

Growing Community Assets Building Design Framework

In order to achieve the Growing Community Assets programme outcome of a more positive impact on the environment BIG will support the design and construction of sustainable community buildings. This document sets out the main factors that contribute to sustainable building design. It is not a prescriptive list; different elements can be incorporated in to the design of your building according to need and local conditions. When you have decided on appropriate priorities for your community and project these can be incorporated into a brief for the architect or design team.

Each page covers one area. The green box introduces the topic, the lilac boxes describe key considerations and the blue boxes gives best practice standards to aim for. References to sources of further information are given at the bottom of each section.

Please contact your GCA adviser if you require further information.

Procurement Building sustainability in to the design of a building is an on-going process from the initial design stage through construction to occupation. It is important to have clear priorities on aspects that you wish to see incorporated in to the design and put these in writing as a brief for the design team. This will help to reinforce community wishes at each stage of the process and throughout construction when cost or logistics issues can lead to a reversal of the original concept. At a later stage when the building is occupied and fully functional it is important to assess whether your original wishes have been fulfilled. A 'Post occupancy evaluation' of the building can reveal any discrepancy between the intention at the design stage and what is actually achieved during operation.

The **design brief** should specify the sustainability objectives the community wishes to achieve.

Incorporate sustainability and environmental objectives into written brief.
Request a written design statement from the design team detailing how sustainability and durability are addressed within proposals.

Durability: Prioritise quality and durability in both the basic structure and essential fittings to produce a building that will benefit the community for many years.

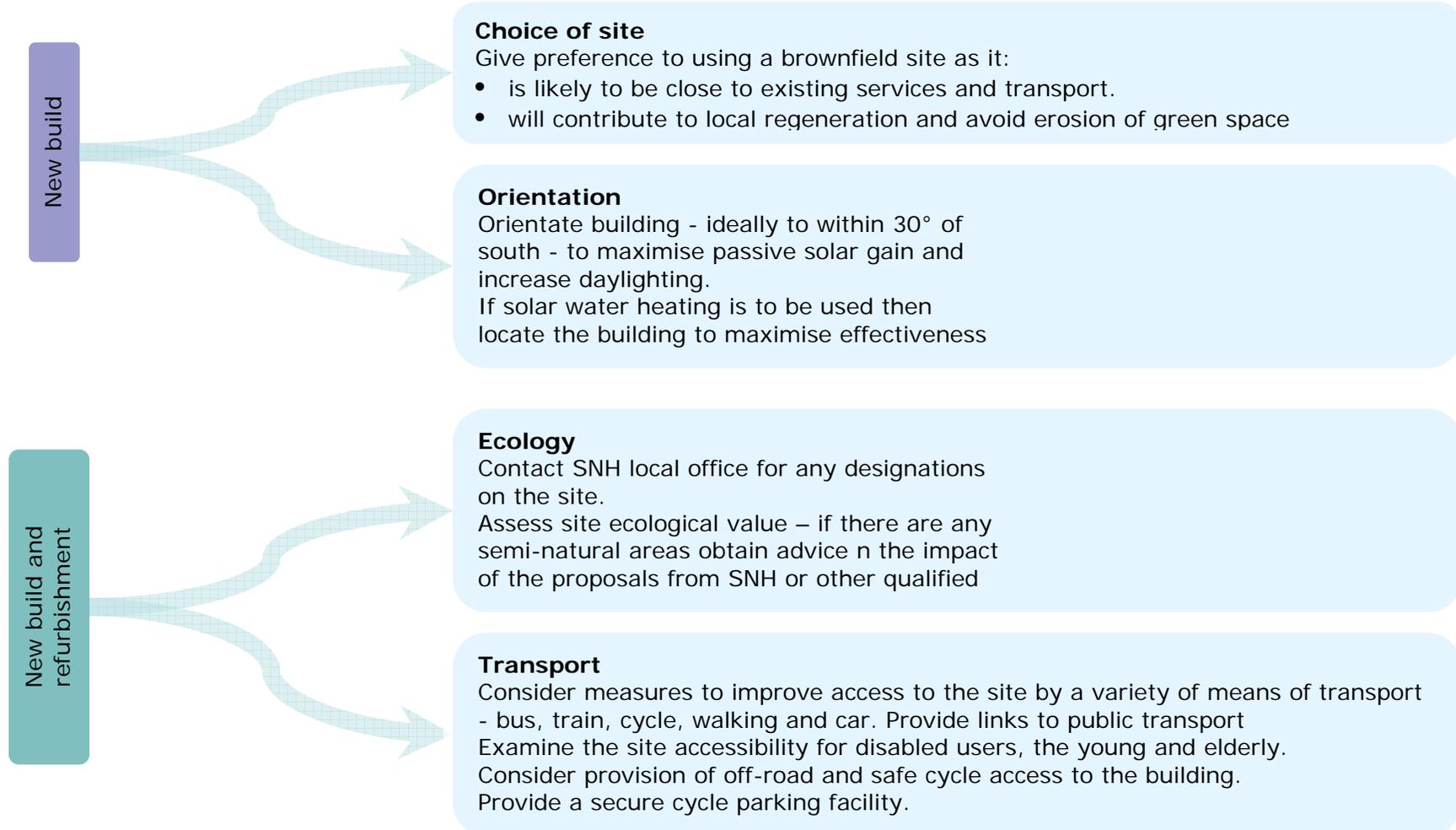
Emphasise high quality materials and long building life as objectives in the design brief.
Design the building to be adaptable to different uses and layouts according to the changing needs of the community.
Design for deconstruction and reuse of materials to minimise long-term waste and environmental impact.

