5 Materials and finishes

The selection of construction materials and finishes is of great importance at Mullum Creek. A building's material selection has an impact on the ecological footprint of the dwelling, the amenity of the home, and the appearance of the streetscape. The finishes and colours you choose will affect the aesthetic appeal of the estate and its natural setting, and can have implications for the thermal performance of your home.

Figure 15. *Example of timber textures that blend with the natural setting.*

Figure 16. *Example of stone and timber that compliment the natural setting.*

Objectives

- Support Council's Design and Development Overlay DDO11.
- Select materials and finishes that have low environmental impacts and contribute to energy and resource conservation.
- Use recycled and recyclable materials where possible and/or those salvaged/sourced locally.
- Maximise the use of materials that will have a net positive effect on the thermal performance of your home.
- Promote the use of materials and finishes with low greenhouse gas emissions or carbon footprint.
- Minimise the use of materials, colours and finishes that contribute to the 'heat island effect'.
- Minimise negative impacts on neighbouring residents resulting from reflection and glare from external building materials.
- Ensure that the external appearance of the home harmonises with or complements the natural environment and surroundings, and contributes to an estate of high-quality appearance.
- Minimise the introduction of toxic substances to land, buildings and households.
- Apply materials and construction details to the exterior of dwellings, mindful of the bushfire attack level (BAL) assigned to the Mullum Creek estate.

Your application for Step 2 Developed Design Approval must include a detailed schedule of materials, finishes and colours. This section lists materials and finishes that are preferred, those that are not generally acceptable, and those that will not be accepted. The lists are not comprehensive, as the DRC recognises that there are many different ways of achieving the Mullum Creek vision, and that environmentally friendly building materials are constantly being developed. Refer to the Mullum Creek website for Guides to selecting these appropriate materials.

Any proposals to use other materials and finishes will be assessed against:

- the Objectives set out below.
- the Mullum Creek environmental vision.
- the Mullum Creek architectural vision.

5.1 Environmental impacts of building materials

Climate and other impacts of materials we choose

The environmental impacts of a dwelling can be considered as comprising two main types. On the one hand, they include the ongoing greenhouse gases produced in heating, cooling and living in the home and using its appliances, and the climate impacts of those emissions. Increasing the thermal efficiency of the home through passive solar design and achieving a high energy rating can help reduce the production of these greenhouse gases.

Of equal importance, there are significant environmental impacts attached to both the physical construction, maintenance and the end-of-life decommissioning of a dwelling. These impacts are associated with the extraction, processing, manufacture and transport of construction materials and products. They include the greenhouse gas emissions resulting from the burning of fossil fuels to generate energy required for procuring and processing materials, the depletion of finite resources, loss of fresh water, loss of biodiversity and habitat, and pollution of soils, water and air, to name a few. At Mullum Creek we would like the scale of these impacts to be acknowledged and mitigated wherever possible, through sensitive design in line with these Guidelines.

When seeking to reduce the environmental impacts of the materials used in home construction, it is helpful to consider the three phases in the life cycle of a dwelling:

The original construction of the home
The impacts embodied in this phase are most effectively mitigated by smart and elegant architectural design that avoids the need to build large scale homes, and by carefully selecting building materials that don't cost the earth. Simply, as a rough rule, smaller homes use less resources, and some materials have less impacts than others.

Cyclical repairs and maintenance
This refers to the maintenance, repainting and replacement of walls, ceilings, roofs, carpet, service systems and other elements of the building, through the life of the home. Mullum Creek encourages the selection and detailing of materials and products for maximum longevity and minimum maintenance, so that the need to maintain, replace and repair is reduced. For instance, choose timbers for external use that are naturally durable, appropriately treated and detailed in construction to endure without deterioration.

End-of-life building demolition and associated waste processing
The energy and environmental impacts required to demolish a dwelling and safely dispose of the resulting waste is significant. Choosing materials that are non-toxic and easily reused or recycled are ways to reduce these impacts.

Objectives

- Minimise the greenhouse gas emissions and climate change impacts associated with the construction and end-of-life decommissioning of dwellings.
- Minimise the other environmental impacts associated with the construction and end-of-life decommissioning of dwellings.

Refer to the chapter on materials in '*Your Home*' http://www.yourhome.gov.au/materials.

Guides

G22 Consider building a well designed, smaller home that can provide high levels of comfort and flexibility, whilst reducing the environmental impacts attributed to its construction.

G23 Choose an environmentally conscious architect to help you design your home - one who understands the implications and comparative intensity of embodied energy and impacts attached to the range of construction materials and methods available.

G24 Consult the DRC for advice and the Mullum Creek website for information on the various low-impact materials, products and processes available.

