



Lochiel Park, Campbelltown Urban Design Guidelines

August 2009

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Land Management Corporation reserves the right to amend these guidelines without notice.

1 Achieving the “Green Village” vision

1.1 About the green village development

In 2004 the Premier of South Australia, The Honourable Mike Rann, announced the development of the Lochiel Park site for a mixture of natural parklands linking directly to the River Torrens Linear Park, together with a small area of housing development. In announcing this project he made a commitment to sustainable development:

“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 Ecologically Sustainable Development (ESD) technologies.”

The development forms part of the implementation of the SA Strategic Plan, which states:

“South Australia should reduce its greenhouse gas emissions and begin preparing its economy and society for climate change and a carbon constrained world.”

The Land Management Corporation has been given the responsibility of delivering this model “Green Village” development, and to achieve the Government’s vision it produced a number of project objectives.

A key feature of the “Green Village” is the way the residential component has been enveloped in a natural parkland setting. With only 4.25 hectares of the 15 hectare site allocated for the residential component, over 10 hectares have now been incorporated and protected as the Lochiel Park Parklands (by Act of Parliament), linking directly to the River Torrens Linear Park.

This new parkland area will be available for wetlands and revegetation in the form of an “urban forest”, making a significant contribution to biodiversity enhancement, community recreation opportunities and offsetting the reduced greenhouse gas emissions from the residential green village.

1.2 Design philosophy

The design philosophy builds on the Vision and Project Objectives, as follows:

- Model “Green Village”
 - A housing development of national significance incorporating a range of best practice sustainable technologies, serving as a model for other urban developments.
- Housing diversity
 - Capitalise on the value of the land and its proximity to large areas of parkland.
 - Develop innovative and desirable design solutions for similar medium density projects.
 - Provide a mix of housing types and opportunities.
- Excellent urban design outcomes
 - Achieve excellent urban design outcomes and innovative built form through an integrated approach to development.
 - Develop high quality streetscapes with plenty of summer shade, colour and atmosphere.
 - Design for the Australian climate.
 - Design for walkability and liveability.
 - Create a durable, long lasting development with a strong environmental character.
 - Protect sight lines between important historic buildings and vistas.
- Enhance biodiversity
 - Complement and enhance the biodiversity of the adjoining open space areas.
 - Minimise impact on the surrounding environment.
 - Use the site to improve environmental outcomes for adjoining areas.
- Open space planning
 - Incorporate an urban forest and other active and passive recreation within the Parkland areas.
 - Provide well-planned open space areas that contribute to increased biodiversity.
 - Work with the community to achieve desired open space outcomes.
 - Integrate with the “Lochend” heritage property owned by the City of Campbelltown.
- Integrate with surroundings
 - Ensure appropriate linkages to surrounding areas and promote community interaction and a sense of place and belonging.
 - Design the Urban Village as “outward looking”.



Living with nature.



How to use these Urban Design Guidelines

The key elements of housing and private landscaping that most influence the way our neighbourhoods look and function are addressed separately by the Design Guidelines. Each design element is described and illustrated in terms of our vision for Lochiel Park **'the Vision'**, mandatory requirements **'the Requirements'**, and helpful building and landscape solutions **'the Advisory'**.

VISION

To help owners understand the Lochiel Park vision, we have described our intent for each element. This provides an introduction to the design element and places the Requirements and Advisory guidelines into context.

REQUIREMENTS

These are mandatory design and construction covenants which must be complied with to receive approval from the Land Management Corporation prior to submitting a building and construction application to a Private Certifier. The Building Envelope Plans form part of these mandatory requirements.

ADVISORY

These are guides to design and construction that have been developed by our design team to help you achieve more comfortable, attractive and sustainable housing and landscape solutions, but these are not mandatory.

2 Introduction to the Urban Design Guidelines

2.1 Purpose of the Urban Design Guidelines

The purpose of the Urban Design Guidelines for the Lochiel Park "Green Village" is to ensure that the physical arrangement of buildings and their relationship to each other reflect the 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 for the "Green Village".

The Guidelines describe the principles and parameters agreed between the project developers and the City of Campbelltown to form the basis of assessment of Development Approval.

In Section 4 of the Guidelines, relating to environmental sustainability, a performance based or minimum target approach can be used. 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, the application can be assessed using the rating tool to achieve the minimum target nominated for this section.

2.2 Seeking approval under the Urban Design Guidelines

When you purchase an allotment at Lochiel Park "Green Village" an Encumbrance is attached to the Title. This Encumbrance requires that prior to any development of that allotment approval must be sought and obtained from the Developer (LMC).

All development will be assessed against the Requirements (or by using the Sustainability Rating tool where applicable) as set out in these Guidelines in order to obtain 'encumbrance approval'. Following that process, Development Approval from Council is also required.

These Guidelines provide a significant resource for purchasers to use to prepare their development proposal. Given the range of issues that need to be addressed, purchasers can seek Preliminary Advice from the Project Manager by submitting a sketch plan. This aims to reduce re-design processes at later stages, provide greater certainty to purchasers and generally streamline the approval process.

Step 1

When the applicant has completed a design and prepared necessary documentation, two copies of the documentation or one electronic copy should be submitted to the Project Manager for 'encumbrance approval' and the applicant should nominate whether Section 4 is to be assessed using the "rating tool". **It is imperative that all of the extensive information required by the guidelines are provided in the application to avoid delays in processing the application. A list of required documentation can be supplied by the Land Management Corporation.**

An application for 'encumbrance approval' under the provisions for the Lochiel Park "Green Village" Urban Design Guidelines should be forwarded to:

By post:

Project Manager
Lochiel Park "Green Village"
Land Management Corporation
GPO Box 698, ADELAIDE SA 5001

Or, by email:

lochielpark@lmc.sa.gov.au

The Developer may agree to issue 'encumbrance approval' for proposals that do not conform completely with the Urban Design Guidelines, where in the assessment of the proposal the variation is considered to be minor and does not adversely impact on the environmental or aesthetical quality of the development as a whole, still achieves the underlying objective and is supported by the City of Campbelltown, if required.

Step 2

Once the Developer, through the Project Manager, determines that the proposal warrants approval, the plans are stamped and returned to the applicant. Plans stamped by the Developer in no way constitute Development Approval. Plans should not be lodged with Council until 'encumbrance approval' has been issued. Following this procedure and providing all of the required information will streamline the approval process with both the Project Manager and Council.

Step 3

Once the encumbrance assessment process has been completed the applicant can then proceed with seeking the necessary approvals from the City of Campbelltown, pursuant to the Development Act. Council will require 2 copies of the 'stamped' plans and supporting documentation as well as a completed Development Application form and the relevant fees.

The applications should be sent to:

Development Section
City of Campbelltown
172 Montacute Road
ROSTREVOR SA 5073

3 Designing and siting your home

3.1 Orientation

At Lochiel Park “Green Village” the allotments have been designed to maximise the north/south and east/west orientation, and Building Envelope Plans have been devised to specify the location of built form and private open space, relative to the orientation of each allotment. Each home’s orientation and positioning on the site ensures the maximum possible benefit from passive solar gain.

Requirements

- Northern building faces with access to winter sun must be occupied by living areas (not sleeping and service spaces) and externally with liveable open space and courtyards.
- Private open space should have a northerly aspect and the main area should have direct access from the internal living areas of the associated dwelling.

3.2 Building envelopes and setbacks

The efficient use of land is encouraged in the Lochiel Park “Green Village” while also ensuring adequate areas of private open space and separation between buildings and the public realm. The Village concentrates housing into a smaller area surrounded by significant areas of public open space.

Sufficient space is required for each dwelling to provide for the house and associated garaging, private open space, landscaping, storage and clothes drying areas.

Building Envelope Plans (included in Appendix 1) have been developed for each allotment having regard to the adjacent allotments and the relationships between buildings, open space and solar access.

The Building Envelope Plans provide site specific guidance regarding:

- Siting and orientation.
- Building setbacks, relative to buildings heights.
- Location and height of building to the boundary.
- Location of private open space/ courtyards.
- Location of mews dwellings, studios and key balconies
- Special fencing requirements.
- Driveway locations and widths.
- Garage/carport locations.

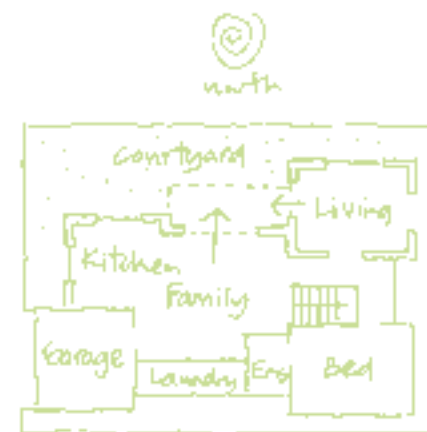
The setback of buildings is an important factor in achieving the desired streetscape character and while the Building Envelope Plans specify the minimum setbacks, built form should adopt a variety of setbacks to create visual interest.

Requirements

- The building envelope plans should be adhered to and predominate over the remaining clauses in these Urban Design Guidelines.
- Dwellings and associated buildings including garages, carports and verandahs shall have minimum setbacks as shown on the Building Envelope Plans.
- Special fencing requirements for primary and secondary street frontages as well as frontages to reserves should be in accordance with the Building Envelope Plan and Section 5.2.2 of this document.
- Garages or carports accessed from the primary frontage of the dwelling should be setback a minimum of 5.5m from the boundary, and be a minimum of 0.5m behind the main face of the dwelling.

Advisory

- In general, the setback of buildings should:
 - Provide for the efficient use of the site.
 - Use the solar orientation to maximise natural lighting and heating in winter and shading in summer.
 - Contribute to the desired streetscape character.
 - Provide adequate visual and acoustic privacy by separating habitable rooms from pedestrian and vehicle movement.
- The set-back and design of buildings within the building envelope should appropriately address primary and secondary street frontages as well as frontages to reserves, in order to present an attractive and visually interesting appearance to public areas.
- Walls of buildings may be constructed on a boundary where indicated on the Building Envelope Plan.



3.1 Orientate living areas and private open space to face north.

3.3 Building height

Lochiel Park “Green Village” is to have a consistent and desirable built form and scale that maximises the use of land while also achieving good solar access to private open space and internal living areas. Building height, in conjunction with its position, is a significant factor in achieving appropriate solar access for all dwellings. Given the ESD focus, buildings heights are to be limited and the extent of upper storey development is designated in the Building Envelope Plans to ensure appropriate solar access is available to all dwellings.

Building heights should reinforce the scale and quality of the streetscape and urban form. Height and design of buildings should minimise the visual impact from adjoining properties as well as addressing overshadowing and maintaining adequate daylight to adjacent properties.

The visual impact of the buildings as viewed from public spaces including the Parklands and the Torrens River Linear Park should also be addressed.



3.3 Building setbacks and heights are designed to allow solar access into indoor and outdoor living areas.

- Two-storey buildings, or parts of buildings where not located on the boundary, should have a maximum wall height of 6.5m and a total maximum height of 9.0m.
- Walls on boundaries should be a maximum of 3m in height for single storey portions, and 6m for two storey portions.
- Three storey components of dwellings (eg rooms within the roof space) may be considered, provided there are no visual and solar access impacts of the third level of the dwelling on adjacent / adjoining dwellings.
- Building heights refer to metres above finished ground level of each lot as created as part of subdivision works carried out by the developer and shown in final and approved engineering drawings.

3.4 Private open space

Private open space areas are to be provided to meet the residents needs and the overall size of the allotment. The main area should be located directly adjacent to the main internal living areas of the dwelling and should take advantage of the northerly aspect.

Private open space should be provided behind the building line (unless indicated differently on the Building Envelope Plan) and be exclusive of storage areas, outbuildings and carports. The areas should be in an appropriate location and be of suitable dimensions and gradient to be functional for likely occupant needs.

Private open space should be located and screened so as to minimise overlooking from adjacent buildings and achieve, where possible, separation from bedroom windows on adjoining sites to minimise acoustic impacts.

Requirements

- Dwellings should be two storeys in height (or partly two storey) and are to be located on the allotment in accordance with the Building Envelope Plan.
- Internal minimum ceiling heights in habitable rooms are to be 2.7m.
- The location of lower and upper levels of dwellings should be as designated on the Building Envelope Plan.
- Single-storey parts of buildings where not located on the boundary should have a maximum wall height of 3.5m and a total maximum height of 7.0m.

Requirements

- Lots 1-5 (should "affordable housing" not be developed), 6-23, 29, 33, 67-71 and 77-81 should have a minimum of 20% of the site area of the allotment as private open space, with one area that is directly accessible from an internal living area of the dwellings that has a minimum area of 40m² and a minimum dimension of 4m. The remainder of the private open space should have a minimum dimension of 2.0m.
- Lots 24-28, 30-32, 34-66 and 72-76 and dwellings designated as "affordable housing" on Lots 1-5 with a ground floor level (subject to a re-subdivision for a new community title layout), should have a minimum of 30m² of private open space, with one area that is directly accessible from an internal living area of the dwellings that has a minimum area of 24m² and a minimum dimension of 3m. The remainder of the private open space should have a minimum dimension of 2.0m.
- An external clothes-drying area that is screened from public view and has access to the winter sun should be provided to enable clothes to be dried without the use of artificial drying.
- Mews dwellings on Lots 12, 24, 26, 29, 49 and 61 and any other dwellings without a ground floor level including dwellings designated as "affordable housing" on Lots 1-5 (subject to a re-subdivision for a new community title layout), should have a balcony or roof patio with a minimum area of 8m² and a minimum dimension 2.5m.

3.5 Daylight into windows

Achieving daylight access into windows is important not only for winter solar gain, but also to create a more pleasant living environment. Habitable room windows (living areas and bedrooms) should have daily access to natural light and face onto areas of open space. Living areas should ideally be orientated in a northerly direction.

Requirements

- A window in each habitable room should be located to face onto an outdoor space that is clear to the sky to enable daylight access to the room. The space should have a minimum area of 3m² and dimension of 1.0m, and should not include land on an abutting lot.

3.6 Privacy

Maximising the efficient use of land at the Lochiel Park "Green Village" requires dwellings to generally be two storeys or partly two storeys as shown on the Building Envelope plans. Maintaining a reasonable level of privacy in a more dense urban environment while also achieving pleasant internal living areas and outlook is a challenge.

Direct overlooking from upper level windows and balconies to the private open space and internal living areas of adjacent dwellings should be minimised through good design.

The building layout and location of windows and balconies can limit potential overlooking, and the use of permanent screening devices, sill heights and landscaping can further address overlooking.

The impact of overlooking on privacy reduces as the distance between the vantage point and the area being overlooked

increases. As separation can improve privacy, only those upper level balconies, terraces and windows of bedrooms and living areas that are located within 15m and have a direct outlook to neighbouring private open spaces, bedroom or living room windows, need to take measures to address loss of privacy. The Building Envelope Plans provide an indication of the location of built form and private open space for each allotment, so in the instance that a neighbouring dwelling is not yet approved and /or developed those Plans will guide the assessment of privacy.



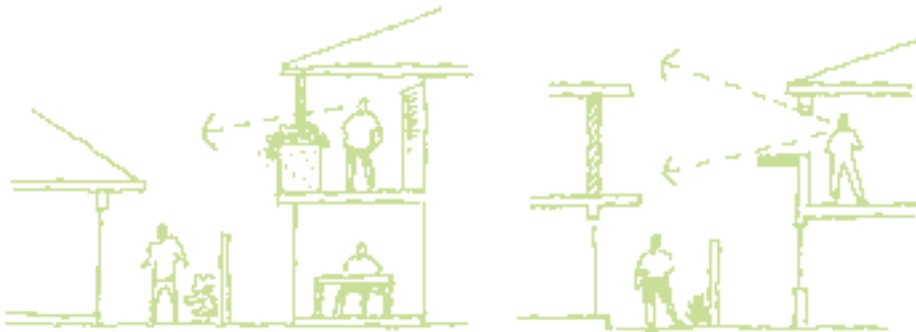
3.4 Outdoor living space relates directly to indoor living areas.



