



Planning Guide

Land division - how Best Practice Land Division
can contribute to Household Energy Efficiency

February 2010



Government of South Australia

Department of Planning
and Local Government





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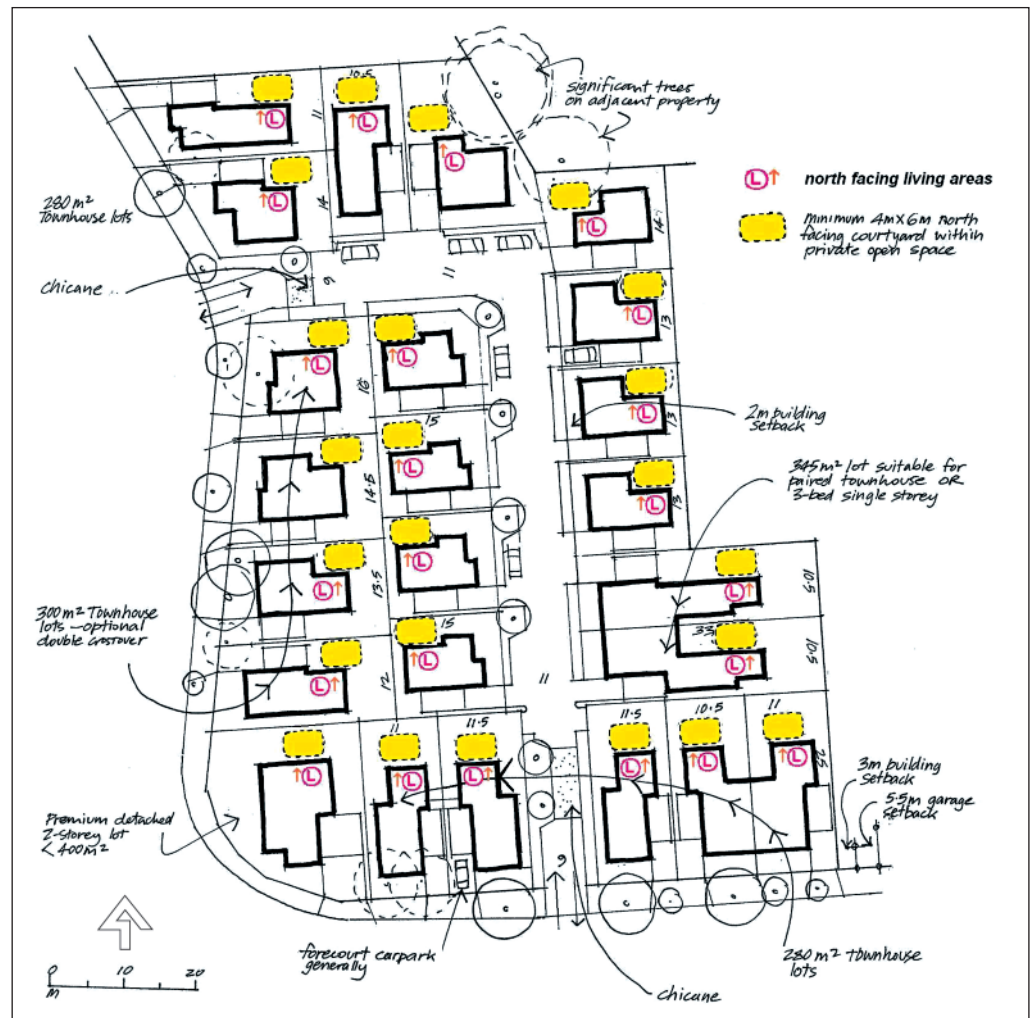
136 North Terrace, Adelaide
GPO Box 1815
South Australia 5001

www.dplg.sa.gov.au

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Purpose

This Guide provides information for councils and developers about how creating optimum block configurations at land division stage can facilitate the best house orientation/design for achieving energy efficiency – and cost effective compliance with 6 star energy efficiency requirements.



Source: Housing SA, Asset Services

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Introduction

Good orientation of a house provides the potential to achieve substantial energy savings when combined with appropriate design. It also enables these savings to be achieved for minimal capital investment.

By having block shapes that enable houses to be built with good orientation for the main living areas, the mandatory 6 star (or higher) energy efficiency requirement for a development approval can be readily achieved.

Poorly shaped blocks that are not suitable for optimum orientation make it much more difficult for building owners to have energy efficient houses without significant capital investment.



General design parameters

In order to understand how land division can subsequently impact on household energy efficiency it is first necessary to consider how solar access and climate factors impact on the design.

SOLAR ACCESS

Adelaide is on latitude 34° 58' and the sun's seasonal variation due to the oscillation of the earth is $\pm 23.45^\circ$. This means that, facing north, the sun's angle in the sky (at midday) varies from 78.45° in summer to 31.55° in winter. It also means that in summer the sun rises approximately ESE and sets WSW but in winter it rises approximately ENE and sets WNW.

