URBAN PLANNING FOR SUSTAINABILITY

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SUMMARY OF

ACTIONS TOWARDS SUSTAINABLE OUTCOMES

Environmental Issues/Principal Impacts

- Environmental inflows and outflows from cities, communities, sites and buildings – energy, water, ecological diversity, transportation options, material use.
- Social connections and equitable distribution of and access to open space and community facilities.
- Economic health through local job creation and diversity of economic opportunities.

Basic Strategies

In many design situations, boundaries and constraints limit the application of cutting EDGe actions. In these circumstances, designers should at least consider the following:

- Retain fragile or important natural locations, create attractive, economically sustainable focus areas, and provide walkable, sociable neighbourhoods.
- Create places with a variety of uses, opportunities for 'linked trips' and greater social interaction.
- Utilise existing infrastructure to its optimum first; generally avoid or limit low-density development.
- Concentrate higher intensity development around public transport systems that connect major destinations.
- Secure the collaboration and support of stakeholders and local communities.
- Reduce water and energy consumption, and negative impacts such as air emissions and receiving water quality.

Cutting EDGe Strategies

- Strategic planning, which sets goals and development frameworks on a state, regional or city-wide level, such as growth and development corridors, infrastructure provision and density objectives, regional open space planning, etc.
- Local area planning, which deals with designated community areas or corridors, such as provision of open space and community facilities, local infrastructure, densities and streetscapes, etc.
- Site planning, with a focus on individual blocks or tight clusters of sites, dealing with water use and water run-off, landscaping, foot and bicycle paths, solar orientation, etc.
- Single buildings, through measures focused on the form and performance of individual structures, such as energy ratings/ energy targets, greywater and rainwater capture and re-use, material selection, passive design features, etc.

Synergies and References

- *BDP Environment Design Guide*: GEN 13 – *Greenhouse Gas Emissions and the Residential Sector*; GEN 33 – *Reducing Greenhouse Gas Emissions through Design of the Built Environment*; GEN 45 – *Urban Development, Accessibility and Transport in Australia – Facing the Sustainability Challenge*; DES 13 – *An Introduction to Water Sensitive Design*; DES 48 – *Contributing to ESD through Landscape Planning, Design and Management*; DES 50 – *Sustainability and Urban Containment*
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ENVIRONMENT DESIGN GUIDE

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In order to deliver sustainability in the built environment, planning policies and statutory requirements need to consider environmental, social, and economic concerns simultaneously. There are a range of concerns pertaining to density, transport, water and energy resources, design, character and amenity that the planning process impacts and where objectives can be modified to reflect greater concern with sustainability. Planning tools from the regional policy level down through to single-building performance measures can be applied to meet this objective.

1.0 INTRODUCTION

This note aims to address how the practice of planning as delivered through policy frameworks and regulatory tools can be shaped to deliver sustainable outcomes in the built environment. It begins with definitions of sustainability and examples of where sustainability has been taken up on a policy planning level. It will set the context in which policies and regulations are applied before offering a broad overview of how planning contributes to sustainability in environmental, social, and economic measures.

2.0 DEFINITIONS AND CONTEXT

2.1 Sustainability

There are many definitions of sustainable development, the most common being that proposed by the Brundtland Commission in 1987:

> "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Another definition is provided in Australia's own *National Strategy on Ecologically Sustainable Development* (NSESD) (1992):

> "Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased."

The NSESD is supported by an Intergovernmental Agreement on the Environment (IGAE), which translates the general principles of sustainability into a national policy on ecologically sustainable development (ESD) and sets out roles and responsibilities of the Commonwealth, states/territories and local government. The NSESD and IGAE were adopted by all states and territories in 1992, and modified in 1999 following introduction of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The extent to which ESD has become a key driver in planning and development policy is evidenced by reviewing a host of recent government documents, including *Sustainable Cities 2025* (Australian House of Representatives Standing Committee on Environment and Heritage); *Sustainable Urban Settlement: Guidelines for Regional NSW* (NSW Department of Infrastructure, Planning and Natural Resources); *SEQ 2021 – A Sustainable Future* (Queensland Government and the South East Queensland Regional Organisation of Councils); *Hope for the Future: The Western Australia State Sustainability Strategy* (Western Australia Department of the Premier and Cabinet); *Melbourne 2030: Planning For Sustainable Growth* (Victorian Department of Sustainability and Environment); and *Green City Program* (South Australian Government and Adelaide City Council). Each of these documents share a broad emphasis on balancing economic, environmental and social concerns within the context of the built environment – particularly urban and regional settlement areas. Moreover, the emphasis tends to be long range and forward focused.