3.5 Windows should face onto a space that is of sufficient dimensions to ensure adequate daylight is able to enter the room.



3.6 Articulate buildings and use wing walls to balconies to address privacy.



3.6 Use screening devices including planter boxes to protect privacy while also providing an outlook.



3.6 Where other measures are not able to be used, provide high window sill heights to address privacy concerns.

Requirements

- Where overlooking from an upper level window of a bedroom or living area, balcony or terrace occurs within 15m of the window of a bedroom or living area or private open spaces of a nearby dwelling appropriate design measures need to be included to address the need for privacy. Design and external screen methods should be given preference over the use of glazing techniques, to provide a better level of amenity to upper floor occupants. Suitable measures to address privacy include:
 - Relocate the window, balcony or terrace beyond the 15m arc of view of windows of private open space of an adjacent property.
 - Articulate the building in a way that creates a screening effect.
 - Screening windows, balconies of terraces at upper levels to a height of 1.65m above floor level by installing permanently fixed external screens, including wing walls, solid or translucent panels, perforated panels, horizontal or vertical screens, planter boxes or trellises that have a maximum of 25 percent openings.
 - Use a window sill height of 1.65m above floor level or install permanently fixed translucent glazing in any part of the window that is below that height. Where this technique is used consideration should be given to increasing the width of the window to improve the amenity of the room, depending on the orientation of the window and the need for shading devices.
- Permanently fixed external screening devices should be designed using the materials indicated in Section 5.3 in order to complement the built form and appearance of the dwelling.

3.7 Garaging, carports and parking

Dwellings should be provided with sufficient and convenient on-site car parking for residents. Garaging and parking areas should be designed to reduce their visual dominance and add to the attractiveness of the streetscape and laneways.

Requirements

- Provide two car parking spaces for each dwelling with at least one being covered, except for dwellings on Lots 12, 24, 26, 29, 49 and 61, and any other sites with mews dwellings above the garage, in which case one car parking space per dwelling is acceptable and is not required to be covered. Dwellings designated as "affordable housing" on Lots 1-5 also require only one car space per dwelling and it is not required to be covered.
- On-site covered car parking should be located on each allotment in accordance with the Building Envelope Plan.
- The maximum opening width of a garage /carport opening on the primary frontage should be 5.0m. Split and staggered openings are encouraged to reduce the apparent width of door openings.
- The opening width of garages accessed from laneways should be designed to accommodate appropriate vehicle access and turning movements.
- The design of garages/carports should complement the design and building materials of the associated dwelling and seek to reduce their visual dominance.
- In laneways the design of garages and carports should incorporate an articulated roof form that includes at least two elements, such as gables, hips or saw tooth forms.

Advisory

Where two covered parking spaces are required consider owning only one car and converting the spare space into a bike storage area and/or workshop.



3.7 Design garages to reduce their visual dominance and integrate with the building design.



3.7 Garages in laneways should incorporate articulated roof forms.

4 Sustainability principles

The Lochiel Park “Green Village” advances sustainable development in South Australia to a new level, supported by design strategies to manage our finite resources through efficient water and energy systems and technologically advanced building approaches.

There are two methods to achieve compliance with Section 4.

- 1. Deemed to comply method**
 - Applications will be assessed against the Requirements contained in this section. The advisory guidelines provide solutions for improving performance beyond minimum requirements and are encouraged but not essential.
- 2. Sustainability rating tool method**
 - Passive design and other active energy and water consumption parameters are rated by using a tool specifically developed for this purpose. This incorporates the AccuRate rating and applies to all sub-sections in section 4 where identified in the heading with “(Rating Tool)”. The tool uses targets for energy and water consumption. These targets can be achieved in a number of ways, however some of the requirements such as the AccuRate rating in Section 4.1 are still mandatory under this method. **These are nominated with a *.**

4.1 Energy conservation

Energy conservation can be achieved through passive design techniques to maximise the thermal performance of dwellings, the selection of materials with low embodied energy, and the use of energy efficient appliances coupled with a change in the behaviour of homeowners.

AccuRate rating

The thermal performance of dwellings is to be measured by an accredited assessor using the AccuRate rating tool to simulate thermal performance and provide an accurate calculation of the heating and cooling loads for the home.

AccuRate was developed by the CSIRO from data such as climatic conditions and known thermal resistance (or “R” values) of building materials. It simulates the heat gains and losses to a dwelling through a 12 month period and calculates the heating and cooling energy required to maintain certain comfort temperature ranges during the year for a given climate zone. In this case the climate zone is the Adelaide plains.

The energy required varies according to the thermal performance of the house design and is converted to a user friendly “Star Rating” scale where a 1 star house requires a considerable amount of energy and a 10 star house requires no energy to maintain the comfort temperature range.

The minimum AccuRate target required for all dwellings at Lochiel Park is 7.5 stars and this can be achieved through a number of possible design solutions and material selection options.



The following guidelines provide solutions to improving the thermal performance of dwellings in order to achieve the required target of 7.5 stars. The guidelines assessed under AccuRate are the passive design elements in sections 4.1.1 to 4.1.3 and are identified with the word “**AccuRate**” in the heading.

Requirements

- Achieve through design of the home, a minimum of 7.5 stars as measured using AccuRate.*

4.1.1 Orientation and winter solar gain (AccuRate)

Building Envelopes

The building envelopes are designed to facilitate development that minimises energy consumption for heating and cooling. Houses built within the building envelopes will maximise access to winter solar gain and enable natural cooling ventilation in summer.

See Section 3.2 for building envelope requirements.

Orientation of living areas

The greatest winter solar benefit needs to be focussed on daytime living area spaces (Family, Kitchen, Living, Dining, Study, Courtyards).

- The northern portion of dwellings with access to winter sun should be occupied by living areas (not sleeping and service spaces) and linked externally with liveable open space and courtyards.

Glazing (windows and doors)

Glass is a poor thermal insulator, therefore large areas of window will result in a poor AccuRate star rating. Windows (and doors) provide the important benefits of

providing access to light, heat, air and views. Maximising the benefits of windows depends on orientation, shading, size, quality, and the area of glass relative to both the floor area and solid wall area of a dwelling.

Walls that do not have exposure to winter sun should have less glazing. Double glazing and similarly functioning glasses increase the insulating capability.

High thermal performance window (and door) options include the following:

- Double glazed 6/10/4 supertoned low-e, argon fill.
- Double glazed 3/12/4 pyrolytic low-e, argon fill.
- Double glazed 3/6/3 clear, air fill.
- Single glazed solar control, pyrolytic, low-e.

Where X/Y/Z is the thickness of outside glass/gap width/thickness of inside glass in double glazed windows, “toned and “supertoned” refers to different grades of body tinted glass, “low-e” means glass with low emittance coatings, “pyrolytic” is one type of coating technology and “argon fill” refers to the gas contained in the space between the two layers of glass.

High thermal performance window (and door) framing options include the following:

- Timber or uPVC.
- Aluminium, thermally improved (thermal break).

For further information about glazing types, thickness, frames, comparative thermal performance of windows and a list of various manufacturer’s windows visit the Window Energy Rating web site at www.wers.net.

Northern facing glazing should be designed to maximise natural lighting and winter solar heat whilst also minimising heat gain during summer. Windows to the other elevations (southern, eastern, and western faces) should be minimised and are only advisable if specifically required to provide light, views and ventilation.

Requirements

- Allotments with a direct frontage to the Obahn busway require double glazing to reduce the impact of noise in all habitable rooms at the first floor level*.

Shading of glazing

In summer, walls, and in particular glazing exposed to direct solar radiation, admit undesirable quantities of heat into the house. Shade significantly reduces this heat load.

Glass should be properly shaded to protect the building from hot summer solar radiation (while enabling solar gain in winter months).

North Facing Windows:

Since the sun moves higher across the sky in summer, effective shade for northern facing windows can be gained from eaves, pergolas that allow solar gain in winter and not in summer, or vertical screens (shutters or blinds) external to the windows. Deciduous trees can provide additional shade in summer.

East/West/South Facing Windows:

Windows facing east, west and south require total external shading from hot summer sun radiation using vertical devices such as blinds, shutters or awnings or covered pergolas and verandas to exclude solar radiation, from sunrise to sunset.

Internally, thermal quality curtains and blinds with pelmets assist in preventing heat loss in winter and heat gain in summer and are therefore encouraged to reduce direct solar radiation.

Shading of external living areas

Paving can store and/or reflect solar radiation onto walls and windows. This is desirable in winter, but in summer adds considerably to undesirable heat loads.

- Provide removable shading devices to external living areas and courtyards to provide shade in summer months.
- Plant and maintain suitable deciduous landscaping to provide shade in summer while allowing heat gain in winter.

4.1.2 Ventilation zoning and, sealing AccuRate)

Natural ventilation supplies effective air movement during summer to assist cooling. Zoning of spaces (by incorporating doors between internal 'zones') provides for maximum winter warmth and summer cooling through division of living spaces and reducing the areas to be heated or cooled.

External and internal wall insulation and adequate sealing lessen internal temperature variation. Ensuring effective air movement during summer will allow the purging of pent up heat (through the placement of openings such as windows and "ceiling through roof" closable vents on opposite sides of living spaces/rooms or on perpendicular (corner) walls to exhaust heat and encourage breezes).

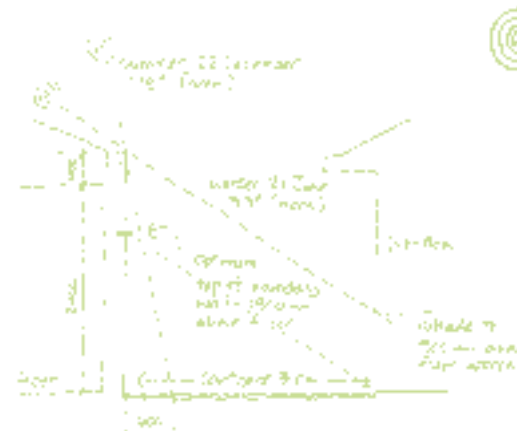
Ventilation

Methods for improving the thermal performance through ventilation include the following.

- Cross-flow ventilation throughout the dwelling.
- Vertical stack effect by ventilating from ceiling level upwards through the roof to the outside, and / or through high and low level windows.



4.1.1 Shade courtyards in the summer months.



4.1.1 Consider winter and summer sun angles on the north facing side.



4.1.1 Use techniques, such as external shutters, to shade glazing.

Direct solar radiation should be prevented from striking glazing from and including November to March from sunrise to sunset.



4.1.2 Design using the vertical stack effect for ventilation.

Sealing

Methods for improving the thermal performance through seals include the following.

- All window and door openings, both external and internal between zones, fitted with fully sealing devices at all meeting faces.
- All vents sealable.

Zone separation in dwellings

Methods for improving the thermal performance through zoning include the following.

- Provide the facility for thermal separation of living areas from sleeping areas.
- Locate and separate stairwells to isolate the two levels from one another thermally and in two-storey voids and mezzanine conditions provide a mechanical system to collect air from high level and deliver to ground floor level.
- Major entrances (lobbies, vestibules) should be isolated from living areas by doorways to provide air locks.

4.1.3 Construction (AccuRate)

Building construction techniques and materials can insulate against the flow of heat from and to the internal spaces.

Floors

Solid (concrete) floors in contact with the earth act to absorb heat from internal spaces or other heat sources (for example: solar radiation in winter). This heat is released to the enclosed and sealed internal spaces in winter as heating, and released to the atmosphere in summer to assist cooling.

High thermal performance floor construction options include the following:

Ground floors

- Concrete “slabs on ground”.

Upper floors

- Suspended floors to upper storeys of solid concrete construction.
- Suspended Hebel floor on timber frame.
- Suspended timber floor on timber frame.

Where direct winter sunlight strikes the floor, heat is absorbed most efficiently where dark coloured tiles or no floor coverings are used. Carpets insulate and reduce the benefit of solar gain in winter and are therefore discouraged in locations where winter sunlight strikes the floor.

Walls

Various construction techniques and materials are acceptable and their benefits may vary depending on the location and the orientation of the wall within the dwelling and the combination of materials.

The total thermal resistance (“R” value”) of a wall is the total of the individual “R values” of the composite materials.

Solid masonry walls, like solid floors, have the capability to absorb and retain heat. They have “thermal mass”. Under certain conditions in summer this capability enables the walls to absorb heat from rooms, maintaining lower temperatures during the day, and releasing the pent up heat into the cool night air, being cool and ready to do the same thing the next hot day. In winter heat generated inside (from the sun or other heat sources) is absorbed, ready for release in the evening, thereby reducing the need for extensive ongoing artificial heating. An insulated timber framed wall may be built around the perimeter of the external masonry walls to maximise the effectiveness of the thermal mass. Walls with these characteristics are commonly known as “Reverse Brick Veneer” (RBV).

High thermal performance wall construction options include the following:

- Autoclaved aerated concrete ACC (Hebel) external/brick internal.
- Polystyrene/cement panel (Quick’n’tough) external/brick internal.
- RBV light weight cladding external/brick internal.
- Mud brick or rammed earth.
- Cavity brick.
- Insulated concrete form (eg. Lock Form).

Under certain conditions, traditional brick veneer construction combined with high levels of insulation and glazing can achieve good thermal performance.

Requirements

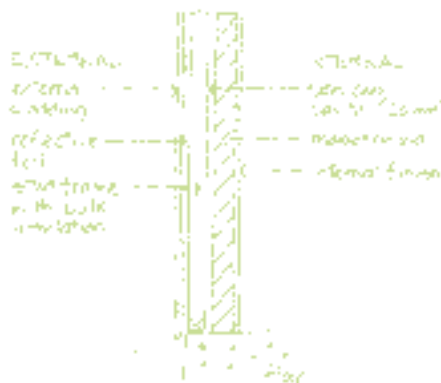
- Reverse brick veneer or insulated concrete form wall construction on the following designated allotments: 22, 46, 74 and 75 .

Wall insulation

The addition of insulation to the above wall types will improve thermal performance. The thickness of the insulation should be matched to the cavity to ensure the insulation is not compressed. A minimum of R2 is recommended. Types of wall insulation available include rockwool, glasswool, sheeps wool, cellulose fibre, reflective foil sheets, insulation and aircell.

Roofs

Insulated roofs (ie fitted with reflective foils and with bulk or proven similarly acting insulating products) will reduce the impact of high levels of solar radiation and other heat gain and heat loss.



4.1.3 Typical reverse brick veneer wall.

4.1.3 Construction (AccuRate) (cont.)

- In addition to the fitting of foil reflective sheets at the underside of roofing purlins, all roof spaces should be insulated to an R3.5 rating.
- Foils which are of laminated form enclosing cellular plastic layer(s) add to the thermal resistance (R value) of the composite “ceiling to roof” area.

Requirements

- Roof space with sufficient space to accommodate evaporative A/C ductwork on designated allotments: 14, 17, 20, 24, 63, 64, 70, 74, 75, 78, 68, 69.

4.1.4 Building materials

The selection of materials and systems can create healthy environments by minimising toxic outgassing (release of toxins as gas). The use of materials should take into consideration the greenhouse gas emissions and water use associated with their production.

Selection criteria

Building designers should consider the environmental effects of construction materials and products over their whole life cycle, and incorporate these considerations as part of a sustainability strategy.

Construction materials and products should be selected based on balancing the following environmental criteria:

- Eco-labelling and certification.
- High recyclable content or potential for recycling.
- Sustainable sourcing.

- Low embodied energy (the energy used in their manufacture).
- Low pollution from manufacturing.
- Low transport costs.
- Minimal environmental impact.
- Durability and minimal maintenance.
- Non-hazardous.

Plantation timber

Requirements

- Rainforest and old growth timbers should not be used. Use only timbers that are supplied from local sustainable plantation sources or locally sourced recycled timber.

Chemical treatment

Toxicity from chemicals used in the construction process needs to be minimised, and on that basis some are deemed inappropriate for use at Lochiel Park “Green Village” due to their high toxicity.

Requirements

- CCA treated pine, and other such chemically treated materials should not be used.
- Use only mechanical or other non toxic pest exclusion systems.

