

Lochiel Park - A Nation Leading Green Village

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Abstract: Lochiel Park is located, approximately 8 kilometres north east of the Adelaide CBD. The site comprises 15 hectares of land and is located adjacent to the picturesque River Torrens linear park. Owned by the government the site became surplus to requirements. In 2002 the Premier Mike Rann stated: "I want South Australia to become a world leader in a new green approach to the way we all live. The Lochiel Park Development will become the nation's model 'Green Village' incorporating Ecological Sustainable Development (ESD) technologies." The Land Management Corporation (LMC), was tasked with the responsibility of delivering the project. LMC has prepared a Master Plan and a Sustainability Framework report to guide the development of the site which sets various targets to be achieved across the areas of water, energy, waste, built form, transport and community.

Some of the initiatives being implemented to achieve these targets include a triple source of water for each dwelling (potable, recycle urban stormwater and rainwater tanks), a comprehensive Urban Design Guideline document requiring, amongst other things, a minimum 7.5 star design using AccuRate, photovoltaic panel generating 1Kw per 100m² of floor area and electricity demand limiting devices. Ongoing monitoring, demonstration and transferability are just three of the key outcomes of the project. The presentation will outline to delegates the features of the master plan and sustainability initiatives being adopted for the 109 dwellings to be created.

1. Introduction Summary and Outcomes

- Broad project description
- What sections the paper contains and what they say

Environmental cities of the future will be those that have recognised the impact of their actions on the environment at a local and global scale and are able to maintain healthy lifestyles while living within the carrying capacity of the planet. Some would say this is the utopian ecological viewpoint but with global recognition from the Intergovernmental Panel on Climate Change¹ that climate change is real and that this effect can be attributed to human impacts, then as a society, our built form should address the uncertainty of the impacts of climate change and be designed to minimise our own impacts.

The Premier of South Australia, Hon Mike Rann has taken a long term view in creating the right conditions to ensure South Australia (SA) developed a reputation as a clean green state. In announcing the vision that Lochiel Park would become a '*nation leading*' Green Village, Premier Rann showed the leadership necessary to move green living into the mainstream and the Land Management Corporation (LMC) was tasked to deliver that vision.

The project, nestled on the banks of the Torrens River, with a world class O' Bahn rapid transport system right next door, offered a fantastic opportunity to link nature and lifestyle to reduce resident's carbon footprint with an increasingly computer connected global world. With internet broadband Fibre To The Home, Ecological Sustainable Development (ESD) initiatives such as rainwater tanks, recycled water, wetlands, community gardens, Photo Voltaic (PV) cells on every roof and gas boosted hot water systems, "Green" living in Lochiel Park will meet mainstream suburbia. Being green will no longer rest in the niche environmental residential markets that have seen the development of Aldinga Arts Eco Village and Christies Walk - Eco Polis in SA, as the *Lochiel Park Green Village* project is fundamentally about moving this type of concept into contemporary residential development.

The project has been master planned and has challenged the traditionalist's view of the industry in that "green" is not fashionable or marketable. The journey so far has definitely opened the development industry to a future where green urban development will encourage the development of environmental suburbia in cities and Lochiel Park will be the norm not the exception.

¹ http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Pub_SPM-v2.pdf

This paper provides details of the Lochiel Park project including its innovative approaches, its willingness to partner with industry; setting nation leading stretch targets in reducing energy and water usage; increasing the use of renewable energy and its commitment to establish a nation leading green village to realise Premier Rann's vision. The paper describes how the project developed its sustainability framework and set benchmarks for the industry in order for the project to be successful, both environmentally and in the housing market, and what has been learnt along the journey.

2. Project Origin / Project History

- Political history
- Community consultation and involvement
- Premier's message

Lochiel Park is located in Brookway Drive, Campbelltown, approximately eight kilometres from the Adelaide CBD. The land is bounded by the River Torrens Linear Park, the O'Bahn busway, heritage listed, Lochend House, a Department for Families and Communities (DFC) property (on which historic Hobbs House is located), and existing residential development. (See Appendix A – site map)

Under the then Liberal Government in 2001 the Land Management Corporation (LMC) purchased the surplus government land for \$1.15 million and undertook a feasibility to determine a development strategy for the land based on maximising the economic return to government and was given development approval for 150 lots. The land area, which included a former TAFE College and Metropolitan Fire Service (MFS) Training Centre, comprises approximately 15 hectares.

Following the change to a Labor Government in 2002, a Lochiel Park Consultation Study was undertaken which recommended the land should be developed for residential purposes, but the design and layout should be mindful of the link to the River Torrens Linear Park, the position of Lochend House, the protection of significant trees, and the opportunity for innovative and energy-efficient layouts, including medium density housing forms. The study noted the site represents the type of land envisaged by the Planning Strategy as suitable for in-fill residential development and as required for the successful implementation of the Urban Growth Boundary.

The South Australian Branch of the National Trust identified the site as significant and it was listed as an 'endangered area' on 22 August, 2002.

On 22 August, 2003 the land use disposal strategy was agreed for Lochiel Park:

- Residential development area of approximately 4.25 hectares.
- City of Campbelltown to be granted, at no cost, the equivalent of 12.5% of the residential development area (6,000 m² approximately) for open space in a location of their choice. It was anticipated this land would form a curtilage area around the State Heritage listed Lochend House which has been refurbished by Council.
- Approximately 1,000m² of land from LMC's holdings would be added to the River Torrens Linear Park along the frontage of the development area.
- All significant trees on the site would be retained.

On 9 September 2003 the Government announced it would retain 100% of the existing open space at Lochiel Park and add 1000m² of River Torrens frontage to the amount of open space along the Linear Park at the Campbelltown site.