Note: Because of the high exposure of west facing windows to mid-late afternoon summer sun, the number and size of glass doors and windows facing west should be kept to a minimum, and preferably none at all.

North is always measured to true north and NOT magnetic north which is 8° west of true north in Adelaide.

Solar access can vary significantly depending on the latitude and the time of year. The following table highlights various sun angles in different locations throughout South Australia and the seasonal variations. These differences must be incorporated into the design process (in particular for shading structures and glazing) to achieve optimum solar access in winter and minimal solar access in summer.

Location	Latitude	Summer Sun	Winter Sun
Mount Gambier	37.83°	75.60°	28.70°
Adelaide	34.58°	78.45°	31.55°
Port Augusta	32.49°	80.96°	34.06°
Cooper Pedy	29.02°	84.40°	37.52°

CLIMATE

In the settled areas of South Australia the predominant direction for inclement weather is South or SW so activity areas around the home facing areas these directions will be exposed to cold winds, storms and rainfall events.

Activity areas

INTERNAL LIVING

Areas of major daytime activity (i.e. the main living areas) should face north to get the benefit of winter sunlight and also have the potential for shading from the intense summer sun. This orientation also enables shielding from inclement weather coming from the S and SW. Correct orientation is very important to getting these benefits and there is little flexibility from optimum true north.

EXTERNAL LIVING

External living areas or private open space are important for children's play activities and 'al fresco' dining/entertaining. Again, the northern side of house is best for these activity areas. The southern side should be avoided as it tends to be shaded by the main house from the desirable winter sun and at the same time is exposed to the prevailing inclement weather. The western side should also be avoided as it is almost impossible to provide shade from the intense summer sun to which it is fully exposed in the late afternoon, the hottest time of the day. The eastern side is more tolerable as mornings are normally the coolest part of the day even in summer. While correct orientation is very important (as for the internal living areas) there is some flexibility in the orientation and shape for the external living areas because opportunities for thoughtful landscaping can moderate conditions.

BEDROOMS

Bedrooms are primarily used during the night so while access to natural light and ventilation is important, direct solar access is not a requirement and southerly aspects are quite suitable. Many people desire the morning sun and for this SE, East and NE are all suitable. As morning solar access is at the coolest part of the day (even in mid summer), this means that bedrooms are able to face South, SE, East and NE. They can also face due north if there is sufficient space but a bedroom should never take precedence for this orientation over the main living areas. Bedrooms should not face NW, West or SW as this means they will be exposed to the hot afternoon sun in mid summer which will heat up the bedroom for the occupants, making it difficult to sleep at night.

GARAGES/UTILITY

Car areas (carports and garages) and utility areas (laundry and store rooms) are best located on the S, SW and W sides as these activity areas are infrequently used and can easily tolerate the setting sun on a hot day in summer. They also provide protection to the rest of the house from winter storms.

Preferred Activity Area Location in Relation to the House

	N	NE	E	SE	S	SW	W	NW
Internal Living	■							
External Living	■	■						■
Bedroom		■	■	■	■			
Garage/Utility					■	■	■	

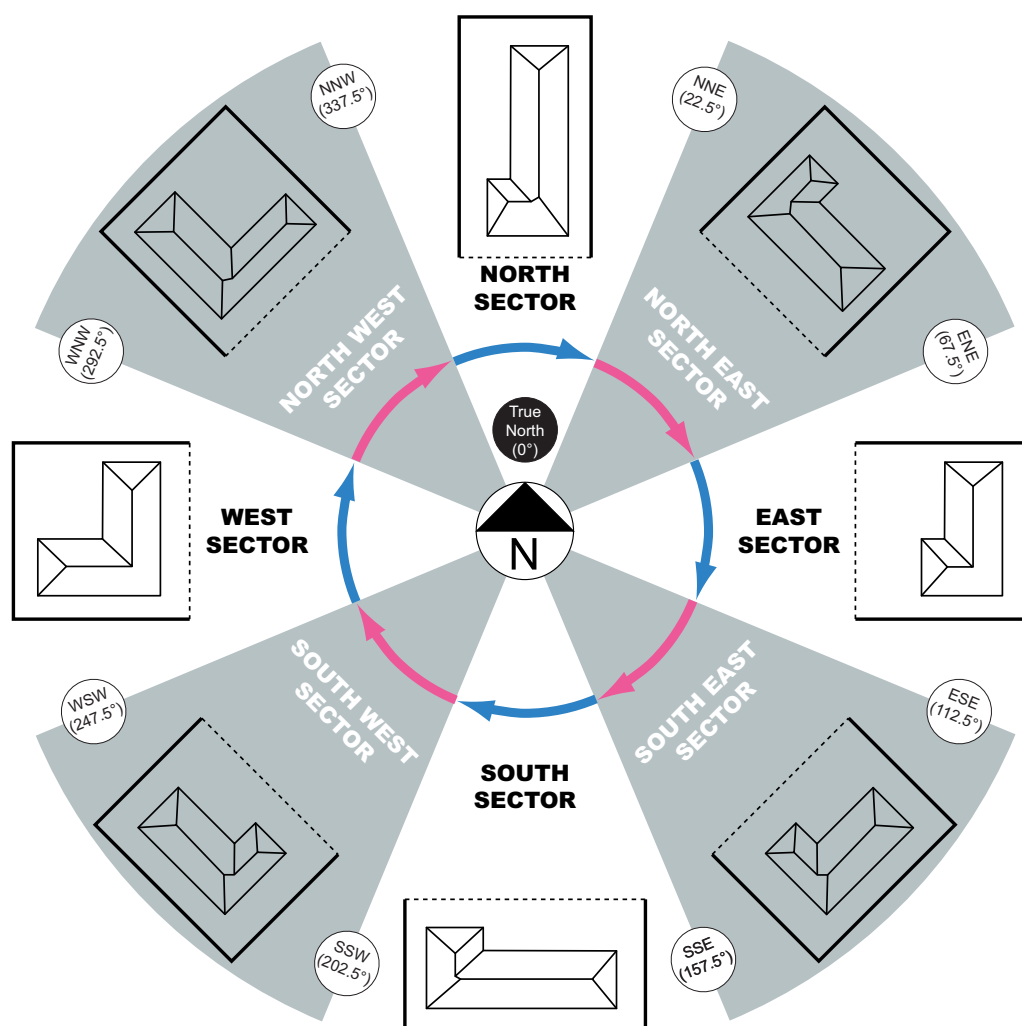
Relationship of the house to the orientation of the block

