

ENVIRONMENT DESIGN GUIDE

LEND LEASE'S APPROACH TO ADDRESSING SUSTAINABILITY IN NEW GREENFIELDS URBAN COMMUNITIES

Rob Ball, Michael Chapman, Paul Eagles and Guy Gibson

SUMMARY OF

ACTIONS TOWARDS SUSTAINABLE OUTCOMES

Environmental Issues/Principal Impacts

- The current pattern of piecemeal development and infrastructure deficiencies severely penalises households living in the outer suburbs of metropolitan areas.
- New communities need to address social, economic and biophysical aspects of sustainability.
- Approving authorities and consumers still sometimes see sustainability initiatives as an extra, rather than as alternatives to existing processes/systems.
- Institutional arrangements can undermine sustainability objectives, because the vested interests of utility organisations may run counter to more sustainable techniques for delivery of services such as water supply or sewage treatment, or because of diffuse responsibilities.

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:

- Master planned communities are able to address the issues that are widely regarded as important to the future development of Australian cities, including protection of the natural environment, creation of job opportunities, and improving access to facilities and services.
- New greenfields development projects need to apply the well established menu of techniques for, e.g. protecting natural habitat and water quality, reducing energy and water use, promoting efficient use and reuse of resources, and respecting topography and climate.
- At the same time, there needs to be research to identify best practice and potential innovations in urban development.
- Benchmarking should be undertaken to establish baselines and performance targets for current and prospective projects.

Cutting EDGe Strategies

- Promote social and economic development through development of integrated, mixed-use communities with a variety of housing and supporting facilities and services.
- Involve the community in caring for their environment, through information programs and supporting resident groups engaged in conservation activities.
- Partner with government agencies, utilities, peak bodies and university and research institutes, to identify opportunities for aligning strategies to achieve sustainability objectives.

Synergies and References

- Delfin Lend Lease, 2003, *Submission to the Environment and Heritage Committee Inquiry into Sustainable Cities 2025*, House of Representatives, Parliament House.

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Lend Lease is the largest developer of urban communities in Australia, operating in nine major population centres, with over twenty projects ranging from large-scale master planned communities in the outer suburbs to high-rise mixed use projects in the inner city. This note contains details of environmental sustainability initiatives being undertaken at current Lend Lease projects, and looks at the scope for achieving further significant improvements in performance at prospective projects now in the investigation and planning phase. It also identifies some key themes for metropolitan planning and development in Australia, to promote better sustainability outcomes.

1.0 ABOUT LEND LEASE

Lend Lease Corporation is an integrated property group that operates throughout the world and offers services in project management, construction, development, capital restructuring, asset management and funds management. Delfin Lend Lease (DLL) is focused on the development of large-scale urban communities. Lend Lease also operates an inner urban development business, underpinned by three large projects: Jacksons Landing and Newington in Sydney and Victoria Harbour in Melbourne.

Delfin Lend Lease is currently developing eighteen projects around Australia and has a current backlog of approximately 35,000 lots, primarily in the major growth corridors along the eastern seaboard of Australia. The duration of projects ranges between three and twenty years. The planning, development and marketing activities at DLL's projects are guided by a set of principles which also address the various aspects of sustainability. They are:

- a sense of belonging
- greener open spaces
- fully planned communities
- quality housing options
- learning communities
- business prosperity
- attention to detail
- respect for our environment.

In Lend Lease's view, sustainable urban communities will be healthy communities that endure over time and will be desirable and attractive places in which to live and work. To that end, sustainability is a significant consideration at various stages of the planning and development process for DLL projects, including:

- project selection
- project assessment
- master planning and urban design
- construction marketing and sales
- asset maintenance and handover
- ongoing administration.

Sustainability is increasingly becoming a driving factor in project selection, generally because it has flow-on

commercial implications, particularly in competitive bid situations. Lend Lease's master planning and urban design is progressively addressing sustainability as a key criterion, although balancing the perceived cost/benefit of many of these initiatives is still a challenge. This is largely because approving authorities and the consumer market still sometimes see these initiatives as 'extras' rather than alternatives to existing processes/systems, which is hampering the viability of significant innovation.