On 5 March, 2004, the Premier of South Australia, The Honourable Mike Rann, MP, declared "*that he wanted South Australia to become known as a world leader in a new green approach to the way we all live and, that the Lochiel Park Development would become the nation's model green village incorporating Ecological Sustainable Development (ESD) technologies*".

In order to achieve this vision:

- an Advisory Panel was established with representatives of LMC, Office of Sustainability (OoS), Planning SA, Campbelltown Council, and a community representative nominated by the Minister to assist LMC in establishing clear project objectives and outcomes, particularly related to sustainability related matters; and
- LMC engaged a lead design consultant to assist in the management of a Master Plan process, with individual experts in the fields of water, biodiversity/trees, site remediation, energy, landscape design, urban design and materials.

3. Project Principles and Objectives

- Paramount objectives and diagram contained in the slideshow
- Project objectives derived from the SA Strategic Plan (see cabinet submissions)

Paramount Objectives

The Paramount Objectives developed to guide delivering the vision for Lochiel Park are:

Green Village

Develop the land as a model 'Green Village' of national significance incorporating a range of best practice sustainable technologies, which will serve as a model for other urban developments:

- Create a 'showcase' for ESD.
- Raise environmental awareness.
- Foster a culture of sustainability.

Urban Consolidation

To achieve Government urban consolidation objectives, develop a high quality, medium density, master planned residential project, incorporating a diversity of housing product:

- Capitalise on a surplus Government land asset.
- Develop innovative, acceptable and desirable design solutions for urban consolidation projects.

Expand Housing Choice

Provide a mix of housing types and meet a range of housing opportunities with products that have broad market acceptance in regard to both design and cost

- Provide housing choice
- Seek affordable housing solutions

Excellence in Urban Design

Achieve excellence in urban design and innovative built form outcomes through an integrated approach to development providing a high level of residential amenity:

- Create a model for future urban infill projects.
- Push the boundaries of urban design and built form.

Enhance Biodiversity

Complement and enhance the biodiversity of the adjoining open space areas, through the minimisation of impacts from the residential development on the surrounding environment:

- Create a sustainable urban area that minimises environmental impacts through the management of water, energy and waste.
- Use appropriate landscaping to complement the adjoining natural open space areas.

Open Space Planning

Facilitate the planning and development of the open space areas, incorporating an urban forest and other active and passive recreation:

- Provide a well planned open space area that contributes to the increased biodiversity of the area.
- Consult with key stakeholders and the community regarding open space outcomes.

Integrate with Surroundings

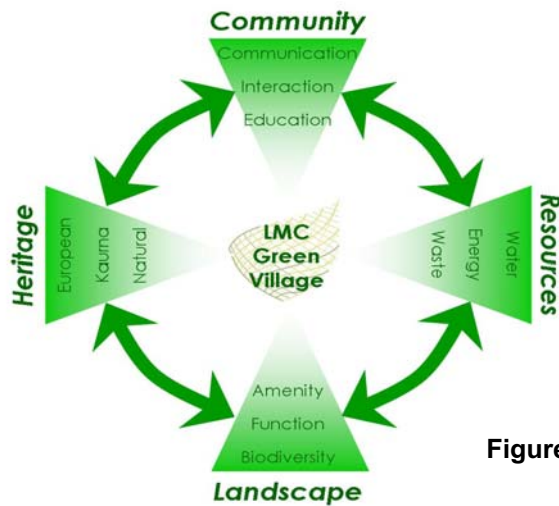
Ensure appropriate linkages and integration with surrounding land uses to promote community interaction and a sense of place and belonging:

- Complement and integrate with adjoining pedestrian/cycle trails.
- Use urban design techniques to reduce the potential for the creation of an insular development.

Financial Return

Achieve an acceptable return on investment for Government

- Ensure the project is economically sustainable and provides an appropriate return on investment to Government.



In order to achieve this vision a sustainability model (Figure 1) was developed which sought to demonstrate the relationship between elements in order to deliver the Lochiel Park Vision

Figure 1 – Lochiel Park Sustainability Model

Contribution to South Australian Strategic Plan (SASP) Objectives

The Lochiel Park Green Village development contributes to meeting the following SASP² sustainability objectives and targets:

- Improve Adelaide's quality of life ranking on the William M Mercer Quality of Life Index to be in the top twenty cities in the world within ten years (T2.1);
- Lead Australia in wind and solar power generation within ten years (T3.2);
- Achieve the Kyoto target during the first commitment period (2008-2012) (T3.3);
- Have five well-established biodiversity corridors linking public and private lands across the State by 2010 (T3.4);
- Increasing the use of renewable energy so that it comprises 15% of total electricity consumption within ten years (T3.10);
- Extending the One Million Trees program so that three million trees will be planted in Adelaide in ten years (T3.10);
- Increasing the energy efficiency of dwellings by 10% within ten years, by such means as the introduction of a five-star energy requirement for new houses by May 2006 (T3.10);
- Reduce waste to landfill by 25% within ten years (T3.11); and
- Achieve a ranking in the top three regions of Australia in Richard Florida's Creativity Index within ten years (T4.1).

Specific sustainability initiatives for Lochiel Park will also contribute to achieving the Government's environmental policies including Planning SA's Urban Design Charter, the Greening of Government Operations Framework, the Three Million Trees program, the Government response to the Girardet Report, *Sustainable Adelaide*³. SA's draft Greenhouse Strategy⁴, now completed, Waterproofing Adelaide and South Australia's Waste Strategy 2050-2010. In addition, they would support recommendations made by the Premier's Roundtable on Sustainability: 3, 4 5 Report⁵ section on settlements.

