured under the social commitment indicator is that regarding housing affordability. This is a difficult issue to address within the context of Salt. The primary nature of Salt and similar developments is in meeting a demand that Australians, like their counterparts in most western countries, are seeking to move close to water. This demand is placing increasing pressure on land supply and, subsequently, land prices. This impact is clearly seen in the town of Kingscliff. However, in economical terms it can be argued that this is a positive pressure in what had previously been a depressed regional town with little inward investment (a factor which is considered under Indicator 11). Others will point to the pressures rising prices bring on property affordability particularly for low wage socioeconomic groups, some of which make up an important labour source for the servicing of developments such as Salt. The vexed question is, do developments such as Salt have a responsibility to provide affordable housing where the definition would imply a social dimension?

The developer has master planned a wide range of tenure which include investment strata titles, land and build packages, medium density apartments and community titled aged care residential units. Each will satisfy a range of income groups and provide ‘affordable’ opportunities. It is not the place of this pilot study to argue for or against the provision of social housing on a scheme like Salt but simply to raise the issue that where there is no legal obligation, provision is not likely to occur. For Salt this raises an issue regarding the housing of key workers such as hotel staff, grounds maintenance landscapers and bar and restaurant workers. For many of these low income workers, Salt will not be affordable, plus with the pressure on other local housing supply, problems in labour supply may result. This factor may become an increasing issue for developments, particularly those that do not have ready access to a large labour market. At Salt, the developer has sought to combat this issue by now planning for ‘affordable’ single bedroom apartments to be introduced into its remaining sites.

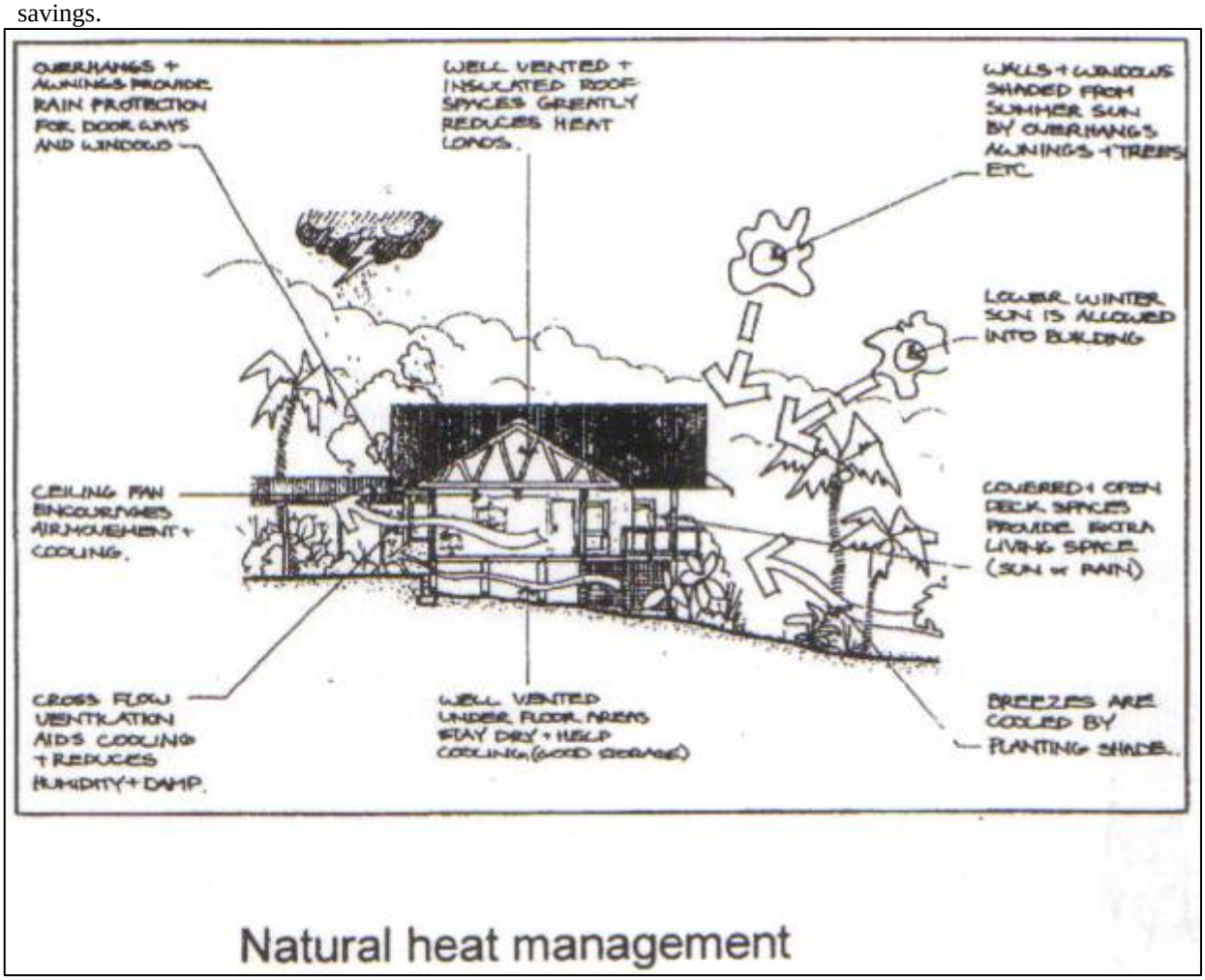
Indicator 4: Energy Efficiency and Conservation

A major objective of this indicator is to advise developers that consideration be given when master planning and designing the precinct to ‘a whole systems view’ regarding energy uses. Salt again indicates the problem of large precincts where, as noted before, the design of major elements such as hotels are not fully in the developer’s control. Consideration is now being given to how this issue can be aggregated across the whole of the development so that gains in some areas are measured against possible losses in others. This would provide for a more equitable presentation of the boarder sustainability achievements being encouraged by a precinct developer.

Further, it is being recognised that the argument for performance based process implies that some of the benefits sought may not readily be achievable at the initial stages of the development. Therefore monitoring procedures need to be a feature of early design decisions involving energy use. This will be particularly relevant if targets are set by a developer seeking to achieve long term reductions in energy use during and after the construction phase. At Salt, no such targets were used. Energy savings would appear to be seen as an issue of development supply and residential use. The developer negotiated the first private butane gas installation on a development in Australia. Installation of a reticulated gas system feed throughout the precinct from an underground tank is complete. The tank site is located along the new highway infrastructure for ease of provider access and reductions of precinct disturbance. This alternative and arguable more environmentally sustainable gas supply provided considerable technical and management benefits over the existing services infrastructure provider. It is hoped that energy savings will result through reductions of commercial and domestic energy usage at Salt. The scale of development and projected commercial and residential customer take up provided an economic returns proposition that allowed for nil capital cost over time in terms of equipment and infrastructure.

The costs should be recovered by Western Australian Company Kleengas who took a long term investment view on consumer take up increasing due to the lower butane gas fuel cost. Measurement of the medium to long term performance outcomes of this supply approach would prove useful and may be possible with input from the supplier.

Whilst it is noted that no specific targets were set at Salt, there is an oblique form of targeting to be found. All residential lots must follow Tweed Councils existing DCP39 'Energy Efficient Housing' rating process. This will provide some measure of energy saving but the question for the developer is whether it is sufficient to relinquish outcomes to what is possibly a fairly low baseline. Further, any gains will go unrecorded, as there is no regime for performance measurement of statutory targets in place. The referencing of the code is also accompanied by a reliance on design criteria found in the content of the Architectural & Landscaping Design Guidelines. It is hoped that design measures will provide the means by which occupiers will achieve energy savings.



Natural heat management

Within this critical document, reference is made to orientation, materials, shading and passive heating strategies. The encouragement of energy efficient solutions regarding solar orientation and control and low maintenance construction practices flows throughout the guide. However, they are subject to the design control procedures noted earlier. The success of this approach will only be measurable when significant numbers of properties are constructed and occupied.

Figure 23: Architectural & Landscaping Design Guidelines recommendations

Regarding orientation at Salt, not all the lots benefit from an east west orientation (Figure 24). The number of lots benefiting from this orientation is a target which developers need to consider. Given the location, scale, precinct mix and existing restraints found at Salt, it would have proved difficult to achieve a fully 'orientated' layout. However, within the context of this type of development, lot sizes could be used to exploit an improved solar access profile. The provision of suitably shaped lots of not less than 525m² and ranging up to 900m² may offer the flexibility needed to site the dwelling north with boundaries running east to west. Also, the maintaining

of adequate setbacks will provide a means of obtaining reductions in energy consumption. On reviewing lot sizes and the content of the Salt design guidelines this is achievable. Designs are in fact reflecting this approach, but it is an issue that is heavily reliant on the already mentioned design approval process. The siting indicator offers the opportunity to measure this approach.

Possible target setting by the percentage of allotments and buildings (hotel, villas, units and retail and recreational facilities) that have been orientated for optimum solar access and air flow ventilation.

Figure 24: Lot sizes, boundary setbacks, orientation and shading

Indicator 5: Water Conservation and Management

This indicator is regarded as one of the suite of measurable performance indicators that provides initial and ongoing quantifiable data critical to the environmental performance monitoring of the development. Its primary aims are a reflection of the need for minimisation of water usage and water treatment prior to use on a development. Management of water is critical because it is recognised as a limited resource but has a high value placed on it by users, particularly in terms of security and quality of supply.

Whilst the developer ensured that the use of salt water not town water was used in the remediation works noted earlier there is no long term potable water management system at Salt. This is possibly due to the infrastructure supply being via the use of an upgraded 600mm diameter trunk water main adjacent to the Coastal Road. Albeit that the main was subject to realignment, it would have been viewed as providing an attractive and economic infrastructure solution. Investigations into the capacity of the existing provision were an environmental mitigation requirement. It is likely that the adequacy and quality of the supply which was entirely within the control of Tweed Shire Council forestalled any discussion on alternative approaches. Further, whilst it is often suggested that alternative sources should be sought, there are health concerns regarding drinking water that can not be ignored by developers and local authority promoters particularly when engaged with the international travel and tourism industry.

However, more could be done regarding the use of grey and black water, particularly in terms of the large areas of open space maintenance, however, here again intent is often thwarted by regulation. At Salt, a $500,000 initiative to reduce water use in terms of landscape maintenance is seen by the introduction of a soil conditioner product known as TerraCottem. It is claimed that this internationally recognised proprietary mixture reduces the amount of water necessary to ensure high quality plants and turf. Savings of up to 50% on the water normally required for green space irrigation is claimed. Considering the amount of open space provided at Salt and on other medium to large precincts which offer considerable areas of open space in their master plans, this is an important issue and should receive consideration at an early stage of the precinct's design, development and management.

At Salt, no specific targets have been set regarding reductions in the water supplied or consumed at Salt. Though as previously noted, the developer did undertake initiatives where control was vested in his own management team. This reflects the difficulty of adopting or imposing measures throughout a precinct where control of the actual construction choices of say fixtures and fittings is limited. This limitation applies to not only the large hotel groups but also to the individual lot purchasers. Further recognition has to be given to the nature of the precinct. International hotel standards are required in both Outrigger and Peppers (and the proposed third hotel resort) which create issues regarding visitor expectations. These client groups will also be either specifying themselves or relying on consultants and builders to offer products that may or may not provide water saving design measures. There may have been an opportunity here to use the Architectural & Landscaping Design Guidelines to offer advice and possible solutions. Developers however may be very reluctant to provide this amount of input due to design and specification liability. Alternative means by which incentives are offered need to be considered regarding the management of water usage during the inception stages of medium to large precinct developments, as do the attitudes of local authorities to water usage.

