



CONCRETE & CEMENT PRODUCTS GUIDE

Explanation and principles

There are many environmental impacts of concrete, arising from the quarrying, processing, transport and manufacture of its components (cement, aggregate and water) and the production of the concrete itself. Cement manufacture in particular is very energy intensive and contributes significantly to concrete's high level of embodied energy or 'carbon footprint'. In fact cement manufacture accounts for a staggering 7% of our planet's total CO₂ emissions.

Minimising the amount of concrete in homes and landscapes at Mullum Creek can help reduce these environmental impacts and greenhouse gas emissions. A further substantial proportion of the embodied energy in a concrete structure lies in the steel reinforcement used, as steel itself has an extremely high carbon footprint. You can reduce the requirement for concrete by avoiding structurally demanding designs, or by using alternative materials with a lower impact, such as sustainably sourced timber.

When concrete must be used, products that include recycled content (e.g. industrial waste by-products as binder, recycled aggregate and water) should be preferred. In particular the inclusion of supplementary cementitious material (SCM) such as fly ash (waste from thermal coal combustion) and slag (waste from steel manufacture) as concrete binders, reduces the need for Portland clinker, which in turn requires extraordinary amounts of fossil fuel based energy to manufacture.

Fly ash, slag and amorphous silica can replace much of the Portland cement used in concrete. Concrete relies on only a (albeit variable) fraction of Portland cement (or alternative chemical compound) to activate these SCMs. In the last few years the use of concrete with SCM binders has become more commonplace because environmentally conscious architects and their clients demand it, and because the energy costs attached to manufacture of Portland clinker have escalated dramatically. With sufficient experience, concrete batchers can add SCM to concrete for all applications. They can substitute Portland cement with SCM in varying proportions depending on the application, workability, curing time and surface finish required. Concrete footing elements such as blinding, bored and backhoe piers, pads and strips lend themselves to high SCM ratios. Most 'environmental' concrete mixes can now be supplied with equivalent strength, and at no or minimal extra cost, to traditional Portland cement based concrete mixes.

Other commonly available waste products, such as coarse aggregate crushed from floaters (usually basalt) excavated and removed from building sites, as well as crushed demolition concrete, can be used to reduce the environmental impact of the coarse aggregate used in concrete for the construction of your home. It is possible to use up to 100% recycled coarse aggregate in concrete.

Portland cement contained in concrete should be Australian made where possible, as the transportation of this heavy material is also a significant contributor to its embodied energy. Unfortunately, a significant proportion of concrete and mortar products prepared locally now use imported Portland clinker.

Where the use of thermally massive concrete contributes to a dwelling's thermal performance, consider using other massive materials and techniques with lower impacts and a lesser carbon footprint, such as recycled brick or earth wall construction.

Fine particulates (dusts) that are released when cutting, grinding or drilling concrete can cause a range of health issues. Exposure to dust should be minimized. Use ventilation/suction to remove dust at the source, and use damp/wet techniques for dust suppression. Appropriate personal protection (e.g. respiratory protection) should be worn.

By stabilising soil with binders to improve the bearing capacity of a building foundation or pavement sub-base (as blinding beneath a strip footing, or as backfill to a retaining wall or posthole), the volume of concrete required and excavated soil needing removal from site can be reduced. More environmentally friendly soil stabilisers include crushed slag, fly ash and bitumen.

The following table lists the different concrete, cement and ancillary products that provide preferred environmental outcomes, and are recommended for use at Mullum Creek.

