Aldinga
Arts EcoVillage
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Community Corporation 21109
Inc

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AAEV BUILDING DESIGN GUIDELINES

Version 6
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Introduction

One of the philosophies of the Aldinga Arts Eco Village is for sustainable building design coupled with creativity. The concept of sustainability includes the more usual considerations of materials used (source, manufacturing processes, toxicity, embodied energy), energy efficiency and the surrounding environment (soil control, water runoff, waste treatments, water conservation). Sustainability can also be the use of appropriate building function (size location) and its place in the built environment (visual and aesthetics).

The details of sustainability are a matter for conjecture and there can be differing opinions as to what constitutes sustainable development. This is evident by the variety of approaches taken in designs proposed for the AAEV and differences of opinion by designers, academics and individuals. There are clearly acceptable practices in addition to those that some may consider more revolutionary. Credence has to be given to both.

The Building Development Committee (BDC) is the authorized group within the AAEV Community to approve proposed building designs on the behalf of the community and as such is in a position of having to interpret what constitutes sustainability under the AAEV bylaws. In undertaking this role, the BDC looks to guide and direct the community, encouraging sustainable practices without stifling creativity of design.

The purposes of this document is generally to provide a guideline for Lot Owners intending to build (and their architects or builders) as to what basis the BDC would evaluate a design and will make it is decisions; more specifically:

- Detail the specific restrictions that the BDC has imposed on itself that represent the practices that the BDC consider reasonable and are able to evaluate. Where the criteria are exceeded (even if the bylaws technically are not) the BDC is likely to refer the design to the community for either feedback or approval at a general meeting of the corporation. If a design exceeds these self-imposed criteria, expect the approval process to take longer.

- Provide some information on what the BDC consider reasonable practice in sustainable design based on the experience gained from evaluating over 50 designs to date. This will assist people in understanding what issues will be of concern to the BDC and the aspects of a proposal that may cause the design to be referred to the Community by the BDC.

- To provide some interpretation of the AAEV bylaws in regards to building which sets a basis for common understanding throughout the Community.

- To provide a checklist for use by Lot Owners that will act as a guide when considering your design options and discussing them with your designers or architects.

What is represented in this document represents the thoughts and approach of the BDC at the time of writing. Over time, it would be hoped that this document would be reviewed to meet the ongoing needs of the community and any other future BDC groups.

BDC Approval Criteria

The following represent specific criteria, where if exceeded, may at the BDC's discretion result in referral of the application to the general community even though the proposed design may technically still be within the AAEV Bylaws. (Note however that where a proposal does not specifically meet the requirement of a bylaw, it WILL result in rejection by the BDC and the application will need to be referred to the community for approval; this is a different practice to previously undertaken by the BDC). These criteria will be taken into account, even if the design has been signed off by an AAEV accredited designer.

1. Less than 30% glassed area of the northern orientation. Without evidence of an alternate method to utilise solar energy inputs or evidence that the glazing is sufficient, the BDC will be concerned that the home does not appropriately use solar passive principles.
2. House layouts where the primary living areas are not able to directly or indirectly receive or have solar heat circulated through them. That is, buildings without a passive or active solar heating system.
3. Houses with primary living areas orientated more than 20 degrees off north. The BDC will be concerned that there may be insufficient thermal gain and will be looking for some explanation as to how the orientation is compensated for.
4. Externally connected thermal mass on the major southern and western faces. The BDC will be concerned as to heat transfer in summer and winter and its impact on thermal comfort levels.
5. Insulation levels of less than total R2.5 in external walls or total R3.0 roof and ceilings unless alternate methods of reducing heat loading to the internal spaces is demonstrated.
6. Overall building heights above ground level of 6m for buildings on 200m^2 lots and 5.5m for buildings on 600m^2 and 450m^2 lots and any single vertical walls over 4 meters in height.[1] The BDC will be concerned that the building may be too overbearing in the landscape and will be looking at what measures are being considered to reduce the impact on the landscape.
7. A house on 450m2 and 600m2 lots with more than 1 storey or 1 storey plus a mezzanine and townhouses on 200m^2 or less with more than 2 storeys or 2 storeys plus a mezzanine. The BDC will be concerned that the building may be too overbearing in the landscape and will be looking at what measures are being considered to reduce the impact on the landscape.
8. A proposal that <u>does not</u> include the use of solar heated hot water and where the SHW panels are located any more than 20 degrees off north or shaded by other rooflines. The BDC will be concerned whether the proposed solution is the most energy effective solution in the long term.
9. A proposal that includes the use of chemical spray treatments (such as for termite control). The BDC will be concerned in regards to the impact of chemicals on neighbours.
10. A proposal where the proposed building will shadow the northern aspect of a neighbouring building and effect solar access to the internal room of the house. Additional leeway would be given to commercial lots but it would still be expected that solar interference be minimised.
11. A proposal that utilises the same or similar design house as another house that will be within a common view line from any point in the village. The BDC will be concerned as the diversity, which is encouraged under the bylaws.

[1] Refer to Page 4 for discussion on ground reference points

Specific Restrictions

The by-laws are in ways ways quite general and with a focus on sustainability and impact on community. It is possible that there are elements of your design that may be considered in appropriate under the by-laws. If you have a very specific design element that you want to incorporate that is influencing your design (or even the purchase of the land) don't assume because its not specifically banned that it is allowable.