The figures for predicted volumes of water being supplied or consumed will become available over time and it may be possible to put in place a retrospective regime of data gathering. With this information, commentary on the precinct's usage and possible means to reduce its consumption if necessary could be post occupancy performance based outcomes that evolve with the maturing precinct and its community.

Indicator 6: Solid and Other Waste Management

There are no major initiatives presently at Salt regarding waste management during the total construction phase or during post development occupancy. Further, there is to be no monitoring of waste generation or land fill use on completion of the development. Whilst the developer recognised that poor decisions at the planning and design stage could lead to levels of solid waste generation during the construction stages, most of the processes and materials used during the construction of the precinct infrastructure and subsequent buildings were not in the developer's control. Again the issues of liability and economic exposure cannot be ignored on such large undertakings. Further, the contractual arrangements normally entered into to secure major infrastructure do not encompass waste management requirements. This is likely to be the same for the large hotel groups.

Limited ability to impact on material selection

Similar to the previous indicator measures to reduce unacceptable waste generation, outcomes need to be implemented during the planning and design stages of the developments elements, i.e. infrastructure, buildings and operational waste. As noted control over the major infrastructure relies on designers, project managers, constructors and build contracts employed to impose or undertake measures deemed appropriate. Unless the implementation of sustainable construction practices is a primary objective during the planning and design phase, reduction of waste generation is not likely.

An objective of PPDS is to encourage ongoing involvement in the process of development. This indicator offers an opportunity to suggest how this may take place. As stated, there was not an integrative approach adopted on Salt regarding waste management, however as the project proceeds matters that were not considered but which now appear as opportunities may still be introduced as the precinct evolves. The following possibilities are taken from the PPDS Handbook:

- Adopting green procurement practices such as avoiding purchases of materials with excessive disposable packaging (such as plastic wrapped fixtures or fasteners);
- Implementing measures that more accurately record waste produced and disposed of (for example, use several containers and skips to sort various types of waste);
- Recycle green waste by delivering to local composting/chipping facilities where available; and
- Reuse green waste in hotel gardens, public areas and residential areas (for example, for wood chip mulching and as compost to enhance soil quality);

These measures could be introduced as a retrospective management plan by the developer given the continuing involvement in the maintenance of infrastructure and by the secured management rights of the Peppers Hotel.

Indicator 7: Resource Conservation (Materials)

The long term maintenance of the precinct's commercial, residential, community and accommodation buildings, as well as the supporting infrastructure, will now be an ongoing feature of its evolution. Whilst new materials will continually be required for this maintenance, reductions can be achieved, and consideration of reclaimed, recycled, and green materials should now be paramount. The use of the Architectural & Landscaping Design Guidelines could minimise environmental impact if, as suggested, they are written to include the necessary information and detail. PPDS identifies for example, that the selection of locally produced materials reduces the quantity of energy expended on transportation. This practice along with numerous other guidelines can result in a decrease in harmful emissions and improve air quality. It must be recognised that actual availability of locally made products and materials can factor heavily in sustainable supply chain linkages. At Salt, no such targets have been set and again limitation in control over owner occupiers and commercial operators is likely to be the major issue.

However, as with the pervious indicator, PPDS provides encouragement for ongoing performance involvement in the development process. This indicator offers a similar opportunity to suggest how this may take place. Again the following possibilities are taken from the PPDS Handbook:

- Reduce the quantity of new materials used by utilising existing resources – this can include salvaging materials from locally demolished developments;
- Minimise environmental impact by ensuring that:
  - ✓ locally reclaimed materials are specified;
  - ✓ green materials are specified;
  - ✓ materials are used whose ingredients are naturally occurring;
- Follow a green procurement policy for hotels and other residential and commercial activities;

- Ensure reclaimed and green materials are transported as short a distance as possible;
- Select timber that originates from non-environmentally sensitive areas for lower environmental impact.
- Consider materials that are low maintenance or those that are likely to have the least impact – that is, materials that require minimal painting, re-treatment, or waterproofing;
- Locally produced materials should be chosen where possible – this reduces the quantity of energy expended on transporting materials and also contributes financially to the local community;
- Choose recyclable materials over virgin resources to contribute to environmental protection – numerous supplies which have been manufactured from pre-used materials are available on the market; and
- Commit to a green materials procurement policy by dealing with local materials suppliers with environmentally friendly supply chains.

These measures could be implemented through amendment to the Architectural & Landscaping Design Guidelines. Whilst this document offers some advice on timber dwellings, little is noted regarding other building types, materials, sources or alternative solutions.

There is reference to the high corrosive impact on building materials close to the ocean in the guidelines. Lot purchasers are advised to obtain a council document which provides advice on corrosion, particularly hidden structural elements that require attention from the outset. It may well have been in the interests of the developer to have actually incorporated this form of advice in the guidelines. This may have ensured greater recognition of coastal deterioration caused by the aggressive salt laden atmosphere

Indicator 8: Chemical Use

Infrastructure Areas

Chemical usage on precinct development may consist of cleaning chemicals, pesticides, and herbicides. A chemical use strategy can assist with identification of the purpose of each chemical and in determining if a biodegradable alternative can be utilised. At Salt there are considerable areas of major and minor road infrastructure, open space, dunal restoration footpaths and cycleways, carparks and infrastructure buildings associated with Salt (Figure 25). This is without reference to the hotels and residential lots. Chemical use and its possible leaching into the surrounding environment was a major issue. The indicator was introduced to identify the risks that can result from uncontrolled use of chemicals on medium to large precinct developments which may result in environmental impacts such as the contamination of waterways. Given the coastal and creek location of Salt, the implementation of a chemical use strategy could gradually decrease the total usage of chemicals and therefore reduce the risk of an environmental incident. Whilst there is no chemical management plan or use strategy at Salt, the introduction of TerraCottem has allowed the developer to dispense with the board use of surface fertilisers on the infrastructure green space areas throughout the development. This action should be viewed in conjunction with the development's stormwater drainage strategy which requires all stormwater to be gathered and filtered via infiltration basins located throughout Salt prior to entry into the development's waterways.

Figure 25: Roads, open space, park and children's playground

Whilst it is again recognised that attempts to implement a policy throughout the precinct may prove difficult if not impossible because of control and ownership, a strategy that is offered as a benefit to the commercial and residential community may be a way forward to secure the reductions in chemical use being argued for in many quarters.

Such a strategy would seek to;

- Initially secure a reduction in the amount of chemicals used, arguing that would be a useful step towards environmental protection;
- Reduce the overall use and frequently select biodegradable chemicals over regular products which will reduce the impacts of harmful active ingredients and reduce pollution of soils, surface water, and groundwater;
- Introduce a pest management program (integrated pest management) which, together with planting of locally suitable species, can replace the need for a greater application of pesticides.

Provisionally, for pesticides, a plan of action could involve the:

- Establishment of a pest manager in the precinct;
- Elimination of broadcast herbicide application in parks and sports fields;
- Establishment of pilot pesticide-free zones in right-of-ways as test areas; and
- Establishment and securing of eco-friendly and alternative cleaning products.

To support this approach it will be necessary to outline what chemical products will be used and for what purpose – this will enable the choosing of alternative biodegradable products to be a simpler process.

Finally, this is another of the indicators that will benefit from ongoing commitment by developers, particularly as it is likely to be subject to changing legislation in areas such as health and safety. Developers will have a high degree of control regarding chemical use through the probable annual contract round of renewing medium to long term maintenance contracts for, say, the infrastructure landscaped areas. The issue is also likely to be one facing the adopting local authority as well given that many have committed to reduce non-biodegradable chemical use. The implementation of a biodegradable chemical usage plan for a the development could provide a way to achieve zero use of known dangerous and damaging, but commonly found, pesticides and herbicides in gardening and landscaping activity. Such an approach at these levels could be translated through communication to the community and result in a similar but voluntary take up by individual owners and occupiers.

Indicator 9: Wastewater Management

The implementation of this indicator promotes the management and treatment of wastewater in such a way that treatment requirements are reduced in terms of tankage, energy and chemical requirements. It seeks to promote the application of best practice for the sustainable treatment of wastewater to an appropriate standard. This is so as to encourage the reuse of wastewater for non-potable uses as a minimum target. Given the location, scale and nature of Salt, it was always likely that the development would prove difficult though not impossible in seeking to implement an environmentally sustainable urban drainage system (ESUD). This proved the case with the local statutory authority seeing no benefit in taking such an approach. Salt obtained development consent for a new sewerage rising main which required to be connected to an existing sewer some 2km away. To achieve this, the new main had to cross Cudgen Creek. This was achieved by directional drilling under the creek so as to avoid damage to the creek and adjacent riparian areas. Also installed were an appropriately engineered regional pumping station and internal development reticulation sewers for commercial and residential lots connection. This typical and traditional method for waste water accommodation on medium to large mixed use precincts is seen on most developments, particularly on the scale of Salt. These approaches are of course well designed and engineered solutions, however they do take forward the search for an ESUD system for wastewater that would at the very least recycle the water for non-potable use or return it to the source if extracted from a river. Detained on site in a constructed wetland for other secondary uses, waste water could prove useful in several ways, not least provide an opportunity to reduce potable water consumption (Figure 26).

Reed bed and similar technology is well established even for sub soil ground conditions made up predominately of sand. It provides the opportunities of employing ESUD on a development.

An interesting aside is the accompanying social capital and biodiversity gains that normally accompany this type of approach.

Figure 26: A large, mixed use precinct development reed bed which takes roadway and residential lots' roof runoff

Whilst accepting that the quality of the local creeks, streams, and estuaries must be maintained, well constructed and managed reed beds or biofilter storage systems have evolved from well tried and tested technology. The problem of their incorporation and use appears to be an issue of acceptance by in the main statutory authorities. In some metropolitan areas it is known that local bylaws prohibit the use of grey and black

water systems for health reasons. However the luxury of losing this potential water source is fast disappearing. In coastal and rural areas it would seem that that such strategies offer opportunities to reduce the major infrastructure civil engineering works required to service sites. However it is recognised that many local authorities use these large schemes as a funding source for the upgrade and repair of existing infrastructure. Accordingly the story at Salt is very familiar to areas where reasonable infrastructure exists and statutory authorities argue against the use of ESUD mainly on short term economic grounds, i.e. no resource shortage, post development management, cost of maintenance and health. Whilst these appear reasonable they may offer only short term resolutions to the issue of dwindling water supply and discharge pressures.

Indicator 10: Stormwater Management

Runoff is defined as that water generated by rainfall on pavements, roads and other impervious surfaces that are not connected to rainwater tanks. Runoff requires a measure of treatment before non-potable reuse as usually it has some contamination from vehicles, animals and other sources such as acid sulphate soils. This indicator may give an idea of the environmental sustainability of the precinct in terms of dealing with stormwater generated in the precinct as opposed to discharging it for treatment elsewhere. The already noted use of reed beds offers opportunity of retention of a major resource.

Stormwater generation at Salt was accommodated under Section 68 of the Local Government Act 1993. The act notionally only deals with connections of a private stormwater drain to a public one and the quality of any control device employed at the point of discharge into the public system. Given this limitation of its function and its age, any sustainability impact achieved by the act will be limited. Accordingly the issue of stormwater management appears to be a matter for resolution between the developer and the local authority engineers. Tweed does aid the process by use of the Tweed Urban Stormwater Quality Management Plan which was adopted in 2000. This requires that a stormwater management plan and an erosion and sediment control plan be prepared and submitted.

The requirements are stringent in that they cover:

- Erosion risk mapping;
- Topographic site limitation;
- Soil properties;
- Erosion and sediment control proposals; and
- Vegetation layouts.