2.0 WHAT IS 'SUSTAINABILITY' IN AN URBAN DEVELOPMENT CONTEXT?

Sustainable development – what is it in an urban development context? The UK Sustainable Development Commission has explained it in the following terms:

'Sustainable development should be the organising principle of all democratic societies, underpinning all other goals, policies, and procedures. It provides a framework for integrating economic, social, and environmental concerns over time, not through crude trade offs, but through the pursuit of mutually reinforcing benefits. It promotes good governance, healthy living, innovation, life long learning and all forms of economic growth which secure the material capital upon which we depend. It reinforces social harmony and seeks to secure each individual's prospects of leading a fulfilling life.'

To achieve more sustainable urban development, a focus is required on:

- respect for existing environment (including heritage and natural systems)
- creation of sustainable biophysical environments (through water cycle management, efficient resource usage, waste management, subdivision design, housing design, air and noise quality, parks and landscape)
- creation of socially sustainable communities (including aspects such as accessibility, housing diversity, community facilities and services, health, social capital, and safety)
- creation of economically sustainable communities (that is, employment and prosperity).

3.0 DRIVERS FOR SUSTAINABILITY IN THE DEVELOPMENT INDUSTRY

From a developer's perspective there are a number of drivers for sustainable development. Legislation is a clear imperative to progressively improving performance, but partner expectations and competitive pressures are now also increasingly important. Many of Lend Lease's projects are based on long-term agreements with government, institutional or private land owners, and sustainability performance is now an important factor in their choice of partner. Likewise, other major developers are placing increasing emphasis on this aspect in response to emerging consumer demands, introducing a competitive dimension to the issue. Developers are also keen to realise the benefits of community and industry recognition of good performance through awards of various kinds. Scorecards from environmental organisations drive better performance. Community expectations are becoming more important, although it is fair to say that most simply expect environmentally responsible development, particularly from blue-chip companies, rather than this being a strong consumer driver. Finally, triple bottom line reporting systems such as the 'Global Reporting Initiative' in large corporates are also focusing attention on sustainability.

4.0 KEY ISSUES FOR LEND LEASE AS A LARGE-SCALE LAND DEVELOPER IN ADDRESSING SUSTAINABILITY

The development industry is now well onto the 'sustainability' bandwagon. Most focus is currently on the mainstream environmental issues, for example, water cycle management and energy efficiency. Some developers are starting to address the broader biophysical, social and economic aspects, although those appearing to make the most effort to date are generally either the developers of small boutique-style projects or those developing larger projects with precincts targeting the premium market.

The challenge facing Lend Lease, and particularly Delfin, is to plan and develop our urban communities with the innovation needed to allow all of the evolving social, economic and biophysical aspects of sustainability to be addressed. While there is now a well-developed menu of techniques for protecting, for example, natural habitat and water quality, the issues of housing affordability, home/work relationships and car dependency are more problematic. Consequently, over the past year Lend Lease has embarked on benchmarking the performance of each of its current projects.

Lend Lease works with a number of organisations, including government agencies, utilities, universities, peak bodies and NGOs, to try to identify best practice and potential innovations in urban development. Current projects include: Building Sustainable Social Capital in New Communities, with the University of

Queensland; and Sustainable Landscapes, which is a partnership between Delfin Lend Lease (Mawson Lakes), the Northern Adelaide and Barossa Catchment Water Management Board, SA Water and the Botanic Gardens of Adelaide.

5.0 KEY SUSTAINABILITY INITIATIVES BEING UNDERTAKEN AT SOME CURRENT LEND LEASE PROJECTS

5.1 General approach to sustainable development

Habitat conservation

One of the key objectives is to protect and integrate environmentally significant areas, including fauna corridors, green zones and significant vegetation within subdivision designs. In addition to the retention of environmentally significant areas and fauna corridors, detailed open space master planning is undertaken on all DLL projects to ensure that the open space needs of the future community are successfully accommodated. Significant pockets of high quality vegetation, wetland areas and natural creek corridors are retained within open space areas. Open space planning balances these environmental values together with stormwater and recreation needs.



Figure 1. Natural habitat at Sanctuary Pocket, Forest Lake

Parks and landscaping

DLL developments generally use appropriate local native plant species for parks and streetscapes to reduce water requirements. Drought resistant grasses have also been planted in open space and residential lawns on certain projects. Caroline Springs and Pakenham in Victoria have developed wetlands with storage that can be used for irrigating public open space areas during drought

conditions. These practices are particularly important in ensuring the long-term sustainability of public open space under local government management.