Specific bans that are in the by-laws include:

- No PVC in contact with the ground or with potable water. This covers all in ground storm and sewer plumbing, electrical and communication conduits and rainwater pipes from roof to tanks.
- No use of perma-pine or any other products with chromosate or arsenic
- No installations of wood fired devices within the home (put in place September 2009)
- No zincalume on walls
- No solid sheet metal fences

Please refer to the bylaws to ensure that you are probably aware of specific bans (dont assume the list above is comprehensive).

Building Envelope - Heights

There is no specific restriction on building height in the Bylaws. The BDC has elected to suggest some limitations on heights of buildings and vertical faces as part of the BDC approval criteria as heights of buildings and vertical faces can have a significant impact on the built environment, particularly if not well considered in terms of the surrounding buildings (existing or potential) and terrain.

The limits decided upon are those where the BDC consider that a design has the potential to be inappropriate and may elect to reject the design on the grounds of height if there is no clear rationale for the height or measures to mitigate the effects of the height.

In making any deliberation in regards to height, the BDC will look at a variety of factors.

Slope: Homes built into slope or using slope to disguise height will be more unlikely to be of concern.

Position in village: Buildings in some parts of the village such as up against mounds or boundary fences are less likely to be imposing or in a significant view line than a building in the middle of the village or the exposed boundary perimeters.

Vertical surfaces: Buildings with broken up vertical surfaces are less imposing than buildings with vertical surfaces to the full height of the building.

Proportion of height to width: Buildings with narrow foot prints and substantial height can appear to be dominating (Not that small footprints are discouraged).

Positions of vertical faces; Vertical faces facing away from view lines of other houses will be less imposing.

Shadowing: The impact of shadowing and light will need to be considered. Excessive height increases the probability that shadowing will occur. Consideration should be given to shadow plans if considering a building with reasonable height.

If your design is likely to involve heights in excess of the criteria set out, it is highly recommended that the BDC be consulted before progressing the design concepts to detailed design stage.

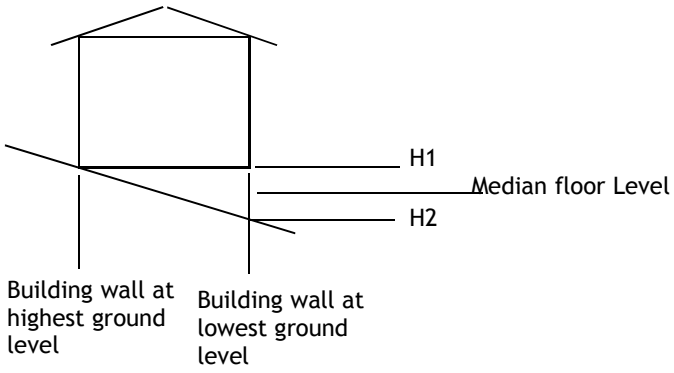
Reference Point for Measuring Height

The measurement of height requires a reference point. Within the AAEV bylaws are two definitions, which relate to building heights

"height" in relation to a building means the vertical distance between any two points in that building; **AND**

"median floor level" in relation to a lot means the height above sea level or the point on the community parcel (as the case may be) determined by the Community Corporation to be the median floor level in relation to the community parcel;

The latter definition is not concise and has resulted in confusion. It does allow the community corporation to determine the "median floor level". The BDC, as a representative of the community corporation has determined the following to be an appropriate reference for measuring height.



Building Envelope – Second Stories

Clause 21 of the AAEV bylaws discusses the use of second level floors, and indicates that single and mezzanine styles are encouraged for 450^2 and $600m^2$ lots and double story for $200m^2$ lots. The use of second story is not specifically prohibited, however the BDC in consideration of the intent will undertake greater scrutiny of second level designs.

The BDC approval criteria include limitations on numbers of stories. The number of stories can have a significant impact on the built environment through introduction of imposing buildings, particularly if not well considered in terms of the surrounding buildings and terrain.

The limits imposed are those where the BDC consider that a design has the potential to be inappropriate and may elect to reject the design on the grounds that there is no clear rationale for the additional stories or measures to mitigate the effects.

In making any deliberation in regards to number of stories, the BDC will look at a variety of factors.

Height of the building: To achieve a full second story would usually also exceed the height guidelines set out by the BDC. The considerations of height would need to be considered.

Incorporation within roofline: The extent that the second level uses space that would normally exist within the normal roofline is a relevant consideration as this disguises the existence of the 2nd level. Some mezzanines and attic dormers are an example where second levels are within the roofline.

The amount of floor space used by the second level: A small floor area can be incorporated more readily without increasing vertical surfaces. Excessive second level floor areas will usually lead to higher vertical surfaces as discussed in building heights.

If your design is likely to involve second levels (450 and 600m^2) or third levels (200m^2), it is highly recommended that the BDC be consulted before progressing the design concepts to detailed design stage.

Glazing and Orientation

It is generally accepted that the heating of a home will need to be achieved using the sun as the primary source of energy. The primary and accepted method is "solar passive" utilising orientation of primary living areas to north and inclusion of sufficient glazing to allow the entry of "solar energy" into the home.

Homes that have primary living areas orientated within 20 degrees of north and have over 30% glazing on the northern face would generally be considered by the BDC to be appropriate for a solar passive design.

The BDC will generally rely on the AAEV accredited designer to advise on the correct orientation and amount of glazing and for them to provide a rationale if the criterion were not as would be normally expected.