2.2 Urban planning

Urban planning is inherently an economic, social, political, and physical process that integrates technical skills and knowledge around wide-ranging infrastructure needs, site preparation and ecology, architecture and design, commerce, community consultation, and governance. It is necessarily process-oriented, and relies on certain tools (i.e. policy statements, zoning codes and overlays and other statutory controls) that are designed to drive general outcomes in the built form. Planning needs to balance today's development imperatives (including sustainability) with goals for future growth and evolution of the city or region.

Planning issues can be actualised in four primary contexts:

- Strategic planning, which sets goals and development frameworks on a state, regional or city-wide level
- Local area planning, which deals with designated community areas or corridors
- Site planning, with a focus on individual blocks or tight clusters of sites
- Single buildings, through measures focused on the form and performance of individual structures

The sections below offer guidance that impacts all of these contexts, grouped around environmental, economic, and social issues.

2.3 Context

Other practice notes from the *BDP Environment Design Guide* related to sustainable urban planning include:
GEN 13 – *Greenhouse Gas Emissions and the Residential Sector*; GEN 33 – *Reducing Greenhouse Gas Emissions through Design of the Built Environment*;
GEN 45 – *Urban Development, Accessibility and Transport in Australia – Facing the Sustainability Challenge*;
DES 13 – *An Introduction to Water Sensitive Design*;

DES 48 – *Contributing to ESD through Landscape Planning, Design and Management* and
DES 50 – *Sustainability and Urban Containment.*

3.0 ENVIRONMENTAL CONSIDERATIONS

3.1 Development density

Residential and commercial densities vary widely, and are generally dependant on a range of factors such as location, available infrastructure, access to mass transit, when the area was developed, and so on. For example, inner-ring suburbs in cities such as Sydney and Melbourne that were built up in the latter years of the 19th and early years of the 20th century are likely to have residential densities around 25 dwellings per hectare, and a wide range of uses. More recent suburban developments built out over the past 30 years are likely to be of lower densities, perhaps in the eight to 10 dwellings per hectare range, and have a greater segmentation of building types and uses.

While there are a variety of opinions on optimal densities and appropriate density levels for local and regional growth, there is widespread belief that higher densities do offer a variety of environmental and possibly social benefits, and are thus more sustainable than the prevalent development patterns of the past few decades. The benefits of higher densities most often cited by proponents include:

- decreased infrastructure requirements and costs
- greater mix of uses and facilities, thus allowing for linked trips
- reduced car use for short trips in favour of walking and cycling
- greater opportunities to use mass transit for longer trips
- better thermal performance from buildings, particularly where there are shared walls and floors
- increased opportunities for social interaction and community connections.

In regional/city strategic plans, increasing development densities should be prioritised in areas well-served by mass transit and other existing infrastructure, i.e. water and electricity services. Moreover, areas that are more likely to accommodate a broad range of uses in addition to housing, i.e. commercial, community, and recreational uses, should be targeted for this more intensive development. In areas such as urban cores, densities of 50 to 100 dwellings per hectare are easily achieved; neighbourhood/regional centres ought to be in the 25 to 40 dwelling per hectare range.

Councils and communities can, through increased public participation in forums and through lobbying, seek to influence decisions on the provision of mass transit infrastructure and service so that these density targets can be supported and higher density areas are functional.

Local area plans should focus on varying densities within corridors and districts so that differences in building size and design are encouraged. Local area plans should see density as one tool for providing a variety of uses and dwelling styles for different sized families and of differing economic means. Reviewing parking requirements at this level and minimising space for car parking is also a tool for increasing residential and commercial density and making transit use more likely.

3.2 Orientation and passive design

Planning has a role to play in facilitating building design outcomes that feature passive heating and cooling. Solar access is a measure of the potential solar radiation that is available to a north facing window/wall of a building on a lot. Site planning should control lot layout to maximise solar gain for space and water heating.