Low off-gassing coatings and materials

Building interiors finished with materials and paints with low pollution emitting levels support healthier internal household conditions.

Advisory

- All internal coatings should comply with Australian Environmental Labelling Association (AELA) standard No: AELA 23-2005 “Architectural and Protective Coatings”. Information about suppliers of coatings that comply is available from www.aela.org.au
- All “particle board” type materials are to be of E-Zero standard (0.5mg/L).

It is recommended to source materials through Ecospecifier.

<http://www.ecospecifier.org>

Embodied emissions

(Emissions caused in production and transportation of materials)

Choosing building materials that measure lower in embodied emissions and that come from a local supplier will have a reduced impact on our environment compared to choosing from high energy (emissions) manufacture base materials and those that need to be transported over large distances by “high emissions” vehicles.

An example of this can be found when choosing how to build wall and roof framing. The use of plantation or recycled timber sourced locally is of less impact than the use of steel (approximately 500Kg/tonne for plantation timber compared with 2000Kg/tonne for steel before considering transport emissions).

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Requirements

- Source concrete that uses a minimum of 40% recycled material for aggregate.
- Masonry wall materials should only be of recycled brick, clay, stone, concrete block or other low cementitious bases (weak slurry, high fly ash (minimum 20%) or similar).
- Roofs to be constructed from metal sheet on timber frame. Steel framing may be used for major spans, or if demonstrated to be produced from recycled steel. Avoid thermal bridging by use of timber framing or insulating separators.
- Wall frame systems are to be constructed using timber. Allowance for use of steel framing, where practical, includes specialist concrete filled systems, or if demonstrated to be produced from recycled steel. If using (recycled) steel studs in exterior walls, special detailing is required to avoid thermal bridging and to avoid condensation. Thermal bridging occurs wherever steel spans from the inside to the outside of the building envelope (steel is over 400 times more conductive of heat than wood).

Advisory

- Concrete can be constituted by quantities of fly ash, thus reducing cement volumes, and thereby reducing the amount of embodied emissions.

4.15 Appliances and utilities (Rating Tool)

Energy efficient appliances that minimise greenhouse gas generation and excessive water use should be installed in buildings.

Details on energy efficiency and star ratings for a range of electrical appliances can be found at www.energyrating.gov.au
Details on energy efficient home electronic equipment can be found at www.energystar.gov.au

Water heating

Hot water systems should meet hot water demands while reducing reliance on state supply infrastructure and minimising greenhouse gas generation. More than 30% of energy used in households is devoted to provision of hot water. Delivery of heated water to outlets needs to be protected from significant heat loss.

Requirements

- The use of gas-boosted solar hot water systems that provide a minimum solar contribution of 70% is mandatory. This includes, but is not limited to split systems utilising “instantaneous” gas furnaces, or such other heating systems of equal or lesser greenhouse gas emissions.*
- For 3+ bedrooms, 25 or more RECS in Region 3
2 bedrooms, 20 RECS in Region 3
1 bedroom, 14 RECS in Region 3
- All hot water pipes are to be well insulated, with minimum insulation of 19mm.
- Hot water systems should be sited to achieve the optimum performance and not obstruct access around the dwelling if located on the ground.

Space cooling and heating

Buildings complying with these Urban Design Guidelines should minimise the need for mechanical heating and cooling. If any mechanical heating or cooling systems are installed, they should be selected on the basis of energy efficiency, and considerate of source and type of energy used. Gas based heating emits less greenhouse gas than electric resistance heating, and power generated from renewable resources significantly reduces emissions.

Heating systems

Preferred technology

- High efficiency non-ducted gas fired heating systems;
- Solar-boosted gas fired hydronic radiator systems;
- Solar-boosted gas fired hydronic in floor heating systems;
- Solar combi (hot water and space heater) systems;
- Solar air heating systems;
- 6 Star, non-ducted heat pump systems;
- Geo exchange loop connected systems; and
- Other heating systems will be allowed if they can be shown to have an equivalent or reduced greenhouse gas emissions. The builder/resident will need to arrange an assessment of a proposal by an independent assessor approved by the Land Management Corporation to determine if it meets the intent of the guidelines. Costs associated with this process will be borne by the applicant.

Precluded technology

- Gas heaters not subject to gas rating labels, or with a gas rating of under two stars;
- Electric resistive heaters, including infrared heat lamps, with a maximum input power exceeding 2.4kW;
- Solid or liquid fuel heaters of less than 50% thermal efficiency; and
- Ducted heating systems other than those listed under Preferred Technology.

Requirements

- If the preferred heating system is electric reverse cycle air conditioning, then this sizing should be governed by the cooling criteria (see cooling section).
- If the preferred heating system is gas, the sum of the maximum gas input for all heaters must not exceed 45 MJ/h.
- Where a combination of heaters is used, the above gas and electrical constraints apply, pro-rata based on heater output capacity. For example, the following three heaters in a given house would have constraints as shown:
- A wood heater of 5kW output (40% pro-rata, but no constraint);
- A gas space heater of 5kW output (Max 18 MJ/h; ie 40% pro-rata); and
- A reverse cycle air conditioner of 2.5kW output (Max 0.7 kVA; ie 20% pro-rata)

Cooling systems

Preferred technology

- Indirect evaporative coolers (including ducted systems);
- Direct evaporative coolers (including ducted systems), with plant preferably located in a shaded open area and exhausted direct to roof space;
- Multi head refrigerative zoned systems without air ducting may be approved subject to the maximum input capacity not being exceeded (see below);
- 6 Star heat pump systems (excludes ducted);
- Geo exchange loop connected systems;
- Reverse cycle systems with digital scroll technology having an equivalent of 6 Stars or 3.5 EER and a Demand Response Enabled Device; and
- Other cooling systems will be allowed if they can be shown to have equivalent or reduced greenhouse gas emissions and peak load characteristics. The builder/applicant will need to arrange an assessment of a proposal by an independent assessor approved by the Land Management Corporation to determine if it meets the intent of the guidelines. Costs associated with this process will be borne by the applicant.

Precluded technology

- Ducted cooling systems other than those listed under Preferred Technology.

Requirements

- If the preferred cooling system is electric refrigerative or reverse cycle, the sum of the maximum electrical input power at rated conditions of 35 deg C ambient temperature for all coolers must not exceed the following:
 - Small House (< 110 m²): 2.0 kVA.
 - Medium House (110 to 185 m²): 3.0 kVA.
 - Large House (>185 m²): 4.0 kVA.Note that kVA is distinct from kW, and depends on the power factor of the system. Some advanced systems have power factor correction.
- Ceiling fans are to be fitted in all habitable rooms, which are to have a minimum ceiling height of 2.7m where the fan is located (refer Section 3.3). Where possible limit the extent of high ceilings to minimise room volume and overshadowing of dwellings to the south. This may be achieved by raking ceilings for part of the room.
- Roof space with sufficient space to accommodate evaporative A/C ductwork on the following designated allotments: 14, 17, 20, 24, 63, 64, 68, 69, 70, 74, 75, 78.

Advisory

- Night purging air extraction fans can be used in summer to efficiently remove heat from the home.

The Land Management Corporation is working closely with the University of SA regarding latest technologies for residential air-conditioning systems. An independent assessment of a proposal to see if it meets the intent of the guidelines can be arranged. Please contact the Land Management Corporation if you wish to have an

assessment undertaken by the University of SA for your air-conditioner. The costs associated with this process will be borne by the applicant.

Kitchen, laundry and bathroom appliances

All appliances demand energy input with resultant Green House Gas emissions. Reduction in emissions can be achieved by selecting high efficiency appliances, whether fitted or loose.

Refer to Energy Labelling website www.energyrating.gov.au for a list of appliances and their relative energy efficiency.

Requirements

- All cooktop appliances are to use gas as the primary energy source. Electrical cooktop appliances are not to be used unless demand for gas free internal environments on health grounds is demonstrated, or additional electrical energy is generated on site being equivalent to a minimum of 0.3kW Photo Voltaic energy for electric induction cooktops, or 0.6kW Photo Voltaic energy for other cooktop types.
- Provide an external clothes line of capacity demonstrably suited to the capacity of the dwelling.
- All appliances installed by the builder should be of "5 star" level for efficient energy use. Dishwashers should be a minimum of "3 star" for both water use and efficient energy use.

Advisory

- If a clothes dryer is required, then it should operate on gas.
- All appliances from fridges to bread makers should be purchased at the highest possible level of energy efficiency.

Lighting

Buildings should be designed to maximise use of natural light and minimise energy use for lighting.

Requirements

- Rooms and spaces without direct access to daylight through windows should be fitted with tube based skylights or roof lights. If roof lights larger than 250mm diameter (or equivalent area) are used they should be fitted with double glazing and operable sunshades.
- Install only energy efficient lighting in every room and outdoors. (Note that low voltage lighting is not necessarily low energy lighting.) A minimum standard for lighting is that they achieve a minimum 30 lumens/watt.

4.1.6 Renewable energy supply (Rating Tool)

The installation of any renewable energy supply system, such as photo voltaic (PV) panels, will provide electricity that is free of greenhouse gas emissions. PV cells connected to the electricity grid will enable “net metering” of the energy generated or selling it back to the electricity retailer at special tariffs. Electricity is fed back into the grid resulting in credits on electricity bills. In addition to this, “green power” generated from renewable sources including wind farms can be purchased at a slightly higher price.

Requirements

- Generate energy from renewable sources using systems with a minimum rated capacity of 1.0kW per 100m² habitable floor area (ie excluding garages and balconies).
- Ensure sufficient and appropriately orientated unshaded roof area is available for the location of solar collection devices (refer Section 5.2.1).
- ETSA Utilities will install a digital metering system located in the external meter box.
- An EcoVision digital display is to be installed within the dwelling and connected to the external metering system to provide a readout of power consumption and onsite renewable energy generation.

Advisory

- Purchase “green power” through an energy retailer.

4.1.7 Electricity load limiters (Rating Tool)

The Land Management Corporation, is running an exclusive electricity load management trial at Lochiel Park.

The peak electrical demand in South Australia occurs on a few days of extreme conditions each year and is continuing to grow. The peak demand for electricity is twice the average demand, meaning that SA's electricity infrastructure is seriously under-utilised for all but a few days each year.

The trial will assist the residents at Lochiel Park to better understand the way they use their electricity. Importantly, it will also provide them with the opportunity to lower their electricity demand, and through that to reduce their electricity bills.

Residents will keep their total electricity load in their homes below a certain level. They will then be charged for their electricity through what is termed a “capacity-based tariff.” The customer's electricity supply tariff will be set in line with their chosen limit. This limit can be changed at any time through the EcoVision in home display.

The resident's chosen load limit will be regulated by a load limiter. This device is provided at no cost to the resident. The device enables households to choose which appliances “trip off”, and in what sequence, should the home at any time be using more electricity than the preset limit.

As an example, during summer a home may have the air conditioner, television, computers, washing machine, stove and a number of other appliances all operating at the same time. If this demand exceeds the preset limit agreed to by the resident for more than a set period of time, the first circuit (eg the air conditioner) would switch off. Any appliances in the home can be switched off to reduce the load.

If the load is still above the preset threshold after a further five minutes, then the second chosen circuit (eg the washing machine) would turn off. This would continue until the demand is below the preset limit.

It is important to exclude appliances such as fridges, freezers, computers and lights from the load limiter circuits.

Requirements

- Wire electrical circuits according to LMC's wiring guidelines for load limiting devices.

4.2 Water (Rating Tool)

Minimising water use and using fit-for-purpose water will reduce demand on potable water and benefit the environment. The fit-for-purpose approach to be applied at Lochiel Park requires the collection and use of rainwater from individual house tanks for use in hot water systems and the use of treated storm water from community storage facilities including wetland and underground aquifers and / or storage tanks, for use in irrigation, toilet flushing and laundry cold taps connected to washing machines. This will limit the use of potable water for other applications such as drinking, kitchen uses and bathing. This approach exceeds the minimum standard required under current state government legislation.

Efficient appliances and fittings (e.g. taps) and “low water use landscape” design will further minimise the amount of water used.

4.2.1 Rainwater tanks (Rating Tool)

The rainwater system requires a roof collection area, conveyance through guttering to a storage tank, a pump, backflow prevention system, mains water top up and connection to the hot water system.

The roof surface should not be painted with lead based paints or coated with bitumen-based material. Pesticide treated timber, lead fittings and lead flashing should be avoided. The rain from the first few runoffs from new roof surfaces may need to be discarded. The size of the collection area should be optimised where the guttering and pipes can be graded for connection to the tank. Maintenance to remove leaf litter and other debris is important.

Specially designed guttering may reduce the cleaning required and reduce the solid

matter and contaminants entering the storage tank. Alternatively gutter screening/mesh can be used to exclude leaf litter.

A first flush device may be used to divert the water that is initially running off the roof surface. The volume diverted should be minimized to ensure optimal harvesting and reuse. A filtration device may be more suitable to ensure that the maximum volume of water is harvested and the pollutants are removed, although this will require maintenance to ensure continued operation.

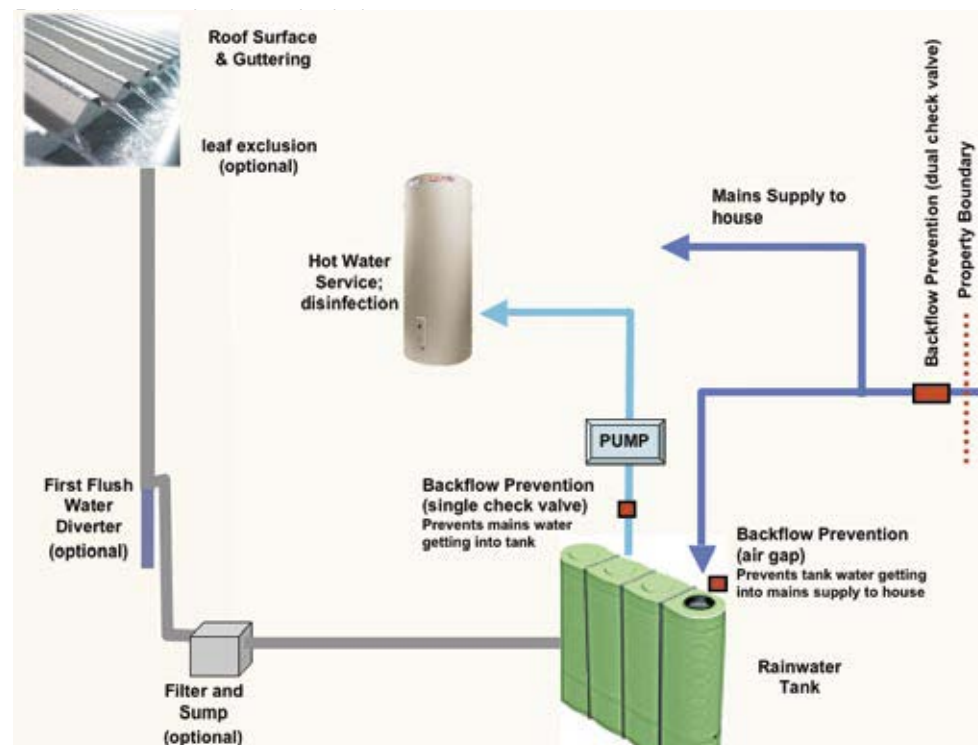
A tank should be made from suitable material, with no risk of contamination from groundwater or surface water through tank permeability or through joints. There are a range of options for tanks from underground tanks to narrow ‘slim line’ above ground tank or bladder storages that can be located beneath the floor, or special guttering designed for rainwater storage.

An overflow pipe is required from a rainwater tank or gutter discharge point to the stormwater system or to a suitable discharge point. Ideally this would be a visible overflow point that could be identified in the unlikely event of a fault resulting in uncontrolled mains water top up. A level indicator may be a useful accessory to view the amount of water in the tank. Mosquito screening is important at all access points (outlets and inlets) to tank.