The Building Code of Australia's requirements for 6 star energy efficiency utilises eight sectors of the compass for orientation. These sectors are used here to link the optimum for house design to the most desirable shape for the block/allotment.

For the purposes of this Guide, block orientation is taken as the direction of the house facing the street. For example in the diagram below the house in the North Sector has a south facing block.

The following diagrams are intended to show how standard single storey house designs built parallel to the street frontage can be used with blocks having an appropriate shape for their orientation.

It is acknowledged that specifically designed houses can be developed to suit any site but this may require a high level of design expertise.



Block shapes related to BCA orientation sectors

SETBACKS

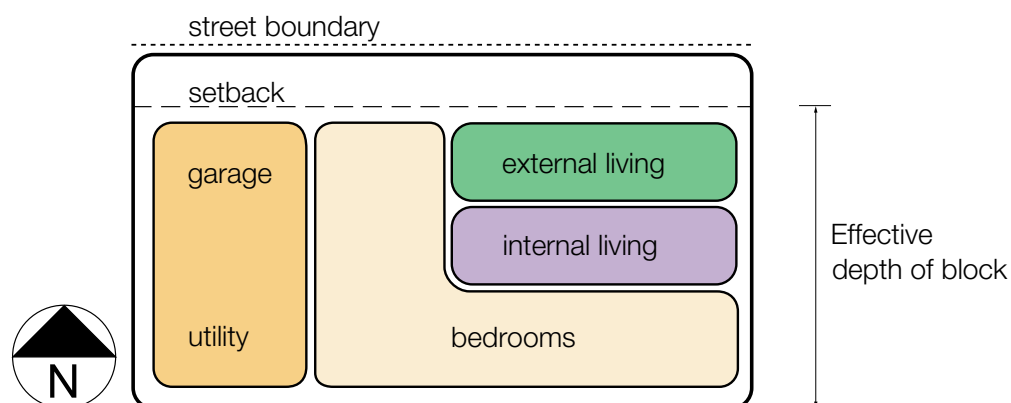
Any setbacks required from the front or street boundary will influence the amount of land available to build on and its configuration.

In this regard setback distances have the most significant influence on very wide and shallow blocks such as those most suited to north facing sites.

Councils could give consideration to having smaller setback distances for such north facing blocks.

Alternatively, for the purposes of an energy efficient house design, the area of the setback land should be discounted and the configuration of the remainder of the block (where the house is to be built) should be the optimum shape. This can be used to advantage in having more consistent street frontages.

In this example, the effective depth of the block is measured from the setback to the rear of the block.



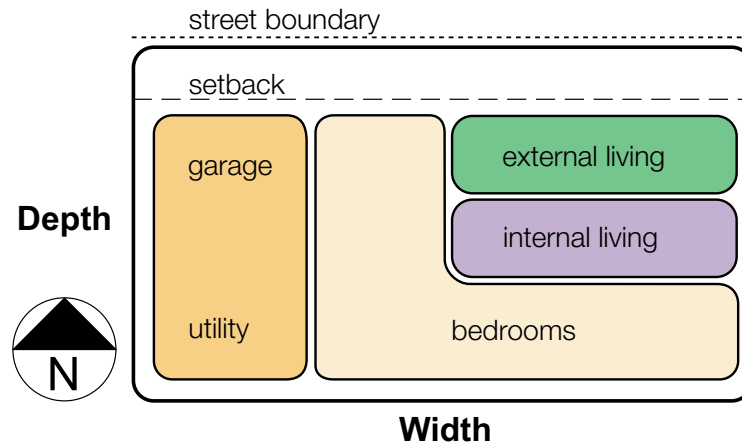
NORTH FACING BLOCKS

House blocks with a northern street frontage are challenging, as the main living areas should not be facing south and be deprived of solar access.