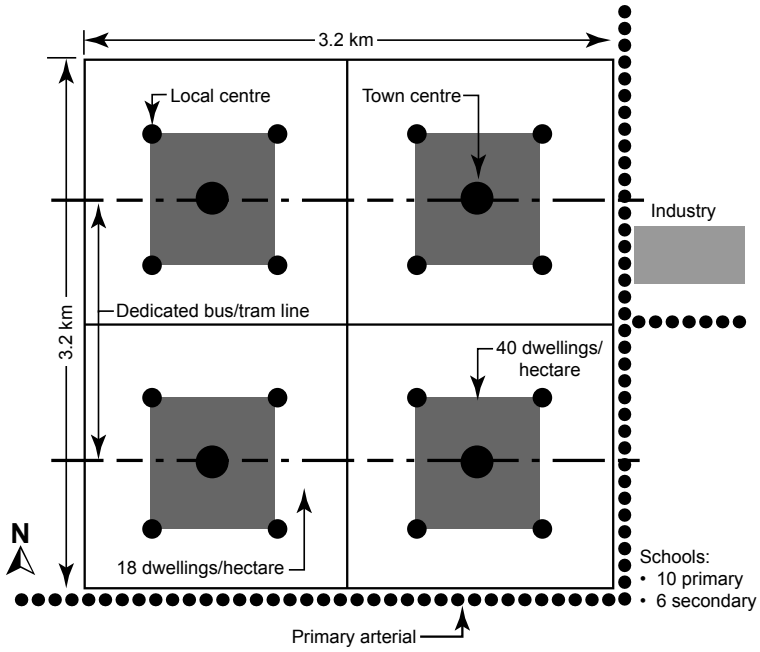

Figure 1. Traditional neighbourhood density
Source: *Greenhouse Neighbourhood Project*

Site planning and individual building codes need to also consider passive ventilation factors to situate and design buildings so that outdoor air moves through a space and creates a cooling effect through convection and air flow. Shading with external building features such as eaves and awnings, and site planning for appropriate landscaping and lot layout contribute to passive cooling. Applying energy performance targets to planning codes can facilitate delivery of these aims. Planning codes need to also consider how the setback/coverage requirements might make it less likely that large eaves and overhangs be incorporated into building design (in that developers will seek to maximise the floorplan on the buildable area), and be written to meet both objectives.

3.3 Water

Australia is the driest habitable continent on earth and faces a growing water crisis if water use patterns are not altered. A number of planning solutions are available to promote water efficiency and reuse that will result in less potable inflows and sewerage outflows. Options include:

- Regional policies for wastewater treatment to return sewerage to suitable standards for reuse, e.g. agricultural production.
- Local area plans for smaller-scale wastewater treatment facilities for reuse on a local (neighbourhood) scale.
- Site planning policies to promote third-pipe systems – one pipe for potable water inflow and one each for sewerage and greywater outflow – to reticulate once-used household water (hand washing, showering, clothes washing) for reuse. Reuse options include irrigation and toilet flushing.
- Local area and site plans for surface and road treatments that provide for filtration, reduced rate of discharge, and local reuse of stormwater.
- Rainwater capture and storage tanks on individual dwellings. Captured water can be used for irrigation and toilet flushing.

It should be noted that practices aimed at capture and reuse of rain, grey and blackwater need to be coordinated with the appropriate environmental protection organisations to ensure that health and safety considerations are dealt with during system design and ongoing operation and maintenance.

Local area and site plans are increasingly implementing water sensitive urban design strategies as an alternative to the traditional conveyance and treatment methods that treat stormwater as waste rather than a resource. Integrating water filtration, capture, and reuse into a site plan offers many advantages from a water resource, aesthetic and natural ecology standpoint.

Actions taken at the smallest scale, i.e. individual buildings, can deliver benefits many steps downstream. For example, by reducing potable water consumption in buildings through greywater diversion, less sewage is sent downstream for treatment. This results in less energy used in water treatment and reduces the size of the facilities needed to treat effluent. Another key measure is to capture rainwater or reduce stormwater volume and flow rates through greater pervious surface area and filters. This helps improve receiving water quality by filtering litter and pollutants and preventing erosion and sediment build-up from excessive volumes reaching receiving waters in short, intense bursts. This is particularly relevant in Australia's urban centres that border rivers and bays where