A pump is required to transfer water from the tank and to ensure adequate pressure to the hot water system, shower heads and tap fixtures. The head will change as the water level drops in the rainwater tank with most frequent operation for a low water level in the tank – ensuring maximum available storage volume for harvesting rainwater. An acoustic hood or box typically used for swimming pool pumps is an effective way to minimize noise levels.

Plumbing requirements include a system for constant supply of water when plumbed to hot water services without any manual intervention. This can be achieved by either a ball float control valve (triggering a small volume top up from mains water when the tank is nearly empty) or with a rainwater/mains water switching valve (and controller) which ensures mains water supply automatically when the rainwater supply is not available.

Some pump and controller systems are available that ensure a seamless automatic switching between rainwater and mains supply as well as the required backflow prevention. In the case of a power failure, these automatically supply mains water as the backup.



4.2.1 Schematic of Rainwater System Components



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Requirements

- Rainwater is to be collected from a minimum 80% of the roof area, retained in rainwater tanks of at least 1.5kL (or 1.0kL for mews dwellings) of storage and plumbed to hot water systems.*
- Drinking water top up should be provided and protected with a suitable back flow prevention device.
- All rainwater tanks are to be fitted with a "first flush" system or filtration device.
- Allotments less than 400m² are to provide rainwater tanks underground or slim line incorporated into fencing or gutter storage systems unless it can be demonstrated that the tank location will not impact on private open space and will not be visible from public areas.
- Installation shall be in accordance with the SA Water Rainwater Plumbing Guide

Advisory

- Rainwater tanks can be connected to kitchen sinks providing appropriate treatment for drinking water supply is installed.

4.2.2 Drinking and recycled water connections (Rating Tool)

All homes in Lochiel Park will be provided with a drinking water and a recycled water connection at the front boundary of the allotment. The drinking water connection will have a standard brass coloured meter and will provide water from the SA Water mains. The recycled water connection and meter will be coloured lilac and will ultimately provide treated stormwater at a lower pressure compared to the drinking water system.

During an establishment period of about 2 to 3 years from the initial completion of the subdivision, the recycled water connection will deliver drinking water at the reduced pressure applicable to the recycled water system.

Requirements

- Treated stormwater from the recycled water system is to be provided for all toilet flushing, cold washing machine and external (irrigation) use.*
- Installation of pipe work inside the property must be installed by a registered plumber in accordance with the SA Water Recycled Water Plumbing guide.* - refer to www.sawater.com.au
- All dwellings are to remain connected to a recycled water system delivered through the lilac pipe network.*

4.2.3 Fixtures and appliances (Rating Tool)

The use of water efficient fixtures and appliances can save considerable quantities of water. Most fixtures and appliances available on the market have a star ratings indicating water efficiency.

Refer to the Water Efficiency Labelling and Standards (WELS) web site at www.waterrating.gov.au/about/index.html for a list of shower heads, dishwashers, clothes washers, toilet suites, urinals, taps and flow regulators including brands and star rating.

Requirements

- Provide only 4 star toilets, 3 star showerheads, and 4 star dishwashers where installed.

Advisory

- Install devices that reduce water loss from delays on hot water supply to outlets caused by the distance of the outline from the hot water service.
- Install hot water services that cater for low flow shower heads and are as close to the intended outlets as practical.

4.3 Solid waste management

4.3.1 Construction waste

Reduce the amount of construction waste and conserve resources through re-use or recycling to reduce the environmental impact from material manufacturing and transport.

Requirements

- Comply with the Developer's Environmental Management and Recycling Scheme.

4.3.2 Domestic waste

Recycling facilities

Recycling of solid waste will reduce additions to landfill and the depletion of non-renewable resources.

Requirements

- Provide separated waste storage facilities within, or adjacent to, kitchens for internal waste sorting and in external service areas for waste bin storage. Such areas must be indicated on all plans and have adequate access to the street.

4.4 Atmospheric management

4.4.1 Zero CFCs, HCFCs and Halon

Avoid the use of CFC's to prevent deleterious impact on the ozone layer.

Requirements

- Demonstrate that all relevant installed appliances are free of CFC, HCFC and Halon.

4.4.2 Indoor air quality

The injection of fresh air and/or filtration of existing air in indoor residential spaces has a benefit to occupants by maximising heating and cooling efficiency and reducing pollutant levels.

Advisory

Use heat recovery ventilators (HRVs), energy recovery ventilators (ERVs) and high efficiency filtration to improve air quality while maintaining indoor air temperature.

- Heat recovery ventilators (HRVs) operate using a heat exchanger between inbound and outbound air flows. In winter for example, cool and fresh outside air is drawn into the building via exhaust fans. Simultaneously, warm, moist and polluted inside air is drawn through the HRV and out of the building. As both air streams pass through the heat exchanger, a proportion of the heat from the warmer (outgoing) air is transferred to the cooler (incoming) air. The result for the building is fresh, improved air quality, while reducing the required energy consumption and sizing of air conditioning units. A similar, but opposite, process occurs in summer.
- Energy recovery ventilators (ERVs) are closely related to HRVs, but also transfer the humidity levels of the exhaust air to the intake air.
- HRVs and ERVs can also have high efficiency air filtration of 90% (10-40 micron standard, but down to 1 micron). This is sufficient to filter out most dust, PM10, PM5 and PM2.5s (carcinogenic fine particulates from diesel and other combustion processes), food smells, even most bacteria, moulds and large viruses. Apart from removing pollutants, the main additional benefit of this type of electronic filtration is the low pressure resistance created (Hospital or HEPA grade filtration requires large amounts of energy to push air through extremely fine pores in the filtration media, whereas electronic filters do mostly the same task, and almost to the same level of performance, but without the high energy and maintenance costs of HEPA filtration. Reduced pollution and dust of internal air also has additional benefit of reducing need for cleaning, and provides relief to dust and chemical sensitive individuals.

4.5 Other building design principles

4.5.1 Adaptable housing design

Homes at Lochiel Park "Green Village" should be designed to consider "whole of lifecycle" needs of occupants. The dwelling designs should be adaptable to changing needs of occupants overtime, particularly access and disability needs.

Advisory

- Designing homes to be adaptable to future needs should be considered in the design of the home, including disability access and the ability to reconfigure the home to facilitate living, sleeping and bathing at ground level.



4.5.2 Crime prevention principles

Safety and security can be promoted and crime discouraged through good design. Dwellings should be designed to overlook public areas (providing privacy of neighbouring properties is not affected) to provide casual surveillance.

Requirements

- Dwellings should be designed to overlook public streets, reserves and parklands to provide casual surveillance as well as an outlook for occupants.
- Appropriate fencing of front, side and rear yards should be installed to clearly differentiate between public and private areas.
- The front door of dwellings should be clearly visible from the adjacent public road or reserve frontage.
- Mews dwellings designated on Lots 12, 24, 26, 29, 49 and 61, studios designated on Lots 33, 38, 48, 62 and 76, and balconies designated on Lots 11, 28, 56, 60, 62-66 and 72-77, are to be constructed to provide opportunities for casual surveillance of public spaces and laneways.

4.5.3 Noise attenuation

The location of the O'Bahn busway adjacent to the Green Village results in noise levels in part of the development that result in the need to use noise attenuation measures in some dwellings to minimise the disruption to residents.

Requirements

- Incorporation of the following acoustic treatment to the façades of all bedrooms, studies, and lounge rooms on first floor of residences on Lots 1, 3, 4, 5, 6, 7, 8, and 9:
 - Ensure that all glazing (including sliding doors) is constructed from minimum 11mm thick laminated glass;
 - Ensure that ceilings are constructed from a minimum of a single layer of 13mm thick fire-rated plasterboard, with 100mm thick mineral fibre insulation (with a minimum density of 60kg/m³) installed immediately above each ceiling;
 - Ensure that all unglazed external doors are minimum 35mm thick solid core doors;
 - Fit acoustic seals to all external doors and windows to ensure that they are sealed airtight when closed;
 - Incorporate alternative ventilation to each room to allow windows and doors to be closed if desired. This alternative ventilation may take the form of air-conditioning incorporating outside air, or ventilation ducts and/or fans. It is noted that the use of ventilation ducts and/or fans for alternative ventilation will provide an additional noise path into the dwellings, and therefore may require further acoustic treatment; and
 - Where a habitable room (such as a bedroom, study, family room or living room) on the ground floor of residences on Lots 1, 3, 4, 5, 6, 7, 8, and 9 does not have a first floor area directly above, ensure that the ceiling to the room is constructed from a minimum of a single layer of 13mm thick fire-rated plasterboard, with 100mm thick mineral fibre insulation (with a minimum density of 60kg/m³) installed immediately above.
- Incorporation of the following acoustic treatment to the façades of all bedrooms, studies, and lounge rooms on first floor of residences on Lots 2, 10, and 11:
 - Ensure that all glazing (including sliding doors) is constructed from minimum 10mm thick standard glass;
 - Ensure that ceilings are constructed from a minimum of a single layer of 10mm thick standard plasterboard, with 50mm thick acoustic insulation (with a minimum density of 32kg/m³) installed immediately above each ceiling;
 - Ensure that all unglazed external doors are minimum 35mm thick solid core doors;
 - Fit acoustic seals to all external doors and windows to ensure that they are sealed airtight when closed;
 - Incorporate alternative ventilation to each room to allow windows and doors to be closed if desired. This alternative ventilation may take the forms as mentioned for other allotments; and
 - Where a habitable room (such as a bedroom, study, family room or living room) on the ground floor of residences on Lots 2, 10 and 11 does not have a first floor area directly above, ensure that the ceiling to the room is constructed from a minimum of a single layer of 10mm thick standard plasterboard, with 50mm thick acoustic insulation (with a minimum density of 32kg/m³) installed immediately above.

4.6 Broadband

Lochiel Park will have fibre optic cable installed in the underground common service trench to facilitate high speed broadband for each home in the development. Fibre-to-the-home (FTTH) technology will enable information transfer many hundreds of times faster than the current standard copper installation offered by Telstra. FTTH will deliver telephony services and high speed internet connection which will have the capacity to deliver high quality television signals and “video on demand” services.

Requirements

- Data cabling is required in the home and must comply with the data cabling guide available from LMC.

5 Building appearance

5.1 “Green Village” character

The Lochiel Park “Green Village” brings sustainable settlement adjacent to Adelaide’s significant linear park environment, to create an attractive, liveable and people orientated village and neighbourhood.

Architectural expression should reflect the ESD aspects of this Village while relating strongly with the riverine and urban forest environs. The residential component of the development is compact and relatively dense, and therefore garden landscaping will be important to help “soften” the appearance and blend the village in with

its natural surroundings. Contemporary design, including use of skillion roofs, large overhangs and articulation enhanced by deep recesses, canopies and modulation of volumes, requires a combination of textures and colours that are drawn from the natural environment. Diversity is to be sought through the use of accent colours as nature does with flowers.

5.2 Built form

In order to create an attractive neighbourhood character, buildings should incorporate quality contemporary built form employing a diversity of finishes and materials. Building design should make a positive contribution to the local environment, should respond to the Adelaide climate and should avoid design philosophies that mimic historic styles.

The visual interest of buildings should be created through a combination of the relief of the built form and the layering of different materials and colours. Relief to the façades of buildings is to be created through the articulation of volumes expressed by use of different materials and colours, and shadows created by these volumes, sun-screening and balconies. Appendix 3 demonstrates examples of desirable building elements and styles.

Fencing also plays an important part in the function and visual appearance of the dwellings and their sites, providing privacy, demarcation of space and framing the building. Fencing and garaging should be considered in conjunction with the built form of the dwelling to ensure that the overall built form and appearance is consistent with the character of the “Green Village”.



5.2.1 Poor secondary frontage presentation.



5.2.1 Good secondary frontage presentation



5.2.1 Example of a good primary frontage with an integrated garage. Setback variations within the Building Envelope add visual interest.

5.2.1 Dwellings and associated buildings

Primary frontages

The primary street frontage of dwellings should present an interesting and attractive form through the use of varied setbacks from front and side boundaries at the upper and lower levels. The inclusion of protruding balconies and porches, the position and size of windows and arrangements of a diversity of shutters/screening devices, where required, should also be incorporated.

Requirements

- Dwellings are to be designed in accordance with the Building Envelope Plan, while incorporating setback variations in the façade at both upper and lower levels.
- Dwellings with vehicular access from the primary frontage should incorporate the garaging in a manner that reduces its dominance, including through the use of building articulation, varied setbacks and projecting elements over the garaging (eg, upper level balconies).
- Openings for garages in the primary frontage should be restricted in width with a maximum opening width of 5m (refer to 3.7). Building massing and voids should be used to draw attention away from the garage.
- The primary frontage of dwellings should be designed to incorporate functional elements such as porches, balconies and window shading devices to provide interest to the façade.
- The location, size and proportion of windows and doors, while addressing energy conservation issues, should be designed to work with the overall built form and style to create an interesting presentation to the street.

Secondary street frontages

The secondary street frontage of dwellings should present an interesting and attractive form through the use of varied setbacks at the upper and lower levels, the inclusion of elements such as balconies and window shading devices, and the position and size of windows and doors.

Requirements

- Dwellings are to be designed in accordance with the Building Envelope Plan, while incorporating setback variations in the secondary frontage façade at both upper and lower levels.
- The secondary frontage façade of dwellings, particularly the first 10m from the front corner, should be designed to incorporate functional elements such as verandahs, pergolas, balconies and window shading devices to provide visual interest. Wrap-around elements on the corner of the dwelling should be included, where appropriate.
- The location, size and proportions of windows and doors, while addressing energy conservation issues, should be designed to work with the overall built form and style to create an interesting presentation to the street.
- Dwellings with vehicular access from the secondary frontage should incorporate the garaging in a manner that reduces its dominance, including through the use of building articulation, two storey elements where appropriate and varied setbacks.

Parkland/Reserve frontages

Dwellings with parkland or reserve frontage should present an interesting and attractive form through the use of varied setbacks at the upper and lower levels, the inclusion of elements such as balconies and window shading devices, and the position and size of windows and doors. In combination with fencing treatments and the design of private open space, parkland or reserve frontages should provide an attractive extension of the outdoor living area of the home while also presenting an attractive and interesting appearance to the public realm.

Requirements

- Dwellings are to be designed in accordance with the Building Envelope Plan, while incorporating setback variations in the secondary frontage façade at both upper and lower levels.
- The built form visible from the parkland or reserve area should be designed to incorporate functional elements such as verandahs, pergolas, balconies and window shading devices to provide interest to the façade.
- The location, size and proportions of windows and doors, while addressing energy conservation issues, should be designed to work with the overall built form and style to create an interesting presentation.



5.2.1 Good presentation to park frontage with visual interest to the façade and casual surveillance from balconies.



Side boundaries

The design of built form to side boundaries should consider both the visual impact on the adjacent property and the relationship to solar access and private open space.

Building on the boundary is acceptable at Lochiel Park “Green Village” as the aim is to maximise the efficient use of land. However the built form must be considerate of the relationship with the adjacent site, and should be designed to avoid adverse impacts.

Requirements

- Dwellings are to be designed in accordance with the Building Envelope Plan to ensure appropriate minimum boundary setbacks.
- Further setback variations within the limits of the Building Envelope Plan should be incorporated at upper and lower levels to provide relief to the built form and create visual interest.
- Building to the boundary should be located in accordance with the Building Envelope Plan and the Building Height requirements (see Sections 3.2 and 3.3), providing that the construction materials are consistent with the predominant materials of the external walls of the associated dwelling.
- Upper level side boundary façades of dwellings should be designed to incorporate windows, shading and screening devices and other elements that work with the overall built form and style to create an interesting presentation to neighbouring properties, while also addressing energy conservation and privacy issues.



5.2.1 Poor side boundary presentation.



5.2.1 Good side boundary presentation.

Roof forms

The built form of the Lochiel Park “Green Village” should incorporate interesting roof designs to create visual interest while also addressing the functional aspects of solar collection, shading and water collection.

Suitable roof forms include skillion roofs, ‘butterfly’ forms together with pitched and gabled forms. Skillion and butterfly roof form edge details are to reflect current contemporary design, with a tendency away from bulky fascias.