These sorts of blocks need to be very wide to allow room for driveways, main entry and living areas (both internal and external), which should all face north. Because the houses need to be wide and shallow for good energy efficiency, the blocks also need to be wide and shallow.

Long narrow blocks should generally be avoided.

Optimum block configuration = **Width >> Depth**

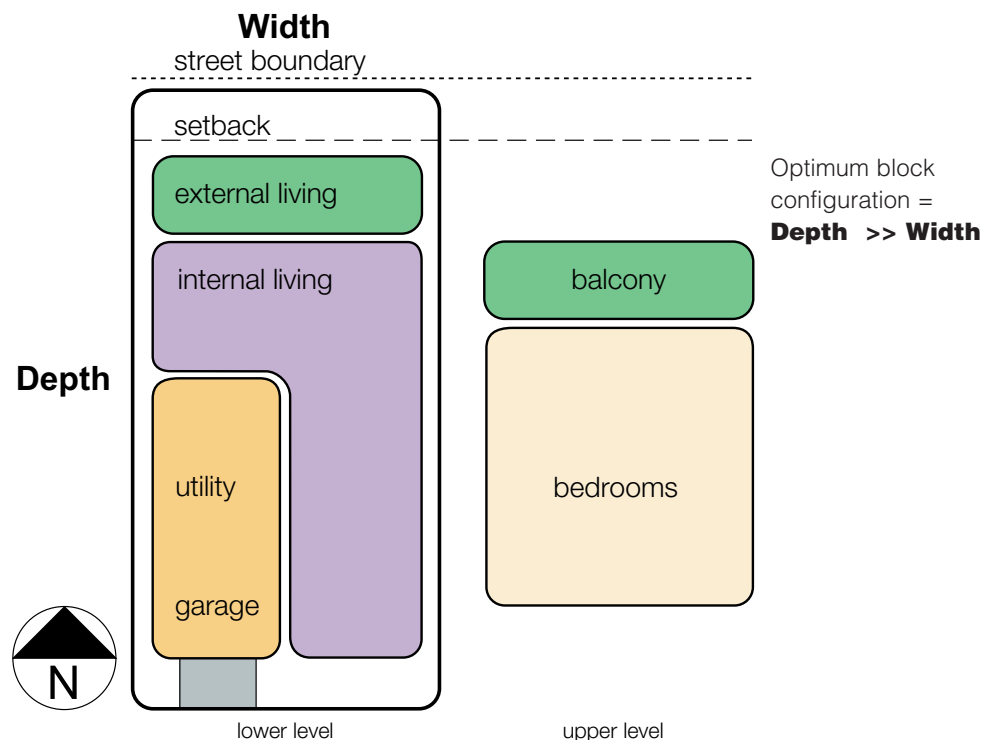


If Rear/South vehicular access is possible:

While long narrow blocks with a north facing street frontage should generally be avoided, vehicular access provided from the south may be feasible in some cases.

This arrangement allows for uninterrupted north facing outdoor living areas, adjacent the street frontage. Amenity, driveways and service areas can then be located to the south west of the site.

Long, narrow blocks with north/south street frontage should have minimal glazing along the western facing wall of the dwelling. If glazing is west facing it should be appropriately shaded with fixed devices or adjustable external blinds.

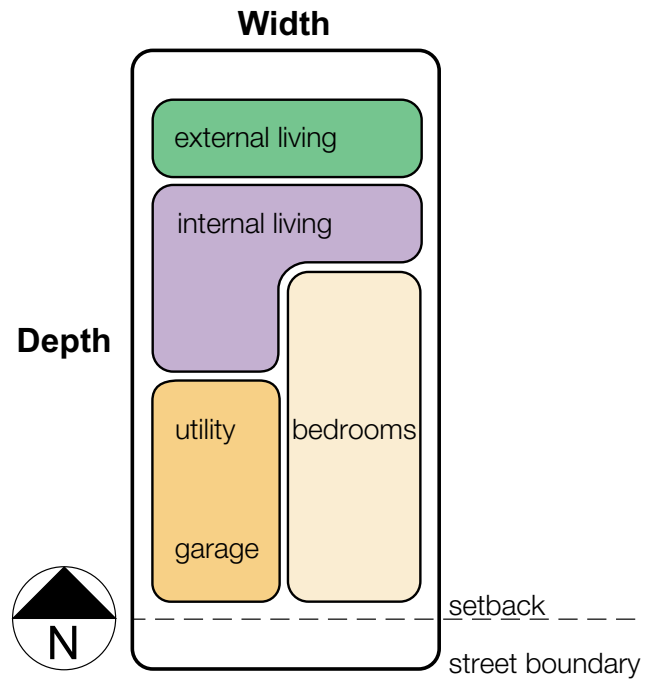


SOUTH FACING BLOCKS

South facing blocks are the easiest to deal with as main living areas can be readily located at the rear of the house (the preferred location for privacy) to face north for optimal solar access.