The BDC will consider alternate approaches, but will look for evidence that the proposed systems will be able to function or can be later retrofitted if found not to function adequately. The main alternative is "active solar" were mechanical systems are used to transfer heat from the sun into the home. Such devices can include solar air heaters, heating of water circulated through radiators, walls or water tanks. Photovoltaics are sometime promoted as allowing offset of electricity used in heating. Photovoltaics are far less efficient (10 to 15%) than when using solar thermal devices, require more surface area to match an equivalent heat load and it would need to be clearly demonstrated as to the overall benefit.

Building Thermal Mass

Adelaide has a dry climate that is generally quite hot with low humidity in summer for sustained periods and conversely quite cold with bitter winds in winter. The location of the AAEV exacerbates this as it is quite exposed to winds and seasonal patterns are showing greater seasonal variation even though the average temperatures are increasing.

The standard practice is for a building to have thermal mass included in the design, which generally includes thermal mass in the floors and thermal mass at body height in some or all of the walls of occupied rooms. The purpose of thermal mass is to store "solar energy" collected

(for winter) and to provide thermal regulation of room temperature preventing excessive temperature spikes during hot and cold days.

Thermal mass needs to be in the correct proportions to the room size, the activity of the room and the heat gain/loss of the room in response to weather events, though there is no clear guidelines that can be provided on what is the "correct" amount. However, it would be expected that there would be thermal mass in the floor (usually a concrete slab) and at least one major wall in the living areas that is thermal mass material of up to 100mm or thicker. Bedrooms and studios/studies may have one wall of thermal mass material of at least 50mm thick when located with a northerly aspect. Some of the thermal mass can be positioned to absorb direct solar energy during the winter periods though thermal mass will absorb via the air as well.

The BDC will generally rely on the AAEV accredited designer to advise on the correct proportions and locations of thermal mass and provide a rationale if thermal mass is less than would be normally expected (including if none at all).

In the absence of significant thermal mass, the BDC would be looking for alternate means and justification for the storage of solar energy and regulation of thermal temperature within the home, appropriate to the weather conditions of the village and using sustainable principles. This is particularly relevant where thermal mass is not used in the floors.

Insulation

One of the primary objectives of energy efficient design is to minimize the amount of heat loss and heat gain through the building envelope, which includes walls, windows and roofs. This is primarily achieved through the use of insulation in the wall and roof cavities and use of low heat conductance windows (double glazing and e-glass as examples) and shutters or curtains to cover windows. Additional measures include shading of windows (keeping heat out). There are optimum levels of insulation, after which point little gain in comfort is gained for additional insulation. Your designer can advise on this.

Roof Insulation: A mix of materials and arrangements of air spaces can obtain the R rating of a roof. Overall, if a total R rating of 3.0 can be achieved, this would be considered reasonable but could be higher. The overall R rating can be obtained by use of bulk insulation, foil insulation, reflective foil, roof colour (darker roofs absorb more heat) and arrangement of ventilation roof spaces. Discuss how the R rating is being achieved with your designer if you are unaware of the different ways this may be achieved.

Western and Eastern Walls: The eastern and the western facing walls can be more greatly exposed in the mornings and evenings and take on considerable heat load in summer. Increased overall insulation of R2.5 or higher with no (or minimal glazing) would be expected for wall directly exposed (particularly the western sun). The use of shade trees, shading from other houses, use of other structures (garages, carports, water tanks, robes) is valid mitigation methods to reduce heat load.

Southern Walls: Overall insulation levels of R2.5 or higher would be expected to prevent heat loss during winter and heat gain during summer for any areas with living spaces exposed to the southern face. Utility rooms and garages provide an opportunity to provide additional insulation benefit to the southern face. Generally it would be expected to keep southern windows as small as possible (to reduce heat loss) but where extensive glazing is required or desired to the south, this is a potential candidate for double-glazing or some other low conductance glass.

Northern Walls: With solar passive design the objective is to absorb heat in winter, for which increased levels of glazing are usually the solution (there are other methods for

collecting and distributing solar heat). The counter point of this is that glass also allows more heat transfer (summer days and winter nights) when it is not wanted. This is generally managed through use of curtains or blinds, which can be opened and closed as needed, adding an extra layer of insulation when needed. Double-glazing can also be used, though this reduced the solar heat input in winter. For walls, overall R ratings of R1.5 or greater are usually appropriate given the use of windows.

THE DREADED WESTERN WALL

Experience in the village has demonstrated the importance of designing the western wall with care. Consider:

1. **Any window, even a small one has been found to heat a room up if exposed to the western summer sun. Adequate shading should be provided for.**
2. **Thermal mass located on the western wall can absorb heat through the wall and continue to radiate heat for some time afterwards. The less insulation on the outer face, the more pronounced is the condition. Thick thermal mass walls can work if properly designed but are NOT insulators, they just delay the heat transfer from outside into the room (though usually enough of delay depending on night time cooling where heat flow is reversed).**

Ventilation

Ventilation is a key element by which the temperature can be regulated in the house by flushing cool air through the house. This can be achieved through cross ventilation such that cool breezes can pass through the house or by the exhausting of hot air from the high spaces (up venting) and the drawing in of cool air from a cool space. The BDC would expect to see one or the other (or a combination of both) to be employed in the design such that all the main living and bedroom areas can be vented.

Things to remember are:

- Cool breezes in summer at the village are from either southeast or southwest. The ability to open windows on the south and north faces will allow rapid cross ventilation and removal of heat provided that there are paths through the house for the breeze to pass through.
- Consider the terrain (slopes) and other buildings (or potential buildings) that could affect your access to cooling breezes. If restricted, up venting may be more appropriate.
- Up venting of hot air requires vents large enough to vent sufficient volume of air to allow hot air to escape quickly.
- Incoming air passing through the southern cool zones and through moist areas (such as ferneries can provide evaporative cooling effects. Air should be drawn from close to floor level.
- All vents need to be sealed so that heat cannot escape in winter.