5.2 Selecting environmentally sensitive building materials

The materials used in the construction of your home are a vitally important aspect of its environmental performance. Many of the materials conventionally used in house construction have major environmental impacts, and there are often much better options available. The Mullum Creek materials guides list these, giving a range of good products to choose from. To ensure appropriate selections have been made, the DRC will review the materials and finishes specified in documents you submit for Step 2 Developed Design Approval. Please refer to the checklists included on the website for a complete list of what specifications need to be detailed. The following materials have been identified as requiring particular consideration when building an environmentally friendly home.

5.2.1 Concrete

The production of cement has a particularly high carbon footprint. So where wet mix-concrete is used in the construction of dwellings at Mullum Creek, supplementary cementitious materials (SCMs) must be specified. Concrete mixes incorporating SCMs are similar in price, and use a reduced amount of high greenhouse gas-producing Portland clinker, when compared with standard concrete mixes. SCMs include industrial waste products such as fly ash and slag. Refer to the **Concrete Products Guide** on the Mullum Creek website for more information, including a list of recommended products and suppliers.

Objectives

- Where possible, design your home to minimise the need for concrete, especially structural concrete requiring substantial steel reinforcement.
- Encourage the use of concrete with recycled content in both cement and aggregate to lower its embodied energy and reduce demand on our earth's finite resources.

Detailed Requirement

R28 The binders to wet mix concrete must include minimum 30% supplementary cementitious material (SCM) in on-ground slabs, suspended slabs, columns and hard landscape elements (e.g. swimming pools, paving, retaining walls, etc).

5.2.2 Steel

Steel is high in embodied energy. Its production has a number of environmental impacts, arising from mining, processing, manufacturing, fabrication and transport. Reducing the amount of structural steel used in homes is the best way to reduce these environmental impacts. For example, cold formed steel is commonly used in house construction and is difficult to recycle. But in most applications it can be readily substituted with a more environmentally friendly material such as timber.

Refer to the **Steel Products Guide** on the Mullum Creek website for more information, including a list of recommended products and suppliers.

Objective

- Minimise the requirement for steel in the structure of your home.

Detailed Requirement

R29 Cold formed steel section (for wall framing, roof trusses, purlins or battens) must not be used in construction at Mullum Creek without prior approval of the DRC.

Guides

G25 Avoid demanding structural designs that require large amounts of framing steel and concrete reinforcement.

G26 Where possible, consider using sustainably sourced timber products as effective and economical substitutes for the steel elements.

5.2.3 Timber

Timber, the original renewable resource, can contribute significantly towards creating a truly sustainable home. But there are serious risks to native forests and threatened species both in Australia and overseas from unsustainable timber harvesting. Luckily, there is a wide range of sustainable timber products available, many of which are included on the **Timber Products Guide** on the Mullum Creek website. Consulting this list will make the task of selecting appropriate timbers much easier. If, however, you wish to use a product that is not included on the list, the product must meet the Requirements set out below. Refer to the **Timber Products Guide** on the Mullum Creek website for the current list of approved timber products, the applications to which they are suited, and where you may obtain them.

Objectives

- Promote the use of timber that is fit for its intended purpose, yet not beyond the grade required with regard to strength, exterior durability, dimensional stability, hardness, appearance, etc.
- Promote the use of timber harvested or sourced with minimal adverse impacts on natural ecological systems.
- Minimise the use of timber harvested in ways that cause adverse impacts on forest-dependent traditional communities.
- Maximise use of timber products that contribute to the reduction of greenhouse gas emissions.
- Minimise the use of timber products containing toxic additives.

Detailed Requirement

R30 1) All timber must be at least one of the following:

a) a product included in the Mullum Creek Approved Timber Products List.

b) recycled timber (e.g. from a prior construction use) whose origin can be verified via a chain-of-custody declaration from the supplier, or via obvious physical evidence such as nail holes, etc.

c) certified by the Forest Stewardship Council (FSC) and:

- ***harvested from trees grown in Australia or New Zealand; or***
- ***provided that it is no greater than 6mm thick, a veneer or panel product sourced from forests outside Australia and New Zealand.***

2) Manufactured wood products must meet the requirements in (1) above, and have low formaldehyde emissions to E0 standard (≤0.5mg/L or 0.041ppm) under AS 2098.11 and AS 4266.16.

3) Timber products treated with copper-chrome-arsenate (CCA) must not be used at Mullum Creek.

Manufactured wood products include laminated veneer lumber (LVL), glulam, I-Beam, cross-laminated timber (CLT), plywood, particleboard and fibreboard (MDF and HDF).