It means that blocks with this orientation are particularly suited to being long and narrow with limited street frontage.

Optimum block configuration = **Depth** >> **Width**

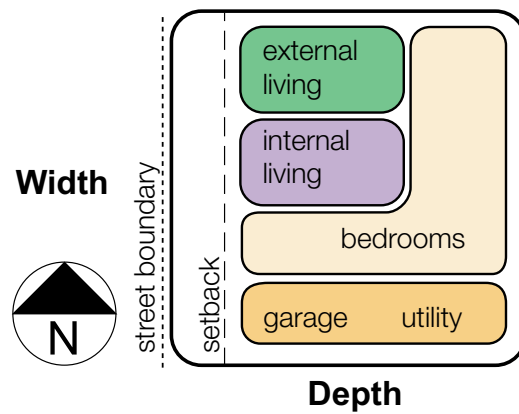
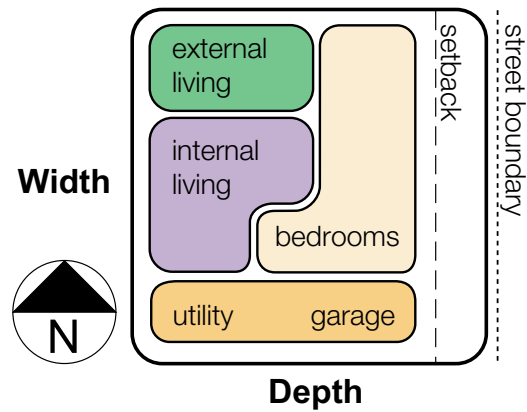


EAST AND WEST FACING BLOCKS

Blocks facing due east or due west should be almost square blocks as these enable the living areas to face north without competing with other areas for space.

These blocks can be slightly longer than they are wide but if they are too long an internal light court may be necessary to get good solar access to the main living areas.

Optimum block configuration = **Width = Depth**



QUADRANT FACING BLOCKS

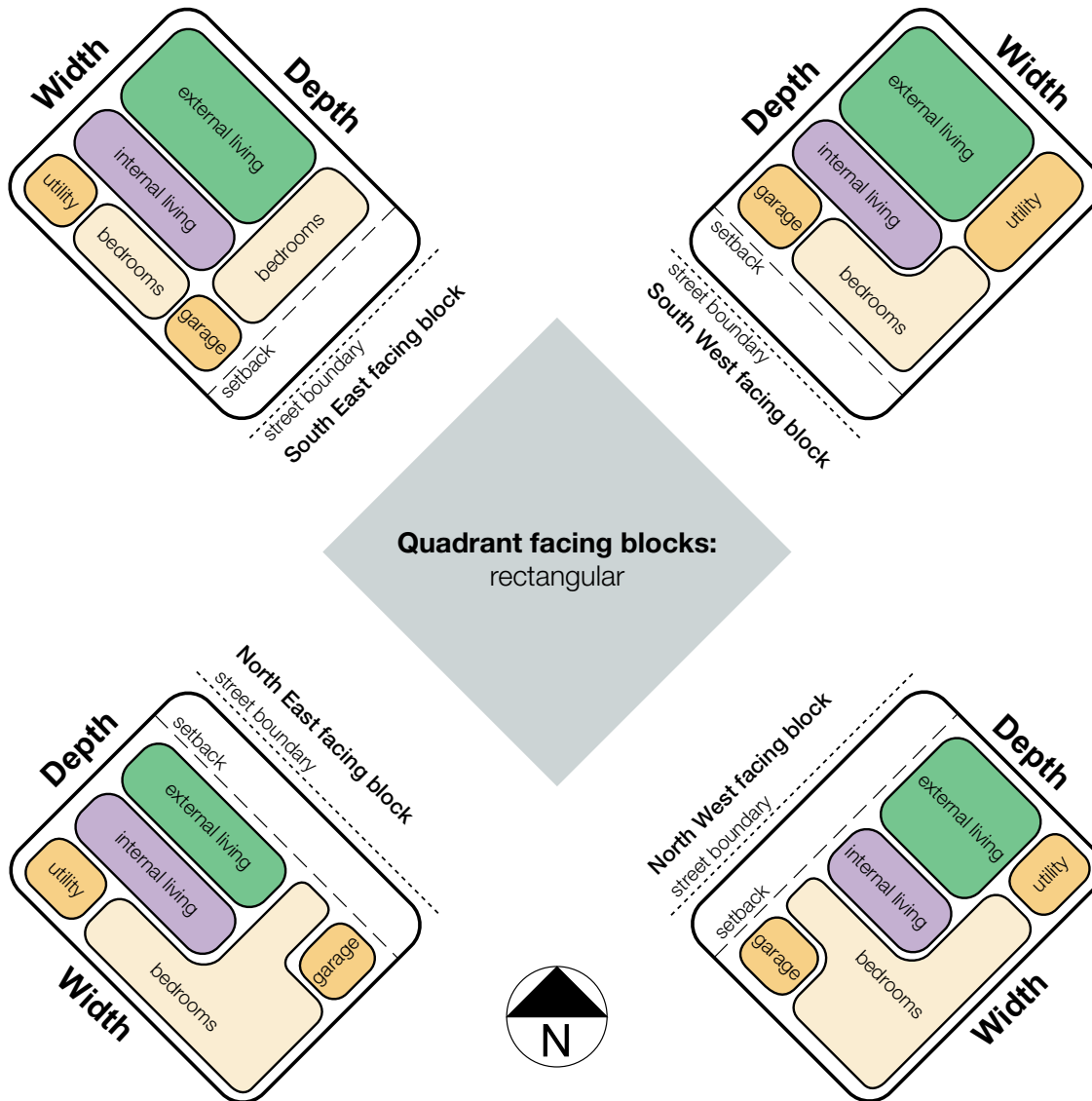
These are conventional rectangular blocks facing one of the four quadrants of the compass - NW, SW, SE, NE.