Requirements

- Roof forms should form an integral part of the design of the built form and style of the dwelling and be consistent with the contemporary style intent of the area.
- Roof forms should incorporate sufficient northern facing area of size and pitch to support solar hot water and photovoltaic collectors of required capacity that are preferably not visible from the primary frontage of the dwelling (refer to 4.1.6). The positioning of solar collectors in a location visible from the primary frontage may be considered where the roof profile and materials are designed specifically to incorporate them.

5.2.2 Fencing and boundary walls

Primary frontage

Front fencing demarcates the division between the public and private realm, providing a sense of ownership of the front yard space while maintaining the ability to view the front of the home. Front fencing should be provided to all dwellings to create an urban feel, but they should be kept relatively low and open to maintain views of front gardens and to the front of the dwelling.

Where the main area of private open space is to be provided on the northern side of the dwelling a more private front fencing style should be used to create a northern facing courtyard (refer to specific Lots on the Building Envelope Plan).

Requirements

- All dwellings should include fencing of the front yard along the street boundary and the side boundaries for a distance of 1.0m behind the building line (to the building line where building to the boundary), except for dwellings on corner sites where the front fencing should extend along the secondary street frontage for a distance of at least 5m beyond the building line of the dwelling.
- Front fencing, including the portions along the side boundaries, should have a maximum height of 1.2m for transparent fencing or a maximum height of 0.9m for solid fencing.
- A letterbox should be incorporated into the front fencing that is of complementary design to the fencing.

Secondary frontage

Where a dwelling includes a secondary frontage to a street or laneway the fencing should be of suitable form and height to provide security for the dwelling and its garden areas, while presenting an attractive appearance to the public realm. Front fencing should wrap-around corners to create open and attractive street corners and to reduce the length of high side fencing to the secondary frontage.

Requirements

- Secondary frontage fencing should complement the form of the front fencing for a length of 5m beyond the front building line of the dwelling and the general form and style of the associated dwelling.
- Fencing along the secondary frontage beyond the 5m distance should be a maximum height of 1.8m and be constructed of materials including masonry, lightweight rendered material, plantation timber paling or custom orb colorbond sheeting in conjunction with masonry plinths and pillars complementary to the dwelling. Colorbond fencing alone will not be permitted.
- In each case, a colour should be used that complements rather than contrasts with that of the house.

Parkland/Reserve frontage

Dwellings that have a frontage to a parkland or reserve should incorporate a fencing design that provides some privacy for the dwelling while presenting an open and attractive appearance to the public open space. The parkland and reserve areas should be considered in the design of the dwelling and open space as an extension of the living areas available to the dwelling and should include open fencing styles that embrace the public open space, providing screened views and natural surveillance.

Requirements

- Adjacent to public open space, fencing should be a maximum of 1.8m in height and be constructed of materials that allow a degree of transparency. This is to be horizontal renewal timber slats or pallings with semi-transparent sections as shown on the building envelope plans.
- Service courts and utilities areas of dwellings (eg, accommodating clothes drying areas, bins, service equipment and other utilities) should be located in a position where they are screened from view of areas of public open space.

Advisory

- Lockable gates consistent with the design of the fencing are desirable to provide direct access to the public open space.

Side boundary fencing

Side boundary fencing should provide for privacy between properties, while also taking into consideration the impacts on solar access and visual amenity.

Requirements

- Side fencing between properties is required to be 'Estate' colorbond and be 1.8m in height (measured from the ground level of the high side property where there is a level difference between adjacent allotments), behind the main face of the dwellings.

5.3 Building materials and colours

Development at Lochiel Park aims to create an attractive neighbourhood character, expressed through quality and diversity of finishes, materials and built form. The aim is to encourage the use of combinations of materials, textures and colours to result in variety and provide architectural interest.

The palette of building materials and colours comprises "layers", which in their combinations produce interesting and contemporary variations in the character and look of each building, while ensuring consistency to the development as a whole.

Requirements

- All materials and colours are to be specified in application documents.

Layers

Relief to the façade is to be created through the articulation of volumes (See sections 3.2 and 5.2.1) expressed by use of different materials and colours, and shadow created by these volumes, sun-screening and balconies.

The layers are:

1. Texture
2. Dominant Colour
3. Accent Colours
4. Features
5. Trim

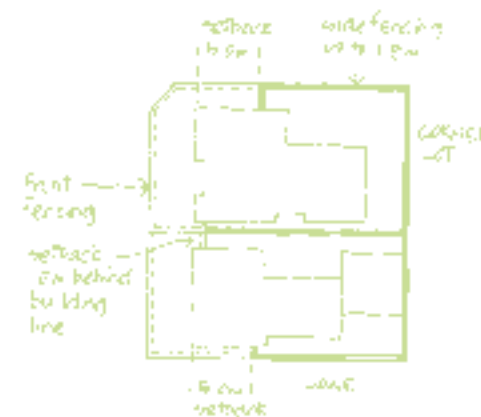
Layer 1: Texture

- The extensive use of any one material externally should be avoided.
- The use of 2 to 4 different external façade materials/colours (not including trimming - see Layer 5) should be used within visibility of the public realm (Refer to Appendix 4, Schedule 1)
- A combination of painted and coloured rendered surfaces, natural materials and metal finishes is encouraged to produce variety and visual interest to the built form.

- Natural materials should include face concrete blockwork, natural stone, rammed earth, pigmented or natural cement render, dressed weather boards and Ecoply 'Texture 2000' or 'Shadowclad' or equal.
- Acceptable metal profiles include corrugated or mini-orb steel, and pan and rib profiles.
- All materials are to be used in combination with coloured surfaces such as acrylic render and painted cladding.



5.2.2 1.5m high semi-transparent fencing for north-facing courtyards to the street frontage.



5.2.2 Location of front and side fencing, including corner lots and lane frontages.

Layer 2: Dominant colour

- The colour range for use in the majority of wall finishes, constituting in the order of 70% of the surface area of each elevation, is to be selected from the following (Refer to Appendix 4, Schedule 1):
- Colours that reflect the natural Linear Park landscape are to be drawn from the non flowering parts of the natural vegetation (eg trunks, foliage, grasses) as indicated in the colour range bar.
- Clear finishing of the natural materials described in “texture” is acceptable.
- Other acceptable metal finishes include Colorbond finished or galvanised steel sheet and clear “zinc”.

Layer 3: Accent colours

- The use of other more vibrant colours is encouraged to express secondary volumes or architectural features and may constitute up to 30% of the façade only (Refer to Appendix 4, Schedule 1).
- Colours in this layer are not to be drawn from the range in Layer 2, and must differ from colours used on neighbouring houses.

Layer 4: Features

Colour of features

- Refer to Appendix 4, Schedule 2 for colours suitable for features.

Roof

- Steel deck roofing of various profiles.
- Finish should be either Colorbond, galvanised or zincalume.
- If dark coloured roofing is used then it should have a heat reflective coating to reduce heat gain in summer.

Features

- Special entry fascias and other similar features may be adopted.
- Specialist finishes such as aluminium, stainless steel, copper or similar materials may be used if deemed to be of merit, and only if in small quantities (due to their high embodied emissions).
- Materials and colours for main entry doors are to be drawn from Layers 2 and 3.
- **Materials and colours for main entry door security screens** should not include aluminium proprietary units.
- Natural finish stainless steel mesh, or coloured perforated flat steel sheet doors are permitted (colour selected from Layer 3).

Garage doors

- Garage doors should be lift or tilt-up, clad with materials such as stained or natural timber, flat perforated or miniorb type metal profiles (which can be coloured or natural finishes), and with the option of glass or polycarbonate inserts to provide a level of interest.
- Standard panelled or roller doors should be avoided.

Window shutters

- Shutters should be selected from louvred, slatted or sheet timber, or metal profiles similar to garage doors.
- Colours can be selected from Layers 2 or 3.

Layer 5: Trim

Windows/doors

- Window and door frame types should include (but not be limited to):
- Stained, painted or natural timber.
- Powder coated or natural anodised aluminium of “commercial like sections” (small domestic aluminium frames will not be accepted).

Gutters, fascias and downpipes

- Gutters should be half-round, quarter round or quad, with tubular downpipes.

Driveways and paving

- Driveways and paving in public view should complement public footpath materials and colouring, using:
- Concrete block paving; or
- Exposed aggregate concrete, of mid-range colours only.

Fencing

- Front fences to be comprised of a selected combination of the following materials:
- horizontal and/or vertical timber (western red cedar, dressed) together with rendered or face masonry piers and base open mesh steel type.
- Side fences between properties and rear fences are to be 1.8m high ‘Estate’ Colorbond.

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5.4 Services

All necessary services and equipment associated with dwellings should be appropriately located and concealed from public view. Services and appurtenances such as air conditioners, pumps and other motors, antennae, satellite dishes, plumbing, rainwater tanks, hot water service tanks and other equipment should be incorporated, or able to be appropriately accommodated in the future, into the building design.

Requirements

- All service equipment and appurtenances, except for energy generating devices, should be designed and located, or be able to be accommodated, within the dwelling and sited in a location that is not visible from the public frontages of the site.
- All service equipment and appurtenances should be designed and located in a manner that will not cause unreasonable nuisance to neighbouring properties.
- Any screening devices should be designed and constructed using materials that complement the building materials and palette of the associated dwelling.

6 Landscape

6.1 Design approach

The landscape design of each house allotment at Lochiel Park is an opportunity to complement the special quality of the area as a whole and to integrate each house into the general environment.

The “Green Village” provides a focus on the natural environment. This emphasis includes the open space areas, the street landscapes and extends to landscaping of each house lot. Each street in Lochiel Park has been developed with its own streetscape in the form of street trees, understorey and ground cover plants. With the wider urban forest and riverine landscape nearby, the landscape design for each allotment needs to complement the landscape character of the wider River Torrens corridor environment rather than impose a new exotic landscape that does not respect this particular place.

A sustainable garden

- Is well designed to suit local environmental conditions.
- Contains plants that require little more water than natural rainfall provides.
- Contains plants that are not invasive in the location and will become environmental weeds.
- Employs practical water conservation measures such as mulch to conserve soil moisture, efficient irrigation and grouping plants with similar water needs together.
- Provides habitat for local native fauna such as small birds, butterflies, bats, lizards and frogs.

- Uses little if any pesticide or chemical that could harm natural insect populations and other beneficial organisms, or could contaminate soil and water.
- Requires minimal non-renewable energy consumption such as use of lawn mowers and power tools, uses renewable wherever possible, and involves minimal transportation of materials and products.
- Uses sustainably and locally sourced materials and products. Does not use moss rocks, river pebbles or timber removed from natural landscapes.

The key elements of this approach to the landscape of each house allotment include:

Design

- Design gardens to complement the residence in an integrated way which maximises the use of plant material and limits the amount of irrigated lawn.
- Take care in the selection of plants to ensure that the ultimate height of plants, particularly trees, are appropriate to a particular site and placement on an allotment.
- Position plants to provide shade and privacy, provide access to winter sun and to frame views to the surrounding parklands.
- Ensure that trees are adequately set back from footings and side boundaries. Root barriers should be used where trees are within 2.5m of a house.
- Use compatible materials, scale and colours in the garden design to, complement the design of the house.
- Minimise hard heat absorbing surfaces and protect them from excessive sunlight.

- Incorporate porous paving where possible to allow water to permeate.
- Design with consideration of the needs of vulnerable local fauna such as bats, butterflies, small birds, small lizards, beneficial insects, soil fauna.
- Design for low energy and chemical use in maintenance.
- Use recycled rubbles and concretes in construction of hard surfaces.
- Use recycled plastics and timbers in markers, bollards and in furniture.
- Recycle materials from the site itself or nearby sites for use in construction, for example the BSmart compressed bricks to be made available from Lochiel Park.

Plant selection

- Use plants with low summer water requirements.
- Use plantings of local indigenous trees, shrubs, ground covers and native grasses wherever possible.
- Where appropriate, use other species of plants suitable for Adelaide's Mediterranean climate and clay soils.
- Take care not to plant any invasive plant species.
- Minimise lawn areas (place them only where they will be utilised) and, where the 'lawn aesthetic' is required, use drought tolerant groundcovers.
- Consider the habitat value of plants including appropriate food, shelter and breeding habitat.

Water conservation

- Use subsurface irrigation where irrigation is necessary.
- Use soil moisture detection devices to ensure plants are only watered when necessary.
- Group plants with similar water needs together.
- Collect and reuse water collected on site if possible.
- Use mulch on garden beds.

Habitat

- Provide some suitable habitat for local fauna such as bats, small birds, butterflies and beneficial insects any plantings.
- If possible provide a water source such as frog pond or birdbath.
- Protect fauna from introduced predators such as cats, dogs and foxes.
- Consider lighting and the effect of night light pollution on local fauna.

Chemical use

- Consider alternative methods of controlling pest plants and animals.
- Use minimal quantities of low toxicity pesticides.
- Use organic rather than synthetic fertilisers and other products.
- Avoid the potential for leaching of chemicals into soil and water.

Energy use

- Avoid where possible the need for use of non-renewable energy use in construction and maintenance.
- Use locally sourced products to reduce embodied energy costs in transportation.
- Use lighting powered from renewable sources where possible.

- Where possible use renewable energies for energy requirements on site.

Materials and products

- Recycle materials from the site itself or nearby sites to use in construction.
- Use recycled rubbles, plastics and timbers in construction and in furniture.
- Use locally sourced products.
- Avoid using rocks, pebbles, timber or other materials collected from wild landscapes.

6.2 Front gardens

Front gardens should be designed to present a visual link from the wider landscape and street to the house frontage. They should be open and welcoming rather than closed off by tall, dense planting.

Requirements

- Planted areas should dominate the area of the front garden rather than irrigated grass, paved areas or built elements. Preferably use native grasses and ground cover plants rather than exotic grass.
- Swimming pools and others service activities such as rainwater tanks are not allowed in the front garden.

Advisory

- Medium height (up to 2.5m) hedge planting on each side boundary to ensure privacy is appropriate (extent depending on size of allotment).
- Use plants that match those in the immediate street frontage or the wider park areas, but avoid using trees that will ultimately grow too large.
- Include in the planting the strip between the front fence (and side fence on corner allotments) and the footpath, using native plants that match the verge planting.
- The size at maturity of all planting needs to be carefully considered so that it does not overwhelm the scale of the house and so that plant roots do not interfere with house footings, including those of neighbours. Note that footings need to be engineered having regard to the number, nature and location of trees.
- Provide a footpath and driveway layout that complements the architectural features of the house frontage without dominating it by being too wide, and avoid contrasting tones or materials.
- The planted areas may take the form of hedges, groves, open shrub-land, glades, swards of native grass, so that there is a consistent character to the garden rather than a series of feature plantings.
- It may also be appropriate to arrange plantings in bold groups of single species to complement the house design.



6.3 Side courtyards and gardens

Side courtyards and gardens should be screened from the street, and should be designed as pleasant private sitting areas and for clothes drying and bin storage.

Requirements

- Locate clothes drying and bin storage areas so they are readily accessible but not visible from the street or adjoining parks. Timber or planted screens may be required.
- Should a pond/fountain/birdbath or other water feature be included in the landscaping design, the feature is not to be connected to a permanent water supply such as mains water, recycled water or rainwater tank. The water feature is to only be filled by bucketed water from the rainwater tank.

Advisory

- North facing courtyards are conducive to outdoor living / dining and clothes drying. Provide access using paved areas and boundary screen planting as appropriate.
- A pergola with deciduous climbing plants provides summer shade and access to winter sun. Do not plant aggressive climbing plants, such as Wisteria, too near the house footings.
- Visual interest can be provided by such elements as sitting walls, sculpture, and other details such as paving, lighting, water ponds, etc.
- Use medium shrubs as screening along the boundary together with shade tolerant understorey plants to provide visual detail.



- Consider including a fruiting climbing plant on the side fence, such as passionfruit, grape or kiwi fruit, if there is sufficient sunshine.
- Consider including edible and productive food plants in the garden.
- Small deciduous shade trees may be appropriate provided there is sufficient set-back from the house footings, but avoid species growing more than about 3-4m high.