Post occupancy evaluation (POE): An evaluation 12-24 months after completion will provide feedback on how the building is operating and the extent to which the design spec has been met.

Schedule POE to take place between 12 and 24 months following date of final completion certificate.
Allow for POE in project budget.

Further information: www.architecture.com/fileLibrary/pdf/Integrated_Building_Design.pdf General info on LBAPs & a list of local contacts www.ukbap.org.uk/default.aspx, To see your LBAP www.ukbap.org.uk/GenPageText.aspx?id=29 www.drc-gb.org/library/publications/services_and_transport/making_access_to_goods_and_ser.aspx

Site considerations



Further information: www.architecture.com/fileLibrary/pdf/Integrated_Building_Design.pdf General info on LBAPs & a list of local contacts www.ukbap.org.uk/default.aspx, To see your LBAP www.ukbap.org.uk/GenPageText.aspx?id=29
www.drc-gb.org/library/publications/services_and_transport/making_access_to_goods_and_ser.aspx

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Energy Buildings currently account for 40% of energy use in Europe so energy efficiency is a key sustainability issue. The heating and electricity requirements can be reduced significantly by improving the building fabric at no loss in comfort levels. Application of these measures to an existing building can be a challenge but significant improvements are possible.

Current building regulations require a calculation of the overall energy that will be used in the building including heating, hot water, lighting and ventilation. For new buildings this will be converted to a rate of CO₂ emissions and used to calculate emissions for your building design with the materials and services you have specified, called the Building Emission Rate (BER). In setting best practice standards we are asking for buildings to be designed to achieve lower emission rates than required by building regulations.

Minimise heating requirements by improving the building fabric, reducing heat loss and maximising the impact of heat from the sun - passive solar heating.

Use of these measures will reduce the size of heating system required.

Specify:

- very high levels of insulation,
- detailing for air-tightness particularly around doors, windows and other openings.
- good quality double/triple glazing.
- sufficient thermal mass to avoid extreme temperature fluctuations.

High thermal mass provides a heat store, creating a building suited to continual occupation.

Choose an insulation material that will perform over a long period and is not environmentally damaging.

Space heating: Base the choice of system on minimising fossil fuel use taking account of local supply constraints.

Woodfuel based heating can be treated as carbon neutral.

If installing a boiler, use a high efficiency condensing boiler.

Use effective heating controls to avoid over-use or overheating.

Consider wood fuel heating where the supply chain permits.

Consider a heat pump if electricity is to be generated on-site (e.g. by wind turbine or micro-hydro).