For blocks facing SW and SE they should be slightly longer than their width.

Optimum block configuration = **Depth > Width**

For blocks facing NW and NE they should be slightly wider than their depth.

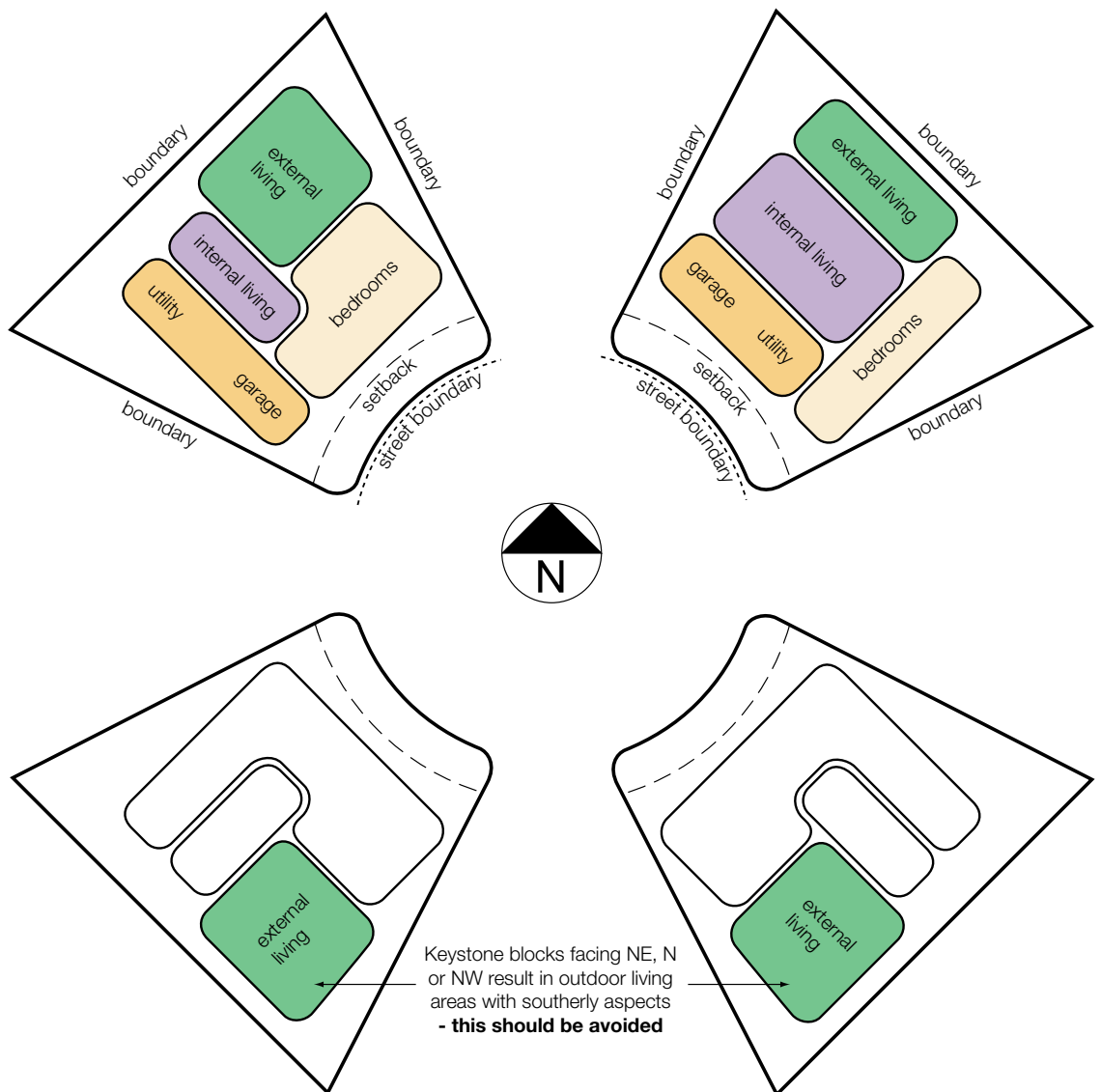
Optimum block configuration = **Width > Depth**



