

EARTH BUILDING

IN MODERN SUSTAINABLE ARCHITECTURE

5-DAY INTERNATIONAL CONFERENCE

Hands-on workshops, expert speakers and tour

2-6 November 2017

Charles Sturt University, Albury-Wodonga, NSW, Australia

Conference Booklet



Venue: CD Blake Lecture Theatre Complex,
Architect: Marci Webster-Mannison.
Photo: Dirk Spennemann

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www.ebaa.asn.au



Welcome...

...to the Earth Building Association of Australia's first International Conference.

For the first time EBAA has the honour of hosting a conference with many of the world's leading experts on earth building.

The first two days will be hands-on workshops where you can get your hands dirty and learn about many aspects of earth building, including practical and theory. See pages 4-5 for the Workshops Program.

Over the weekend our international speakers will be discussing wide ranging topics including contemporary earth building, design for climate, and thermal modelling. See pages 12-13 for the Speaker Program and pages 14-24 for the list of speakers and their subjects.

On Monday there is a tour of the campus, guided by Marci Webster-Mannison, who is also a speaker and the architect (together with her team) of the rammed earth buildings on campus. There will also be a visit to other local earth buildings.

Tuesday brings the Industry Seminar which will look at the challenges facing earth construction, including thermal performance, codes, standards and training.

The Industry Summit on the final day brings together industry professionals and representatives, politicians, regulators, researchers and academics to work through the important issues facing the industry, and to find resolutions and ways to move forward.

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Day 1: Thursday 2 November - Workshops Program

Note: Remember work clothes or spare clothes and a towel. Hat etc. if hot. Gloves if desired. Boots if you wish to participate in Rammed Earth workshops.

6:30	BREAKFAST (1.5 hrs) - BBQ area - for those staying on campus
8:30	Determining the Characteristics of Earth Materials (1.5 hrs). <i>Verena Maeder, Solid Earth; Peter Hickson, Earth Building Solutions</i>
10:00	MORNING TEA (30 mins)
	<i>These workshops highlighted in blue are continuous for two days</i>
10:30	Building an Earth Heat-retention Oven <i>Bob Cameron, Rockcote</i>
10:30	A Creative Play with Cob and Wattle & Daub <i>Ray Trappel, Ray and Lynne Trappel Architects</i>
10:30	Light Earth (clay/straw) Construction <i>Vasko Drogriski, Building Designer</i>
10:30	Earthen Natural Finishes <i>Tony Thorogood, Rockcote</i>
10:30	Healthy and sustainable alternatives to standard varnishes and paints <i>Angela Petruzzi, Livos Australia</i>
10:30	Making Mudbricks - including varying density for cold climates (2.0 hrs) <i>Peter Hickson, Earth Building Solutions; Verena Maeder, Solid Earth</i>
12:30	LUNCH (1.0 hr)
1:30	Mudbrick Wall Construction – dampcourse to top plate (3.5 hrs) <i>Peter Hickson, Earth Building Solutions; Verena Maeder, Solid Earth</i>
1:30	Stabilised Rammed Earth Construction - Part One (1.5 hrs) <i>Tony Wright, Rammed Earth Australia</i>
3:00	AFTERNOON TEA (30 mins)
3:30	Stabilised Rammed Earth Construction - Part Two (2.0 hrs) <i>Tony Wright, Rammed Earth Australia</i>
5:30	Clean up - Please hose down well before going for a shower
6:30	DRINKS - BBQ Area - a complementary drink and then drinks by donation
7:00	DINNER - BBQ area - healthy, yummy fresh cooked meals from earth oven (vegetarian options). Please book in advance. \$20/head
8:30	Evening Session (1.0 hr): Natural healthy paints and finishes - <i>Angela Petruzzi, Livos Australia</i> , (20 mins) 5x5 Program: <i>Workshop participants are welcome to introduce your project 5 slides in 5 minutes</i> <i>Please contact Peter to discuss inclusion - TBA</i>