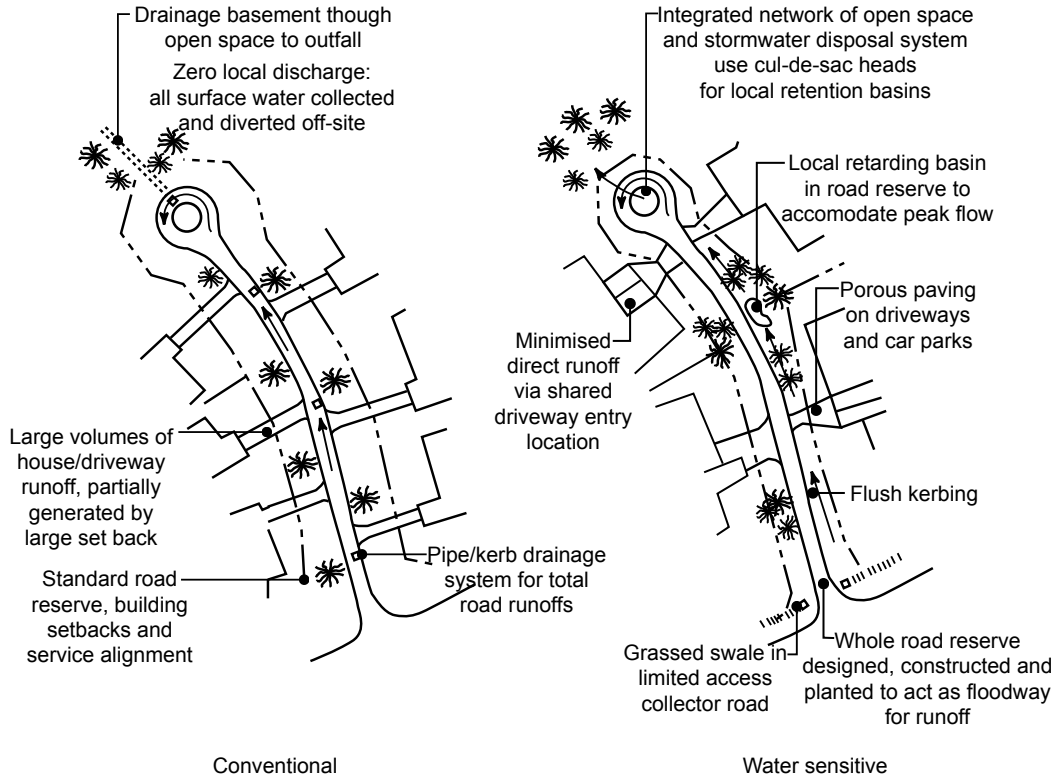

Figure 2. Conventional versus water sensitive streetscape plan
Source: *Urban Stormwater Best Practice Environmental Management Guidelines*

stormwater pollutant loads are an increasing problem for aquatic plants and animals.

Research by CSIRO has demonstrated the potential to create totally water self-sufficient suburbs. While the costs to do so are not likely to be commercially viable at this time, less aggressive options that are cost-neutral can cut potable water consumption by nearly two-thirds.

3.4 Ecology

Several recent reports from the Department of the Environment and Heritage and the Australian Conservation Foundation note that many endemic species are under threat from habitat shrinkage and the impact of human settlements. Planning for sustainability therefore needs to better balance the needs of the natural and built environment.

Regional plans need to identify key natural habitat areas and manage growth patterns to protect areas of significant natural heritage, keep prime agricultural land available for localised agricultural production (thereby enhancing local economies and minimising transport distances and pollution impacts between production and consumption), create sufficient habitat zones and corridors for wildlife, and promote biodiversity.

The designation of growth boundaries through green rings or wedges can be an effective tool in directing growth to appropriate areas. However, drawing a line around growth areas and letting the development process run its course will likely miss the target in terms of delivering sustainable outcomes in residential and commercial development areas. Therefore, guidance and processes need to be embedded in local area plans so that growth is managed inside the green ring as well. Overall objectives should be to increase density where appropriate, keep the separation between green zones and growth zones (i.e. avoid creep into green areas through low-density 'conservation' housing subdivisions), and provide sufficient passive and recreational green spaces within core urban and suburban areas. Accomplishing these goals might result in local area and site plans that decrease lot sizes and increase shared open space in residential districts, and innovative use of public/private space (roads, rights of way, rooftops) to create discrete green areas.

These ecological concerns should be matched with regional catchment management strategies, the outcomes of which are impacted by decisions around water use and management, wetlands and drainage areas, wildlife corridors and natural reserves, and use patterns (i.e. agricultural versus non-agricultural).

3.5 Reclamation/adaptive reuse

Former industrial and commercial sites with residual contamination – commonly referred to as brownfields – are abundant in older urban areas. Putting these sites to use represents a great opportunity to clean contamination and recycle this previously-developed land and existing infrastructure. (The CSIRO estimates that 80,000 sites throughout Australia are affected by contamination in the urban environment, caused by petrochemical, manufacturing, military, urban, agricultural and mining activities.) Brownfield redevelopment not only reduces the burden on previously undeveloped land, but can also provide much needed investment and regeneration into previously defunct industrial areas and communities.