As a project with the specific goals of being a "leading green village" Lochiel Park invested significant time in planning the delivery of the sustainability aspects of the project and to better understand the relationship between what was considered best practice, current legislative requirements and the vision of a **Green Village**. Figure 2 outlines the framework applied to the Lochiel Park project to determine if the benchmarks set would meet or exceed best practice in sustainable residential development.

² http://www.stateplan.sa.gov.au/documents/South_Australia_Strategic_Plan_2007.pdf

³ http://www.thinkers.sa.gov.au/images/Girardet_Final_Report_A3.pdf

⁴ (<http://www.climatechange.sa.gov.au/strategy/strategy.htm>)

⁵ (<http://www.premcab.sa.gov.au/roundtable/publications.html>)

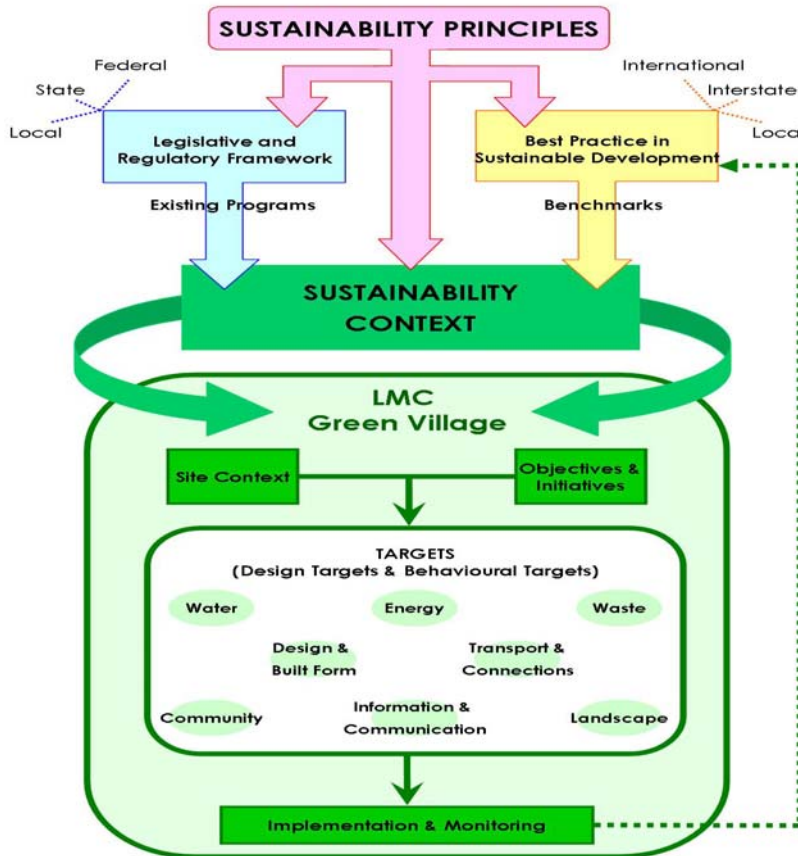


Figure 2 : Sustainability Framework

4. Project Description

- Detailed project description in terms of areas, houses, lots, infrastructure etc
- Marketing & Sales research
- Master Plan

The Lochiel Park development is now 3 years on from the announcement by the Premier and the vision is being realised. The master plan incorporates infrastructure requirements that deliver on the sustainability aspects of the project including the following innovative approaches:

- The project will have 78 residential allotments of which, 5 will include mews dwellings over rear garages of the main dwellings and it is proposed that 26 additional dwellings including 4 mews dwellings, and 22 apartments will be procured through Housing SA to deliver affordable housing options. This makes a total of 109 dwellings. This arrangement delivers significant density increases to reflect modern sustainable living outcomes, reduce the footprint of the development and maximise solar orientation.
- Stormwater harvesting from two local catchments, one comprising 189 hectares and the other comprising 70 hectares, (approximately 2,400 houses) cleaned through a wetland system prior to reuse for toilet flushing, cold tap washing machine and garden use for all houses through the provision of a third pipe water supply system;
- Innovative Water Sensitive Urban Design initiatives to clean stormwater collected from inside the development before discharge into the Torrens.
- Use of recycled pavement products both in the road base and wearing course.
- Use of recycled and low embodied energy materials in reserve and public realm infrastructure including recycled aggregate and fibre reinforced concrete and pavers manufactured on site from waste material and clay excavated from the wetlands.
- Solar and high energy efficient public lighting and photovoltaic cells on community buildings within the park lands.
- A possible wind turbine.

- Provision of a weather station within the estate linked to the community website portal to track temperatures and rainfall
- Provision of approximately 10 hectares of woodland park (urban forest) planted with native species endemic to the Torrens River floodplain and local Campbelltown area to provide a biodiversity corridor, to connect and enhance local habitat, and offset greenhouse gases from the development; (it is proposed that 4,000 trees and approximately 200,000 plant species will be planted throughout the development); and
- Provision of an opportunity for allotment owners to have access to a community garden.

Consultants engaged by LMC undertook a market survey of 200 people to advise on the markets preparedness to adopt EDS initiatives and the cost that the market would be willing to pay for those initiatives.

The survey found 5 separate segments which covered a range of demographics. The two groups of interest to the marketing strategy were groups known as the “greens” and the “homebodies” representing 52 % of the market. The greens not surprisingly were those that had passion for the environment and the homebodies were those that took less risk and did not consider themselves to be trendsetters. ‘Greens’ were more likely to buy a hybrid car, would be prepared to pay more for Green Power and think Australia is not doing enough to combat climate change.