6.4 Rear courtyards and gardens

Rear courtyards and gardens can be designed as an enjoyable extension to the house, providing living space, visual interest and privacy.

Advisory

- Use indigenous trees, shrubs, ground cover and grasses, where space allows, to provide screening and shade and to provide habitat for local fauna. Where there is sufficient space, well away from the house, include medium to large indigenous trees, but check first the mature size of each selection and incorporate root barriers and stronger house footings.
- Storage sheds and service areas should be screened from the street, neighbours and from adjoining parklands.
- Include paved areas as well as planting with trees and understorey species. The rear garden should generally be spacious and screened from neighbours and the street, but frame views to adjoining parklands, where appropriate.

- As for side gardens, north facing rear courtyards and gardens are conducive to outdoor living / dining. A pergola with deciduous climbing plants may provide summer shade. Outdoor sitting / dining areas should preferably be paved with permeable paving.
- Consider carefully the extent of green grass and whether a paved area or ground cover, such as Lippia, may be a suitable substitute.
- Consider the view and access from the rear of the house and from various vantage points in the rear garden when positioning sitting areas and taller trees and shrubs, and possibly include sculpture as a focal point.
- Use medium shrubs as screening along the boundary together with shade tolerant understorey plants to provide visual detail.
- There may be an opportunity for small fruit trees such as lemon, almond or peach.

6.5 Planting selection

There is a wide range of appropriate plants that can be used at Lochiel Park. These include many plants that are indigenous to the local area, including shrubs and grasses as well as trees.

Advisory

- Refer to the Recommended Plants List (Appendix 5) to select a range of plants suitable for Lochiel Park.
- To promote reasonable consistency and environment appropriateness, select as many plants as possible that are indigenous to the locality.

- Initial planting should make provision for the growth of each species, particularly the likely size of trees and shrubs.
- It may be necessary to visit nurseries that specialise in propagating indigenous and native plants, and to prepare a list of plants for ordering. Commonly, discount stores and general nurseries do not stock indigenous and native plants.

6.6 Irrigation

The installation of a drip irrigation system is highly recommended as it can effectively ensure plantings have adequate water supply, particularly during their initial establishment. When carefully utilized, drip irrigation will also substantially reduce water use.

Advisory

- Inline pressure compensating drip tube should be used for irrigating all garden beds. Consider the use of sub-surface irrigation for lawns. A dripper spacing of 40cm is appropriate. The tube should be covered by mulch. A small in-line filter is recommended.
- Avoid spray irrigation, which is wasteful because of evaporation losses and tends to give uneven application. Button drippers are appropriate for pot plants.
- Automated control of watering is highly recommended as it helps avoid over watering. By incorporating control valves for each planted area, the water application rate can be varied according to the needs of the plants.

6.7 Driveways and paving

Requirements

- Driveways and paving in public view should complement the public footpath materials and colouring in accordance with the Building Materials and Colours section (refer to Section 5.3).
- Paving out of public view should be constructed of materials that complement the tone and texture of the house. Contrasting or excessively decorative colours or patterns should be avoided.
- A footpath and driveway layout should complement the architectural features of the house frontage, without dominating it by being too wide and avoid contrasting tones or materials.
- Footpath access to the house entry from the street may include a seat area or similar paved area, but ensure that planted areas dominate rather than paved areas or built elements.
- Suitable materials for the driveway and footpath include: honed concrete paving units, wash-back in-situ concrete, honed in-situ concrete, recycled clay bricks, muted flagstone unit paving, selected compacted gravel and exposed aggregate concrete in mid-range colours only. Stamped patterned paving and contrasting colours are not permitted.

6.8 Establishment and maintenance

Requirements

- Front garden areas including the verge areas must be completed within three months of occupation.

Advisory

- The landscape planting and associated works such as paved areas, storage sheds and pergolas should be undertaken as soon as practical.
- Adequate soil preparation before planting is important to successful plant establishment and is more easily and effectively undertaken over the whole allotment using machinery. Soil preparation may include weed eradication, cultivation, clay treatment, compost application and mulching.
- Avoid extensive importation of topsoil unless essential for such areas as lawns.
- It is advisable to avoid establishment of plants during the height of summer, even where irrigation is available.
- Regular control of weeds and insects is recommended, particularly for the first year when plants are undergoing rapid growth. Mechanical, hand weeding or non chemical weeding using steam or hot water is recommended. Only non residual chemicals should be utilized.
- During the initial seasons of growth, and regularly thereafter, it is advisable to prune all native plants after flowering to maintain compact densely foliated growth.
- Apply adequate but not excessive water during the establishment period. For most native plants, the soil only needs to be slightly moist and not saturated. Over watering may cause root rot and is wasteful.

7 Monitoring and implementation

Monitoring

Land Management Corporation will undertake 3 separate energy, water and temperature monitoring strategies to evaluate the outcomes of the sustainability measures to be undertaken at Lochiel Park over a 9 year period commencing from the occupation of a minimum number of homes.

These three strategies include:

- Detailed house energy (electrical circuits and gas), water (mains drinking water, recycled water and rain water (hot water)) and temperature (living room and bedroom) monitoring applying to designated allotments 26, 42, 48, 68 and 77. (Designated allotments may be varied with the approval of the Land Management Corporation).
- Total house energy (electrical and gas) and water (mains drinking water, recycled water) monitoring from billing data on all homes in the development.
- Network monitoring of the total energy (electrical and gas) and water (mains drinking water, recycled water) for the whole subdivision from meters at the mains entering the development.

The data will be gathered, analysed and reported on with the approval of the property owners (and tenants) in accordance the Privacy Act and will not be used in a way that disadvantages owners (or tenants). This monitoring program will provide quantitative data for ongoing research and refinement of the sustainability measures.

Requirements

- Enter into a Monitoring Agreement in accordance with the encumbrance and special conditions of the land sale contract to permit the detailed monitoring of energy and water consumption and temperature in homes to be constructed on allotments 26, 42, 48, 68 and 77 (Designated allotments may be varied with the approval of the Land Management Corporation) and the total house energy and water consumption to be gathered from billing data.

Implementation

When you move into your home you will be provided with the Lochiel Park Handbook containing useful information about energy and water consumption, transport and tips on how to live sustainably.

Requirements

- Take part in a survey on sustainable living prior to and following occupation for a period of time to assist in the understanding of the impact of behaviour change on resource consumption.