Solar Hot Water Systems

It is generally expected that all buildings in the village will use solar hot water heating as their primary source of water heating. Backups would generally be either gas or off peak electricity. Sufficient panels and storage should be included for the size of the proposed home and the panels

need to be appropriately located (north orientation and between 20 and 45 degrees) for optimum operation.

There are occasions when solar hot water is not the most energy efficient form of water heating (when using small quantities of hot water). The BDC would consider a request to not use SHW, but would require a clearly stated rationale (apart from cost) as to why SHW could not be used. The likely outcome is that the application would be referred to the general community for approval.

Circulation of heat around the home

There will always be the room that does not have direct solar access but for which some heat in winter is desirable. Even that chilly bathroom! To avoid the potential for using ancillary heating (such as the portable) electric heater, methods of transferring heat to those rooms should be considered. Methods could include:

a. Ducting air from the warm room (north) to cooler rooms (south) using small low powered fans. With thermal mass in the cooler room, this can be done during the day, the heat will be partially absorbed and re-released at night. Air in cavity roofs can also be used, providing appropriately filtered for dust.
b. Heat transfer through conducting walls between the hot and cold interior spaces. Thermal mass is a great conductor but don't make it too thick otherwise the time lag will be too great.
c. Active systems such as hot air heater boxes or hot water circulated from solar panels to a thermal storage device (water or earth/brick). Solar panels in conjunction with thermal storage using water is being used in the Village. Some of these devices can be purchased commercially. There is a small amount of energy used for circulating pumps and fans, but far less than conventional heating systems.

Thermal mass designs vs. lightweight designs

There is much discussion about the relative merits of thermal mass designs vs. lightweight designs, particularly if a lightweight design is on a suspended floor system. The science is simple but complex at the same time. While not exhaustive, the following considers the differences.

Light Weight

With no or minimal thermal mass, the ability to store thermal energy is limited and there will be no time lagging in regards to temperature. In summer, internal air temperatures will rise more quickly but conversely will reduce more quickly once the cooling breezes are available. This is one of the considered benefits, as thermal mass designs take longer to reduce the internal temperatures due to the slower release of heat from the thermal mass.

To combat the increased air temperatures, measures to substantially reduce the heat gain on the internal space will slow the rate of rise. Measures could include some or all of the following and in sufficient measure will slow the rate of rise over a day such that cooling breezes are available before the thermal comfort levels are exceeded.

a. Increased insulation levels, particularly in walls and roofs to prevent heat transfer from outside. The western walls in particular will benefit. Turn the house into an esky!
b. Use of reflective foils and light coloured roofs to reflect heat
c. Increased shading and protection of glazing, particularly in the afternoon western sun.
d. Reduced glazing on the "sun" faces
e. With cavity roof/ceilings, the venting of hot air in the ceiling space.

f. Airlocks to prevent entry of hot air when moving in and out of the home.

These measures are great for the thermal mass design as well but are essential for the lightweight design. The limitation on this design is that eventually the house will increase in temperature beyond thermal comfort levels (quicker than a thermal mass design) and if the outside temperature does not drop and the cooling breezes start, the heat cannot be flushed from the internal space.

For the Aldinga area, there are occasions when the evening temperature does not drop and the house will hold a high temperature equivalent to the outdoor temperature. The use of up venting with a cool air draw from a cool zone is a critical component to help alleviate this (effectively a natural evaporative cooler).

In winter, there is no thermal mass to store solar energy in during the day and to release during the night. This means that solar energy has to be stored in the internal room air. Air in large spaces is able to transfer heat far more quickly (due to convection), so it is important to restrict the transfer of heat back to the outside as much as possible such that the temperature remains at reasonably elevated levels into the evening. This requires as in summer, substantial amounts of insulation in all walls, roof and also the floor. Also the heat loss through glazing needs to be reduced by use of double glazing, e-glass, shutters, heavy drapes or simply reducing the amount of glazing.

As the air is storing the energy, and with increased insulation, the temperature will increase substantially during the day past the point of comfort if exposed to too much solar access. Consequently, it is to balance the amount of north facing glazing for the solution being employed.

Shadowing

Any home is going to cast a shadow on the ground with changing lengths of shadow from summer to winter. The effects of shadow on neighbours (and by neighbours) are an important consideration in your design. This includes known shadows as well as "potential" shadows from buildings not yet built.

It is impossible to avoid completely the casting of shadow onto neighbouring lots, particularly where lots are orientated in a north-south line. For the BDC the objective is to ensure that opportunity for solar access for all is maintained in regards to the houses and where practicable the garden as well though it recognised that there will inevitably be some shadowing of the garden within some lots.

This emphasis of this principle is "opportunity" by which the BDC needs to consider whether a proposed design is reducing the opportunity for others in regards to future buildings. Specifically:

A. If lots have not been built on, will the shadow cast by the proposed home substantially reduce the space available to that neighbour to build a home maintaining solar passive principles?
B. If the lots have not been built on, will the position of the proposed home leave sufficient opportunity for the neighbouring buildings to be placed such that they can maintain their own solar access and not cast shadows on the proposed building.
C. If the lots have been built upon, will the shadows cast upon that home impede solar access to internal and external living spaces, taking into account whether the location of that home provided "reasonable" opportunity for the proposed home to be located.