“KEYSTONE” BLOCKS

These blocks are commonly encountered around cul de sacs and usually have narrow frontages with much greater width at the rear of the block. With these blocks the opportunities for significant external living areas with good solar access are very limited.

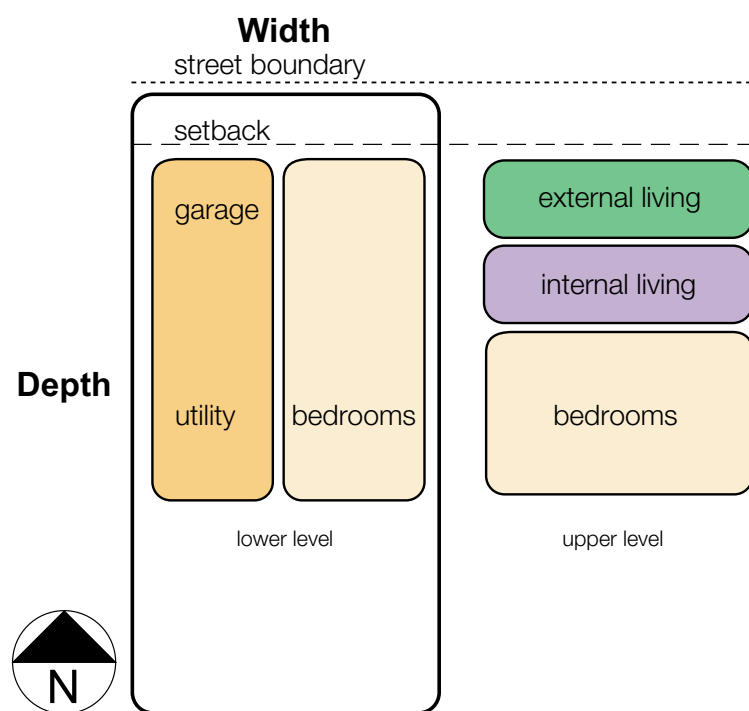
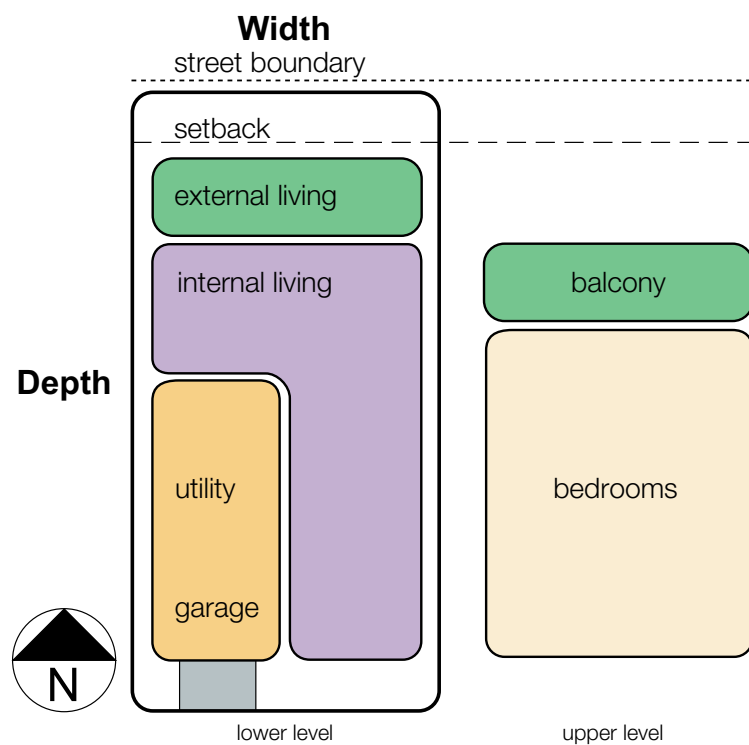
They work well with SW, S and SE facing blocks but should not be used for North facing blocks and should be avoided for NE and NW facing blocks as it will force the living areas to have southerly aspects.



TWO STOREY HOUSES

General principles of orientation also apply to two storey dwellings. More flexibility can be achieved with a two storey dwelling including increased exposure to sunlight due to greater potential for window areas facing north.