Regional and city planning policy should identify sites most in need of remediation, that are suitable for reuse. Local area plans need to consider the range of remediation options – treating contaminants off-site, treating on-site, or capping on-site to mitigate negative health and environmental impacts – and create controls and incentives suitable for the proposed end use.

Site plans and building codes should also consider how existing buildings can be adapted for new uses, again offering a sustainable solution for old buildings by making use of existing infrastructure and lessening development pressure on previously unbuilt sites. Issues to consider might include whether certain features of a structure can be 'grandfathered' so that it remains suitable for certain uses while not meeting current requirements for new construction, and zoning/code issues to allow for new occupants where use restrictions exist.

4.0 SOCIAL CONSIDERATIONS

4.1 Equity and diversity

There is certainly no standard formula for what makes a community or locality 'a good place to live', nor is there wide agreement on what prescriptive measures should be advanced in the planning code or are effective in delivering social outcomes. However, planning policy and codes can play a role in ensuring that a variety of housing styles and sizes are available, thus making it more likely that a neighbourhood can accommodate people of different family sizes and structures, different ages, and varying income levels.

Achieving this diversity can be facilitated in regional plans by steering development to areas that are served by mass transit and/or where cycling is a safe and attractive option. In this way, individuals or families for whom car ownership is not financially feasible still have access to the same housing and job opportunities as others. It is of additional relevance that development patterns create links between where people live and where they might shop and work. In this way, communities will not become isolated from other activities, and social and economic interaction that is supportive of local area development is more likely to occur. Walking and cycling trails between suburbs and regions can also play a role in enhancing access and connectivity between places.

Local area and site plans should also consider questions of access and distance to local and regional parks and open spaces for passive and active recreation, and to community facilities such as meeting places, churches, health facilities, and so on. A target of 250–500 metres from any residence is reasonable for the provision of basic amenities such as local passive recreation parks. Larger park and recreation options, shopping, and other community facilities ought to be available within one to four kilometres of most residences, and ideally reachable by foot, bike, transit, and private vehicle.

4.2 Community consultation

Planners need to strike a balance between engaging stakeholders and community members for input and reactions to policies and development proposals, and allowing local activism to steer policy and determine

outcomes too strongly in one particular direction. Clearly, opinions and input from stakeholders is important, but planners need to manage how and when feedback is sought and then incorporated to produce objective processes that deliver consistent outcomes.

Where existing communities are in place, consultation in regional and local area plans should seek guidance on the following issues:

- Are development options supported by existing residents?
- Do new planning policies and development programs integrate well with the existing community in terms of layout, design, scale, and access?
- Will development plans adversely affect the availability of key community assets, such as jobs, open space and recreational facilities, streets that are safe for walking and cycling, local air and water quality, and so on?

Community consultation should acknowledge that local conditions, character, and solutions are important factors in delivering sustainable outcomes and help a community or region evolve rather than stagnate or change too abruptly. New developments and buildings should respect what currently exists, create efficiencies from the use of local resources (including local skills, materials, and design frameworks), and be attentive to local scale.

In areas where there is no existing community, consultation activity should focus on issues of scale, design, and character and how regional and local area plans advance goals around environment, social needs and economic development.

The use of external facilitators should be considered in order to bring fresh perspective to the process, and avoid the perception of being too involved with one group or viewpoint or driven by a particular agenda.

4.3 Designing for safety and to enhance community character

Local site plans should promote design solutions that create defensible spaces: areas that are open and visible from a number of vantage points ('eyes on the street') and accessible from a number of different locations. This helps ensure that illicit activity will be spotted by others, and offers a built-in deterrent. This can be achieved by having dwellings face and open onto streets and other public spaces, reducing or minimising the use of walls and other barriers, and designing on a scale that people feel is appropriate (non-threatening) to the setting, and through street wall and streetscape requirements.

Regional, local area, and site plans also need to work together to ensure that the street system is safe and follows a hierarchy and design methodology that balances through-trips with local trips, and makes walking and cycling a viable and safe option. Within local communities and neighbourhoods, auto speeds should be minimised; this can be accomplished through grid layouts (with an emphasis on shorter blocks and frequent crossing points for pedestrians and cyclists), minimum-width streets, speed humps and narrowings at crossing points, and roundabouts.