Day 2: Friday 3 November - Workshops Program

6:30	BREAKFAST (1.5 hrs) - BBQ area - for those staying on campus
8:30	Testing Finished Earth Building Products (1.5 hrs) <i>Verena Maeder, Solid Earth; Peter Hickson, EB Solutions</i>
10:00	MORNING TEA (30 mins)
	<i>These workshops highlighted in blue are continuous for two days</i>
10:30	Building an Earth Heat-retention Oven <i>Bob Cameron, Rockcote</i>
10:30	A Creative Play with Cob and Wattle & Daub <i>Ray Trappel, Ray and Lynne Trappel Architects</i>
10:30	Light Earth (clay/straw) Construction <i>Vasko Drogriski, Building Designer</i>
10:30	Earthen Natural Finishes <i>Tony Thorogood, Rockcote</i>
10:30	Healthy and sustainable alternatives to standard varnishes and paints <i>Angela Petruzzi, Livos Australia</i>
10:30	Mudbrick Wall Construction – dampcourse to top plate cont. (2.0 hrs) <i>Peter Hickson, Earth Building Solutions; Verena Maeder, Solid Earth</i>
12:30	LUNCH (1.0 hr)
1:30	Earth Wall Finishes – earthen plasters and natural paints (2.0 hrs) <i>Verena Maeder, Solid Earth</i>
1:30	Commercial Cob – mechanical mixing and formwork (2.0 hrs) <i>Peter Hickson, Earth Building Solutions</i>
1:30	Traditional Rammed Earth Construction - Part One (1.5 hrs) <i>Jomo Zeil, Lehm Ton Erde</i>
3:00	AFTERNOON TEA (30 mins)
3:30	Traditional Rammed Earth Construction - Part Two (2.0 hrs) <i>Jomo Zeil, Lehm Ton Erde</i>
5:30	Clean up - Please hose down well before going for a shower
6:30	DRINKS - BBQ area - a complementary drink and then drinks by donation
7:30	DINNER - BBQ area - healthy, yummy fresh cooked meals from earth oven (vegetarian options). Please book in advance. \$20/head
8:30	Evening Session (1.0 hr): Prefabrication of Rammed Earth Walls and Fireplaces <i>Jomo Zeil, Lehm Ton Erde, Austria</i>

Workshop Descriptions and Presenter Bios

Jomo Zeil: MA Arch. BSc. Project Architect Lehm Ton Erde, Baukunst Ltd, Austria

Jomo is an architect with the world's leading firm of unstabilised rammed earth contractors, Lehm Ton Erde (Loam - Clay – Earth) of Austria headed by Martin Rauch. Loam stands for handcraft and technology, Clay for artistic design, Earth for the sustainability of earth construction. Lehm Ton Erde has built major rammed earth constructions in many countries and on several continents over 25 years. They are the undisputed world leaders in prefabricated, factory-made elements made of unstabilised rammed earth. Martin has written several books on his work and many publications reference his outstanding, innovative and often multi storey unstabilised rammed earth work.

Email: j.zeil@lehmtonerde.at

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Traditional Rammed Earth Construction

Martin Rauch, Lehm Ton Erde in Austria is leading the world in prefabricated rammed earth panels and masonry stoves using raw unstabilised rammed earth material. This is done within a factory using robotic equipment to fill and ram. Panels cut from a huge run of wall are pre-dried and shipped to site where they are relocated as cut and joined seamlessly. We can't bring to factory to you. However, in the UK, Australian developed systems are being using with traditional rammed earth mixes, with clay as binder. In this workshop Jomo Zeil, Lehm Ton Erde will use the same Australian system and equipment as used the first day to build SRE walls to build RE walls without cement. Jomo will assess the earth material we have given him, hopefully he will be pleased and he will mix and ram some beautiful unstabilised rammed earth walls.



Prefab rammed earth

Vasko Drogriski: Building Designer

Vasko Drogriski is a building designer with 25 years of experience. He focuses on ways to incorporate landscape, food growing and the owner building process into homes as key components of sustainable living. Vasko is building low density clay/straw or light earth homes in the Daylesford area of Victoria. He developed a system with James Henderson and is currently on his 5th build using this system and is happy to share what he has learned. Vasko believes earth and straw combine beautifully in the rural setting, where both are sourced locally. Together they have the lowest embodied energy impact, operational energy is minimised with enhanced thermal performance suited to cold climates.

Email: vaskod@icloud.com



Light Earth Construction (Clay/straw) - Two days

Vasco will be showing people how to mix clay/straw and mould it within a section of typical structural frame and will discuss the advantages he sees working with his system. He may be able to demonstrate a little wall finishing. Mixing and applying the straw/earth mixture is non-toxic, not caustic and safe to use without protective gear and with very simple hand tools and the waste scraps from the building process are returned into the garden. So no need to bring anything but some older gear or work clothes and be prepared to get a little dirty.





Peter Hickson: *Earth Building Solutions*

Peter Hickson is a master builder and one of Australia's leading proponents of earth building. He has been actively engaged in earth building for 35 years, in design and construction as well as in writing, education, research, promotion, leadership, community development and aid work. Peter has developed construction systems and commercial mud brick making equipment. He was a foundation member of the Earth Building Association of Australia (EBAA), serving on the committee since 2000 and as president for seven years. Currently he is vice president. Peter's business, Earth Building Solutions, offers services such as building, training and consultancy.