The homebodies on the other hand would prefer to walk or ride than drive a car, were strongly committed to recycling, (like the greens) and would be prefer to pay a premium for an energy efficient house. There were considered to be less demanding, younger and less wealthy. The market research has tried to identify homogenous groups that would be prepared to pay for and live in a Green Village development and this is the first time LMC has undertaken a segmentation study.

This research has helped to direct the marketing strategy, which has taken some risks including launching the concept at the National Wine Centre in Adelaide with the 4 builders who were engaged to deliver on the housing products in November 2006 in which 400 people attended, surprising many in the development industry. From this project launch 15% of lots were sold immediately and a further 15% of the lots had an expression of interest. Presently, 28 purchasers have committed to become residents of Lochiel Park.

In regard to housing and allotment design, the Master Plan (Appendix B) was developed to ensure that orientation and designation of building envelopes and location of upper storey areas will optimise exposure to prevailing winds, maximise solar access and minimise overlooking and overshadowing of neighbouring allotments. Through this process optimisation of natural lighting, ventilation and indoor air quality is also assured.

5. Element Scoping and targets

- Benchmark table and discussion
- Urban Design Guidelines
- Sustainability Ratings tool
- Targets

Benchmarking the elements of a leading Green Village

The benchmarking approach for sustainability applications for Lochiel Park identified the elements considered important through discussion with industry, community and government representatives. These were referenced to the paramount objectives and the targets as described in the Green Village framework (Figure 2). Initial research conducted through LMC and consultants identified a set of elements that would be expected in a Green Village covering water, energy, waste, biodiversity, transport and connections, sustainable design and built form, landscaping, community and information technology .

The range of initiatives under these elements was then benchmarked nationally and internationally, against other like residential sustainable developments and the elements and initiatives they were addressing. This enabled the Lochiel Park project to identify any gaps in the list and to propose alternatives if appropriate. The resultant table (Appendix C: Sustainability elements benchmarks) suggested that if Lochiel Park addressed the range of initiatives listed it would certainly become a leading **Green Village**. Although the world has moved on since then it is important to recognise this approach at project inception produced the comprehensive set of elements arrived at meeting the paramount objectives related to sustainability.

Given that technology, ideas and approaches to sustainability have shifted positively towards a more sustainable lifestyle, Lochiel Park has already played a significant and critical role in transferring knowledge and lessons learnt within the residential development sector. The industry in South Australia has also since taken up the torch in addressing sustainability in design and construction with developments such as *Beyond* in Port Elliot and *Point Boston* in Port Lincoln.

Since its initial inception, Lochiel Park has taken on more elements in response to new targets in the South Australian Strategic Plan including reducing the Ecological Footprint of SA, reducing greenhouse gas emissions and addressing the impacts of climate change.

The Sustainable Urban Design Guidelines,

The Urban Design Guidelines (UDG) developed for Lochiel Park ensures that the physical arrangement of buildings and their relationship to each other reflect the **Green Vision** set for the development. The Guidelines address the quality of the built form and landscape both in terms of appearance and the contribution to the sustainability objectives. They apply to all dwellings in the development and by their very nature will produce a genuine *green village*, the benefits of which can be significantly enhanced by the resident's lifestyle and behaviours. In particular houses will have:

- 1.0kW photovoltaic system per 100m² of habitable floor area
- Gas boosted solar hot water service
- Rainwater tank plumbed to hot water service
- Smart metering system for utilities
- 7.5 star energy efficiency assessed using the Accurate rating tool to exceed the BCA providing a performance based approach to determine minimum insulation requirements, roof angles and aspects and location and size and shading of windows
- Fibre to the Home Broadband ICT connection
- Guidelines for sustainable landscapes that minimise water use
- A checklist to ensure all homes achieve sustainability targets that will provide options for:
 - building materials;
 - design elements;
 - appliances (whitegoods, tap ware etc)
 - use of water for thermal mass;
 - use of energy efficient heating and cooling alternatives (geothermal, solar, gas, hydronic in-floor heating).

In addition a residential community education strategy is being designed to encourage sustainable behaviour.

The Guidelines describe the principles and parameters agreed between the project developers and the City of Campbelltown which has formed the basis of assessment for Development Approval.

Lochiel Park Sustainability Rating tool

In Section 4 of the Urban Design Guidelines (UDG) relating to environmental sustainability, a performance based or minimum target approach is offered as an alternative to the prescriptive guidelines. This requires the use of the Lochiel Park Sustainability Rating Tool and provides greater flexibility while achieving a similar result. For example, in Section 4.2 relating to water, instead of complying with the requirements of the UDG, the application can be assessed using the rating tool to achieve the minimum water saving target nominated for this section.

In developing a performance based sustainability rating tool as opposed to a scorecard approach the project has tested new ground in South Australia which has been attached to the design guidelines with which builders have to comply. Although similar tools exist in NSW with BASIX and Victoria has recently released its sustainability rating tool, the LMC sustainability rating tool for Lochiel Park provides a measure of prescriptive and performance based evaluation methodologies in order to meet the objectives of the UDG, sustainable building approaches and the targets that have been set for reduced water and energy consumption.

Targets for relevant elements

In determining the targets and benchmarks for elements related to sustainability a number of studies were conducted. The studies were used to set the baseline for each element including the establishment of an average household energy and water use according to ASB data for 2004. Even though superior data may have become available later, it has been determined that 2004 when the announcement was made, should be set as the baseline year for the benchmarks. Although some of this has changed slightly due to mandatory rainwater tanks, 5 star energy efficient houses and a GGE

standard for hot water services standards coming into effect in SA 1st July 2006, prior to starting residential building on the site, it is LMC's belief that the targets and benchmarks will still be valid and transparent in accounting for Lochiel Park meeting its vision. Specific targets include:

- *Water*–78% saving through installing a triple pipe water system;
- *Energy* - 66% saving through increase thermal performance and energy efficient appliances; and
- *Greenhouse Gas Emissions* - 74% saving through introduction of load limiters, mandating of photovoltaic systems and improved overall energy efficiency in the house.