The design and implementation of the stormwater drainage strategy at Salt is extensive, coordinated as noted earlier with other elements at Salt and well executed. The swales (see Figure 27) in particular offer opportunities for an extensive biodiversity gain through the planting that accompanies the swale areas. It is however felt that, as with the traditional engineered solution employed for waste water collection and discharge, stormwater retention and reuse potential has been somewhat lost particularly as these swales are in place to trap stormwater and aid in the recharge of the underlying freshwater aqua.

Figure 27: Stormwater drainage swale

Indicator 11: Economic Commitment

Economic outcomes are closely linked to environmental and social performance and its impact can be (as with the other two development factors) both positive and negative. Inward investment can increase employment and business opportunities. This will possibly be the major economic measure particularly in an area such as the Tweed Shire which is seeking regeneration. The range of possible and actual improvements can be extensive; however they do need to be prioritised and appropriate. This is because, as noted, negative detrimental effects can result where a greater dependency on such inward investment and companies brings instability in labour markets and diversion of investment from other development areas. Achieving a well-integrated approach that creates win-win situations should be the major aim of a developer and the range of stakeholders involved with a

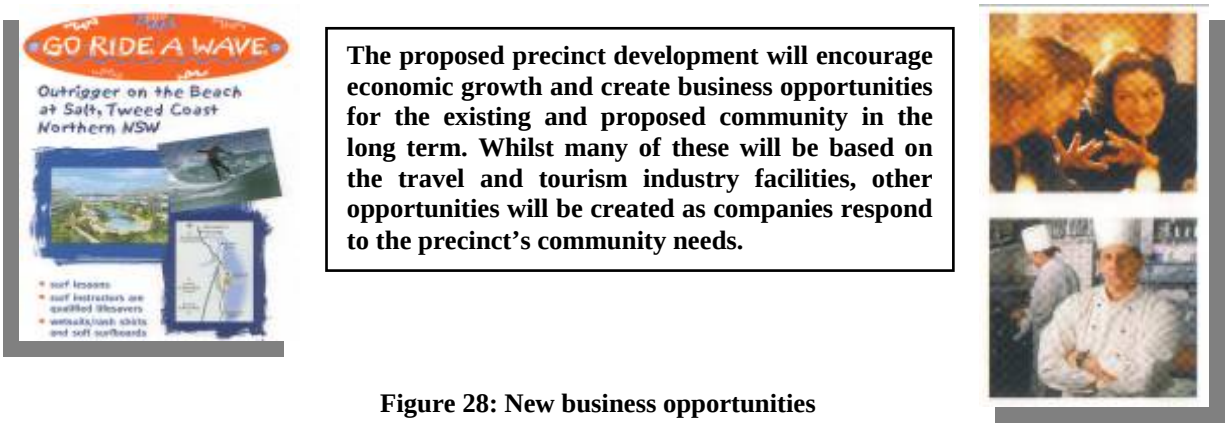
precinct and its surrounding region. In terms of this indicator (as with the social commitment indicator), negotiations regarding what the likely attributes and possible outcomes are should be translated into the precinct template. This translation should reflect the underlying principles of economic sustainability and include the propositions that there will be:

- The creation and maintenance of high and stable levels of economic growth and stability;
- Social progress which recognises the needs of everyone;
- Effective development and protection of the existing economic environment; and
- Prudent use of existing resources.

The economic review of Salt started with an assessment of the socioeconomic impact statement. It was estimated that the total cost of phase one of the development would be in the region of $218.5 million. This includes the first resort buildings and all dwelling units and houses. How this building investment dispersed into the region is not known, however it is reasonable to suggest that local businesses and the labour market benefited not least from the approximate 400 part-time construction jobs generated on Outrigger alone. However, considerable leakage from the Tweed area of this income is likely to have occurred due to only one in four workers actually living in the shire. The statement also noted that the local economy would benefit from an annual contribution of some $36.2 million in terms of income and taxation.

Whilst these particular figures will need to be tested over time, it is clear that some economic impacts are already being seen and not just at Salt. The most obvious of these are the hotels and new businesses opening at Salt. They include a range of facilities such as restaurant, hairdresser, convenience store, bottle shop and café. These will be dependent in the main on trade from the precinct but it is highly likely that they will service a wider market. i.e. day-trippers to the beach areas and/or visitors to the proposed parkland concerts. It is possible to argue that these operations may have negative impacts on similar existing businesses at Kingscliff; however this does not appear to be the case at present. Growth has been noted on the High Street at Kingscliff and in the small town of Cabarita Beach. Research into the causation of this perceived growth is limited but there is no denying the fact that improvements in a variety of retail offers and their quality are to be found. Many of these improvements have appeared following the start of development work on the Salt precinct.

The indicator also sets the objective of encouraging sustainable levels of inward investment to the area during and after development of the precinct. Further, it argues for an increase in the business base of the area, particularly new businesses (see Figure 28), and an improvement of the viability of existing businesses. The nature of Salt appears to provide the means by which this can be achieved, given the potential spending power being encouraged to the precinct.



The proposed precinct development will encourage economic growth and create business opportunities for the existing and proposed community in the long term. Whilst many of these will be based on the travel and tourism industry facilities, other opportunities will be created as companies respond to the precinct's community needs.

Figure 28: New business opportunities

Another example of where possible successful outcomes for the regional economy will be generated lies with the hotel groups. It is suggested that the resort and conference market alone may inject some $80 million annually to the Tweed Shire region once it becomes established.

The ripple effect into the region through the precinct's use of local businesses and via direct taxation offers a financial model that many hope for when encouraging these types of development. This area alone warrants the continuing use of a performance based measurement model to identify what the true financial impacts are on the local economy. This information is critical to the accurate predictions needed in medium to long term economic planning, by local authorities in particular. This again shows the close relationship that developers and stakeholders such as the local authority should have and encourage.

A further and equally critical issue for this indicator to review is the impact on employment. The major objectives are that there will be:

- Employment and training opportunities for the existing and proposed community;
- Permanent and part time employment opportunities created by the development at all levels of operation;

- Training and long term career opportunities for local people particularly young persons and the disabled; and
- Environmental and social linked job opportunities.

Salt has generated considerable numbers of temporary job opportunities during the preconstruction and construction phases of its development. However, whilst beneficial to those consultants, local authority personnel and tradespersons involved, they normally provide only short term gains in employment. It is felt that these figures can be useful for predictions regarding impacts on labour supply and on short term training opportunities, but for long term employment gains it is the full time equivalent (FTE) positions that must be predicted and then measured.

The socioeconomic statement provided some summarised figures. It stated that 504 employment opportunities would be generated in the operational phase of Salt. This figure may need adjustment if the planned third hotel is constructed. The figure does not take into account possible indirect FTEs arising from the related businesses that will inevitably become involved in precinct servicing, i.e. tour operations, real estate, legal, health, taxis and child minding. This list will be extensive. The direct economic contribution of the 504 positions is put at $45.5million dollars; the other opportunities suggest that it may be higher. However, the figures do need to be researched and confirmed but at this stage the potential of this scale of economic injection into the Tweed Shire cannot be underestimated.

As mentioned at the beginning of this indicator, negative outcomes do occur. The suggested levels of equity inflowing into the local area could distort the local economy, particularly the housing market. The potential of employment will bring an influx of non-shire workers to the precinct, which will naturally lead to a demand for accommodation, bringing supply pressures on suitable local housing and in particular rental properties. Key workers, as noted under the social commitment indicator, may begin to experience market barriers which may in turn impact on labour supply and the efficiency of operational activity on the precinct.

Linked to this issue is the shortage of skilled workers in many labour forces. Training programmes are critical in this situation, particularly for retraining and young worker development. The indicator seeks to measure the opportunities offered by the developer and the major precinct employers in this area. For the developer, its non-involvement in construction activity limited its earlier opportunities. However, staff training and skills updating in terms of marketing activity was undertaken. Further, because of its long term management of the Peppers Resort and that it is known that the Peppers organisation enjoys the advantages of well established training programmes, a review of skills needs is likely. Outrigger initially did not undertake active staff training, seeking mainly to exploit the existing labour supply. This is likely not to be sustainable particularly as the other hotels enter the labour market. Already moves are being taken to implement training policies for the Outrigger hotel operation at Salt.

It can be argued that this is a major initiative area for local authorities such as Tweed Shire to become involved in when looking at the regeneration of its local economy. Employment and skills supply are major factors. In the Tweed Future Paper the shire council saw its role as one of encouraging inward business investment into the shire what it did not recognise or make the equally critical link to was skills shortages. This issue will without doubt act as a major disincentive to business if its costs are impacted on by low skills workforces and high training bills.

There was no specific information regarding environmental or social linked job opportunities. However, given the opening of the Surf Life Saving Club, the large areas of dunal restoration, the creekside infrastructure and other social capital, it is highly likely that dedicated positions will result. Long term measurement of the employment profile at Salt and its adjoining areas should show the effects of this large precinct development on the job market. This data will need to be collected to ensure the long term sustainable performance of Salt will be maintained.

Conclusions

PPDS – Lessons Taken From the Study of Salt

When proposed, Salt created immense interest and was not without controversy. Reactions both for and against development, particularly in areas such as coastal regions, are likely to be repeated in many countries and states as demand for this seachange lifestyle grows. Social and economic pressures ensuing from major demographic shifts means many areas are going to be grappling with the conflicts experienced at Salt in the coming years.

The issue for all stakeholders is complex and difficult given the various and often irreconcilable differences that will exist. The difficulty of the development debate is that ‘it is not black and white or one of rationality’. Today the world is one of persuasive arguments, with some of the stakeholders who lack the necessary skills of representation missing out when it comes to influencing outcomes. Developers should be wary of dismissing this group of normally well meaning people on the ground. They may be the route to a successful outcome as they normally seek resolution but with conditions, most of which are normally quite reasonable (Curtin & Jones

2000). Accordingly, developers should recognise stakeholder communication takes many forms and their response must be seen to be effective and encompass the total community. An amendment to the pre-commitment questionnaire which reflects this issue and offers an earlier input to developer awareness has been implemented.

The search for resolution of the many competing interests has lead to recognition that the current statutory planning process is neither sensitive nor robust enough to offer sustainable solutions. Whist it is argued that PPDS may help in the resolution of a much broader range of issues because of its wide indicator suite and their content, it may not fully reconcile all the issues. It is suggested that it will need to sit within a new performance process based model, which gives regard to a way of achieving a fully integrated and transparent system of development approval. This model will possibly argue for an earlier involvement tool, i.e. a sustainability indexation matrix that assesses the location and site prior to decisions regarding its use. This tool may be of particular use where state regional plans that are seeking more recognisable sustainable solutions to regional development are in existence. Sustainability and planning linkages could be reflected in the matrix and earlier decisions made on how best to achieve mutuality in terms of developer and stakeholder goals, aims and objectives.

The lack of a totally integrative approach exposes issues which get to the heart of the industry's problem with tracking and improving performance generally. This is an issue which will need to be addressed on future developments and again the means to encourage a more proactive involvement by all involved will need to be generated. This is clearly seen at Salt with the involvement of the large hotel groups. These influential components of the scheme are obviously a mainstay to its economic viability. They also contribute heavily to the social commitment that will feature at Salt. However, a balance with environmental impacts must be achieved. The achievement of this objective may lay with the suggested performance based model of development which could show the positive benefits to be gained by a more sustainable agenda being adopted. As noted, PPDS is a process based performance monitoring tool. It uses appropriate indicators as a mainstay in providing accurate information to aid in decision making, implementation of solutions, improving planning and design and management outputs. However it must be recognised that indicators 'are not a one-time procedure they are most useful when measured repeatedly and consistently through long term monitoring programmes' (WTO 2004, p.462). They are also useful if development targets in areas such as energy use, water conservation and employment levels are identified. Verification and possible modification of these targets can only be achieved by such monitoring.