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APPENDIX 1

Building envelope plans

APPENDIX 2

Built form style sheets

APPENDIX 3

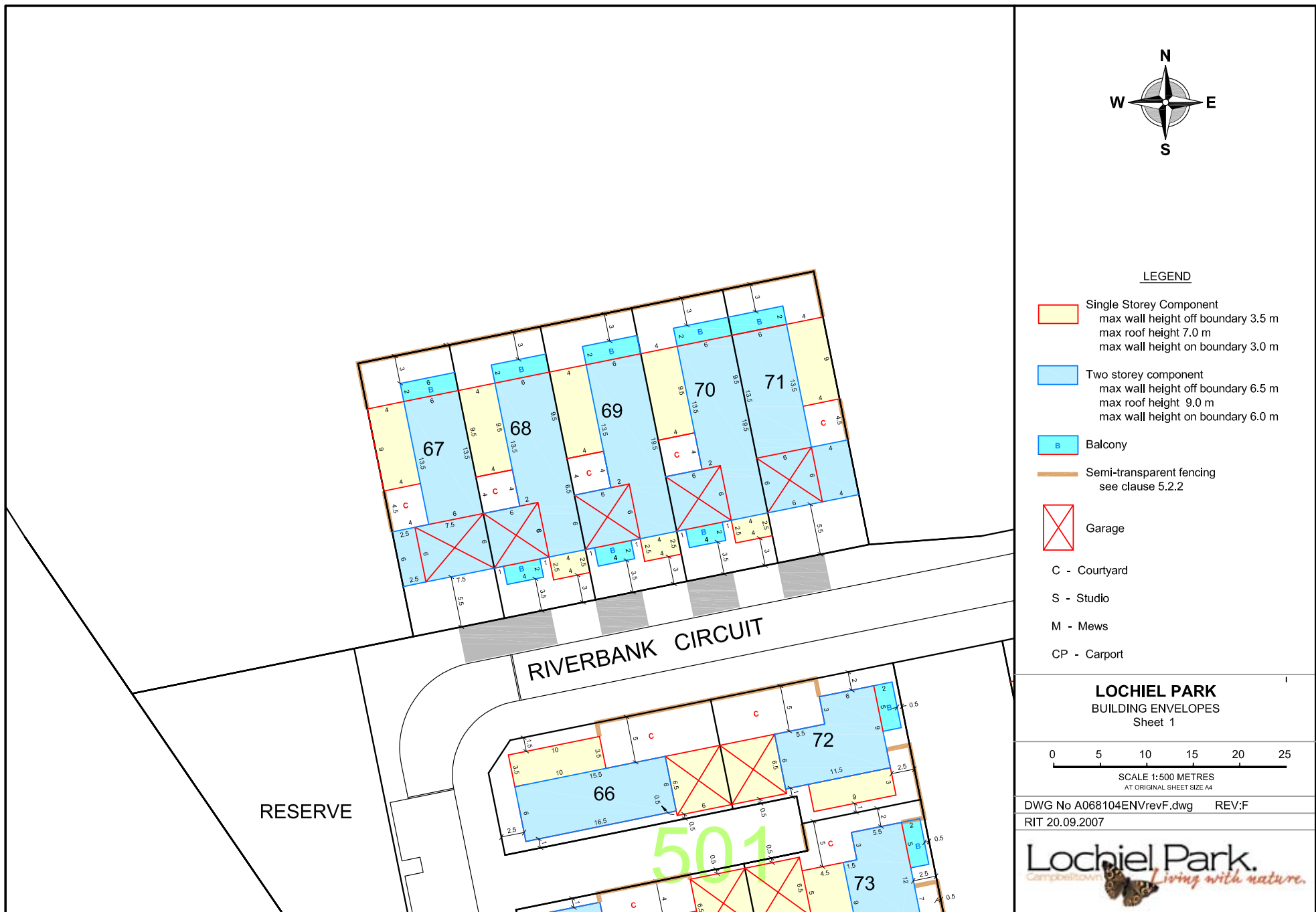
Building colour schedules

APPENDIX 4

Recommended plants list

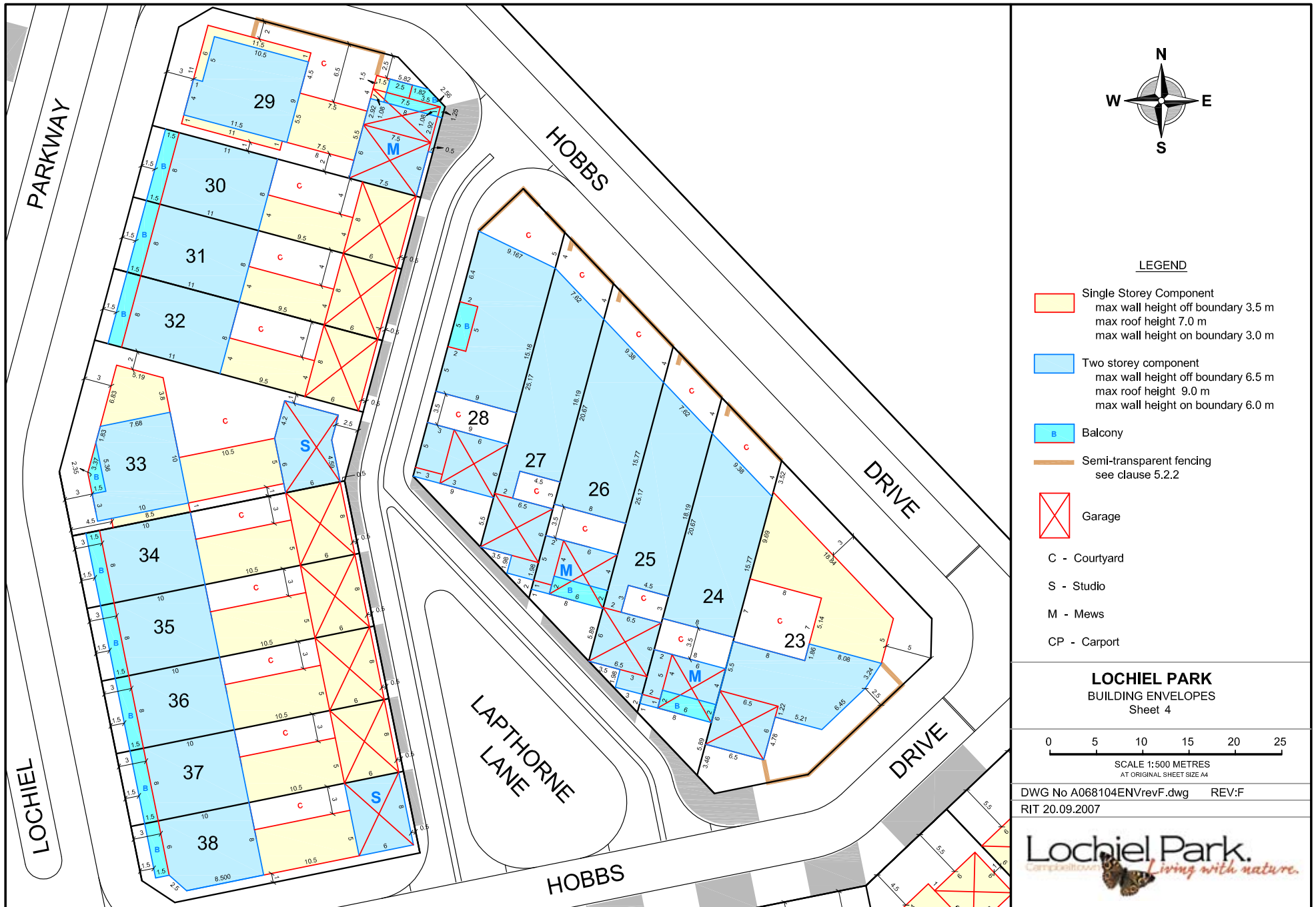
APPENDIX 1 Building envelopes

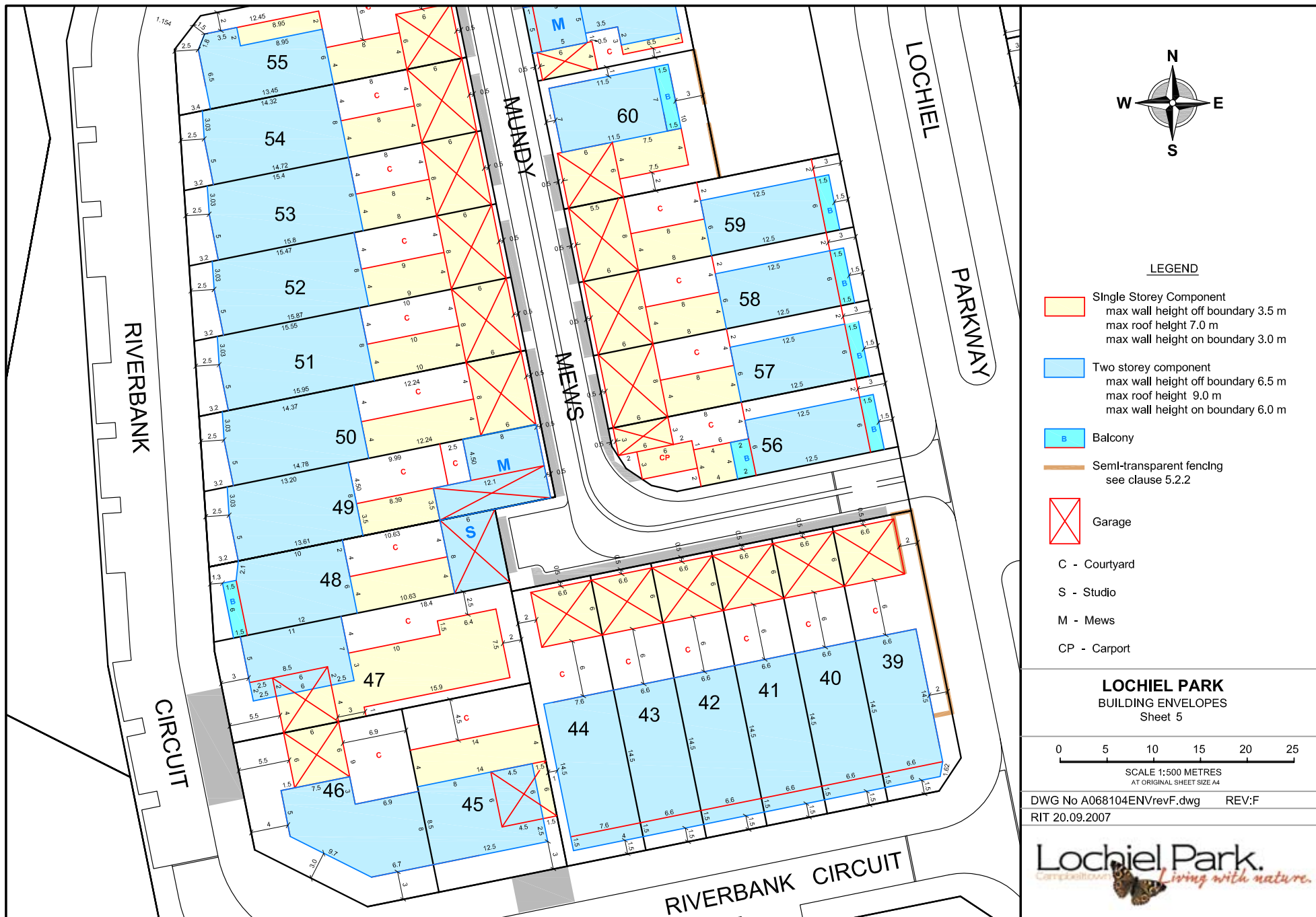


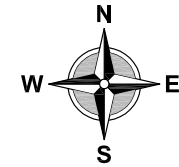
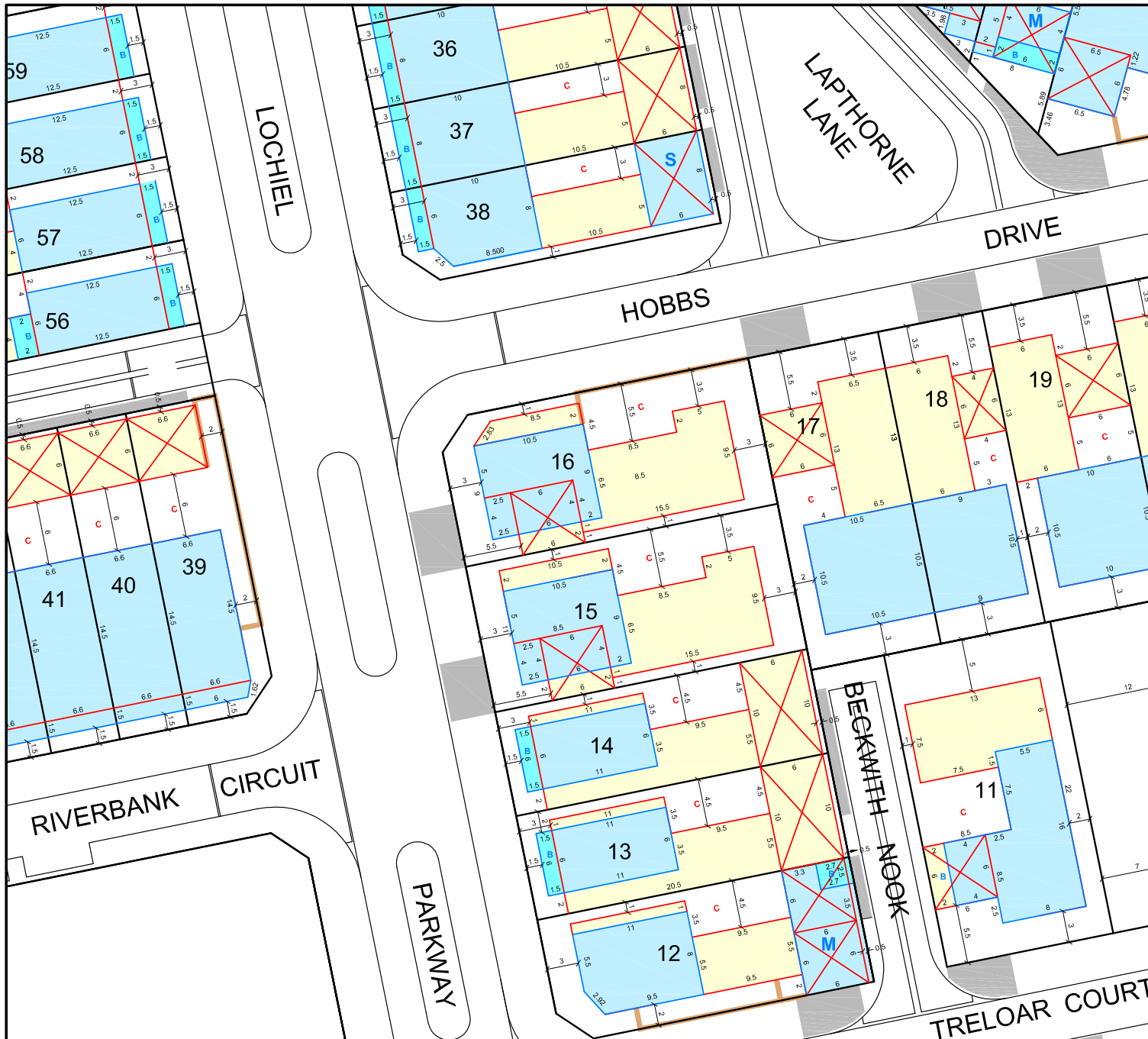












LEGEND

- Single Storey Component
max wall height off boundary 3.5 m
max roof height 7.0 m
max wall height on boundary 3.0 m
- Two storey component
max wall height off boundary 6.5 m
max roof height 9.0 m
max wall height on boundary 6.0 m
- Balcony
- Semi-transparent fencing
see clause 5.2.2
- Garage
- C - Courtyard
- S - Studio
- M - Mews
- CP - Carport

LOCHIEL PARK BUILDING ENVELOPES Sheet 6

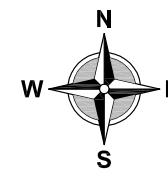
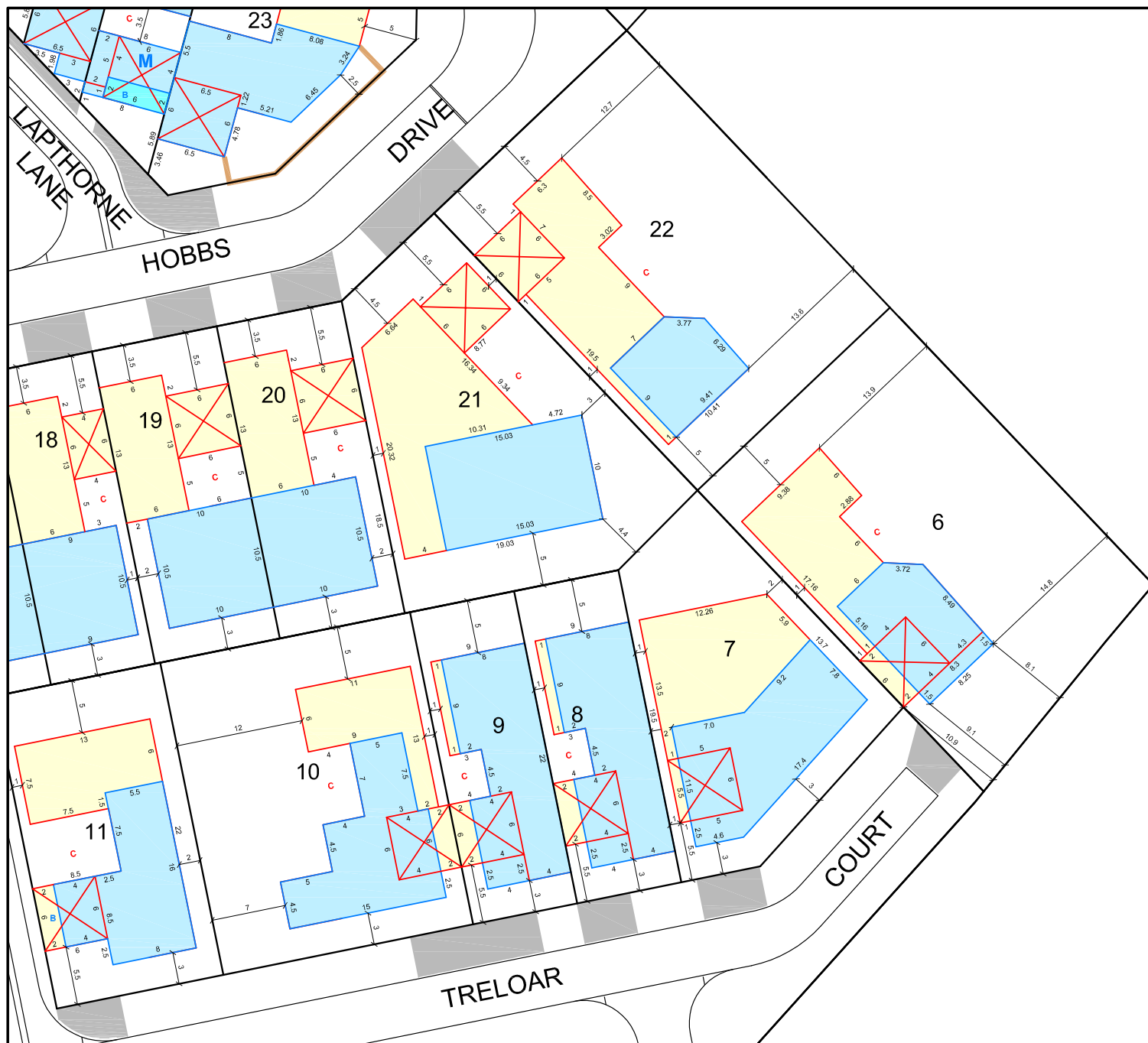
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SCALE 1:500 METRES
AT ORIGINAL SHEET SIZE A4

DWG No A068104ENVrevF.dwg REV:F

RIT 20.09.2007

Lochiel Park.
Living with nature.



LEGEND

- Single Storey Component
max wall height off boundary 3.5 m
max roof height 7.0 m
max wall height on boundary 3.0 m
- Two storey component
max wall height off boundary 6.5 m
max roof height 9.0 m
max wall height on boundary 6.0 m
- B Balcony
- Semi-transparent fencing
see clause 5.2.2
- Garage
- C - Courtyard
- S - Studio
- M - Mews
- CP - Carport