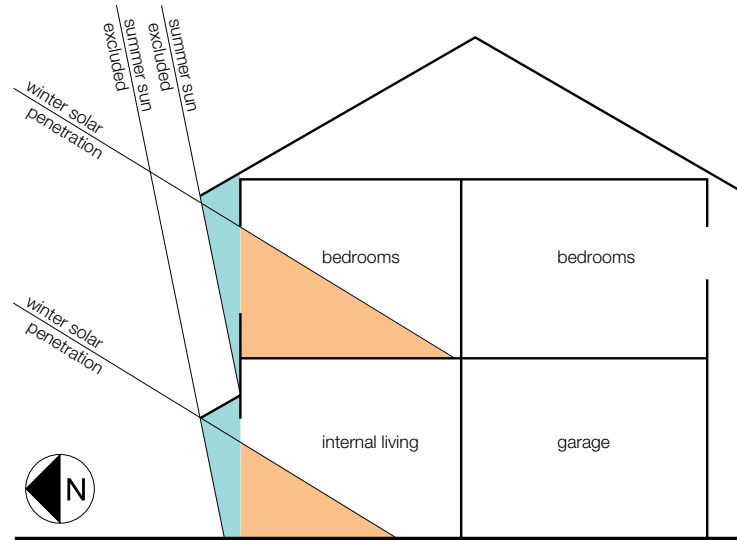
Two storey dwellings are particularly useful for the difficult north facing blocks.



TWO STOREY HOUSES

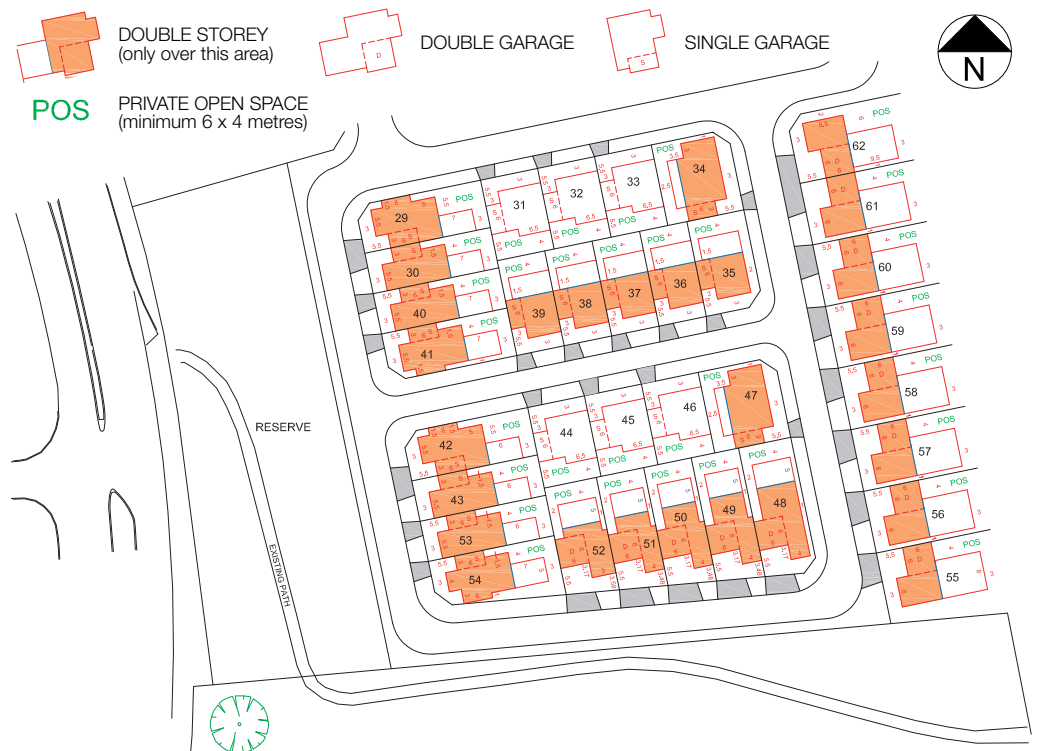
North facing blocks

The following section through a double storey dwelling highlights the benefit of achieving North oriented living areas, with rear vehicular access. The projected sun angles for summer and winter highlight the seasonal variation of solar access (refer to chapter 02 for solar access angles).



EXAMPLE

The following example illustrates how the principles in this Guide can be applied in practice. For instance blocks numbered 35-39 are south facing and have been designed to provide long and narrow sites to cater for North facing private open space (POS) external living areas. While blocks 31-34 are wide and shallow to maximise the solar access on the northern elevation of the dwelling. Blocks 42-54, face west and allow for POS on the northern side of the site.



Source: Housing SA, Asset Services

Contact Details

Building Policy Branch
Strategic Policy and Sustainability Division

Department of Planning and Local Government

Street address:
Level 4, Roma Mitchell House
136 North Terrace
Adelaide

Postal address:
PO Box 1815
Adelaide SA 5001

Tel: (08) 8303 0602
Fax: (08) 8303 0716

Email: dplgbuildingbranch@sa.gov.au