Whilst no targets were set, discussions with the developer have indicated a continuing role for assessment. This is a result of recognising that many sustainable inputs and their impacts take place over time and may come about by adjustment to aspects of the development. The phenomenon will most likely be seen in the critical social and economic areas.

Also flowing from the review of the PPDS at Salt has been confirmation of the need for long term developer involvement with precinct developments and the associated management processes. This is seen in several major areas at Salt. Firstly, the Architectural & Landscaping Design Guidelines document, as noted, uses legal covenants to ensure compliance throughout the development in terms of delivery and quality. The enshrining of the document and the commitment of dedicated staff to aid users has maintained an important link between purchasers, their builders and the developer. This is a critical issue given that the developer, whilst not in control of the residential build programmes, can and does influence the important design stage.

Secondly, because the scheme which following inception and planning has an estimated development period of some eight years, continuing developer presence is a given. This presence is not only strategic but calls for day-to-day involvement. The developer will most certainly be required to maintain standards, particularly throughout the infrastructure provision. Ongoing maintenance until adoption and possibly beyond will feature in maintaining the quality of place achieved through the early provision of planted road kerbs and open spaces. The added value of this commitment should not be underestimated. A further dimension of involvement at Salt by the developer is the purchasing of operational management rights of the Peppers Hotel, the ownership of The Salt Bar and Restaurant and the health spa. These actions will ensure a considerable say in the projection and management of Salt and other operational areas during the coming years.

It must be recognised that Salt did not aspire to PPDS at its inception. The developer had already shown a willingness to put forward a sustainable agenda of his own making that sought to recognise relationships with clients, regulators, the public and suppliers. The resultant agenda sought to improve with effective and more sustainable development practices the delivery of a major precinct development. The developer was asked to undertake the measurement of the planning and design processes used and the resultant scheme against an evolving standard of sustainable indicators. An evaluation of Salt against the PPDS indicators has been carried out and can be viewed in Appendix C. It shows that, whilst the development can be challenged regarding important areas of what are norms for sustainable agendas, there are considerable inputs to the development that indicate its likely long term success, particularly for socioeconomic measures. They show the difficulty of expecting a definitive listing of sustainable elements that guarantee success. They also need to be measured against a difficult and obtuse planning system that does not truly encourage or reward the sustainable developer.

In that lies a major problem and one which must be addressed if sustainable developments are to be the norm not the exception.

The developer responded to the demand for lifestyle seachange now sought by many Australians. If this demand is to be managed in a sustainable manner then it is without doubt that such schemes must be measured in terms of their impacts and eventual performance. Without the ensuing data, critical planning and design decisions cannot be made with any certainty of success. Salt has started the process regarding PPDS; other schemes are now submitting to the review of their processes, decisions and performance outcomes.

The developer has now been joined by others involved in the development of precincts. It can be said that they all recognise the potential merits of sustainability. By challenging the norms of precinct delivery and opening their planning and design to the scrutiny of a new standard they indicate a growing willingness to reduce if not mitigate entirely the impacts of development. These actions and others that are noted suggest that for those who wish to undertake innovative, responsible and committed approaches on their developments they need at least to recognise the merits of an open mind in their approaches in seeking and achieving sustainable outcomes. That this process may provide a potential checklist of actions that go some way to ensure long term environmental, social and economic success is the goal. In achieving this goal the planning process may be made more sensitive to individual planning and design solutions that are appropriate for each and every location.

Chapter 6

PPDS WORKSHOP RESPONSES

Ben Bayada, Angela Hair and Richard Moore

Two workshops have been conducted on the PPDS. The first of these was attended by representatives from the Isis, Ballina and Tweed Councils. The second workshop was held at the Royal Australian Institute of Architects and was attended by building professionals. Feedback and responses from those in attendance at the workshops has been collated. Workshop feedback includes guest responses to key questions and key issues raised.

Responses from Building Professionals

Figure 29 summarises brief responses to questions answered by twenty-seven building professionals during one of the workshops.

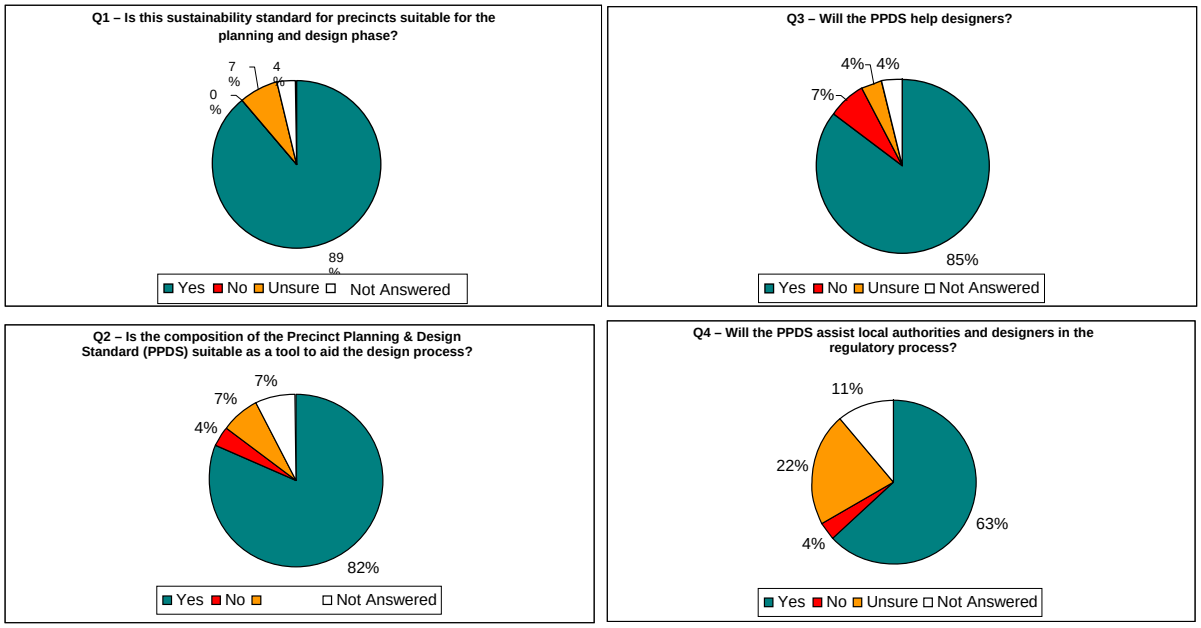


Figure 29: Questionnaire responses from building professionals

Of the building professionals present, 89% indicated that the PPDS is suitable for the precinct planning and design stages. None of the remaining 11% indicated that the standard was not suitable, responding that they were not sure or did not answer the question. Despite this positive indication of the standard's suitability, slightly fewer building professionals (82%) agreed that the specific composition of the standard is suitable for aiding the design process, whereas a minority of building professionals (4%) indicated that the standard was unsuitable in terms of the composition of the standard.

A slightly greater number of design professionals, 7%, indicated that the PPDS is not helpful for designers. However there was less uncertainty associated with this question and as a result (despite some disagreement), a large number of building professionals (85%) indicated that the PPDS would be helpful to designers.

Many design professionals were uncertain whether the PPDS would assist local authorities and designers in the regulatory process. With 22% of building professionals indicating they were unsure, and 11% not answering the question, it is clear that there is a higher level of uncertainty associated with this question. In contrast to other questions asked, there was a relatively low level of agreement associated with this question, in that only 63% of building professionals agreed that the standard would assist in the regulatory process. This is likely to be due to the high level of uncertainty.

Tables 9 to 12 list detailed responses to each of the four questions. Detailed responses to each category are categorised using SWOT analysis. Accordingly, responses are categorised based on whether they highlight strengths or weaknesses and whether they indicate opportunities or threats associated with the use of the PPDS in planning and design.

Table 9: Detailed responses on the suitability of the sustainability standard for the planning and design phase (Question 1)

Strengths	**Weaknesses**
Opportunities	
- Need to use tool. - The checklist framework or indicator framework is a useful tool. - Directional tool also to generate discussion and lateral thinking in relation to problem solving. - It can be further developed as it goes on. - The issue of sustainability needs to be addressed at macro and micro scales and this means it needs to be addressed during planning and detailed design. I think this standard is suitable for use in all of these instances. - Will generate appropriate ideas, and will guide and open up discussions. - It appears to be a tangible tool to work from. - It promotes the right things (ecological sustainable development) with reference to international best practice. - Suitable form, Green Star does not offer this more integrated system. PPDS offers benefits across the board. - It is at this stage when the project is an accumulation of ideas only and nothing is yet in 'concrete'. It is at this Planning & Design Phase where innovative solutions can easily be presented to developers, clients, community groups.	- Must be implemented – standard should be adopted by designers and local authorities. - Need to start at the top (i.e. local authorities) however, as an architect, we can educate developers etc. on these standards. - It would be useful for the presentation to be more explicit i.e. case studies to relate more directly to the standard (e.g. Buxton showed parts (all?) of the standard but not how it was applied to the design process).
Threats	
- It would appear to be at the appropriate level, however, how does it connect with the Green Star Planning System? - As a guide though, not definitive; must be a recognised set of standards by all; justification of costs. - This seems promising. However, there is insufficient detail from one seminar alone. - From a developer's point of view, it would add confidence to the system or take it up if this system can be endorsed/supported by LGA’s first as part of the town planning assessment tools.	- Need to consider redeveloping existing precincts which are already developed and becoming dense. - Suitable in a very lightweight manner. - Need more detail in Social Commitment, because not all projects are built in a modern culture. The issue lies in how we can prepare the real society to the advances of the project. - Depends on "values" inherent in the Standard; what is the extent of the measure of sustainability? Does one demolish the development that is not sustainable, even if fully ticked? Oh no!! - Should be a prompt sheet for designers/developers to assist with meeting requirements of SEPP65 and similar submissions. - But: 1. Developers must loop DA into profit and buildability (procurement); 2. Getting through to local government; 3. Dealing with arrogance/ignorance of local government councillors.

Table 10: Detailed responses on the suitability of the PPDS's composition as a tool to aid the design process (Question 2)

Strengths	**Weaknesses**
Opportunities	
- A very basic, checklist like approach. - Gives designers a process and set of guidelines to follow when considering how to create sustainable design. - Important to start at the design stage – sustainability should be integral to the development, not an advertising gimmick. - Yes and especially with use of a multidisciplinary team – this will result in a better output. - This is needed to ensure all measures are addressed throughout the course and planning of any master planning development. - It would help to guide the process if the details of the system are robust enough. It would certainly help with improving the transparency and communication to various stakeholders. Subsequently, it should also aid the creation and/or amendment of benchmarks required. - More identifiable criteria to use in addressing design suitability and outcomes needed – on a par with Green Star. - I think it works because it can be implemented and applied to individual projects, it is flexible and also the suggested approaches to sustainability are also appropriate design measures that benefit the quality of the architecture overall, not just in the area of sustainability. - More flexibility for wide range of applications, e.g. size of project; use of checklists; good universal definitions of all the 'new terms', e.g. open space ratio.	- It is important to involve both the design and development application aspects. - Yes but with the support of an experienced and willing team. - Facilitation of the design process will be important to the effectiveness of the tool.
Threats	
- Suitability depends on development application. - The values given to the indicators are still the $64,000 question. - Generally, although the detail (understanding) suffered.	- Need to have a desired standard to compare indicators stated against that standard – measuring tool! - The tool is not wide enough, though, to cover everything. - PPDS is a measure rather than a design tool…it could become an unnecessary distraction…to do so just because it says so…accepting values that remain concealed. - Always needed a landscape architect and urban planner; People in a community – first objective: economics cannot dictate the lifestyle. - Breakdown of issues and indicator 11 particularly suitable though economic growth impedes the environmental objectives of Green Globe.