LOCHIEL PARK BUILDING ENVELOPES Sheet 7



SCALE 1:500 METRES
AT ORIGINAL SHEET SIZE A4

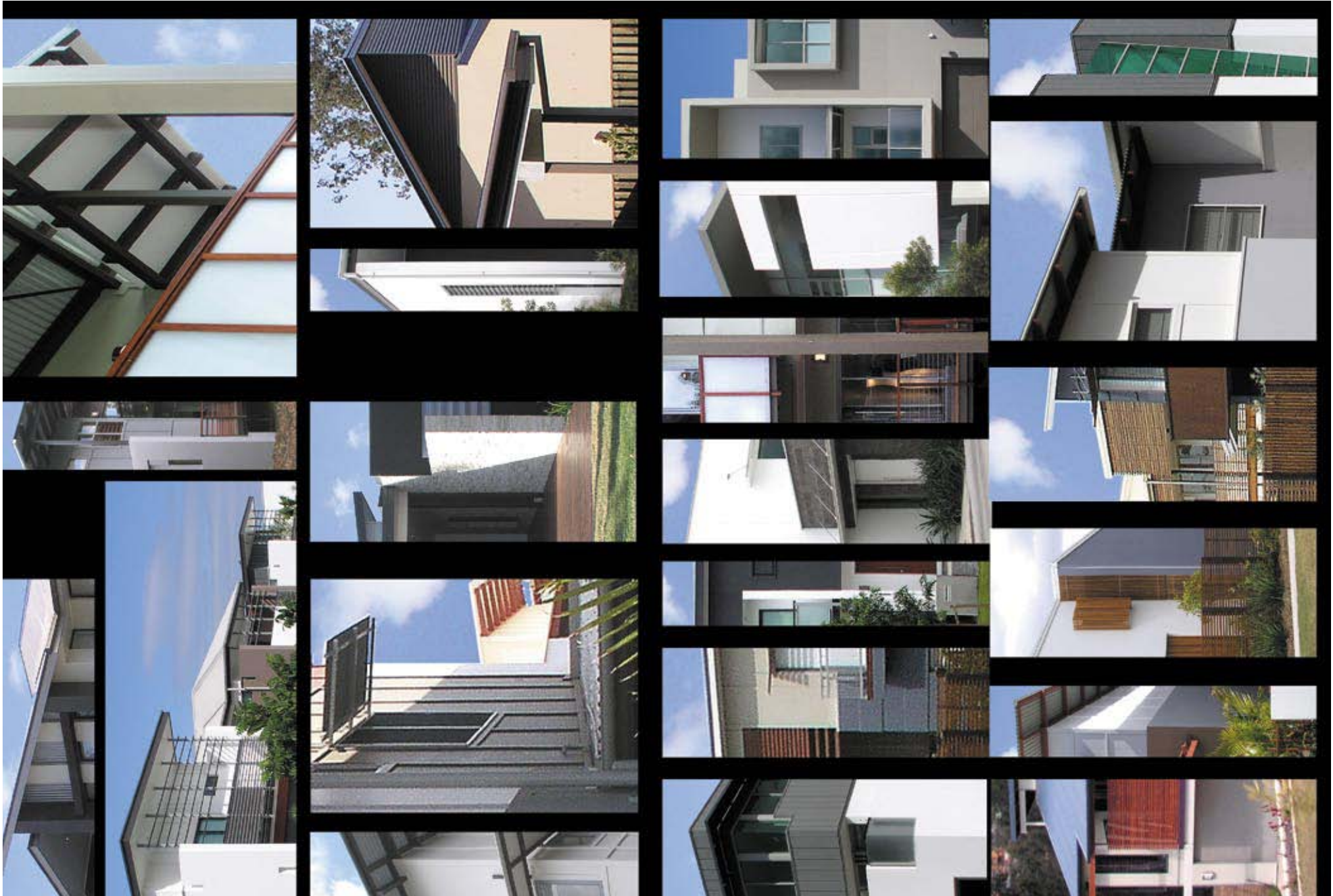
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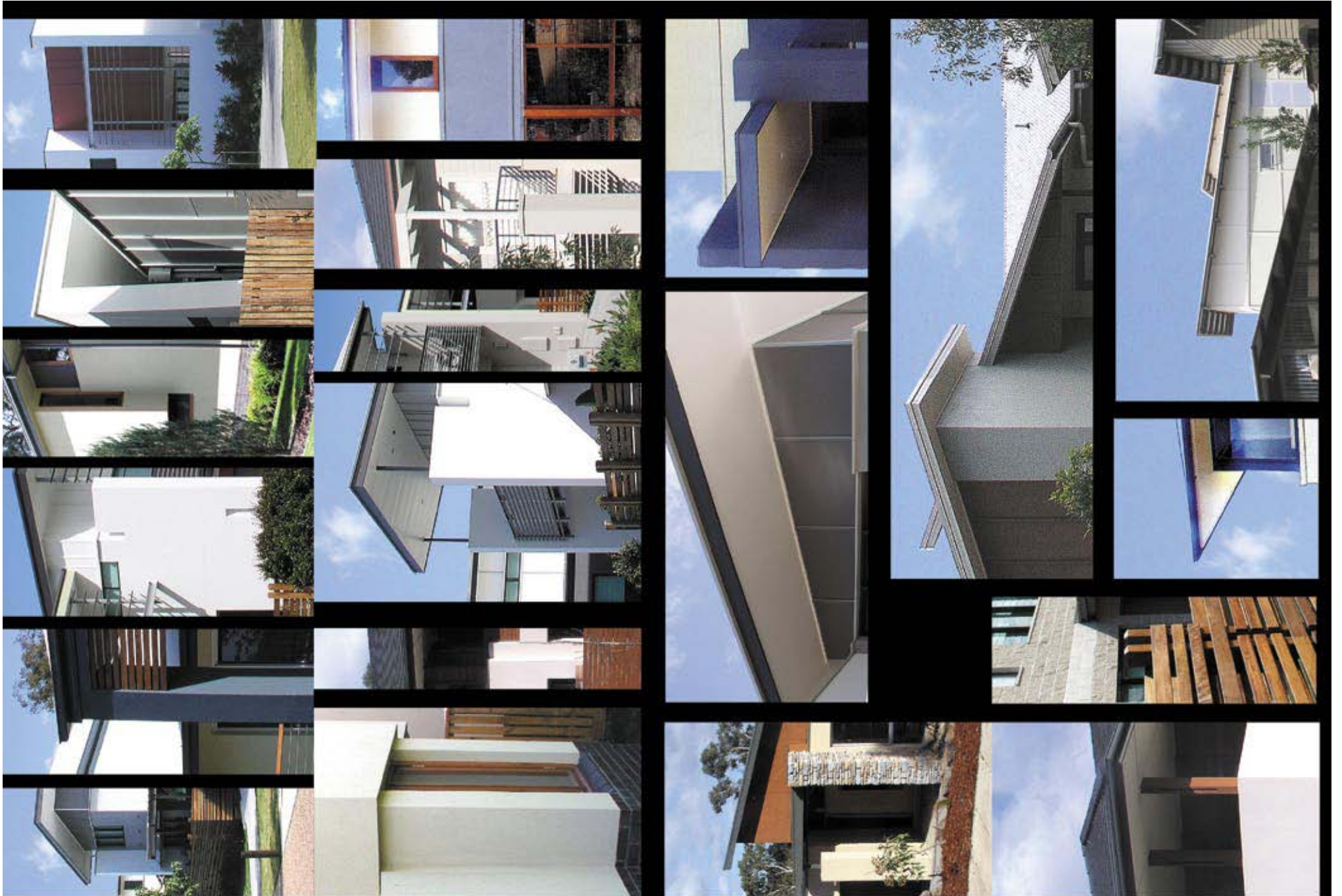
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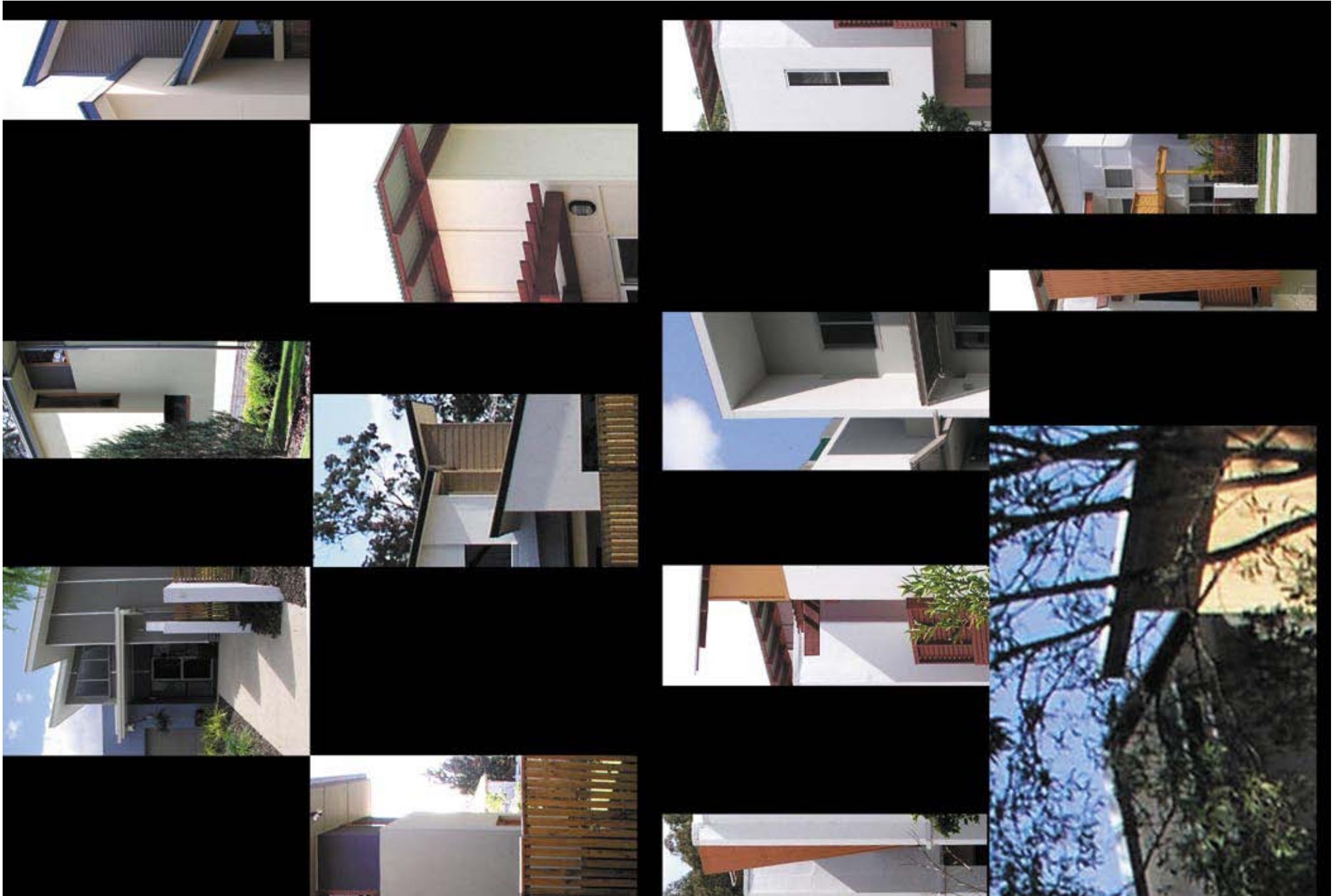


APPENDIX 2 Built form style sheets



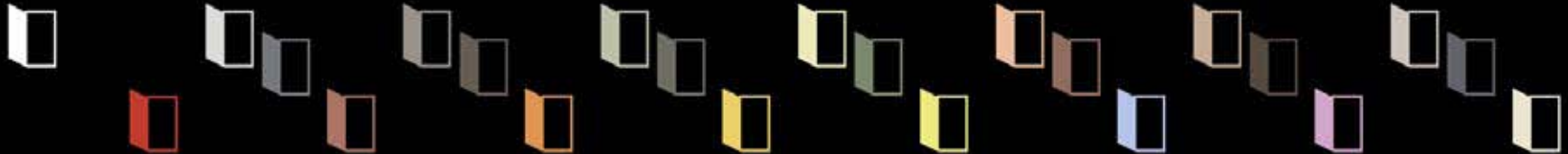
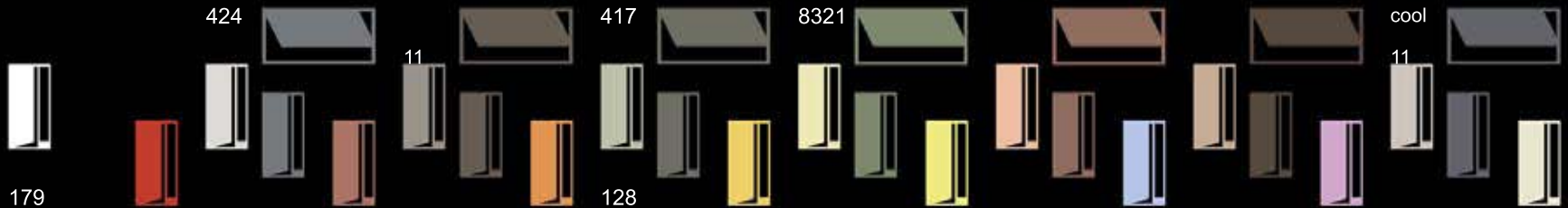






SCHEDULE 1

SCHEDULE 2



CLASSIC CREAM SURFMIST SHALE GREY PAPERBARK DUNE SANDBANK CORTEX CITY AXIS CONSERVATORY SKYBRIDGE



APPENDIX 4 Recommended plant list

Large trees

Trees should be positioned well away from built structures including house footings, underground services and roadways. Incorporate a root barrier when planting all trees that may affect footings, roads or services.



Plant Species and Common Name	I = Indigenous to locality N = Native to Australia E = Exotic plant	Approximate size at maturity	Other Comments
Allocasuarina verticillata Drooping Sheoak	I	5 to 8m	Attractive grey green drooping foliage.
Callitris gracilis Southern Cypress Pine	I	7 to 10m	Vertical form. Deep green foliage.
Corymbia ficifolia Red flowering gum	N	6 to 10m	Brilliant red flowers.
Eucalyptus camaldulensis var. camaldulensis River Red Gum	I	15m + m	Large tree. Not suitable for small garden
Eucalyptus leucoxylon ssp. leucoxylon South Australian Blue Gum	I	8 to 30m	Large tree. Not suitable for small garden.
Eucalyptus leucoxylon ssp. megalocarpa South Australian Blue Gum	N	5 to 8m	Good for small garden.
Eucalyptus odorata Peppermint Box	I	15 to 20m	Large tree. Not suitable for small garden.

Small trees

Trees should be positioned well away from built structures including house footings, underground services and roadways. Incorporate a root barrier when planting all trees that may affect footings, roads or services.

Plant Species and Common Name	I = Indigenous to locality N = Native to Australia E = Exotic plant	Approximate size at maturity	Other Comments
Acacia pycnantha Golden Wattle	I	4 to 6m	Short lived, about 10 yrs.
Acacia retinodes var. retinodes Wirilda / Swamp Wattle	I	6m	Tall and open small tree.
Callistemon 'Harkness' Bottlebrush	Cultivar	5 to 8m	Spectacular red flowers in spring. Benefits from pruning.
Eucalyptus torquata Coral Gum	N	6 to 8m	Small spreading tree. Pink flowers in spring and summer.
Koelreuteria paniculata Golden Rain Tree	E	5 to 8m	Attractive small shade tree.
Lagerstroemia hybrids Crepe Myrtle	E	3 to 5m	Various colours available.
Pyrus calleryana cultivars Ornamental Pear	E	4 to 5m	Bushy crowned tree, rich autumn colourings.

Shrubs

Plant Species and Common Name	I = Indigenous to locality N = Native to Australia E = Exotic plant	Approximate size at maturity	Other Comments
Acacia acinacea Wreath Wattle	I	1 to 1.5m	Feathery foliage. Bright yellow winter flowers. Tolerates light shade.
Acacia ligulata Umbrella Bush	I	2 to 3m	Bushy umbrella shape bush. Good understory.
Acacia paradoxa Kangaroo Thorn	I	3m	Prickly, good bird shelter.
Adriana klotzschii Coast bitter-bush	I	To 2.5m	Glossy dark green leaves.
Atriplex semibaccata Berry Saltbush	I	To 1m	Low spreading shrub.
Bursaria spinosa Blackthorn /Christmas Bush.	I	To 3m	Erect, thorny shrub. Dark green leaves. Massed white flowers in summer.
Callistemon sieberi River Bottlebrush	I	To 3m	Fast growing pendulous shrub, silvery grey foliage.
Correa 'Dusky Bells' Native Fuchsia	Cultivar	To 1m	Low spreading shrub, deep pink flowers.
Correa glabra Rock Correa	I	2m	Rounded shrub. Green, red or yellow flowers in winter.
Cullen australasicum Scurf-pea	I	0.5 to 2.5m	Erect, soft wooded.
Dodonaea viscosa Sticky Hop bush	I	5 m	Erect bushy shrub. Good screening plant. Compact variety available.
Eutaxia microphylla Common Eutaxia	I	To 1m	Low attractive understory requiring sunny position. Yellow pea flowers in spring.
Gaura linheimeri Butterfly Bush	E	1m	Open sunny dry position.
Hakea rostrata Beaked Hakea	I	To 2m	White flowers. Beaked fruits. Prickly, good for birds.
Grevillea lavandulacea Lavender Grevillea	I	To 0.5m	Spreading or compact. Cream to pink flowers.
Myoporum viscosum Sticky Boobialla	I	To 2.5m	Rounded shrub with white flowers. Useful low screen.
Olearia ramulosa Daisy-bush	I	To 1m	White or blue flowers in spring and summer.

Ground cover plants

Plant Species and Common Name	I = Indigenous to locality N = Native to Australia E = Exotic plant	Approximate size at maturity	Other Comments
Ajuga reptans 'Atropurpurea' Carpet Bugle	N	Prostrate	Forms dense leaf cover, tolerates semi-shade areas.
Boerhavia dominii Tar-vine	I	Prostrate	Dull green with small pink flowers. May spread.
Eremophila divaricata Spreading Emu Bush	N	1m	Rounded or spreading. Pink/mauve flowers in spring.
Eremophila 'Kalbarri Carpet' Prostrate Emu Bush	N	Prostrate	Dense carpeting plant.
Kennedia prostrata Running Postman	N	Prostrate	Scarlet pea flowers spring and summer.
Lythrum hyssopifolia Loosestrife	I	Prostrate	Prefers damp areas.
Myoporum parvifolium Creeping Boobialla	N	Prostrate	Green and quickly spreading, tolerates some shade.
Senecio quadridentatus Cotton Groundsel	I	30cm	Keep contained. Can be invasive.

Grassing and clumping plants

Plant Species and Common Name	I = Indigenous to locality N = Native to Australia E = Exotic plant	Approximate size at maturity	Other Comments
Anigozanthos sp. Dwarf Kangaroo Paw cultivars	N	90cm	Colourful unusual flowers
Chloris truncate Windmill grass	I	50cm	Short lived: 2 to 2 yrs. Short narrow leaves, with taller seed-head.
Dianella 'Little Rev' Dwarf Flax Lily	Cultivar	60cm	Strappy green foliage with blue flowers
Dianella tasmanica Tasman Flax Lily	N	70cm	Strap green foliage with blue flowers followed by purple berries
Enneapogon nigricans Black-head grass.	N	45cm	Short dense turf
Isolepis nodosa Knobby Club Rush	N	70cm	Attractive rush plant
Lomandra 'Tanika' Dwarf Mat-Rush	Cultivar		Strappy green foliage. Fragrant flower.
Lomandra multiflora ssp. dura Flowering matt-rush	I	70cm	Strappy green foliage.
Schoenus apogon Common bog-rush	I	25cm	Slender rush, prefers damp areas.
Stipa nodosa Tall spear-grass	I	1m	Attractive feathery native grass.
Themeda triandra Kangaroo Grass	I	75cm	Tussock forming grass, soft linear leaves.
Xanthorrhoea quadrangulata Rock Grass Tree	I	1.5m	Slow growing, slowly develops a 'trunk'.

Climbing plants

Plant Species and Common Name	I = Indigenous to locality N = Native to Australia E = Exotic plant	Approximate size at maturity	Other Comments
Dipogon lignosus Australian Pea	N	Climbing	Fast growing twining, summer flowers.
Hardenbergia violacea Native Lilac	I	Climbing up to 4m	Attractive purple flowers in winter. Benefits from pruning.
Kennedia nigricans Black Coral Pea	N	Climbing to 2m	Red flowers
Parthenocissus tricuspidate Boston Ivy	E	Self clinging	Spectacular autumn foliage. Deciduous.

Many of the species listed above are not commonly available from general or discount nurseries. Additionally, for the indigenous plants listed, it is recommended that propagation is carried out using seed collected from the Lochiel Park site. Seek out nurseries that specialize in the propagation of indigenous plants and be prepared to pre-order plants. For further information www.campbelltown.sa.gov.au/webdata/resources/files/Biodiversity_Booklet.pdf