	Product	Manufacturer / Brand	Nearby Suppliers	Reasons for Recommendation
FILL AND AGGREGATE	Polystyrene waffle pod void formers for slabs on ground.	Foamex Diamond Pods™	Foamex Group 31-33 Gatwick Road Bayswater North, VIC (03 9720 4200)	<ul style="list-style-type: none"> Reduces the amount of concrete required. Provides thermal insulation under slab. 40% recycled content. Check with engineer on suitability for land slope and soil type.
	Interlocking recycled polypropylene dome void form system for slabs on ground.	Cupolex The Structural Dome	Australian Urethane & Styrene 32/9 Ashley Street West Footscray, VIC (03 9687 7500)	<ul style="list-style-type: none"> Manufactured from 100% recycled and recyclable material. Reduces the amount of concrete and gravel/fill required. Stackable for compact transport. Could be adapted to provide active underfloor heat exchange.
	Decorative aggregate manufactured using 100% recycled Australian glass.	Exotic Pebbles & Aggregate Exotic Glass Range	Haddens Garden and Building Supplies 341-343 Darebin Road Thornbury, VIC (03 9497 2740)	<ul style="list-style-type: none"> Used in polished concrete screeds. Reduces waste going to landfill.
	Coarse aggregate from recycled concrete, asphalt and bricks. Crusher dust	Alex Fraser Group Recycled Aggregate	Alex Fraser Group 235 Dohertys Road Laverton North, VIC (136 135)	<ul style="list-style-type: none"> Recycled coarse aggregate for concrete, asphalt and brick. Recycled sub-grade for road construction, hardstand and driveway material to standards CBR15, CBR35, and CBR45.
	Lightweight, high strength clay aggregate.	Clinka ClinkaFILL	Clinka PO Box 156 Neerim South, VIC (0411 588 603)	<p>Whilst imported from Scandinavia, Mullum Creek encourages the use of this product, because it provides good thermal insulation under an on-ground slab and has ISO 14001 Environmental Management System in place for the manufacturing process.</p> <p>We hope that local demand for this product increases to a degree that encourages the establishment of a local manufacturing base.</p>
WET MIX CONCRETE	Concrete that includes supplementary cementitious materials (SCMs) alongside Portland cement as binder.	ACM (Aurora Construction Materials) E-Crete™	ACM 335 Oherns Road Epping, VIC (03 9408 0666)	<ul style="list-style-type: none"> Includes 99% of industrial by-products (e.g. fly-ash, slag) activated by proprietary geopolymer as binder. E-Crete binder has 80% lower embodied greenhouse gas intensity than equivalent Portland cement binder. Concrete has 60% less life cycle greenhouse gas emissions than similar product based on Portland cement only.
		Boral Envirocrete	Boral 20 Varman Court Nunawading, VIC (133 006)	<ul style="list-style-type: none"> Includes industrial by-products (e.g. fly-ash, slag) as binder. Includes some recycled crushed concrete or a blend with natural crushed rock as coarse aggregate, lowering the embodied energy in the product. Facility compliant with ISO 9001 Quality Assurance standard. Remaining portland cement quotient manufactured in Adelaide.
		Holcim Environmental Mix	Bulleen Batching Plant (131 188) (Kevin Petes – 0429 791 412)	<ul style="list-style-type: none"> Includes industrial by-products (e.g. fly-ash, slag) as binder. Includes some recycled crushed concrete or a blend with natural crushed rock as coarse aggregate, lowering the embodied energy in the product.
		Hy-Tec Environmental Concrete	Hy-Tec Concrete 130 Abbotts Road Dandenong South, VIC (03 9799 1366)	<ul style="list-style-type: none"> Includes industrial by-products (e.g. fly-ash, slag) as binder to varying ratios depending on required concrete surface finish and ambient curing temperatures. Use of recycled water. Facility compliant with ISO 9001 Quality Assurance standard. Remaining Portland cement quotient manufactured in Victoria.
		VICMIX Green Star Mixes	VICMIX 161 – 171 Ordish Road Dandenong South, VIC (Joe Pietrosanto – 03 8792 3100)	<ul style="list-style-type: none"> Includes industrial by-products (e.g. fly-ash, slag) as binder. Includes some recycled crushed concrete or a blend with natural crushed rock as coarse aggregate, lowering the embodied energy in the product. Product compliant with MAT4 GreenStar Guidelines VICMIX also will use SCMs in exposed aggregate applications. Vicmix is a wholly Australian company.
		Various other independent concrete suppliers who normally hold Australian Builders™ Ecoblend® cement at their batching plants	Pronto Mixed Concrete 58 New Street Ringwood, VIC	<ul style="list-style-type: none"> Includes 30% industrial by-products (e.g. fly- ash, slag) as supplementary cementitious material (SCM). A substantial portion of the coarse aggregate is crushed from rock removed from excavations on construction sites.