6. Project Delivery -Partnership approach

- Builders
- Advisory Groups
- Utilities /Council/Government

Partnership Approach

The project has been developed within a partnership framework. As there were significant leanings that could be achieved collectively in the industry, it would ensure that LMC had the best available information in order to achieve the Lochiel Park vision. Selected builders were required to work in partnership with LMC and its project marketing and sales agents to deliver sustainable design to the market as a demonstration project in accordance with the sustainability framework.

Builders

A public, 2 phase registration of interest (ROI) process was carried out in order to obtain builders who were likely to deliver on the projects vision and work in partnership with LMC in order to reach the benchmarks associated with the building design. Eight builders in phase one, were selected to be participate in phase 2 and were asked to submit one detailed design of their proposed display home which complied to the UDG. Submissions were assessed by the advisory group (noted earlier), and each builder was asked to demonstrate a capacity and capability to build a minimum volume in any one year, be assessed against the AccuRate energy efficiency rating tool, willingness to become a Green Smart (HIA) accredited builder (if they weren't already) and to outline successful projects they had been involved in which showcased their building sustainability credentials.

A number of builders were unable to continue to phase 2 of the ROI process due to; the complexity of the project and the delivery mechanism required; and, the capacity and financial capability of the builder to respond to the timeframes and briefs.

As such, 6 builders responded to the project brief for phase 2. Four builders were initially selected however one of the selected builders chose to withdraw. The three remaining builders engaged by LMC to deliver the vision for Lochiel Park are:

- Rossdale Homes
- Alpine Construction
- Charterhouse by Hickenbotham Group

These builders have a significant investment in the project and have gained benefits through their involvement by developing strategic partnerships to take 'green homes' to the market and through increasing their network of suppliers in delivering sustainability benefits.

Advisory Groups

Water and Energy Advisory Groups were formed to develop best practice approaches to water and energy use and efficiency for the building envelope (amongst other things) and for the project.

They consisted of University Professors and Lecturers, Industry representatives, including ETSA and SA Water, ESD consultants, such as an AccuRate assessor to assess thermal performance of the house building designs and Government, in particular Sustainability and Climate Change Division in the Department of the Premier and Cabinet (formally Office of Sustainability) and Energy Division of Department of Transport Energy and Infrastructure (DTEI). The forums provide a rich environment for debate in proposing a logical way forward proposed on the best available knowledge at the time, including the relationship to government policy and thinking. Sometimes this has resulted in a desire for more information to clarify that the right decision is made to ensure Lochiel Park was leading the nation as a 'Green Village'.

Linking with the builders, advisory groups and the consultants has proved to be a time intensive process however this has meant that along the way people and the industry have built their capacity to embrace green issues in the future.

Utilities /Council/Government

Consultation and partnership with the local water authority, SA Water and the City of Campbelltown will result in the creation of a unique tripartite agreement on the design, delivery and operation of the recycled water system. Extensive monitoring of water usage throughout the Village will also be carried out to determine whether the targets have been achieved and this data shared with the industry.

Similarly, collaboration with the electricity authority, ETSA Utilities, and the gas distributor, Envestra, has resulted in commitments to collect and analyse energy data for the benefit of each organisation. Agreement has also been reached with ETSA for an electricity load limiting device to be trialed in all homes in the project.

7. Project Delivery

- Sales and information centre and display village
- Monitoring and evaluation
- Solar Cities

Sales and Information Centre and Display Village

The development of the sales and information centre, due to be completed in May 2008, is later than planned due to a range of issues including modelling of the design to meet the AccuRate thermal performance measure of 7.5 star. The sales and information centre is a complex structure as it still needs to meet the UDG as well as function as both a sales and information centre and a future residential house with a mews. The centre will install a 3.7 kW PV system and as such will be energy neutral as energy produced during the day transferred to the grid will be reduced during the night.

While most residential projects deliver a display village to encourage sales of particular designs, the project builders have taken an opposite approach given that they were testing new ground in delivering 7.5 star home. They have wanted to ensure that in putting up a sustainable house design, it would be an acceptable model for the market. In minimising the prospect of capital risk, builders have been working with purchasers through the pre release process, on the initial designs and thereby testing the market before committing to a design for their display home.

There have also been some issues with the AccuRate tool itself given it is a new tool and there is limited access to AccuRate assessors in the state. This is an issue for the industry if it wants to use AccuRate methodology as a tool of choice to assess the thermal performance of houses in SA.

Monitoring and evaluation

Aside from the process of delivering the sustainability elements this project will undergo significant scrutiny in meeting its sustainability targets to reduce water and energy use and in reducing its ecological footprint.

A comprehensive 9 year monitoring program will be put in place, connected through a data logging system so that all consumption for energy and water and solar energy produced can be electronically analysed over time. This can be used to determine the extent of good design and behaviour on consumption targets and whether the assumptions made in the design phase meet reality.

The University of South Australia has obtained a \$500,000 grant from the CSIRO to undertake a 3 year study on the ability of the building design to influence energy efficiency of dwellings. A PHD student from the University of Adelaide, Urban Design Architecture, has also been attending meetings to better understand the integrated approach to the Lochiel Park development and how future sustainable developments can deliver the best and most efficient outcomes using an integrated approach.

Solar Cities

The winning Adelaide Solar Cities consortium consisting of Origin Energy, BP Solar, ANZ, and the City of Salisbury will commit to supplying discounted PV panels, smart meters and discounted home loans to the home buyers in the Lochiel Park project. Energy usage data gathered from the homes will be analysed by the consortium to provide valuable direction for future programs.