Establishing what is reasonable can be difficult for the BDC to assess, particularly where there are no buildings. The benchmark that the BDC has set as being "reasonable" is to consider the impacts of a shadow that would be cast by a screen located along the northern boundary that is 1.8 metres high, this being permissible within the AAEV bylaws. When planning your garden and house consider this area to be potentially shaded.

The issue of shadowing is relevant to the shadow that a home will cast on other lots, whether they be built on or not. But also relevant is the shadow that will be cast on your lot by other buildings, whether they be built or not. The following considerations, and those that will be considered by the BDC are:

a. Does the lot have northern or southern neighbours?
b. If southern, will the shadow cast by the proposed house fall outside a shadow boundary that would be created by a 1.8m screen installed along the boundary.

Similar Designs

The AAEV bylaws encourage diversity in design and form. While many houses already built are very different in design, there are designs of similar style (or in some cases exactly the same). While dispersed through the community, diversity is maintained but where concentrated, it is not. Consideration should be given whether there are similar designed houses within the same view shed and how the aspect and orientation varies. Where designs are similar, measures to reduce the impact of similar forms such as colour schemes use of terrain, mounds, screens and other landscaping to add variety should be considered and detailed. The BDC have established the presence of similar or same houses within the same view shed as a decision criterion.

Views

Designing to views is often a common criterion for many people, and in the village there are many great views, particularly while there are minimal number of buildings on site. In considering your design, it is important to remember that not all of those views will be available once homes are built on lots between you and the view and consider whether in the desire to maintain your view that others would be unreasonably constrained in their design options.

Similarly, consider those homes around you that have invested in a "design with a view" and look at what design options exist to allow that view to be maintained. The best approach to is to consult with your neighbours as to how best a result can be achieved to the benefit of both parties.

Privacy

The rights to privacy are acknowledged in the AAEV bylaws and it is fair and reasonable for people to want to maintain privacy. This should be considered within the design process taking into account existing and future homes.

a. While you may not be concerned about your privacy, other may not want to impinge upon it or wish to maintain their own. If you have windows facing neighbouring lots, expect that is reasonable that screens may need to be placed to block straight line views and that it is reasonable for them to be requested, even if they should cause other effects, such as shading.
b. Similarly, also consider what you could do in your own design that would improve privacy while still maintaining other criteria, such as solar access. This could include the use of opaque windows, lead lights, curtains, etc.

Design Checklist

The following is a checklist and some pointers that you can use to assist you in considering the design of your house and what to discuss with your house designer/architect (if you are using one). Its intent is to be informative and provide a basis for decision making by providing some insight into how the AAEV bylaws are interpreted. Specific technical detail in regards to solutions can be found from books (the AAEV library is available), the Internet, discussion with other community members and consulting with your architect or building designer. This check list does not provide all solutions and is not is intended to limit solutions.

Solar Access	
Orientation	Is the house orientated north for the primary living areas (solar passive design)? If not, how is it proposed to get "solar heat" into the primary living areas?
Eave Depth	Assuming a solar passive design is the eve depth appropriate to the wall height to allow winter sun to enter windows but prevent the summer sun (December to February)? If not, are other methods of shade control being considered? Eg. shutters, pergolas etc.
Northern Glazing	Assuming solar passive, has sufficient glazing been installed in the northern face to allow sufficient heat gain (radiation) in winter? If not, what other considerations have been given to get "solar heat" into the home?
Room Placement	Are all the primary living areas exposed to the "sun" side of the building? If not, is there a mechanism to shift heat into areas that do not have direct access to the sun?
Building Placement	Has the building been positioned so as to not be shadowed (blocked solar access) by existing buildings, future buildings or vegetation? Will the building significantly impact on the available solar access for other houses?
Insulation and Glazing	
Southern Glazing	Has glazing area been kept to a minimum (enough for light and ventilation)? If not, what measures have been taken to reduce heat loss in winter (such as double glazing, blinds, shutters, e-glass) and are those measures sufficient to offset the increased area?
Eastern and Western Glazing	Is the glazing necessary and what impact will it have (mainly in summer and particularly the western walls)? If it is, what measures have been taken to reduce the impact of heat gain (summer) and heat loss (winter)?
Northern Glazing	What measures have been employed to reduce heat loss at night (winter) and heat gain (summer) through the glazing, such as curtains, improved glazing (double glazing, e-glass), shutters etc?
Roof Reflection	Have light coloured roof surfaces been used? If not, what other measures have been implemented to reduce heat loads, such as increased insulation, reflective foils, special coatings, ventilation of roof spaces etc?
Roof Insulation	What level of insulation has been added into the roof and is it sufficient? Has consideration been given to the overall R rating including materials, air gaps and ventilation in the ceiling space?
Wall Insulation	What level of insulation has been added into the walls and is it sufficient? Have appropriate air gaps been built in and the combined value of all materials considered.
Installation of Insulation	Has the insulation been properly installed such that there are no