In addition, footpaths should be required on both sides of the street and cycling encouraged. The infrastructure for cycling should ideally create bike paths separate from both auto traffic and pedestrian traffic where space allows. The general aim is to minimise conflicts between different personal transport modes, and create balance so that one mode is not favoured at the expense of others.

5.0 ECONOMIC CONSIDERATIONS

5.1 Mixed-use zoning

Regional and local area planning policy needs to ensure that a mix of residential, retail, commercial, and community facilities are allowed. Creating this mix, rather than exclusive zones where user groups and building types are limited, makes it more likely that a proportion of residents will have employment opportunities close to where they live, and that shops are available to meet local demand and local needs.

These more intensive activity areas should be directed towards nodes where multiple modes of transport are present or can be easily added. This makes it more likely that trips will be linked, that is, single trips by area visitors will accomplish multiple aims, helping to reduce greenhouse emissions from transport. Clustering uses in this way can also help generate economic synergies between businesses and create efficiencies in operational requirements such as space for deliveries, waste hauling, etc.

It should be acknowledged that many planning codes trace their roots back to the need to zone out certain polluting, industrial uses from residential and commercial areas for health and safety reasons. Clearly, uses that do have negative community impacts or that have unique logistical needs require separation from other use groups. Yet, where local area and site plans can move to performance, rather than end-use or exclusionary zoning for certain industrial and commercial districts, it should be encouraged. Rather than limits on uses, planning codes could adapt so that outcomes around air and water pollution impacts, for example, become the relevant measure. This allows for clean industry and new commercial uses to develop that add to an area's economic base and vitality while minimising negative health and environmental impacts.

5.2 Distributed energy and water infrastructure

The existing paradigm of large, central power-generating facilities with extensive feeder networks to bring power to local users is a well-defined and embedded feature of our infrastructure and built form. Planning has a role to play in altering this paradigm: a change that will be a long and gradual process but is one worth pursuing.

Developing energy closer to the point of consumption – even on site for individual homes – creates efficiencies by reducing transmission losses from distant, centralised sources. Decentralising energy generation also has benefits from a safety and security point in that major generation and grid facilities are more vulnerable to large-scale maintenance breakdowns and security breaches.

Moreover, distributed generation sources – small wind, solar, biomass and landfill gas, fuel cell, and co-generation – tend to create power from clean, renewable resources and/or make use of otherwise waste products. Wider adoption of these technologies generates economic activity to develop and manufacture the systems to meet new demand, and in installation and servicing of these distributed sources.

Updating regional and area plans to allow for this distributed generation helps these technologies gain market share, reduces greenhouse emissions, and reduces the need for costly and often disruptive upgrades to the existing generating and grid system. Site and building codes will need to address siting issues for small generating facilities, interconnection with the existing grid, and solar access/impact of shading from adjoining structures.

Distributed water treatment facilities can also create new regional economic activity by utilising a waste product, in this case sewerage, which can be treated and used for other productive uses such as in agricultural production or recreation facilities. Regional plans can provide the guidance for this infrastructure and impact land-use decisions where use/re-use of resources can drive economic activity.

6.0 ESD STATUTORY REQUIREMENTS AND RATING TOOLS

Local councils have rightly recognised that for ESD to become a meaningful contributor in overall planning and development goals, environmental and sustainability requirements will need to be formalised into corporate plans and into the planning approval process. According to the Victorian Department of Sustainability and Environment (DSE), roughly two-thirds of Victorian councils have already or are in the process of adopting sustainability strategies.

Regulating ESD outcomes for residential buildings can draw on a range of well-tested tools and means to measure compliance. For example, the Building Code of Australia now requires minimum residential energy performance, measured using FirstRate or NatHERS. Certain states have opted to strengthen these energy requirements beyond what the BCA requires, and these requirements will be applied in local council development controls.

Furthermore, the NSW Department of Planning has developed a tool specifically to measure residential environmental performance at the planning stage. This tool, BASIX, will be phased into local planning codes across NSW in July 2004 to measure mandated residential energy and water consumption savings. This web-based tool additionally looks at issues such as site ecology, recyclables and waste, materials, social issues, and transport.

On the commercial building side, there is currently a lack of widely adopted methods for linking ESD outcomes to planning permits. Tools that have been recently developed to predict or measure sustainable outcomes in commercial buildings such as Green Star (Green Building Council of Australia) and NABERS (National Australian Building Energy Rating System, the Department of the Environment and Herritage) might have potential application in the planning approval process.

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BIOGRAPHY

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Rosemary Cousin contributed to this practice note.