Stormwater management

Careful urban design and understanding of the environment allows stormwater systems to be developed that greatly improve the quality of the waters entering and leaving many of DLL's communities. These efforts minimise the impact on the environmental values of downstream waterways. Water Sensitive Urban Design (WSUD) is a more natural way of replicating the power of the natural system as a water cleansing and regulation agent. It considers treatment for the 'whole of catchment' not just individual development sites, and is increasingly being employed on DLL's projects.



Figure 2. Water sensitive urban design at Sanctuary Pocket, Forest Lake

Respect for topography and climate

Through careful master planning, the development patterns of DLL communities are designed to be responsive to topographical features while recognising the need to optimise solar orientation as an overlying urban design constraint. This principle also reduces the generation of construction waste. Roads for instance are sited with respect to existing contours to limit the excavation or filling of material. On sites with steeper terrain, DLL is promoting the use of housing construction techniques that are responsive to the landform. Springfield Lakes in Queensland is promoting the use of split slab, suspended flooring and lightweight factory built housing. By promoting 'non slab' housing techniques, the amount of earthworks on individual sites and hence construction waste will be considerably reduced. These principles are promoted through a building covenant for residential homes, design advice and builder education.

Waste management

Given that construction and demolition waste comprises a significant proportion of landfill in Australia, DLL is developing waste management systems and construction procedures to reduce waste and assist in improving the sustainability of urban development.

Public transport, walking and cycling

While major public transport initiatives remain the domain of state and local governments, early provision of public transport on several DLL projects such as Forest Lake and Springfield Lakes has assisted in establishing

patterns of use within new communities. This has encouraged the development of meaningful public transport initiatives. In addition to the provision of public transport, the urban design of DLL developments promotes walkable neighbourhoods and the integration of a mixture of land uses. These two measures are critical to developing self-contained communities with reduced reliance upon cars for transport.

DLL communities are master planned to ensure that residents can minimise internal car trips by using networks of walking and cycling paths that link homes to local facilities such as parks, schools and shops.

Social and economic development

The integration of lifestyle and business opportunities within DLL developments ensures the creation of sustainable communities that will accommodate the needs of current and future populations. The layout of DLL communities typically divides the community into a number of neighbourhood units or villages, which focus upon either a mixed-use town centre or smaller neighbourhood hubs. Some of the lifestyle opportunities offered on DLL communities include:

- recreational lakes and parkland
- sporting facilities
- education services
- community facilities
- retail and commercial facilities
- housing options that appeal to a wide variety of household types and market segments.

Varsity Lakes in Queensland, Mawson Lakes in South Australia and Edgewater in Victoria, although located in suburban areas, all promote a distinctively urban lifestyle through the density of buildings, range of housing styles, integration of land uses and treatment of the public realm.

DLL has also initiated a number of Lifelong Learning Centres, for example at Mawson Lakes and Caroline Springs, which provide educational and learning facilities that cater to the community as a whole, rather than solely school age students. These centres are a focus for community development.

Community involvement

We involve our communities in caring for their local environment, through information programs and by supporting resident groups that are actively engaged in conservation activities.

5.2 Case studies illustrating DLL's approach

Case study 1: Varsity Lakes

Varsity Lakes, located at the geographic centre of the Gold Coast on a 343-hectare site and developed since 1999, is a good example of the new approach to urban development, as it is viewed as an economic development project as much as it is a residential development project. Varsity Central is an intensively developed mixed-use centre within the project that will ultimately accommodate 4,500 jobs.

The residential component of the project has been developed to higher densities than are typical for suburban development, to create a more urban place to complement the town centre. Net residential densities (i.e. measured on site area and local roads and open space) achieved at Varsity Lakes vary from 18 dwellings per hectare in the standard 'suburban' environment to 25-35 dwellings per hectare in residential precincts closer to the mixed-use areas.

Housing innovations introduced to Varsity Lakes include:

- purpose designed small office/home office product
- small lot attached products at 70 dwellings per hectare
- Torrens title town houses, five metres, 7.5 metres and ten metres wide
- the Delfin 'warehouse' on Torrens title lots as small as 153 square metres.