The DRC may update its Timber Products Guide from time to time, by listing other timber products that meet the above Objectives and/or Requirements. Please contact the DRC if you know of other timber products that you believe meet the criteria of Requirement R30, and that you wish to put forward for review and inclusion in the Guide. There is a **Timber Selection Form** (*Other Proposed Timber Products)* on the website that you can use to request review of such products. Please provide supporting documentation as requested on the sheet to enable the DRC to assess the product.

5.3 External walls

External wall finishes can contribute significantly to the environmental impact of a home. Specialist finishes such as aluminium, stainless steel, copper or similar materials can be very greenhouse gas intensive in their manufacture, so are generally acceptable only where needed in small quantities. Render finishes on a polystyrene substrate have some thermal benefits, but have poor durability and limited recyclability, so avoid this material and finish where possible.

Suitable materials include:

- locally manufactured face concrete blockwork.
- natural stone (must be locally sourced where practicable).
- bricks (must be locally sourced and/or recycled if practicable).
- rammed, pressed or puddled earth.
- natural or pigmented cement render.
- rough sawn or dressed timbers with high durability.
- plywood cladding.
- timbers finished with clear or pigmented oils, or left to weather naturally.
- in-situ concrete (subject to it satisfying Requirement R28).
- lightweight steel sheet.

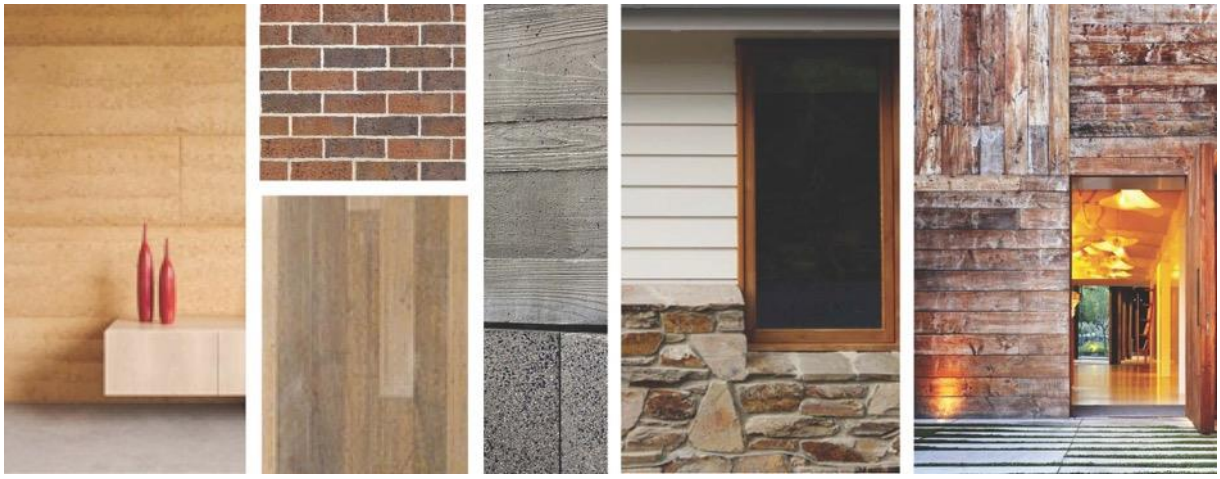

Figure 17. *Finish options.*

5.4 Roofing

Unless they have been recycled from a previous use, concrete and terracotta roof tiles are high in embodied energy, and increase a building's environmental footprint. Roofs may absorb or reflect heat and impact on thermal efficiency, depending on the material. Acceptable roofing materials include lightweight sheet roofing, earth or other media for green roofing, and recycled concrete and terracotta tiles. The use of newly manufactured concrete or terracotta tile is not acceptable.

Objective

- Minimise the use of roofing materials with high embodied energy.

Detailed Requirement

R31 All roofs must be steel sheet, or other materials with low environmental impact, as approved by the DRC.

5.5 Garage doors

Garage doors can have significant impact on the appearance of a home and the streetscape. Panel-lift, tilt-up, sliding and swing panel garage doors are suitable where clad with materials such as stained or oiled timber boards or plywood, or Colorbond steel sheet board panelling.

Garage doors should also be consistent with the material of the home's front façade to blend with its overall appearance, or offer a high quality design response that is integrated with and complementary to the overall dwelling design.

Metal roll-up garage doors will not be accepted if they are visible from a street or public reserve, unless it can be shown their use results in a positive visual outcome consistent with the Mullum Creek architectural style.

Figure 18. *Example of an integrated garage door design.*

5.6 Driveways and paving

Driveway colours and tones that complement the natural palette of the Mullum Mullum valley are encouraged. They should not cause excessive glare or create an obtrusive visual appearance.