Table 11: Detailed responses on the usefulness of the PPDS in helping designers (Question 3)

Strengths	**Weaknesses**
Opportunities	
- Will help designers/developers focus on triple bottom line issues upfront. - Use of a cross-referenced checklist for the design team/stakeholders for the various stages so everyone is aware of what they should be doing and when. - Will at least encourage new thought and innovation. - It does help to set a very basic guide for the design process, however, a detailed process on what measures can be employed would be beneficial. - Especially useful for communication. - It will help to ensure that designers have considered numerous options for sustainable design. - Gives us the tools to present sustainability ideas and systems, to developers and local authorities. - Will be able to provide additional details, and framework on ecologically sustainable design issues during the briefing stage of the precincts and/or master planning. - It will be a useful reference standard for the overall process of any development. - It would help in terms of providing starting points and arriving at key issues much earlier for cost/benefit analysis and practicality assessment. - Provides a framework for structuring the decision making process, however, as with any system, will require imaginative and informed interactive strategies to and economic, but more be effective. - Only if clearer criteria and testing are identified or, as stated, introduced as an integrated tool to assist but not form compliance standard - To be environmentally and socially sensitive is a large fuzzy subject – easy to say, hard to quantify. Anything to help solidify requirements would help. - It gives us avenues to influence developer's clients etc. to inform them that all this is possible and the monetary implications/benefits that result. Architects can feel more confident with suggesting environmental solutions knowing that ideas can be backed up with information. - I think so. Many designers rely on generalities, rules of thumb and industry accepted practice without any data to support gestures. Bring it on.	- Minimally helpful. - Access required to appropriate outcome standards. - It will need to become a pre-requisite for designers to use, prior to obtaining development approval. - Only useful for those that are trying to achieve sustainable design. - Co-ordination must be encouraged between the designer and the owner (awareness). - Should include also not only environmental ethical and spiritual values which are needed for the re-generation of societies at present. - Should be – will the PPDS help designers and developers? - Some big developers (no names) are still in the dark ages!
Threats	
	- A link to the design sources for determination of indicator values is critical – this is still the designer's main problem (valuing the values). - Requires education (university level). - The danger is that this tool will become used by all and to approve anything.

Table 12: Detailed Responses on PP&DS potential to assist local authorities and designers in the regulatory process (Question 4)

Strengths	Weaknesses
Opportunities	
- Helps to support your sustainability approach. - Both authorities and designers have to work to the same standard, so the design can be assessed against that standard. - Not sure yet why PPDS principles aren't compulsory. - The more the tool is used the more successful it will become. - Currently BCC has issued sustainability principles and guidelines but no checking system to comply – the PPDS could be integrated into the BCC sustainability guidelines to test compliance! - It is beneficial that the designer, owner, and developer will be aware of environmental impact before government intervention. - Hopefully it should – this makes the assessment process fair to all parties…common level of criteria understanding to all parties involved. - This system has the potential to function as a guide to draw the LGA and the designers together on issue/agenda setting and resolution. - Is it being promoted so its documentation is automatically accepted by authorities replacing SEPP65 and like submissions and formal planning submissions other than registration/payment to local authorities? - It could, a system certainly needs to be adopted to use universally. - Reference tool to compare approaches and ensure most aspects have been considered. - It is important that architects are encouraged to consider the design process as holistic in that environmental issues are considered along with all other design issues. Any help in this area i.e. lists of approaches that can be taken, and that have been implemented on other projects so that we know that consideration of the environment in the construction industry is possible and also achievable. - But the practicality of implementation: 1. Local governments are law unto themselves; 2. State Governments won't intervene (probably need to); 3. This would take a lot of the subjective debate out of the approval process.	- May need integration depending on individual council regulation and processes. - Would be more beneficial if the indicators can mesh with the local authority. - A regulatory standard should be in place for people interested.
Threats	
- As long as those assessing the design are qualified!! Compliance after approval is hard to enforce must be common to all authorities. - The LGA staff would need to be educated extensively on PPDS for the regulatory process to benefit from this system. - Depends a lot on a cooperative approach and integration with LGA/BCA regulations (e.g. BCC Sustainability Codes) and town plans. - Provided it is a common ground, known to both and understood from the promotion of the common good.	- Should eliminate an amount of subjectivity involved in approval and assessment of development projects – depends on interest of councils. - Unfortunately it will probably be grabbed by those to help rush anything through (as we have experienced at Springbrook) – words like ‘eco’ and ‘sustainable’ are becoming weasel words.

Response from a Local Government Representative

A representative of the Ballina Council provided the following detailed responses to a different set of questions to those in the previous section. These responses are summarised in Table 13.

Table 13: Detailed Responses from a Ballina Council Representative

Strengths	Weaknesses
Opportunities	
- The PPDS can aid the development process as this type of documentation can assist the concept formulation, design and assessment process. - The PPDS will aid the development process by providing a checklist for developers. - One means by which the PPDS can be linked into the development process is through strategic planning and zoning processes.	
Threats	
- The standard will be effective as it allows developers to be public recognised and allocates status. The level of recognition depends on the accreditation credentials of the governing body.	- The potential for the PPDS to make the development process quicker is doubtful. Uncertainty is often a consequence of local or state political aspects not technical issues. - For a favourable development process, the first question should be: is this type of development on this site a good idea? There are other assessment factors to consider (e.g. architectural style, character). - The council representative appears to see more logic in implementing ISO14000 than customising the PPDS for his or her own location.

The Ballina Council representative also commented on the view of the council associated with standards such as these, as well as the accountability of linking with companies such as Earthcheck.

- Council has no current view on standards and tools such as these, except that it will be interested not only in the attainment of a standard or benchmark, but also the method involved in attaining it as they often love to take infrastructural components into their ownership and operation.
- When considering a link to companies such as Earthcheck there are doubts about certification/accreditation and the recognition of the standard. Independence and publicly verifiable accountability is questioned when considering a link to companies.
- Local and state governments largely already set benchmarks for indicators such as those in the standard.

Workshop Questions and Issues Raised

An aim of the project was to run professional development courses on the PPDS for planning and design professionals. To date, two workshops have been conducted, specifically targeted at two of the most important professions involved in the pre-development work associated with precinct development. The first was held at the Salt Development, Tweed Shire, NSW, and was attended by representatives from the Isis, Ballina and Tweed Councils. The second workshop was held at the Royal Australian Institute of Architects, Brisbane, and was attended mostly by architectural and design professionals who normally take on a major coordination role regarding the master plan and development approval processes. This workshop, while aimed at architects, did include a number of private practice planners normally retained for the development of the master plan and development approval process.

In introducing the workshops, it was noted that PPDS is seen as primarily a planning and design tool targeted at a broad band of professionals and others involved in the development process. Feedback from professionals in attendance at the workshops was an important objective of the project and the future evolution of PPDS.

The workshop responses include questionnaire results and the raising of a number of questions and issues.

Responses from Local Government Representatives

As stated, the first of these professional groups consisted of regulatory planning officers representing a range of local regulatory bodies, city or shire councils. The feedback from this group was mainly recorded on the day; no questionnaire returns were received.

This workshop offered an insight into the difficulty that PPDS, or any other sustainable planning and design tool, will face when it seeks to diffuse into the existing development approval process. The development approval process is legislated through the Integrated Planning Act (IPA). This act is used to establish the local or town plan.

Reponses and questions raised at the workshop provided evidence that confirmed Tweed Shire Council's comments that "development assessment is a crucial role and the day-to-day pressures impede proper attention to sustainable issues … sustainability is a macro concept that is not easily applied to the coalface of local government planning and decision making …". While the executive officers in attendance voiced a strong desire to incorporate a standard that appeared to offer an integrated and measurable approach to the delivery of sustainable outcomes, the enthusiasm of planning officers was much more muted. Their major concerns were the fear that PPDS could become another layer of regulatory requirement and extra work for the approving officer, and that it did not reflect the 'tick the box' nature of the existing development approval process. Also of concern was the compliance of a scheme that achieves approval based on an interpretation of the current regulatory requirements. Vulnerability to the developer's actual delivery, as opposed to their intent, obviously lay at the back of this question. Of interest here was the suggestion put forward by the research team that compliance can be achieved through conditions placed on the development approval. The use of PPDS as a means by which such conditions could be legally enforced by the regulatory authority did offer a positive route according to the executive officers. However this suggestion again presented problems for the planning officers, who foresaw enforcement issues, brought on by manpower and skills shortages. The issue of training staff in sustainability was a major issue for the planning officers. Many felt that they did not have the necessary skills to fully interoperate the sustainable agenda in practical terms. Interestingly this presents a contradiction. Due to this lack of skills there is an over-reliance on external agencies and a loss of control over appropriate outcomes. PPDS could go some way in redressing this for planning officers by providing a means to challenge and measure the worth of solutions put forward by others involved in the development approval process.

The regulatory challenge for PPDS will be to gain take-up by the development industry at the pre-master planning stage. This is so that assessment, sustainable interpretation and incorporation of regulatory requirements into its indicator suite can offer transparency and commitment. This should offer the degree of trust sought by planning authorities and their representatives when dealing with an industry which, unfortunately, has always been viewed with suspicion.

Responses from Building Professionals

The second of the workshops presented far more positive and considered views, as can be seen by the charts and questionnaire summaries. At this workshop the architects and planners attending offered responses that are being filtered into parts of PPDS as it develops further; of particular note are the areas of pre-development activity, social and economic commitment and indicator values. Also of interest was the suggestion that there is a need to modify or develop a new PPDS for regeneration of existing precincts.

As can be seen, PPDS received general support from participants asked about its suitability as a sustainability planning and design tool. There were also positive responses to the questions regarding its composition and ability to aid the design process. Where the doubt crept in was in its ability to assist local authorities in the regulatory process. This last issue echoes the previous section, and is a major problem facing many in the development industry. The fragmented delivery structure of the industry sector does not provide a clear mechanism for the reconciliation of the goals, aims and objectives of all those involved in the development process. Many recognised that the PPDS structure provided a macro to micro view of development, which would aid the planning and design processes and may bring about more appropriate solutions.

Landscape architects raised several points regarding the use of open space. Its use as a tool of wellbeing, social connection and, in developers' terms, 'added values' are reflected in PPDS; their question was about how much should schemes provide? This question has been identified as an example for illustrating the nature of PPDS. There is no definite answer; as the research team commented, "there is not necessarily a good or bad measure" and each scheme will have its own issues and solutions; the trick is to judge the correct ratio for the development type, size and population. While this is a slightly ambiguous answer, it hints at the flexibility and strength of PPDS, which does not necessarily lie in the specifics of the accuracy of assessment, but rather in the process which establishes confidence, adds legitimacy and creates a point of reference.

One of the major outcomes from this workshop has been the interest shown in testing PPDS on schemes being worked on by workshop attendees. This response was noted with satisfaction, given that many were prepared to undertake the evaluation of decisions made without the benefit of the performance-based process inherent in PPDS. Several schemes have been contacted for testing and it is hoped that the rigour gained from their input bodes well for the further development of PPDS.

Chapter 7

CONCLUSION

The PPDS tool has been examined from the standpoint of a number of stakeholders. The benefits are seen as follows.