Varsity Lakes incorporates the mixing of employment, education and residential uses to create a significant employment centre in the Gold Coast community. One of the keys to business growth and sustainability at Varsity Lakes has been the initiatives catering to the differing demands of business. The business opportunities that have been made available at Varsity Lakes include:

- home occupations
- small office/home office (SOHO) – these operate in a similar manner to a home occupation but include a dedicated office
- small commercial tenancies – there are a range of product types including mixed use (residential above) and tenancies located in office parks or similar
- larger scale tenancies – large office buildings have been built in some projects within Varsity Lakes to offer large floor areas for businesses in prestige buildings.

Other key sustainability features at Varsity Lakes include the water quality management system, habitat conservation areas, and commitment to all-of-life learning centred on Varsity College and Bond University.

Varsity Lakes has retained the Reedy Creek corridor as part of its commitment to protecting natural



Figure 3. Commercial development at Varsity Lakes

environmental values, and has also incorporated significant wetlands and devices along Reedy Creek to treat the water entering the site before it discharges into the lake systems. These wetlands and stormwater detention basins have been constructed. The Reedy Creek wetlands and conservation area is located in a low-lying portion of Varsity Lakes that receives and treats waters higher in the catchment. The wetlands and conservation area is 25.3 hectares in size of which 3.4 hectares are used for wetlands and water quality treatment. The wetlands hold approximately 34,000 cubic metres of water across six water bodies, of which approximately 60 per cent is covered with wetland plantings. The balance of the site is rehabilitated with native lowland forest species. Varsity Lakes also incorporates ten other wetlands around the site, four of which treat water from outside of the site.

Case study 2: Forest Lake

Forest Lake is located 18 kilometres south-west of the Brisbane CBD and covers 1,010 hectares. Developed since 1990, it has been a flagship for Delfin in Queensland for almost 15 years. For most of that time it has been regarded by many as being a benchmark for master planned community development in Queensland because of the comprehensive planning and coordinated development of a wide range of supporting facilities and services. Many of the community building and environmental management initiatives trialled at Forest Lake are now routinely undertaken at other Delfin projects and by other developers.



Figure 4. Town cottages at the The Cascades, Forest Lake

Forest Lake was the first project in Queensland to introduce small lot housing on a broad scale with its villa allotments of 300 square metres introduced in 1992. Other innovative housing forms introduced through its life include the 'town cottage' on 250 square metres in the late 1990s. Residential densities achieved using the range of residential products is typically 13-16 dwellings per hectare.

From the start it has been a mixed-use community with local shopping, education and community facilities to serve the resident population, and industrial development to generate local jobs. Forest Lake has implemented a benchmark program in water and energy efficiency. The village of Sanctuary Pocket provides 33 hectares of building land for over 400 dwellings with 20 hectares of park. Through a partnership with Brisbane City Council to support rainwater tanks, Sanctuary Pocket's 'Naturally Green Scheme' involves all homes installing a 3,000 litre rainwater tank and solar hot water system (both supplied by Delfin), in return for the purchaser including a range of water and energy efficient measures into their house at the purchaser's cost.



Figure 5. Rainwater tank and solar hot water system at Sanctuary Pocket, Forest Lake

To assist further each of our purchasers has been offered free access to seminars on sustainable living. To date, over fifty purchasers have taken up this offer. DLL also sponsored over 15 of its key partner builders to achieve the HIA 'GreenSmart' training and accreditation in the lead up to the Sanctuary Pocket launch. The main village park will use solar lighting. Water sensitive stormwater design techniques have been adopted to control and treat runoff through bio-retention and wetland elements. An eco-trail will meander through an environmental corridor with interpretative signage. Customer feedback is showing that these relatively simple steps have created an impact and awareness with our purchasers where such measures may not otherwise have been considered in their house design due to financial constraints or lack of knowledge. The higher cost of including these elements has meant that this village drew purchasers from a wider geographic catchment than has been typical for Forest Lake, but the purchasers have also tended to be older and more affluent.

Forest Lake includes an 11 hectare lake as one of the central community foci that has been designed to naturally produce an improved water quality within its

system. This lake was constructed in 1994 using analysis techniques and designs considered 'state of the art' for the time. Regular monitoring of the lake performance has shown that it is matching its water quality objectives and maintenance outcomes. The lake was initially seeded with suitable species to create a living ecology and has since become a significant and robust wildlife habitat. However, some unsuitable flora and fauna species have also been (informally) introduced into the lake over this period, causing additional maintenance costs and undermining the natural ecology of the lake. This suggests a need for stronger community information programs to raise public awareness of the problems created by such invasive species in lakes and waterways.