	gaps around edges that bulk insulation has not been compressed and that vertical insulation is not slumping? This can be written in to the building specifications.
Ventilation	
Number and placement of windows	In summer the site is subject to cooling breezes on many nights. Have windows been placed in the appropriate locations to capture the breezes and cross-ventilate the primary living and sleeping areas.
Exhausting of heat	Hot air rises and can get trapped at ceiling/roof level. Have mechanisms been put in place (such as opening windows, opening vents etc) to exhaust hot air? Are the vents of sufficient size to vent enough volume and also incoming air vents for fresh air to be drawn into the building? Are vents easily operable? Are the vents able to be sealed to prevent heat loss in winter?
Cooling of air	Has space been defined externally that will be cooler (and more moist) that can be used as a source of cool air providing natural evaporative cooling? Have windows or vents been provided to draw that air into the building?
Leakage of Air	Have various measures been put in place to prevent leakage of either warm (winter) or cool (summer) air from the internal spaces? This includes window and doors seals, use of airlocks, dampers on vents etc.
Materials	
Foundations	The standard approach to foundations is the concrete slab. There are options that exist to minimise the amount of concrete used (resulting in less embodied energy) including screw anchors and waffle pods. Solutions depend on the requirements of your design and soil conditions and there are other environmental tradeoffs to consider (such as use of polystyrene in a waffle pod). Have you checked with your designer/engineer as to options available? Other owners in the village also have experience with different approaches to foundations – ask around.
Building frame	What materials have been used for the building frame in relation to embodied energy and sustainability? The two common materials are steel and timber. Examples of sustainable timbers are plantation timber or recycled. Suitability can depend on the design. For timbers, what chemical preservative treatments have been used and if composite what adhesives have been used?
Roof	What materials are being used for the roof cladding? Readily available roof materials are sheet metal or tile. Typically sheet metal is used (colourbond or galvanised) as having less embodied energy relative to clay-fired tiles, which have high-embodied energy and are therefore not considered acceptable. Will the roof be seen from the street and will it reflect sunlight that is visible from other homes or the street? If so, has a material been used that will reduce reflection, or been treated to reduce reflection?
External Claddings	What materials are being used for wall claddings? Has sustainability, embodied energy and maintainability been considered? External claddings are wide and varied. The desire for heritage and natural looking materials (under the bylaws) influences this choice. Clay fired bricks are not considered acceptable (high embodied energy).

	Typical materials used in the Village so far include sheet steel (colourbond and galvanised – zincalume is not allowed for walls under bylaws), straw-bale (rendered), fibre cement sheet (painted and rendered), fibre cement weatherboards, timber and rammed earth. Other materials could include mud bricks, earth bricks, and adobe. There is also a wide range of other eco cladding products available on the market.
Thermal Mass	There is wide range of materials available for thermal mass, including rammed earth walls, compressed earth bricks, mud bricks, concrete bricks, timbercrete etc etc. Each has its own physical and textural characteristic, their own environmental footprint in terms of embodied energy as well as cost variations. Have you considered the various pros and cons of different types of thermal mass? New clay fired is the only real restriction regards thermal mass.
Window and door frame materials	What materials are being used for the window and doorframes? Has the thermal performance (timber and PVC do not leak heat) been considered? Has embodied energy (manufacture and transport) been considered? Has source of materials (plantation vs. old growth forest and overseas rainforest timber) been considered? Has durability and maintenance (PVC does not need painting) been considered? Has toxicity (timber is natural fibre) been considered? There are no easy answers on windows and materials to date include timber, aluminium and PVC.
Chemicals	Has the use of chemicals been considered, in particular those not allowed under the bylaws? Many materials use chemicals for preservation or as binders/glues. The more obvious treatments include white ant spray treatments, pesticides and herbicides, arsenic treated woods and various plastics and paints that have high levels of toxicity.
Insulation Materials	Insulation is generally either bulk or film and can come in many different materials including glass fibre, polyester fibre, wool fibre and cellulose. There is no clear benefit to any insulation though it generally recognised that fibreglass dust causes more issue with allergies etc.
Equipment	
Electricity Generation	Do you want to generate your own electricity? Electricity can be generated on site using renewable energy (sun or wind). The most common approach is solar photovoltaic connected directly to the grid (no battery storage). Wind is great but in a residential environment issues need to be considered regards noise an uninterrupted wind flows. Use of photovoltaic panels is encouraged to offset external electricity use. Rebates are available from the government. If you are using PV or may consider it in the future, then consider also the direction, angle and amount of roof area required to install them.

Hot Water	Is your hot water solar heated and is it sized to meet your needs? It is generally expected that a solar hot water would be installed to provide your hot water requirements that is sized to meet the needs of your home. Families will require larger units, or will be over reliant on boosting. There are many different solar HW systems available and you will need to investigate the different systems available to determine what meets your needs. Talk with others in the community to find out what works. Properly sized, the need for boosting should be minimal. Either gas or off-peak electricity is the preferred suggestions for boosting. Daytime electrical boosting should be a last resort. Your house design should allow for the solar hot water systems to be properly orientated and set at the right angles. Discuss this with your designer. Also try and locate the SHW system as close to where the hot water is used (less water waste). Also ensure that your roof is designed to support the weight of a tank if placing tank on roof.
Supplementary Heating	Do you really need supplemental heating? There are those times of extreme weather events where supplementary heating is sometimes needed but could you live without it? If you do need it how can it best be achieved in a sustainable way? With a properly designed energy efficient home, these times it is needed should be minimal. Gas heaters are one option (select energy star efficient) but also a substantial investment for the small amount of use. Off peak electrical heat banks are another solution as is efficient heat pumps. Reticulated hot water systems can also be used either in the floors, walls or through radiator panels. The water can also be heated or preheated by the use of solar panels. Consider making allowance for future installation (such as running power or gas lines) but it is recommended to live with your home for a year to see what is needed.
Supplementary Cooling Systems	There are times of extreme weather events where supplementary cooling is needed. Refrigerative air conditioners are large consumers of energy though more efficient units are available and it is preferable to not use them unless absolutely necessary and all other options are exhausted. Evaporative coolers are also a solution (and generally the preferred option if supplementary cooling must be had) But the same effects can be achieved through good ventilation design and use of southern cool areas. Ceiling fans with variable speed controls and efficient motors can be used to circulate air within individual rooms.
Cooking	Solutions for cooking are relatively conventional; electricity or gas. Gas would be the preferred method but it is not always economic to install gas just for cooking. Electric cooking (with purchase of green electricity or inclusion of PV to offset CO2) is a viable option. Using good quality pots can reduce the amount of energy used for cooking.