Developers and Building Professionals

Reports from workshops with developers and building design professionals suggest the following benefits:

- *Recognition and reward*. The standard sets a 'best practice' design level. Companies which use the standard signal their ethical perspective to sustainability which improves a company's profile in the sustainability arena. This provides an eco-profile for the company;
- *Cost benefits*. Green design can provide significant capitol cost and operational savings. The first commercial application of Design and Construct Standard in the Sundance Project, Indonesia, has significantly reduced capitol and operational costs by approximately 10% (initial estimates);
- *Use of an 'Eco-label.'* The Green Globe brand is internationally recognised and complements their service star rating for marketing. The specific design standard allows niche-marketing, i.e. the Novotel/Ibis has become termed the 'green hotel' in Sydney and receives niche business from 'green' groups. 'Green buildings' in the USA now have so many visitors they have to limit tours;
- *Design process efficiencies.* Considerable efficiencies in the design management of a project can be achieved through the use of the tool and the standard, as it:
    1. Provides a checklist of issues for the design brief;
    2. Sets environmental performance targets for the design team;
    3. Provides a reporting tool for progress in the design process;
    4. Facilitates collaboration with local authorities in meeting code compliance issues in the sustainability area;
    5. Complements existing ISO 9000 quality management systems by assisting in setting goals and objectives;
    6. Provides information on selected contractual obligations by builders and other personnel to improve environmental performance during construction;
- *Access to a knowledge base on 'green' development.* One significant barrier to 'green design' is the knowledge gap in finding appropriate systems and products. An indirect benefit of the standard and the tool via Green Globe is to provide access to information and expertise. This saves time and money by providing access to a knowledge database, expert group and supply chain information. The cost benefits are difficult to assess, but without this capability 'going green' can extend project design times and costs to the point where green design issues are abandoned.

Local Government

The tool is seen as playing a role in supporting an evidence-based planning policy. Workshops will be carried out with developers, planners and local authorities, following a similar methodology to that used with the design professionals. The initial outcomes suggest that, although the PPDS tool will not replace the planning process, it could be integrated with it to improve the quality of decision-making. This can be achieved by providing a structure to facilitate code compliance through an alternative route, in addition to providing an industry standard to measure performance under Agenda 21. In Australia, many local councils are adopting these principles, and hence tools that link to this policy can aid the planning and design process. Furthermore, much of the planning legislation that uses Agenda 21 as a framework lacks the measures to evaluate the proposals submitted by proponents such as developers.

Work is underway to examine the benefits of the tool in practice, through a case study of a developer and local council who wish to enhance their evidence-based planning policy. The aim is to use the tool to predict the environmental performance of the development and thus enhance the quality of evidence used in decision-making. The benefits of reduced risk to the developer and less time with ambiguity of information could lead to an enhanced planning process.

Further research is needed to test PPDS and to develop appropriate benchmarks for the system.

APPENDIX A: GREEN GLOBE PRECINCT PLANNING AND DESIGN STANDARD

The Green Globe Precinct Planning and Design Standard (PPDS) was developed by the University of New South Wales and The University of Queensland, in conjunction with the Sustainable Tourism Cooperative Research Centre (STCRC) of Australia. This standard underpins the global affiliation, benchmarking and certification program of Green Globe, which strives for sustainability in travel and tourism infrastructure.

Implicit in reaching for sustainable tourism is the view that *planning and design* has a key role to play in resolving, or at least mitigating, many of the conflicts that tourism developments may generate. Many governments now have policies and regulations in place to tackle universal themes such as water and energy conservation, waste reduction, social inclusion and economic sustainability.

Green Globe has created guidelines and tools including indicators to help tackle these and other development issues.

Employing indicators is now widely accepted as a practical and meaningful way to evaluate performance in order to help tourism developer's progress towards sustainability by:

- Providing effective protection of the environment;
- Making prudent use of natural resources, especially scarce and important ones;
- Helping integrating tourism alongside other economic sectors; and
- Beneficially influencing physical patterns of development.

Focussing 'best practice' planning and design around sustainability principles will bring high calibre results in the form of more efficient operation and management and increased quality of service. Some of the key premises of the PPDS program are that:

- Sound principles build strong foundations;
- Good planning and design should be followed by good management;
- Being smart, resourceful and efficient saves time and money; and
- Balancing the needs of people, place and dollars creates partnerships which benefit all.

This Green Globe Standard should be read in conjunction with:

- The separate Green Globe Sector Benchmarking Indicators for Precinct Planning and Design which provide a concise outline of what should be measured;
- The Green Globe PPDS Developer's Handbook, which explains how and why each specific indicator should be measured;
- The Green Globe PPDS Benchmarking Workbook which provides a set of tables for the detailed calculation of indicators, plus summary table for indicators related to both precinct planning and design; and
- The Green Globe Design and Construct Standard which covers new building in a precinct development and the site infrastructure needed to operate the building.

Introduction

Green Globe generally supports the tourism sector by facilitating the conservation of natural and cultural resources and by increasing consumer and community awareness of important environmental, social and economic issues. Green Globe also assists in many specific ways, in the case of the PPDS by ensuring that forward planning and careful design of travel and tourism developments promotes an 'eco-efficiency' ethic that reduces impacts on the environment and may lead to lower costs of infrastructure construction and operation.

What the PPDS Covers

An increasing number of tourism developments occur as precincts that incorporate multiple facilities and varying land uses. They can cover large land areas in contrast to individual hotel and motel buildings and their sites. While the dominant purpose of the development project may be travel and tourism related, such precincts might include residential areas, public open space, community centres, small retail outlets and commercial space, in addition to the infrastructure connecting such land uses. Infrastructure may include enabling works such as offsite roads and services, structural landscaping, onsite roads, bike and pedestrian paths, piped or overhead services and areas reserved for treating storm and wastewater onsite.

The PPDS has been created to account for the broad areas of precinct developments that are not covered by Green Globe's associated standards, especially the Design and Construct Standard and the Company Standard. The PPDS applies at the planning phase of a multi-land use/multi-facility proposal and involves planning and design at the strategic level in the precinct. A critical outcome of the PPDS process is the master plan. It will be accompanied by a series of guidelines, for example covering architectural design, materials, signage, landscaping and chemical use.

These guidelines will need to apply to the aims, objectives and operation of the precinct including all future building sites until the sites are ready for building construction. At that point they would fall within the ambit of the Green Globe Design and Construct Standard, assuming that the developer adopts that standard for the development as well.

It is important to recognise the PPDS is a broad scale standard for the master planning and design of precincts. It seeks to encourage developers and their advisors to recognise the importance of good planning and design in the protection of increasingly fragile ecosystems. The critical Master Plan and associated documents such as Design and Landscaping Codes, Biodiversity and Ecology Reports, Energy and Waste Management Policies, and Social and Economic Commitment Strategies will be the means by which developers can show their commitment to sustainable development. It is these documents that will be assessed under this standard.

The Principles Underlying the PPDS

The PPDS adopted the following principles to define sustainable planning and design. Developers can use these as preliminary guidelines to set objectives and select appropriate processes to fulfil the requirements of this standard.

Planning and designing for sustainability integrates Agenda 21 principles through appropriate statements in the Master Plan, covering:

- Planning and design approach and application of sustainability policies;
- Location and siting;
- Conservation of energy and water resources;
- Selection of appropriate materials and processes;
- Protection of air, earth and water;
- Planning for sustainability in the construction and operation phase of the development; and
- Social and locational issues.

Objectives and Benefits of the PPDS

The principal objective of the PPDS is to facilitate environmentally, socially and economically sustainable new development in the travel and tourism industry and especially in the planning and design of new infrastructure in precinct development. This document sets out the requirements for sustainable environmental, social and economic performance and it describes how this achievement can be certified under the Green Globe program.

The benefits of gaining certification under the standard will assist in the following groups:

Developers[1]

- By providing them with fundamental guidelines for facilitating environmentally and socially responsible precinct planning and design from the onset of a project;
- By permitting an assessment against set criteria, providing developers with a benchmark for sustainable performance for planning and design of travel and tourism developments and encouraging developers to continually improve their performance; and
- By being less wasteful and more eco-efficient, thereby improving profitability.

Environment and community

- By providing consumers and travellers with the means of recognising components of sustainable tourism;
- By protecting local and global environmental quality; and
- By encouraging sustainable tourism's contribution to local communities and conservation.

Strategies to Achieve the Objectives of the PPDS

Strategies to achieve a plan and design for sustainability in precinct infrastructure can come through a large range of approaches:

- Environmental briefings;
- Adopting a multidisciplinary team approach with a team based on green credentials;
- Preparing a sustainability policy;
- Ensuring the Master Plan specifies the adoption of an appropriate environmental management system during and post-construction;
- Preparing a Master Plan which contains a vision for the precinct;

[1] The term 'Developers' here includes developers/owners and their project managers, building design professionals, consultants and contractors.

- Preparing a Master Plan which contains a comprehensive policy for land use disposition and infrastructure planning and design, including:
    - Waste minimisation statements regarding construction waste and operational waste;
    - Resource conservation statements regarding the construction of precinct infrastructure;
    - Statements designed to minimise development impacts related to soil, air, water and noise pollution from construction, site preparation and day-to-day operational activities;
    - Statements designed to minimise adverse socioeconomic impacts;
    - Statements designed to maximise benefits to the local economy and community (e.g. using local materials and labour);
    - Deploying passive solar design strategies in buildings;
    - Appropriate deployment of active measures including selection of "green" materials, building systems and processes;
- Implementing appropriate waste management strategies during construction, including material inventory and daily waste monitoring;
- Undertaking an integrated approach to planning and design by:
    - Using life cycle assessment and other modelling and simulation methods involving users and builders at an early stage to communicate the sustainability vision;
    - Facilitating the documentation and monitoring as required by the sustainability design brief;
    - Facilitating an integrated approach between the design team members; and
    - Including planners, engineers and architects.

The ABC Process: Affiliate, Benchmarking, Certification

Developers responsible for the planning and design of new tourism precincts may participate in the Green Globe program at three levels:

A. **Affiliate:** Green Globe has an Awareness (Affiliate) program, which helps tourism companies to understand the Green Globe program, its benefits and requirements. It informs the developers about the principles of sustainable planning, design and construction, as well as the strategies and the means that can be employed to achieve them. Green Globe can also assist with setting performance targets for sustainable planning and design and provide copies of the standard, Sector Benchmarking Indicators and the PPDS Handbook. These documents, together with general information available to developers under the Affiliate program, will help tourism planners and designers understand what is needed to meet Green Globe requirements, e.g. in relation to sustainability policy, setting and working towards targets and monitoring performance of the development.

B. **Benchmarking:** Developers may undertake benchmarking independently of full certification. Projects that have been successfully benchmarked above baseline performance against all the Sector Benchmarking Indicators in the PPDS will have addressed all of the points in Sections 1-5 inclusive of the Green Globe Standard. The developer then receives the Green Globe logo (without a tick). The logo can be used to promote the development's environmental and social achievements.

C. **Certification:** A precinct development which has satisfied all the requirements of the PPDS and has attained the baseline benchmarks for the PPDS indicators can be certified following an evaluation of the planning and design process by an accredited external reviewer/third-party assessor. Certification is also linked to development approval to give Green Globe some surety that essential elements of the project will be met. Certification also involves a commitment to securing annual improvements in the benchmarking indicators (see Section 1, para 1.2 overleaf). After certification by Green Globe, the developers are entitled to use the Green Globe logo with distinctive tick.

Evidence of compliance

Documentation required verifying the sustainability of the precinct plan and design may consist of the following:

- Project overview;
- Sustainable precinct planning and design policy;
- Master planning brief;
- Design documentation and drawings including technical specifications;
- Project team composition;
- Infrastructure and construction management policy;
- EMS for construction phase;
- EMS for operation phase; and
- Consultant reports and documentation.