Objectives

- To reduce the area of homesites covered by hard, impermeable surfaces.
- To ensure that driveways do not dominate the visual landscape, nor contribute significantly to the heat island effect at Mullum Creek (refer also to **Section 6.5**).
- To minimise the use of materials of high embodied energy.
- To maximise the use of renewable and recycled materials.

The following are suitable driveway and paving materials:

- Modular, recycled, porous and permeable paving systems.
- Coloured and/or exposed aggregate concrete.
- Asphalt.
- Salvaged bricks.
- Loose local aggregate (suited only to flat areas).

Other materials may be approved by the DRC at its discretion.

Figure 19. *Suitable driveway and paving material options.*

5.7 Materials and finishes for a healthy home

The design of a healthy home aims to eliminate harmful chemicals. Toxic off-gassing is a risk unless engineered wood products, bulk insulations, floor coverings, adhesives, sealants and paints are carefully selected. To help with specifying low-toxicity materials and products, refer to the Mullum Creek Timber Products Guide as well as the following tables on the Mullum Creek website:

Table 1. Maximum Formaldehyde Levels for Processed Wood Products.
Table 2. Volatile Organic Compounds (VOC) and Formaldehyde.

Detailed Requirements

R32 ***Bulk insulation must have zero formaldehyde emissions or be third-party GreenTag/GECA certified.***

R33 ***At least 95% of paints (including sealers, oils and stains and pigmented finishes) must be low VOC paint in accordance with the VOC levels identified in Volatile Organic Compound and Formaldehyde tables found on the Mullum Creek website.***

5.8 External colours

Colours in the Mullum Creek landscape are varied. When viewed carefully they are not restricted to muted earth tones, but include also brighter ochres and greens found in the soil and the foliage. Colours selected should blend with or complement the landscape.

Bold colours will generally be accepted only where they are restricted to small areas to provide definition and contrast, except where they contribute to a high-quality architectural outcome as assessed by the DRC.

External materials of lighter colour can help to reflect and emit heat back into space on a hot summer day. Light external colours in low-gloss finish are encouraged when carefully applied so as not to create an imposing overall aesthetic or cause glare.

In general, dark-coloured roofs should be avoided to reduce heat gain. The DRC will approve roof colours that are sensitive to the natural palette of the local environs.

Colour should contribute to an integrated high-quality architectural outcome.

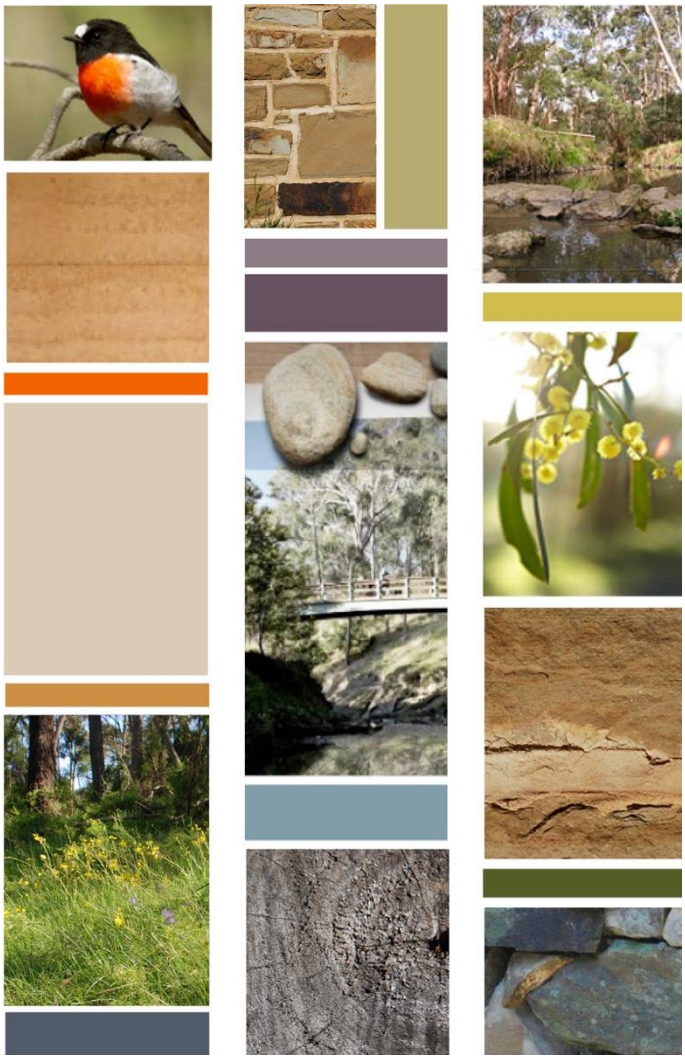

Figure 20. *Colour scheme options.*