Lochiel Park has become, through its innovative approaches, an incubator for research which will help to inform and transform the industry.

8. Highlights and Achievements

- Performance based approach not prescriptive
- Education and transferability to the industry
- Education and Marketing for the general public

Performance based approach

Driven by market forces the UDG evolved from a prescriptive set of requirements to a more target based tool to assist the builders with achieving an affordable and cost effective solution to the challenges of environmental sustainability. Section 4 of the UDG requires a minimum AccuRate rating of 7.5 stars and allows the use of the Lochiel Park Sustainability Rating tool to achieve minimum targets for water and energy use reduction. The result being that the development will be able to track performance over time and that the ratings tool has the potential to be used in other LMC projects.

Education and transferability to the industry

One of the paramount objectives for the project is to create a showcase for ESD and to demonstrate new and sustainable technologies to the development industry.

This process was started when an advertisement was placed in national newspapers in early 2006 seeking registrations of interest from suppliers of sustainable building and affiliated products. A strong response was received from over 70 suppliers. The information received was then assessed for its value to the home owners and the builders and a comprehensive resource provided to the builders.

In addition to these, regular meetings with builders have included presentations from industry experts on topics such as waste management and the solar cities program. Builders in the project have also been required to attend training and become accredited in the HIA Greensmart program and encouraged to attend seminars on sustainable development issues such as using Ecospecifier⁶.

The education process continued with the release of the Lochiel Park Urban Design Guidelines in November 2006, which can be downloaded via internet.

All research into sustainable development technology has been and will continue to be made available to the industry. In the future, conclusions from the nine year monitoring program and the cost benefit analysis will also be made available. LMC will continue to present a series of seminars and conference papers on the project over the next few years to promote the initiatives undertaken.

Education and Marketing for the General Public

A comprehensive website on the project has been created and it is proposed at the time of this paper that it will go live in August 2007, providing details on all aspects of the project and many useful links to other sustainability websites. A community portal or intranet will be provided for use by the new residents and local existing community and aims to promote community engagement with the sustainability objectives for the project.

9. Project challenges/ learning's

- Who do we believe –expert opinion differed
- Transport
- Life cycle costing (CBA)
- Monitoring still to come
- Rapidly changing environment/climate change agenda.

Who do we believe?

The project parameters were testing the boundaries of knowledge and with any group there will be differing opinions between experts. The question arose, when this occurred, as to whom we believed. While a consensus approach was the preferred option in the advisory groups, there were also other issues such as cost, ownership and timelines that influenced LMC's decision making. This meant that

⁶ Ecospecifier is a knowledge base of well over 3000 environmentally preferable products, materials, technologies and resources: <http://www.ecospecifier.org/>

decisions may have been taken without full information being available at the time (for instance on embodied energy issues or costs of water infrastructure) however the best decision at the time was made in consultation with others. LMC may not have got it right but we have definitely made our best endeavours to get it right.

Transport

The major constraint to Lochiel Park being classified as a world leader is its location in relation to public transport options.

The development site is *inconveniently* located half way between two interchange stops on the O'Bahn busway creating a challenge to the frequent use of the this high speed transit system. The ideal scenario to demonstrate sustainable transport options was to have an O'Bahn stop at the Village thereby encouraging use of a rapid public transport system. Advice from the operators of the system informed LMC that this would severely compromise the integrity and efficiency of the system. The distance to retail facilities and areas of employment will maintain a reliance on private car transport for residents.

The Linear Park bike and walking paths along the River Torrens Valley however, provide a direct route to one of the interchange stops and are likely to be used by residents of the project commuting to the city for work. Commuters will be able to ride bikes all the way to the city approximately 8 km away along a safe and pleasant bike track surrounded by trees in a natural setting adjacent to the River Torrens thereby also increasing the opportunity for promoting a healthy lifestyle alternative.

The improvement of facilities for cyclists, the upgrade of lighting along the Linear Park and the creation of better linkages to public transport are amongst a number of initiatives aimed at encouraging alternatives to private car use. Similarly a proposal being investigated to establish a small convenience shop combined with a dwelling in a prominent location in the development with good access to the linear park is being investigated. This could provide groceries and other essentials and reduce the reliance on vehicles.

Much of the targeted improvement in transport will result from a comprehensive education program aimed at changing people's habits and facilitating convenient alternative methods for transporting goods and people. This will be achieved through the use of carpooling facilitated through the community portal and links to the websites that provide grocery delivery amongst other things.

Life Cycle Costing (CBA)

A cost benefit analysis being undertaken for the project will analyse a number of the initiatives including the 7.5 star AccuRate rated house, photovoltaic cells, the recycled water system, and a number of other items. Cost data is to be gathered from the three builders, consultants and stakeholders to compare current market houses against the Lochiel Park house. Results from the CBA taking a whole of life cycle cost approach will provide valuable feedback to LMC and other stakeholders in the project and assist in the future planning for similar projects when considering sustainability as an integral part of the planning process.

Monitoring

The project is committed to 9 years of monitoring energy and water usage within the project. This will be carried out in three levels including detailed data logging of water and energy used in a small sample of homes as well as temperature in the homes, analysis of billing data in all homes and the analysis of energy and water use at the subdivision level through meters on the mains electrical and water supply. This will be a unique system as families will have a detailed understanding in the impacts and benefits of living in a green village.

Rapidly changing environment and the climate change agenda

Lochiel Park was announced in 2004, since then there has been a significant shift in environmental attitudes due to the drought in southern Australia and climate change has become a central facilitator of change. In 2006 the government mandated 5 star energy efficient house ratings, 1 kL rainwater tank and a GGE standard for hot water services for new residential developments and improvements.