Lighting	Power consumption can be reduced through the appropriate application of lighting, which includes use of high efficiency lighting (compact fluros), use of motion sensors and automatic timers as well as appropriate placement of lights for maximum effect.
Rain water Tanks	The AAEV bylaws require a minimum of 10,000 litres. Experience has found that a greater volume can generally be filled using rainwater in any one year and is required especially if you intend to undertake extensive gardening or have lots of washing. 20,000 litres is common and 40,000 litres has been installed in some cases. Any investment in water tanks will reduce the reliance of street water. Tanks can go under ground or above ground and generally concrete, polyethylene or fibreglass. All are generally acceptable solutions. Also have you considered where the tank will go? It can be used a windbreaks and for generating privacy but can also be a dominating feature in the landscape. Also consider within the design the ability to add more tanks at a later date (which may be enforced through future by-law changes)
Water Pressure and Pumps	Water supply to the house is generally via the use of a pressure pump as the tank is either at ground level or underground. Only if the tank is above the house (up a slope) is gravity feed possible. The use of a pressure pump requires electricity, which means that water supply is not available when there is no electricity. An option is pump water to a header tank located above or in the roof space that will supply some water when the power is not available.
Street Water	Street water is available at the lot, fed from the storage tanks at the entry to the village. This is intended as supplementary supply and will be metered at the entry point to the lot (and charged at SA water rates). The entry point of the street water into your tank must be 75mm above the overflow pipe; this prevents backflow. Control can either be via a manually operated tap or level controlled valve. If using level control, make sure that only 1 third of the tank is filled, otherwise the tank will be full of street water when it rains. Do not connect the street water directly to the house.
Inground Plumbing (Waste and Storm Water)	The AAEV bylaws prohibit the use of PVC in the ground or in contact with potable water. The alternate material is polyethylene and all underground waste pipes are generally of this material. It is advisable to ensure that PE is specified to the builder and that the plumber is competent with installing PE (many are not). Storm water pipes in the ground are generally also PE (and cannot be PVC).
Stormwater above ground	Storm water runoff from the roof is ultimately potable water and also cannot come in contact with PVC. The main form of down pipes are either steel (e.g. Colourbond) or PE or a combination of both.
Waste plumbing not in contact with the ground	Technically waste plumbing not in contact with the ground (which includes connection between sinks/basins and the floor pipes and overflows from the water tanks to the ground level). It is preferred however that consideration be given to maintaining the integrity of the system and not install PVC plumbing products.
Water distribution	Water pipes in the ground can be either copper or PE; PE is generally the preferred material. In wall plumbing generally is

	polybutlyene, polyethylene or copper. Either is considered acceptable a both standard are standard products. Good lagging of all hot water pipes (when copper) will assist to reduce heat losses from the pipe systems.
Electrical supply	The electrical supply will usually come from the street supply via your selected electricity retailer. All conduits into the house will need to be polyethylene (PVC cannot be used). Make sure that the electrician doing the connections knows this. The preference in regards to meter boxes is to use a dual box with both electricity and gas meter compartments. This is the most common one used in the village. This can be specified in your building contract. Internal wiring is generally conventional with the use of PVC covered wires and PVC fittings. There are no real alternatives that are considered viable. Meter boxes need to be accessible from the street and on the street side (ETSA requirement)
Communications	The village an underground communication infrastructure which provides coaxial (TV) and copper (Phone) services to each lot. By-laws were changed in September 2009 to ensure that no external aerials are installed were the option to connect to the village communication system is available. A communications pit will be located at a service point near your lot. You will need to install conduits (polyethylene) from the pit to the house and cabling from the nearest connection node (could be up to 50 metres away). This applies for phone and free to air TV. Consider using higher quality coaxial cables to avoid signal degradation.

Additional Facilities

Garden sheds	The preference for garden sheds is that they be incorporated into the building and reflect the materials of the building. However, standard colourbond sheds are being used in the village. If they are used, the installation of screens (vegetation, mounds, timber) is preferred to disguise the impact of the shed.
Garages	Parts of the AAEV bylaws relate to management of vehicles (both in terms of parking and maintenance). It is important to consider what your needs are in regards to parking and garaging space for your vehicles, including defined spaces, covers and enclosure. It is encouraged for garages and carports to be integrated into the house design rather than appear as an add-on structure.
Pet Containment Areas	The AAEV bylaws recognise that animals and in particular pets are part of our everyday lives but does require containment of animals when unsupervised. If you have pets or any other animals, it is important to consider how you will contain them and still maintain the overall general philosophy of open space and use of appropriate materials and screens. Plans for pet containment should be thought about and included in any development application.
Clothes drying	The use of electric tumble driers is highly discouraged. Outdoors drying is allowable with consideration giving to available sunlight while still allowing the areas to be as discrete as possible. Consider this as part of the overall design rather than an after thought. Other options include