Figure 6. The lake at Forest Lake

Forest Lake has served as a leading test case for Brisbane City Council on various trials of alternative Water Sensitive Urban Design (WSUD) components such as swales, wetlands and other drainage configurations. Some aspects of the WSUD at Forest Lake have not proven successful. For example, the deep, grassed swales within some road reserves have silted up as a result of housing construction and, due to their depth, home owners have been unable to maintain them properly. Future WSUD may focus more on stormwater retention on site, with swales being implemented with a shallow profile overlying porous material in a trench providing a bio-remediation function.

The Blunder Creek corridor has been protected as well as adjacent corridors that link to Oxley Creek, which contain significant frog habitats. With 13 per cent (130 hectares) of the site retained as open space, Forest Lake is renowned for its active program of retaining trees within the development both within private lots and in public spaces. This retention varies from retention of young trees that can mature into the future, to the retention of mature trees where root zones and water regimes can be protected. As part of its commitment to protecting cultural heritage values, Forest Lake retained the remnant vegetation on the site of the original homestead within a village park. Delfin fostered the creation of resident 'Friends of the Park' volunteer groups within each village to assist in maintaining their open space areas. The Council has subsequently adopted this program.

In relation to transport aspects, Forest Lake sponsored

the delivery of a local bus service, which provided important public transport access both locally and to the central city of Brisbane from the start of the project and also established early patterns of use.

Case study 3: Mawson Lakes

Mawson Lakes, located in the northern suburbs of Adelaide on a 620-hectare site, has a series of 'project benchmarks' built into its agreement with the State Government partner, the Land Management Corporation. These relate to: urban design and character, information technology and telecommunications, education, business and employment, energy and environment, and social development.

Mawson Lakes has introduced an Energy Rating Score sheet. This strategy aims to reduce domestic energy use by 50 per cent compared to the Adelaide average. The checklist identifies preferred ways to reduce energy consumption with each home required to meet a set standard before construction commences. Mawson Lakes was the first project in South Australia to mandate wall and ceiling insulation. Solar hot water systems were mandated for all homes in July 2003. Additionally, innovative and cleverly designed solar powered lighting is currently being introduced into selected public areas.

Mawson Lakes has incorporated a system that recycles both stormwater and treated effluent and supplies recycled water for use in domestic gardens and toilets as well as to irrigate the public domain. This system reduces usage of mains water in Mawson Lakes by 50 per cent, compared to the Adelaide average. Average use of recycled water could result in annual savings of 110 kilolitres of mains water per household. This will result in an anticipated saving on the use of water from the River Murray or Mount Lofty Ranges by about 800 mega litres per annum by the Mawson Lakes community. Significant environmental benefits include reduction in the amount of treated wastewater containing nutrients entering Gulf St Vincent and the sensitive Barker Inlet.



Figure 7. Mawson Lakes recycled water scheme

In addition, the Sustainable Landscapes project has

promoted the integration of good design, low water use plants, non-weedy plants, low chemical use, low energy consumption, habitat creation, water conservation measures and the use of sustainable products. There are no legislative requirements in South Australia mandating this. The first stages of the project included creating a public park/square demonstrating sustainable landscapes to the broader public. In addition, a selection of new display homes at Mawson Lakes will apply sustainable landscape initiatives in their private gardens.



Figure 8. Sustainable landscape at Mawson Lakes

Mawson Lakes has waste management guidelines that will help to reduce and recycle waste from building construction and daily living and working. The target is a 50 per cent reduction in construction and domestic waste dumped as landfill.

The town centre/commercial precinct in Mawson Lakes has been designed to create a main street environment that provides for better integration with the overall community. The precinct was located adjacent to the existing campus of the University of South Australia and is modelled on successful 'main street' strips in metropolitan Adelaide, but applied in a contemporary commercial context. The model results in a more user-friendly solution that has the ability to trade and prosper well beyond trading hours of more conventional 'suburban' shopping centres.