The Structure of the PPDS

The PPDS contains five sections:

1. Sustainable Precinct Planning, Design and Infrastructure Construction Policy
2. Regulatory Framework for Precinct Planning and Design
3. Sustainability Assessment
4. Planning and Design Management System
5. Community and Stakeholder Consultation and Performance Reporting

Section 1.0

Precinct Planning, Design and Infrastructure Construction Policy

The developer shall:

1.1 Have a written Environment and Social Sustainable Precinct Planning and Design Policy for the project that incorporates the points mentioned in this section and is appropriate to the Precinct and its infrastructure design's environmental and local social footprint. Contextual factors such as location, climate and design brief should be taken into account when planning the required nature and scale of activities. The policy shall have regard to the sustainable planning and design guidelines as described in preface of the standard.

1.2 Declare an intent to make appropriate changes and improvements in design to achieve Sustainability Performance Indicators measures at, or better than, the Green Globe Precinct Planning and Design Best Practice Level.

1.3 Have a commitment to comply with relevant environmental legislation and regulations, and with other requirements to which the planning and design should conform.

1.4 Have a commitment to give preference to indigenous planning and design strategies, infrastructure construction practices and products/services of local origin, which endorse the planning and design's sustainable vision.

1.5 Have a commitment to promote the Sustainable Policy and vision in the infrastructure construction phase and integrate within the infrastructure construction management system.

1.6 Have a commitment to communicate the aims of the Green Globe Precinct Planning and Design program to the infrastructure construction team, other builders and material suppliers.

1.7 Have a commitment to give special consideration to the employment of persons living in nearby communities, for infrastructure construction and resource procurement purposes.

Section 2.0

Regulatory Framework for Precinct Planning and Design

The developer shall:

2.1 Have a commitment to comply with relevant environmental legislation and regulations, and with any other requirements to which the precinct plan and design should conform.

2.2 Maintain an up-to-date register of relevant legislation, regulations, standards and codes to which the development should comply. These could include environmental requirements, land use planning and zoning controls, pollution control regulations, public health and occupational health and safety (OHS) requirements.

2.3 Maintain records of compliance and, where compliance was not maintained, maintain records of the remedial action taken to return to compliance.

2.4 Comply with any special requests from Green Globe for a particular geographical location.

Section 3.0

Sustainability Assessment

The developer shall:

3.1 Assess the environmental, social and economic impacts of plans, designs, strategies, techniques and other specifications in each of the Key Environmental and Social Performance Areas (usually abbreviated to 'Key Performance Areas' or 'KPAs'), by having particular regard to the Key Design Considerations outlined in Figure 43 below.

Relationship between Key Performance Areas and Key Design Consideration Areas

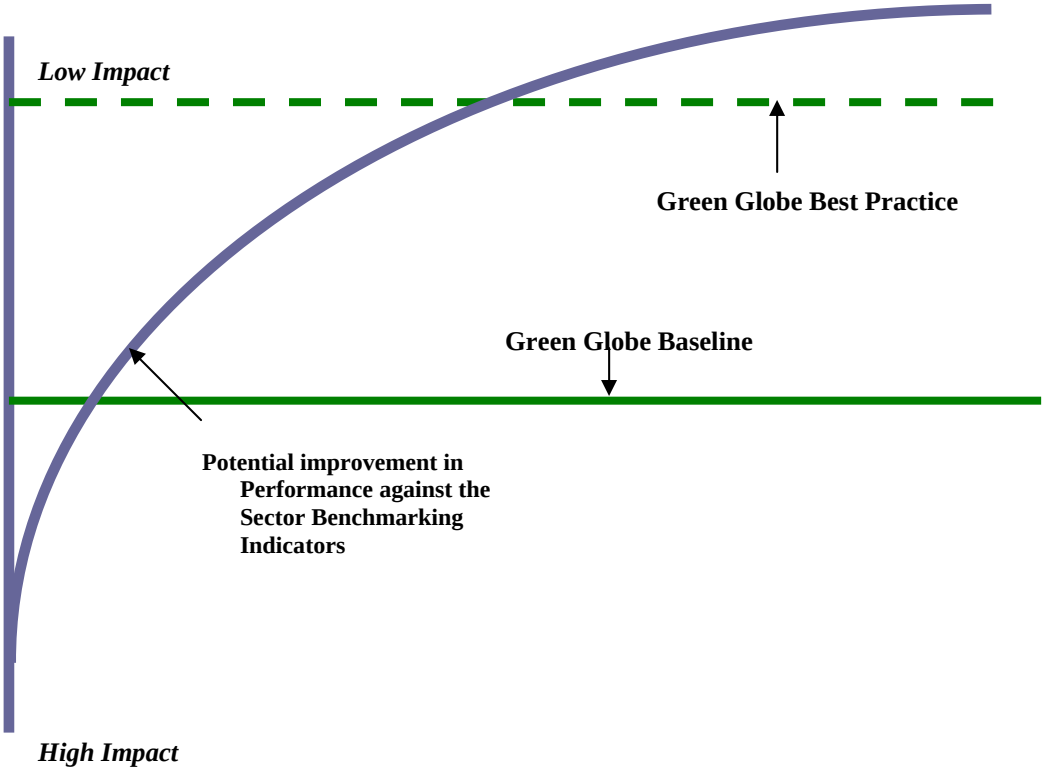
Key Design Consideration Areas	*Green Globe Key Performance Areas (KPAs)*								
	Greenhouse Gas Reduction	Energy Efficiency and Management	Air and Noise Quality	Fresh Water Resources	Waste Water Management	Waste Minimisation	Land use Management	Environmentally Harmful Substances and their Use	Social And Cultural Issues
Design Approach and Sustainable Policy	y	y	y	y	y	y	y	y	y
Location and Siting Issues			y	y			y		y
Energy Efficiency and Conservation	y	y							
Selection of Building Materials and Process	y	y	y	y	y	y		y	
Protection of Air, Earth and Water	y		y			y		y	y
Construction and Operation	y	y	y	y	y	y	y	y	y
Social and Economic Issues during design and construction			y						y

3.2 Record and document the level of potential impact of the planning and design process by using the Green Globe Sector Benchmarking Indicators for Precinct Planning and Design. The Sector Benchmarking Indicators are further elaborated in the Green Globe PPDS Handbook and are summarised below.

GG21 Sector Benchmarking Indicators for Planning and Design

SBIs for Planning and Design	*Green Globe Key Performance Areas (KPAs)*								
	Greenhouse Gas Reduction	Energy Efficiency and Management	Air and Noise Quality	Fresh Water Resources	Waste Water Management	Waste Minimisation	Land use Management	Environmentally Harmful Substances and their Use	Social And Cultural Issues
1. Sustainability Master Planning Approach	y	y	y	y	y	y	y	y	y
2. Precinct Location and Siting	y	y	y	y	y	y	y	y	y
3. Social Commitment						y			y
4. Energy Efficiency and Conservation	y	y			y	y	y		y
5. Water Conservation and Management			y			y	y	y	y
6. Solid and Other Waste Management						y			y
7. Resource Conservation	y	y		y	y	y	y		y
8. Chemical Use	y			y		y	y	y	y
9. Waste Water Management		y		y	y		y		y
10. Storm Water Management		y		y	y		y	y	y
11. Economic Commitment				y	y	y	y	y	y

3.3 Compare the environmental and social performance of the precinct plan against the Green Globe Sector Benchmarking Indicators for the Precinct Planning and Design Standard. A Green Globe Sustainability Assessment result above Green Globe baseline performance must be achieved for all indicators in the PPDS, as reflected conceptually below.



Green Globe Benchmarking of Environmental Performance against Sector Benchmarking Indicators

3.4 Establish achievable and responsible improvement targets, with the help of an external Reviewer or third party assessor to reduce adverse impacts and, where appropriate, to increase positive impacts in the KPAs of the precinct plan and design.

Section 4.0

Precinct Planning and Design Management System

The developer shall:

4.1 Develop and document a Sustainable Planning and Design Management System (SPDMS) in support of the Sustainable Precinct Planning, Design and Infrastructure Construction Policy (Section 1). It will show how targets and objectives are to be implemented and have clearly defined responsibilities for the planning team members. Senior management should formally approve the SPDMS and periodically review its implementation during the planning and design process (refer section 4.7 below).

4.2 Nominate a senior executive officer to be responsible for the implementation, ongoing performance and outcomes of the SPDMS for all planning and design elements and stages in order to promote an integrated design process.

4.3 Provide, where necessary, training in sustainability for all the planning and design team members with key responsibilities for actions within the SPDMS.

4.4 Ensure that interdisciplinary planning/design meetings take place with key team members and ensure the team has particular regard to the strategies needed to achieve desired performance in the KPAs.

4.5 Informally match the relevant Green Globe Sector Benchmarking Indicators to the Master Plan during the planning and design process to help achieve the required Green Globe baseline performance level. Use the Sustainability Assessment to strengthen the benchmarking of the Master Plan against the relevant Sector Benchmarking Indicators.

4.6 On a regular basis, review the plan and design and document the findings in accordance with the SPDMS.

4.7 Engage an external referee or assessor to review the Master Plan and associated codes and guidelines. Record the findings of this review and implement any necessary changes in an appropriate manner.

4.8 Use the Green Globe Sustainability Assessment Report to ensure that a significant improvement above benchmark is achieved in the relevant KPAs and Sector Benchmarking Indicators.

4.9 Assess the sustainability objectives for planning and design against the final design outcomes achieved.

4.10 Have a system in place for documenting and recording the planning and design process to provide the relevant data for the Green Globe Sector Benchmarking Indicators and their measures.

4.11 Establish and implement mechanisms to achieve targets, analyse the performance, review the process (with external referees or assessors for the certification stage) and suggest appropriate strategies and changes for improvement before finalising the Master Plan and design. Where appropriate, this monitoring process may include documented programs, procedures and reporting mechanisms for tracking targets and allocating responsibilities.
4.12 Regularly undertake a Senior Management Review to determine the adequacy and effectiveness of the SPDMS in fulfilling the requirements of the PPDS. The findings of this review shall be recorded and appropriate actions taken to correct situations not conforming to the Sustainable Planning and Design Policy (Section 1) and relevant targets.
4.13 Retain, for at least 24 months, appropriate records demonstrating conformance with the requirements of the PPDS, including data supporting the measures of the relevant Green Globe Sector Benchmarking Indicators.

Section 5

Community Stakeholder Consultation and Performance Reporting

The developer shall:
5.1 Establish effective consultative mechanisms and strategies to ensure all sections of the community are able to participate in developing the precinct Master Plan and design.
5.2 Communicate to the stakeholders and community in a clear and regularly updated manner, the developer's predicted environmental and social performance based on the Green Globe Sustainability Assessment
5.3 Communicate to the stakeholders and community all activities related to participation in the Green Globe program.
5.4 Hold stakeholder and community workshops involving team members, end users and representatives of local residents and organisations, including the local council.
5.5 Encourage customers and suppliers to engage in the project and its environmental and social programs. This could, for example, include the local community's and stakeholder advice on indigenous design elements and the provision of local goods and services during and post-construction.
5.6 Encourage and respond to both positive and negative feedback from the community and stakeholders on the developer's Sustainable Precinct Planning and Design Policy, the Master Plan and Design, ancillary plans and guidelines, related strategies and the targets used in all environmental and social performance areas.
5.7 Maintain records of community consultations and communications.
5.8 Be proactive in raising community/stakeholder awareness of local and global environmental issues.
5.9 Regularly produce and distribute to the community/stakeholders, a sustainability report that includes the findings of the annual Green Globe planning and design benchmarking reports.