The commercial building industry in SA has also undergone significant change in delivering 'green' office buildings which have resulted in a change of perception in the value of building and investing in green (environmentally) friendly technologies and practices. Federally, the Solar Cites program was announced as was the National Water Initiative aimed at sustainable water use.

Internationally, this trend toward green living has been recognised by the promotion of the Eco Village concept in Sweden, the world's first eco-city at Dongtan in Shanghai, China, and the Eden Project in the UK. As mentioned previously in SA there has been announcement of the Boston Point project in Port Lincoln and the Beyond project in Port Elliot espousing green living credentials.

The rapidly changing environment will result in two things for Lochiel Park:

1. LMC must keep to the task of creating a nation leading green village by the time the village is fully functional benchmarked against the standards of when the village was announced; and
2. As far as practical new technologies and information will continue to influence the development and where possible be incorporated in the village.

10. Conclusions and implications for the future

- Tested limits of knowledge
- A 'green' market exists
- Innovation and sustainability cost money
- Future opportunities

Tested limits of knowledge

From the outset the approach has been to investigate the latest knowledge in sustainability, challenge and consider alternatives. There is continual improvements in technology and new ideas emerging all the time which supersede some of the initiatives undertaken in the project. The time required to develop new technologies and implement them may take many years. The challenge is then to change paradigms and gain market acceptance. Sustainability knowledge and understanding has evolved with the project as new products and innovations come on the market. Lochiel Park has provided an opportunity to become and incubator of ideas and approaches that will be easily transferable not just to other LMC projects but to the industry as a whole. Lochiel Parks' benefits will not be just what it has achieved but how it has assisted the industry to embrace the concepts and gain greater knowledge and understanding.

A green market exists

This project proves that sustainable development is being accepted by the main stream housing market. The partnership with three of Adelaide's larger home builders and their willingness to challenge and test the market with sustainable housing options provides a platform for the acceptance of sustainability. Evidence that the market has accepted the options presented to it exists in the form of contracts to purchase land and houses in the project.

Innovation and Sustainability Cost money

The cost of living sustainably can be high due to the initial lack of volume in the market for some of the new technologies and up front cost premium. Over time, the cost will reduce where regulation exists and/or the operational cost savings to purchasers can be demonstrated. This is a well understood mechanism amongst most developers, home builders and purchasers alike and it needs to be embraced if the targets for reducing our impact on the environment are to be achieved. Environmental cities and Green Villages such as Lochiel Park assist in developing our understanding of the benefits of sustainable living, gathering research data through ongoing monitoring and in reducing our ecological footprint.

Future opportunities

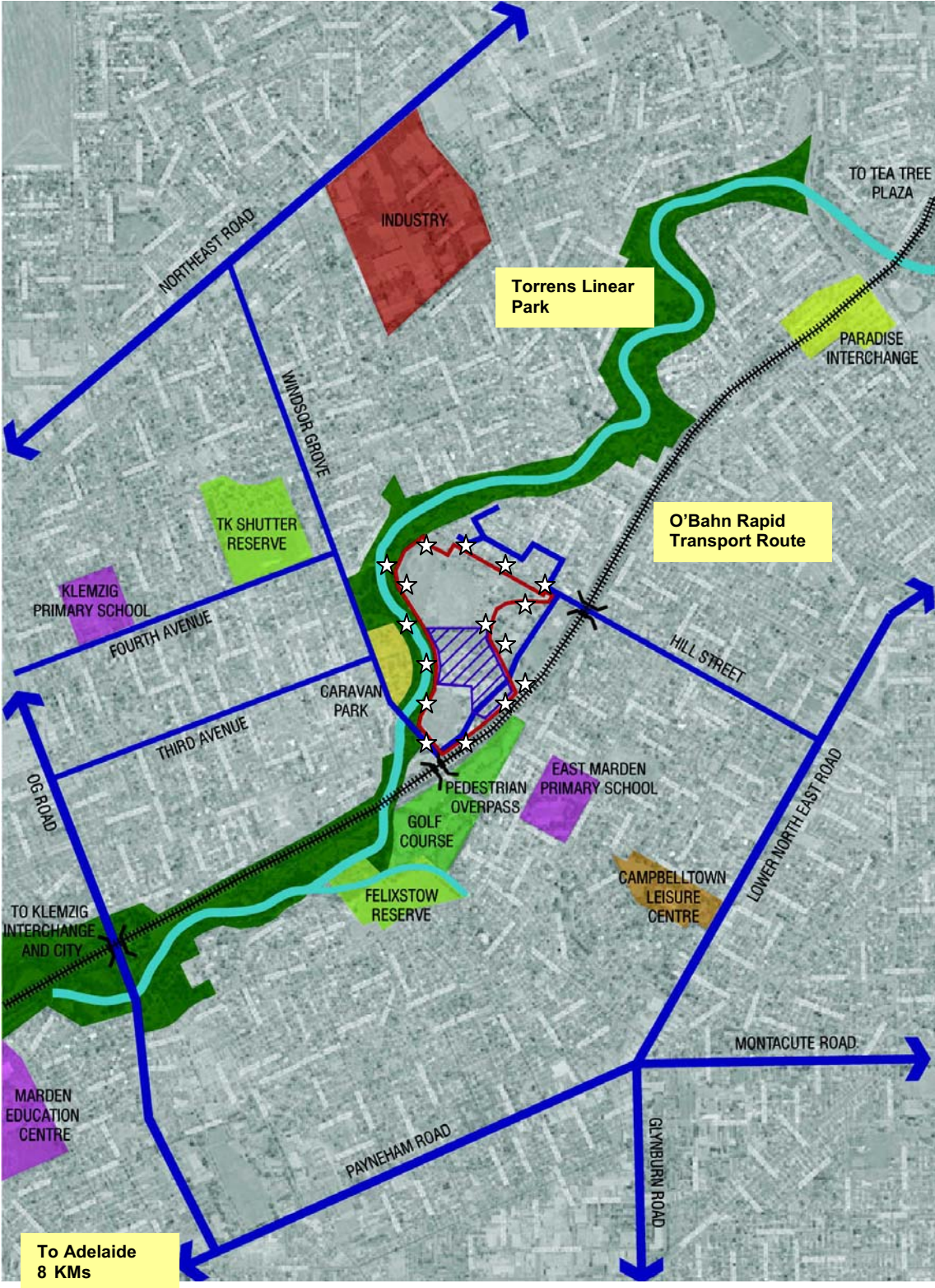
LMC treats the Lochiel Park Green Village as a forerunner to incorporating ESD in future residential projects. In developing this project the Corporation has recognised that if it wants to continue to show leadership in the industry then it needs to disseminate the learning from Lochiel Park through all its developments and land releases. It is committed to improving on Lochiel Park and where opportunities exist to encourage the replication of the Green Village concept throughout its business.