Further information: Design and Detailing for Airtightness www.seda2.org/dfa/index.htm CTV014 - [Building fabric technology overview](#)
Sustainable Housing Design Guide for Scotland Section 4.3 [How to take control - heating controls](#)
Woodfuel Information Pack www.forestresearch.gov.uk/fr/infd-66sj9p Woodfuel suppliers: www.nef.org.uk/logpile/
CE82 Domestic Ground Source Heat Pumps www.energysavingtrust.org.uk

Renewables Overall carbon emissions can be further reduced by installing renewable energy equipment to provide electricity or to heat water. This is a good option if the site is off the mains grid supply, if high levels of electricity are likely to be consumed, for example in conjunction with a heat pump system, where hot water use will be significant or to provide a source of income.

Water heating: Even in the Scottish climate solar water heaters can be effective as long as the site is reasonably clear and facing southeast to southwest.

Install solar water heating if hot water use will be significant otherwise consider point of use heating.

Solar water heating is most effective in the summer and can provide water heating when the space heating system is not operating.

Electricity generation:
The decision hierarchy for renewables is:

1. Micro-hydro: if you have a modest source of fast flowing water then this option is worth investigating.

A comprehensive feasibility study will be required to assess the suitability of your site for either of these options.

2. Wind generators need an open site on flat or gently sloping land and should be mounted 10 metres above surrounding objects.

3. Solar photovoltaic panels are expensive and have high embodied energy. This is an appropriate option to provide a small, reliable electrical supply in a remote location.

Lighting & appliances: Aim to increase the level of daylighting throughout the building and maximise energy efficiency of electric lighting. Low energy lamps use 5-15 times less power for the amount of light produced and have a much longer life than conventional bulbs. Select energy efficient appliances.

Daylighting improves the quality of user experience and reduces energy use.

Maximise the use of daylight by:

- increasing floor to ceiling and window head heights
- introducing daylight to deep plan spaces using light wells and atria
- orientating building to within 30° of south.
- using external shading to avoid excess glare.

Electric lighting

All lamps to be energy efficient except where specialist needs require otherwise.

Lighting should be designed to suit the activities planned in different parts of the building, taking account of the needs of the visually impaired.

Use adequate controls and/or switching to prevent excess lighting when not required, use motion detectors and daylight sensor switches externally.

Electric appliances
Consider the energy rating of any electrical appliances purchased.

There are two labelling systems that indicate energy use:

The EU energy label shown on all refrigeration and laundry appliances, dishwashers, electric ovens and light bulbs. It rates products from A* (the most efficient/least energy used – goes up to A++ for refrigeration), down to G (the least efficient).

The Energy Saving Trust energy saving recommended logo is displayed on the most efficient products. Products covered include fridges, freezers, dishwashers, washing machines, tumble dryers, light bulbs, light fittings, gas boilers and heating controls.

Best practice: select A+ rated fridges and freezers, A rated dishwashers & washing machines, appliances with EST energy saving recommended logo.

Ventilation: As weather patterns lead to a rise in average temperatures strategies for ventilation and cooling to maintain comfort levels in buildings are likely to become more important. The level of intervention required will depend on the building's thermal properties and the intended use.

Air conditioning is very energy intensive and should be avoided if at all possible.

The design of the building can incorporate strategies to increase its thermal mass and provide natural ventilation flows to prevent over-heating.

The use of opening windows allows occupants greater control over the internal environment and local comfort levels.

Consider strategies for increasing natural ventilation in the building such as:

- designing the building layout to encourage airflows throughout
- installation of opening windows or vents
- ceiling heights sufficient to keep polluted air above the occupant level
- sufficient thermal mass within the building structure to smooth out extreme variations in internal temperature.
- night time ventilation to extract heat in warm weather.

Design for natural ventilation except in areas of the building where there will be internal heat gain, excess moisture or pollutants.

Mechanical ventilation can be limited to areas that will have high heat or moisture levels such as showers, kitchen or photocopier area.

Materials: The environmental impact of a construction material is affected by factors such as the energy used in manufacture and transportation, the pollution emitted and the scarcity of the primary resource. Look for ways to reduce the amount of materials used, repair and re-use existing materials and give preference to products with recycled content. To alleviate the longer term disposal problem consider materials that can be reused at the end of the life of the building or are biodegradable.

Greater awareness is now being given to building materials containing toxic chemicals that are released during manufacture and throughout the lifetime of the product. These will contribute to indoor air pollution and some are thought to be significant allergy triggers. These should be avoided to reduce the impact of pollution and create a healthy internal environment.