In addition, the 'mixed use' precinct in Mawson Central, immediately adjacent, is successfully integrating a full range of uses from business, commercial, education, civic and residential and is delivering a more vibrant and ultimately sustainable 'inner urban' precinct than would be typically found in more contemporary suburban settings.

The delivery of education at Mawson Lakes has been

approached with a view to 'life-long learning'. An integrated approach has been pursued through the delivery of childcare centres, primary, middle and secondary school and tertiary education outcomes via the University of SA and TAFE. A key component of this is the Mawson Centre developed in partnership with the University of SA, City of Salisbury, SA Department of Education and Children's Services and the Mawson Lakes Joint Venture for the use of the Mawson Lakes community. The centre was delivered via shared funding and management arrangements. It is a unique multi-use building and is available for use by a broad section of the community. The shared use model adopted resulted in significant savings in both capital investment (building and land) by development stakeholders and the community.

The centre comprises a community library, a 255-seat SA Water lecture theatre, meeting rooms, exhibition and performance spaces, teaching areas, a café for relaxation and public plazas; it is also integrated with both the existing University campus and new town centre precinct. It encapsulates the broad concepts of integration, innovation, technology, environmental sustainable design and lifelong learning.

6.0 DIRECTIONS FOR THE FUTURE

DLL's evolving approach to promoting more sustainable greenfields development is well illustrated by the current proposal to build a model ESD community known as 'Yarrabilba' in northern Beaudesert (south of Brisbane in the rapidly developing Gold Coast corridor). Yarrabilba is a proposed new satellite town for 19,000 lots/22,000 dwellings which will ultimately accommodate 50,000 people. The opportunity here is to create a model community that will be a complete town, not just a suburb, with a full range of services including jobs. Key environmental features include: a total water cycle management system, including on-site treatment of sewage effluent for recycling to the community, travel demand management through designing the town around public transport, walking and cycling and by providing a high quality (bus-based) public transport system from day one; and a range of resource conservation measures including energy efficiency and waste recycling. The overall vision is to set a world benchmark in sustainable urban development. Many of the proposed innovations are possible because the scale of the project creates a critical mass for the economic provision of a range of sustainability initiatives. The project also offers the opportunity to provide continuity of land supply in the Brisbane Gold Coast corridor, given that land for large-scale development is likely to be exhausted by the end of the decade.

A key initiative for Yarrabilba will be a true Total Water Cycle Management system. While this is still a 'work in progress', the general current logic is commonly referred to as 'Fit for Purpose' water use, whereby each property will have access to an appropriate water source being used to supply water that is of a quality fit for the proposed purpose. This strategy for Yarrabilba is

based upon providing each dwelling or business with alternative sources of appropriate water supply such as rainwater tanks, larger scale stormwater harvesting, suitably treated recycled and potable water with demand management systems in place to minimise the water use. To analyse this strategy an intensive computer modelling program has been carried out to simulate supply and demand at both catchment and individual lot levels using historical local rainfall and climatic data to develop sequences of daily conditions over a 109-year period. Eleven residential dwelling types with a range of one to five persons per dwelling were individually modelled on six configuration scenarios with different rainwater storage tank sizes.

This research showed that we could achieve a reduction in potable water use of up to 80 per cent compared to the current 'business-as-usual' scenarios. Even assuming more conservative reductions in household demands, with the robustness of the modelling produced to date, it could be conservatively estimated that a reduction in potable water demand of at least 60 per cent should be readily achievable. The research also showed that the integrated water management system can provide a reliability of supply for household purposes at a level equal to, or better than, accepted 'potable mains water only' performance criteria. It will also result in up to 90 per cent reduction in wastewater outfall.

7.0 KEY THEMES FOR METROPOLITAN PLANNING AND DEVELOPMENT PATTERNS AND PROCESSES

Most new urban development in Australia occurs on a piecemeal basis with the result that employment, services and transport lag behind actual needs. Much of the workforce in outer suburbs has to travel outside the locality in order to access employment. The key issue is therefore the structure, not the form (density) or location of urban development. Provided that new urban areas are properly serviced with employment, public transport/arterial roads, and basic community facilities (such as schools, community centres, and emergency services), the urban development can provide sustainable outcomes. Moreover, even the most ambitious programs of urban consolidation will not obviate the need for greenfield development, hence the policy objective of the Commonwealth and State Governments should be to encourage and facilitate the types of greenfield development that are more sustainable, such as large-scale master planned communities.