Yes, sustainability does cost money but there is a market for it. We still however have a lot to learn but if we are to address the impacts of climate change and reduce our impact on the planets resources, green villages such as Lochiel Park can assist in demonstrating that green living is a precursor to environmental cities of the future.

Appendix A: Site Map Location and Context Plan

(Site outlined in red with ☆)

(Village Development )



Appendix C: Sustainability Elements Benchmarks

Sustainability Elements for LMC Green Village and Benchmarks from Case Studies

SUSTAINABILITY INITIATIVE	LMC GREEN VILLAGE (Lochiel Park)		Aldinga Eco Village	Christie Walk	Mawson Lakes	New Haven Village	Regent Gardens	St. Kilda Inkeman	Kensington Public Housing	Green Smart Homes	Melbourne Games Village	Sydney Games Village	Subi Centro	Kelvin Grove	Sydney Sustainable House	BedZed	
	Possible	Confirmed	SA	SA	SA	SA	SA	Vic	Vic	Vic	Vic	NSW	WA	QLD	NSW	UK	
WATER																	
Aquifer Storage and Recovery	✓						✓			✓					✓	✓	
Rainwater Tanks	✓				✓		✓			✓	✓				✓	✓	
Water Retention & Recycling		✓		✓	✓		✓								✓	✓	
ENERGY																	
Geothermal Heating & Cooling	✓			✓		✓				✓	✓						
Solar Hot Water		✓		✓		✓		✓		✓		✓			✓	✓	
Energy Ratings		✓		✓				✓			✓				✓	✓	
Green Mortgage Scheme	✓					✓											
Energy Saving Fittings		✓		✓								✓			✓		
PV Cell Use		✓	✓	✓								✓			✓		
WASTE																	
Community Composting Scheme	✓		✓	?										?	?		?
Recycling of Construction Waste		✓	?	?	?	?	?	?	?	✓	?	?	?	?	?	?	?
Onsite Sewage Treatment			✓	✓		✓	✓			✓					✓	✓	
Greywater Treatment / Reuse				✓		✓	✓	✓		✓					✓	✓	
Sewage Treatment Plant						✓										✓	
TRANSPORT & CONNECTIONS																	
Pedestrian Provision		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Cycling Provision		✓			✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Integrated Transport System	✓				✓		✓				✓	✓	✓	✓	✓	✓	✓
Reduction in Motor Vehicle Use	✓			✓							✓	✓	✓	✓	✓	✓	✓
Commercial/Retail Proximity	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Employment Proximity								✓	✓		✓	✓	✓	✓	✓	✓	✓
DESIGN & BUILT FORM																	
Sustainable Design Principles		✓	✓	✓	✓	✓				✓	✓				✓	✓	
Use of Recycled Materials		✓		✓						✓	✓				✓	✓	
Low Construction Costs		✓								✓					✓		
Plantation Timber Materials		✓		✓						✓	✓						
Low Impact Materials		✓		✓						✓					✓		
Resource Proximity		✓		✓						✓						✓	
COMMUNITY																	
Village Farm/ Community Garden	✓		✓	✓	✓								✓			✓	
Village Agricultural Arts Centre	✓		✓													✓	
Increased Density / Small Footprint		✓		✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	
Integrated Wetlands		✓			✓		✓					✓			✓	✓	
Mixed Use	✓				✓			✓					✓	✓		✓	
Housing Variety		✓								✓			✓	✓			
Disembled Centre		✓			✓								✓	✓		✓	
Housing Affordability									✓								
Community Management of Village			✓	✓				✓	✓								
Resident Consultation		✓	✓	✓				✓					✓	✓			
Community Provision		✓	✓	✓	✓								✓	✓		✓	
Heritage Provision		✓						✓	✓						✓		
Integrated Community Facilities		✓			✓			✓	✓				✓	✓		✓	
LANDSCAPE																	
Locality Appropriate Vegetation		✓		✓			✓			✓		✓	✓		✓	✓	
Open Space Provision		✓			✓		✓										
Private Open Space		✓			✓					✓					✓		
INFORMATION & COMMUNICATION																	
Community Web Portal	✓							?	?		?	?		✓		?	
Smart Metering		✓		?		✓		?	?	✓	?	?		?		✓	
Home Management Systems		✓		?	✓	?		?	?		?	?		?		?	
Broadband Access		✓		?	✓			?	?		?	?		?		?	