The embodied energy of a material or component lies in the energy (and thus pollution) associated with its sourcing, manufacture and transportation. Natural materials can be used in preference to high energy manufactured materials

Identify materials currently on-site that could be used in the construction.

Where practical specify locally produced materials particularly high volume, high mass products such as blockwork or concrete.

Seek blockwork with a high recycled content.

Timber should ideally come from Scottish sources or, if from outside the UK, is FSC (Forest Stewardship Council) certified. Do not use timber from tropical regions.

Consider the health impact of materials used in construction avoiding the more persistent and potent pollutants such as PVC, timber treatments, glues used in fibre boards, synthetic carpets and furnishing fabrics.

Avoid materials containing known allergens or triggers (e.g. Formaldehyde).

'Breathing' walls* or other moisture management mechanisms will help reduce relative humidity and discourage moulds and mites.

Timber preservative treatment can often be avoided through good design and breathing walls. Consider the need for treatment on internal wood.

Avoid the use of PVC by substituting traditional materials or less damaging plastics.

Use paints, varnishes and glues free from volatile organic compounds.

Use natural floor coverings and furnishing fabrics such as linoleum or marmoleum and wool carpet.

Further information: Materials supplies - www.ciria.org/recycling; www.wrap.org.uk/construction/index.html; www.fsc-uk.org; Association of Scottish Hardwood Sawmillers www.ashs.co.uk; www.greenspec.co.uk/index.html; www.ecoconstruction.org; Communities Scotland *Sustainable Housing Design Guide for Scotland* Section 6.3; Health issues - www.besafenet.com/pvc/index.htm; www.healthyflooring.org/; archive.greenpeace.org/toxics/pvcdatabase/bad.html; www.sustainablehomes.co.uk/pdf/WINDOWS.pdf;

Waste management: A huge amount of waste from construction sites goes to landfill in the UK each year. It includes packaging, soil and rubble and around 13 million tonnes of surplus new materials. Site waste management plans aim to reduce waste by separating waste on site, reducing over-ordering and by using materials on the site as a construction material.

Construction waste: Discuss plans for minimising, reusing and recycling site construction waste with potential contractors to develop a site waste management plan.

Minimise production of waste by avoiding over-ordering & careful storage of materials on-site.

Recycle packaging material.

Re-use or return surplus materials.

Provide several colour-coded skips for segregation of waste on site.

Recycling: All community buildings should include some provision for recycling whether for waste generated on site or as a wider community recycling facility.

Contact the local authority to see what existing services are in the area, or search the directory on the Waste Aware Scotland website.

Provide internal containers for separated waste in areas that are accessible to disabled users.

Provide external containers either as part of a local authority collection scheme or other waste recycling service. External bins to be within 10m of an external door and accessible to disabled people. The number and size of containers should be to suit local waste recycling collections and their frequency.

Composting: Any organic waste generated on the site can be composted to provide a soil conditioner for planted areas. This will reduce the amount of waste to landfill.

Easy to use compost bins and advice are available through Waste Aware Scotland.

Provide an internal bin for collection of organic waste.

Further information: www.wasteawareconstruction.com/managing.asp; www.wrap.org.uk/construction/on_site/index.html; www.sort-it.org.uk/index.asp; www.wasteawarebusiness.org.uk/; www.recyclenow.com/home_composting/in_your_area/in_your_area_1.html

Water use and management: Basic water conservation measures can be incorporated in to new and refurbished buildings. Sustainable drainage systems aim to prevent any additional surface run-off from the site to the municipal drainage system and reduce susceptibility to local flooding.

Water use

Specify the use of:

- spray taps to reduce water flow
- self-closing taps
- dual flush toilets
- urinals that do not require continuous water flow.

Collect rainwater for toilet flushing and/or external use.

Surface water management

The level of runoff can be reduced or controlled by:

- incorporating soakaways
- adding areas of permeable paving or graded aggregates
- recycling rainwater
- incorporating a holding pond.

Target: Ensure that peak run-off rates and annual volumes of run-off will be no greater than under the previous conditions on the site.

Further information:

On saving water http://www.environment-agency.gov.uk/subjects/waterres/286587/511050/?lang=_e
Sustainable Urban Drainage www.sepa.org.uk/publications/leaflets/suds/index.htm