The Indicators Underlying the PPDS

There are 10 indicators underlying the PPDS with an additional elective indicator. Each indicator is accompanied by an average of four measures, which are fully described in documents available to developers – the Handbook and the Sector Benchmarking Indicators. Both documents are available from Green Globe. The main indicators are presented here for ease of reference:

Sector Benchmarking Indicators

Indicator 1: Sustainable Master Planning Approach
Indicator 2: Precinct Location and Siting Planning
Indicator 3: Social Commitment 'Quality of Life' Approach
Indicator 4: Energy Efficiency and Conservation
Indicator 5: Water Conservation and Management
Indicator 6: Solid and Other Waste Management
Indicator 7: Resource Conservation (Materials)
Indicator 8: Chemical Use
Indicator 9: Wastewater Management
Indicator 10: Storm water Management
Indicator 11: Economic Commitment

APPENDIX B: ECOLOGICALLY SUSTAINABLE DEVELOPMENT

The Local Government Act (1993) defines ecologically sustainable development (ESD) as the following statements of principle. ESD requires the effective integration of economic and environmental considerations in decision-making processes. ESD can be achieved through the implementation of the following principles and programs:

a) The precautionary principle, namely, that 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. In the application of the precautionary principle, public and private decisions should be guided by:
    (i) Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and
    (ii) An assessment of the risk-weighted consequences of various options;
b) Inter-generational equity namely, that the present generation should ensure the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;
c) Conservation of biological diversity and ecological integrity, namely that conservation of biological diversity and ecological integrity should be a fundamental consideration;
d) Improved valuation, pricing and incentive mechanisms namely, that environmental factors should be included in the valuation of assets and services, such as:
    (i) Polluter pays, i.e. those who generate pollution and waste should bear the cost of containment, avoidance or abatement;
    (ii) The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste; and
    (iii) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The purpose of including this definition is to require councils, councillors and council employees to have regard to the principles of ESD in carrying out their responsibilities. The definition of ESD must be contained within the Council Charter and in the contents of draft management plans with respect to council's work and activities in order that councils are able to properly manage, develop, protect, restore, enhance and conserve the environment of the area for which they are responsible, in a manner that is consistent with, and promotes the principles, of ESD.

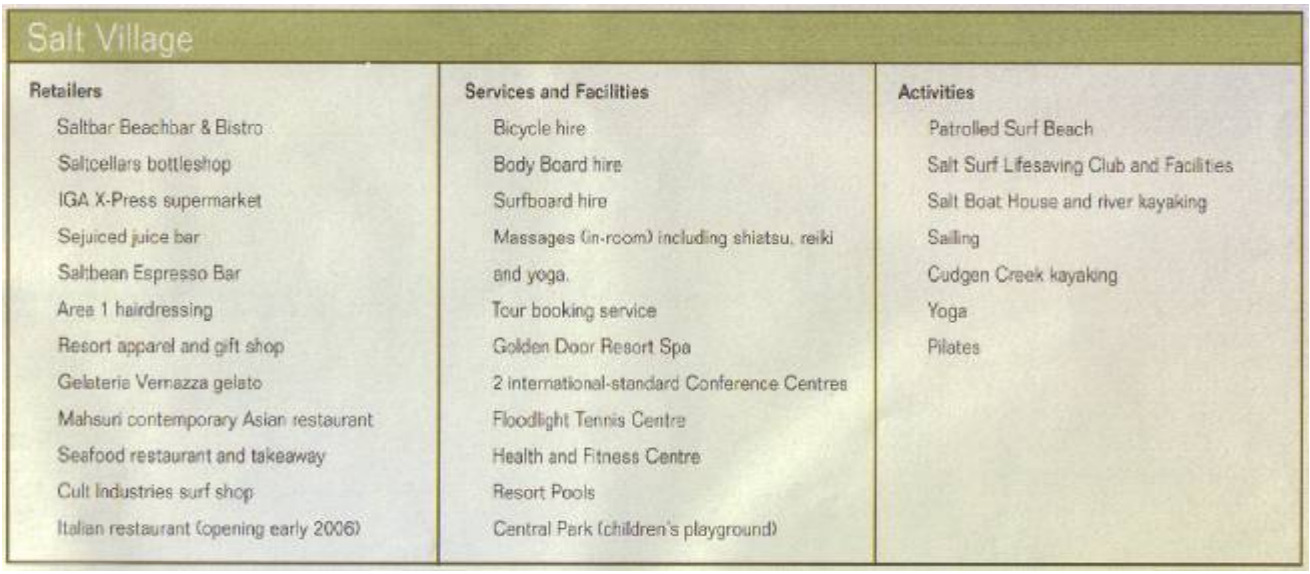
APPENDIX C: INDICATOR EVALUATION

√ – best practice x – baseline	
Indicators and Measures	
Indicator 1: Sustainability Master Planning Approach *Measures* ▪ The Master Planning Project brief, which includes sustainable goals, objectives and performance targets; ▪ A Community Consultation Plan; ▪ A multidisciplinary planning and design team with experience in sustainable master planning; ▪ An Architectural and Landscape Code, which integrates local mandatory and other voluntary environmental standards; ▪ The legal integration of environmental standards including PPDS within the precinct's title; ▪ The adoption of environmental design and operational standards for enabling infrastructure and buildings.	 √ √ √ √[1] √[1]
Indicator 2: Precinct Location and Siting Planning *Measures* ▪ Precinct location rating; ▪ Habitat conservation ratio; ▪ Public open space ratio; ▪ Building footprint ratio; ▪ Environmental landscaping rating; ▪ Site disturbance ratio.	 √ √ √ √ √
Indicator 3: Social Commitment *Measures* ▪ Planning and design strategies for the social progress; ▪ Encouragement of the communities understanding, involvement and integration with the natural, built, economic and social environments being developed or extended.	 √ √
Indicator 4: Energy Efficiency and Conservation *Measures* ▪ Total predicted energy consumption per year/predicted occupancy levels per year; ▪ Total predicted carbon dioxide emissions per year from energy consumption; ▪ Predicted percentage of renewable energy consumed per year; ▪ Use of energy sensitive site planning and design techniques; ▪ Application of passive building design; ▪ Predicted percentage of total energy consumption produced from a cogeneration facility; ▪ Percentage improved in energy efficient equipment; ▪ Used in buildings and infrastructure.	 **x** √ √ **x**
Indicator 5: Water Conservation and Management. *Measures:* ▪ Total predicted precinct water consumption per capita (kL/person per year); ▪ Water management plan in place; ▪ Predicted volume of auxiliary water supplied / total predicted water consumed (kL/year).	 **x** **x** **x**
Indicator 6: Solid & Other Waste Management. *Measures* ▪ Predicted volume of waste to landfill (m3) /occupant; ▪ A Waste Management Plan to be implemented.	
Indicator 7: Resource Conservation (Materials) *Measures* ▪ Specification of locally available materials has occurred; ▪ Predicted proportion of locally recycled or reclaimed materials used / total materials used; ▪ Structural and cladding materials selected will have a BRE Summary Rating and Recyclables Rating of at least Level "B"; ▪ Percentage of green components and systems used; ▪ A green materials procurement policy has been developed and adopted.	

Indicator 8: Chemical Use *Measure* ▪ A biodegradable chemical-use plan is in place.	**x**
Indicator 9: Wastewater Management *Measures* ▪ Predicted volume of wastewater treated on site; ▪ Total volume of wastewater generated per year; ▪ Predicted volume of wastewater reused for non-potable purposes / total volume of wastewater generated on site per year; ▪ Use of separate wastewater collection systems and decentralised systems; ▪ Predicted volume of wastewater sludge used sustainably (both on- and offsite) / total volume of wastewater sludge produced. ▪ Application of strategies/policies to secure the quality of local groundwater and surface water.	**x** **x** **x** **x** **x**
Indicator 10: Stormwater Management *Measures* ▪ Predicted volume of stormwater runoff collected, treated and reused / total predicted volume of runoff per year; ▪ Capacity of passive treatment systems (detention ponds, reed beds etc.) / total predicted volume of runoff per 10 year event; ▪ Application of strategies/policies to secure the quality of local groundwater and surface water; ▪ Proportion of permeable surface to total site area; ▪ Safety measures installed to prevent accidental public ingress.	**x** √ √ √
Indicator 11: Economic Commitment *Measures* ▪ Inward investment to the area during and after development of the precinct; ▪ The increase in the business base of the area, particularly new businesses; ▪ Improvement of the viability of the existing businesses in the area of the development; ▪ The numbers of permanent and part time employment opportunities to be created by the development at all levels of operation; ▪ Training and long term career opportunities for local people particularly young persons and the disabled; ▪ Environmental and social linked job opportunities.	√ √ √ √ √ √

√[1] - Best Practice results are in reference to residential housing lots and associated infrastructure only.

APPENDIX D: SOCIAL CAPITAL LISTS FOR SALT AND BROADER REGION



Salt Village

Retailers

- Saltbar Beachbar & Bistro
- Saltcellars bottleshop
- IGA X-Press supermarket
- Sejuiced juice bar
- Saltbean Espresso Bar
- Area 1 hairdressing
- Resort apparel and gift shop
- Gelateria Vernazza gelato
- Mahsuri contemporary Asian restaurant
- Seafood restaurant and takeaway
- Cult Industries surf shop
- Italian restaurant (opening early 2006)

Services and Facilities

- Bicycle hire
- Body Board hire
- Surfboard hire
- Massages (in-room) including shiatsu, reiki and yoga.
- Tour booking service
- Golden Door Resort Spa
- 2 international-standard Conference Centres
- Floodlight Tennis Centre
- Health and Fitness Centre
- Resort Pools
- Central Park (children's playground)

Activities

- Patrolled Surf Beach
- Salt Surf Lifesaving Club and Facilities
- Salt Boat House and river kayaking
- Sailing
- Cudgen Creek kayaking
- Yoga
- Pilates

Facilities listing at Salt: Whilst much of the above can be viewed as 'Social Capital' hard foundations for travel and tourism, many of the facilities can be integrated into the needs of a permanent residential coastal precinct community. They provide opportunities for wellbeing, employment, training and new business ventures. However, some critical elements are missing, e.g. medical services and educational provision at all levels. These will need to come from the wider regional community in the case of Salt.

In and around the New Tweed Coast

- Boat hire
- Jetski hire
- Scuba diving
- Fishing charters
- Flying lessons
- Hot air ballooning
- Horse riding
- Rafting tours
- Skydiving
- Tweed River cruises
- Whale watching
- Currumbin Wildlife Sanctuary
- Tropical Fruit World
- Tweed Art Gallery
- Farmers' Markets
- Pioneer Plantation
- Major theme parks (Dreamworld, Seaworld, Movieworld, Wet n' Wild)
- World-class golf courses
- Outlet shopping
- Arts and craft
- Pioneer towns
- Hiking
- Mountain climbing (Mt Warning)
- Rainforest walking

Broader Regional Area: Travel and Tourism Inputs to "Social Capital" Hard Foundations. Some of these are again appropriate to meet the needs of the transitory and permanent communities of Salt and the adjoining Tweed area in terms of employment, recreational and retail needs. Again recognition of those elements that are missing must be given, e.g. medical services and educational provision at all levels.

Figures: The New Tweed Coast Definitive Guide www.newtweedcoast.com

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The Sustainable Tourism Cooperative Research Centre (STCRC) is established under the Australian Government's Cooperative Research Centres Program. STCRC is the world's leading scientific institution delivering research to support the sustainability of travel and tourism - one of the world's largest and fastest growing industries.

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Tourism is a dynamic industry comprising many sectors from accommodation to hospitality, transportation to retail and many more. STCRC's research program addresses the challenges faced by small and large operators, tourism destinations and natural resource managers.

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Sustainable Enterprises: Enterprises that adhere to best practices, innovate, and harness the latest technologies will be more likely to prosper.

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isation

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