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PRECAST CONCRETE PRODUCTS	Pre-fabricated steel reinforcement grids incorporating also void formers for cast-in-situ concrete floor slabs	BubbleDeck® BubbleDeck concrete floor slab	BubbleDeck G11. 59 Albany Highway Victoria Park, WA (1300 282 535)	<ul style="list-style-type: none"> Incorporates recycled plastic hollow balls through the slab as void formers. Void formers reduce by approx. 35% the amount of concrete in the slab without loss in loadbearing capacity.
	Concrete Bricks & Blocks	Boral FireLight™ bricks	Bairnsdale Brick & Tile 696 Main Street Bairnsdale, VIC (03 5153 0300)	<ul style="list-style-type: none"> Contain 75% industrial by-products (e.g. fly-ash) and 5% recycled concrete aggregate.
		Island Block & Paving Bricks for the Future Pavers for the Future	Melbourne Brick Bayswater Store 443 Mountain Hwy Bayswater, VIC (1300 722 102)	<ul style="list-style-type: none"> Available in a wide range of colours and surface finishes. Up to 40% recycled glass aggregate used. Up to 40% less natural resources used. 10% reduction in cement usage = lower CO₂ emissions. Facility compliant with ISO 9001 Quality Assurance standard. Global Green Tag certification.
	Aerated Autoclaved Concrete Blocks & Panels	CSR Hebel Hebel® Block Hebel® Powerfloor Hebel® Powerpanel	Buildcor Lightweight Systems 297 Diamond Creek Road Greensborough, VIC (03 9434 6744)	<ul style="list-style-type: none"> Meets Environmentally Innovative Products standards (GECA). Manufactured in New South Wales.
	Pressed Cement Sheet	James Hardie Fibre Cement Building Products	James Hardie Distribution Centre Unit 1, 539 Mount Derrimut Road Derrimut, VIC	<ul style="list-style-type: none"> Much like galvanised steel sheet cladding, fibre cement sheet provides a cladding with low embodied energy, because of its high surface coverage per unit volume, excellent durability and low maintenance. Research and development done on James Hardie fibre cement sheet to reduce environmental impact of the product, including an excellent life cycle assessment (LCA) report. Efforts made by James Hardies to recycle water and waste products during the manufacturing process.
BAGGED PRODUCT	Cement	Independent Cement and Lime Pty Ltd Australian Builders™ Ecoblend®	Available from most major retail hardware, building and garden centres.	<ul style="list-style-type: none"> Includes 30% industrial by-products (e.g. fly-ash, slag) as supplementary cementitious material (SCM). Meets Environmentally Innovative Products standards (GECA). 29% less carbon emission than from standard Portland cement. Remaining quotient of Portland cement clinker manufactured and crushed in South Australia.
	Concrete Mix	Independent Cement Pty Ltd Australian Builders™ Concrete Mix		<ul style="list-style-type: none"> Portland cement clinker manufactured and crushed in South Australia.
	Mortar Mix	Independent Cement Pty Ltd Australian Builders™ Mortar Mix		<ul style="list-style-type: none"> Portland cement clinker manufactured and crushed in South Australia.
	Earth Stabiliser	Independent Cement Pty Ltd Australian Builders™ Steel Pave Slag Lime		<ul style="list-style-type: none"> Product contains 85% slag as soil binder.
ROOF TILES	Recycled Concrete Roof Tiles		Coghlan Roofing 570 Canterbury Road Vermont, VIC (03 9873 0963)	<ul style="list-style-type: none"> Recycled, therefore minimal environmental impacts attached to supply.
			Sunshine Roofing Tiles Cnr Ballarat Rd & Hulett St Sunshine, VIC (03 9312 4377)	

Disclaimer

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