	purpose built drying rooms within the house with solar access, and the use of cathedral roof space to hang drying racks.
Screening and Privacy	
Privacy for yourself	The nature of solar passive design is that northern faces have larger windows and the rooms are exposed to views from the outside. While the overall philosophy is to maintain a feel for open space, the need to protect individual privacy is also recognised. It is worth when designing your house to give thought to your needs in regards to privacy and how they can best be achieved, either through screens, use of mounds, use of vegetation and orientation of windows and doors. This is partly why a landscaping plan is requested as part of the BDC application.
Privacy for others already built	Consideration of the rights to privacy for the homes already built should be considered and if opportunities exist to not impinge unnecessarily then incorporate it into your design.
Privacy for others who have not built	It is easy to forget that eventually others will build on the lots around you and that in doing so may desire to have some privacy of their own and also not wish to impinge on your own. So when designing your home, consider what may be needed by your neighbours who have not built. It may be that they desire (and have a right to) some screens to aid privacy that may influence where to best locate your house, windows and rooms. Consulting with your neighbours on this is an effective way of determining this.
Use of Screens	Screens are an effective way to provide privacy. When considering the use of screens, consider how you may make them as minimal as possible to serve their purpose and use materials that are compatible with the style of the house. There are relevant AAEV bylaws in relation to screens that should be considered. The differences between fences and screens are difficult to define, but if the screen is minimal in proportion to the house, this should be in line with the general principles.
Materials for screens	Where ever possible natural materials (earth, vegetation etc) are the preferred medium. If man made materials have to be used, natural timbers, wire, mesh and lattice would be preferred. Solid sheet metal is not allowed under the bylaws in regards to fences, and is best avoided in screens.
Common Land	
Driveways	Generally to be able to access your lot and garages a driveway will be required and this invariably will cross common land. Proposed driveways should be shown on site plans and where they will cross common land. The care and maintenance of the driveway will be the responsibility of the lot owner. However there are no rights over the common land and if the driveway needs to be excavated to allow other services to be installed then it can be.
Installing services across common land	Often to install services (gas, water, communication, electricity), you may require to dig trenches to the nearest common connection point that will cross swales, existing garden beds, retaining walls, curbs, driveways and other services. It is expected that any damage caused by your works would be rectified back to its original condition. Drawings of site services are available on site, though not all services were installed as drawn. These are available as a guide only.

Landscaping on Common Land	If you wish to undertake landscaping on common land as part of your development, an application is required to the Natural Environment Committee. Any planting would need to be within the AAEV vegetation guidelines.
Consultation with Neighbours	
Neighbours	Your neighbours are part of your community. You will need to live with the consequences of their design and they with yours. Neighbours are not just the immediate boundary lots but all lots that will be influenced, whether it be shadowing, view lines, noise, or privacy.
Consent of Neighbours	The consent of neighbours to your proposed design is not obligatory but is preferred. It is recommended that you consult with neighbours at the time of preparing preliminary drawings, or even prior to that, to establish any criteria that may be relevant to the design. Consent and support of neighbours for the development approval is preferred.
Permaculture Design	
Permaculture Philosophy	One of the primary concepts of the village is Permaculture. The design of your home and the surrounding landscape and gardens are integral. Design of the outside space is as important as the design of the indoor space, and is not considered to be an after thought (which is why a landscape is requested). If you are unaware of Permaculture, there are many resources within the community to assist you – please ask.
Landscape Design	As the external space is as equally relevant as the house, landscape plans are requested as part of the AAEV development approval process. It is very much encouraged that some concepts of the landscape plan be provided with any application.
Building Works	
Waste Management	Each owner/builder is responsible for removal of building waste. Have appropriate mechanisms been put in place to contain and dispose of building waste? Have bins been provided? Has recycling been considered for materials that can be? (Other villagers are also good scavengers if they know that materials can be taken). Has the builder and tradesmen been appropriately instructed to use waste facilities (on a regular basis, not at the end of the job)? Has lids or covers been put on receptacles to prevent wind blowing rubbish (There is a strong wind across the village). **A clean site is a good site.**
Site tidiness and safety	Due to the open nature of the village, the building site will be accessible and viewable by the community? Have arrangements been made to keep the site tidy and reasonably safe?
Concrete Washout	There is always some concrete residue after a concrete pour, including excess washout from the truck and pumper. Have you made any provisions for disposal of left over concrete? Options for disposal include a pre-prepared hole on site or even pre-prepared brick moulds to pour left over concrete into. (Polystyrene fruit boxes are great moulds and bricks can be used in landscaping. Otherwise ensure your contract includes disposal of concrete slag off-site (outside of the village).
Site Access	Trades people and delivery people will need access to your site and places to offload materials. Have you considered how they will be able to access the site? (this will become more difficult as more buildings are built, further limiting access). Is access needed across common land or another owner's lot? If, so have arrangements been made with either the community and/or the lot owner.
Storage of materials	Sometimes materials (and rubbish skips) may be located on other lots.

and spoil on neighbouring lots	If this is required have you discussed this with your neighbours to identify any issues; and as a courtesy?
Noise	Your house will be built in an environment that others are living in. It is good to consider the timing of activities that involve noise in regards to the immediate community around you, advice neighbours of potentially noisy activities. Also be aware of noises such as flapping covers/materials.
Dust	During the course of building, earth will be uncovered and dry out, and generate dust, particularly when the wind blows which may be a nuisance to neighbours. Consideration of where dirt is placed and suppression of dust should be considered (including covers if necessary).