Master planned communities, by virtue of their size and approach, offer scope for comprehensive planning and coordinated development. This accordingly offers the prospect of breaking the cycle of piecemeal development and infrastructure deficiencies, which at present severely penalise households living in the outer suburbs of metropolitan areas. Master planned communities are able to address the issues that are widely regarded as important to the future development of Australian cities, including protection of the natural environment, creation of job

opportunities, and improving access to facilities and services. At present, the differing returns on developing land for residential as compared with community and industrial purposes discourages developers from creating integrated, mixed use communities, i.e. communities with a range of uses other than housing.

Because of the inherent benefits of master planned communities, satellite town development may be a more sustainable pattern of urban expansion in some metropolitan regions. This would involve greater decentralisation of employment opportunities, and removal of some inappropriate rural-residential and non-urban designations in emerging growth corridors. It could also involve more localised systems of sewage treatment to achieve more sustainable water cycle management.

Land release strategies should promote large-scale master planned communities or facilitate coordination of small-scale subdivisions. There are clear advantages in applying a land release model that encourages the market to assemble parcels that can be properly master planned and then developed in a coordinated way.

Institutional arrangements can also undermine sustainability objectives, because the vested interests of utility organisations may run counter to more sustainable techniques for delivery of services such as water supply or sewage treatment, or because of diffuse responsibilities (i.e. roads and utilities and human services being delivered by different agencies, preventing a 'whole of government' solution to urban development challenges). Institutional arrangements need to be aligned to promote sustainability, particularly in relation to delivery of urban services (water, sewerage, stormwater, electricity). Innovations to promote sustainability can be frustrated by conflicting policies, but supportive policies can create a climate for continuous improvement, such as with Brisbane City Council's support for Sanctuary Pocket.

The key lesson from the DLL case studies included in this note is that large-scale master planned communities offer the potential to break the cycle of unsustainable development that results from small-scale fragmented subdivision of land for urban purposes. Each of them is attempting to achieve better outcomes in relation to natural habitat conservation, social and community development, job creation, and getting a better balance between public and private vehicle use, which are the issues at the cutting edge of urban development practice.

REFERENCES

Delfin Lend Lease, 2003, *Submission to the Environment and Heritage Committee Inquiry into Sustainable Cities 2025*, House of Representatives, Parliament House.

BIOGRAPHY

Rob Ball is a chartered professional civil engineer with over 20 years' experience in the development industry. Prior to joining Lend Lease in 1999, he worked on a variety of major residential, commercial and infrastructure projects in Australia, the UK, Middle East, and South East Asia. Rob currently holds the position of Engineering Services Manager – Queensland for Delfin

Lend Lease. This role involves the administration of all engineering and environmental aspects of the design and construction processes on DLL's projects in Queensland. As an extension of this role, Rob is also currently involved in DLL's sustainability benchmarking project to promote more sustainable outcomes across the DLL business nationally.

Michael Chapman is the Principal Urban Designer and Landscape Architect for Lend Lease Communities and currently works with the design teams around Australia to create balanced design for each of the Delfin and Lend Lease Development communities. Michael has worked with Delfin since 1990, merging urban design and landscape architecture together to produce robust sustainable design that balances needs and wants, marketability and liveability, and individual and community outcomes.

Paul Eagles is Project Director – Major Projects (SEQ) and is responsible for the team progressing the Yarrabilba project in northern Beaudesert. This project will be Lend Lease's largest community development and is intended to be Lend Lease's flagship project, at the forefront of urban sustainability. Prior to joining Delfin Lend Lease in 1999, Paul held senior positions in local government, consulting firms and land development companies. Paul has been involved in the master planning and implementation of four master planned communities during the past fifteen years.

Guy Gibson is the national General Manager – Affordable Housing and Sustainability for Lend Lease Communities. In this role, Guy is responsible for Lend Lease's involvement in the emerging opportunities for redevelopment of public housing estates across Australia, and for progressing sustainability initiatives in the urban communities business. Between 1997 and 2002 he was Project Director for the North Lakes project in Brisbane's northern growth corridor. Before joining Lend Lease in 1996, he held various positions with Brisbane City Council, including Director of Town Planning and Project Manager Urban Renewal, and with the National Capital Development Commission in Canberra.

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