Emails: peterhickson7@gmail.com.au
mail@earthbuildingsolutions.com.au



Commercial Cob: *mechanical mixing and formwork*

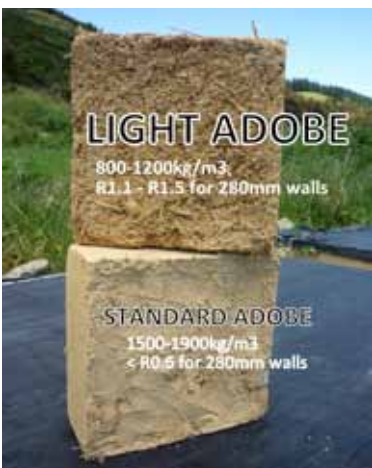
The Cob revival is all about hands-on creative small organically sculpted homes. In the UK the tradition was about a rural community helping each other into shelter with what lay at their feet and by-products from the fields and using their daily tools - pitch forks and spades. Today labour is expensive and machinery is available to do the work. This workshop will discuss and demonstrate ways of reducing labour and time through mechanical mixing and use of formwork so cob becomes just as sustainable though commercially viable or simply easier for self-builders. We will look at pretty basic affordable formwork, preparation of cob and then filling and stripping forms immediately.



Verena Maeder: *Director, Solid Earth Adobe Buildings Ltd NZ*

Verena Maeder is an earth building artisan with 27 years of experience in the construction of earth buildings in Switzerland, Germany and New Zealand. Since 2002 she has been running her own company SolidEarth Ltd, specializing in the construction of adobe buildings, earthen plasters, restoration of historic earth buildings and R&D of load-bearing lightweight adobe bricks for improved thermal performance. Verena has trained in Architecture and Building Biology and Ecology in Switzerland and was the chairwoman of the Earthbuilding Association NZ from 2007-2014. She is part of the sub-committee in charge of the revision of the NZ Earthbuilding Standards and has recently received the "Tradeswoman of the Year" award by the National Association of Women in Construction NZ.

Email: contact@solidearth.co.nz
 Websites: www.solidearth.co.nz
www.earthbuildingschool.com



Earth Wall Finishes - *earthen plasters and natural paints*

In this workshop we will delve into practical aspects and the creative potential of using earthen materials for wall finishing. Participants will get to prepare and mix natural renders and washes that can be applied over a range of substrates, such as earthen walls, straw bales, concrete block, plaster board, fibre cement board and even recycled carpet! This session will cover all relevant steps from plaster prep to naturally sealed finish coat.

Bob Cameron: Rockcote

Bob Cameron is the co-owner and founder of ROCKCOTE. He is often described as part entrepreneur, part mad scientist and part eco warrior. His unique philosophy of employing and promoting sustainable business practices and basing product innovation and manufacturing on natural living systems (or biomimicry) has seen ROCKCOTE grow from strength to strength.

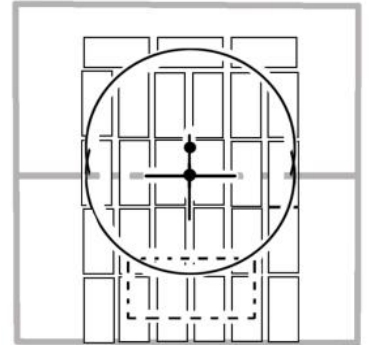
Email: bob@rockcote.com.au

Website: www.rockcote.com.au



Building an Earth Heat-retention Oven

Construction of a heat retention earth oven using various earth building techniques. This is a great example of a complete project. Join this hands-on workshop to learn more about the history of cob ovens and how to build a ROCKCOTE traditional cob heat retention oven. We will be building an oven using a ROCKCOTE Traditional Wood Fired Oven kit over two days. These traditional ovens can be used to cook a variety of foods including pizzas, meat, fish, bread and vegetables.



Tony Thorogood: Rockcote

Tony Thorogood is ROCKCOTE's natural materials specialist and a passionate advocate for creating spaces that nurture human health and tread gently on the earth. Tony runs ROCKCOTE's artisan program and regularly instructs building professionals in the use of ROCKCOTE Natural Materials.

Email: tthorogood@rockcote.com.au

Websites: www.rockcote.com.au
www.thenaturalartisan.com



Earthen Natural Finishes

Hands-on with ROCKCOTE Natural Materials. The team will be on hand to talk about and demonstrate Otsumigaki, ROCKCOTE's Japanese inspired lime and clay plaster; and Clay Plaster Décor, a beautiful, fine finishing clay plaster. Participants will find out how these natural finishes can be used to enhance the interior of earth buildings. create their own sample boards to keep.



Ray Trappel: Ray and Lynne Trappel Architects

Ray has been involved in earth building for over forty-five years and is an active member of the Earth Building Association of Australia.

He has devoted his time to many community projects – his most recent, The New Secret Garden at Western Sydney University, Hawkesbury.

Emails: raytrappel@iinet.net.au
raytrappel@gmail.com



Creative Play with Cob; and using Wattle & Daub

This workshop describes itself. In the construction of a small and simple structure of bamboo and mud you will be introduced to working hands on with earth building where the emphasis is on fun and creativity. We will build a structure of woven bamboo, then mix mud and straw by foot and apply cob to the base and a daubing mixture higher up creating a fun structure that could be a cubby or a chicken coup. A great practical way for anyone of any age to get creative and learn to love earth building. Be prepared to get dirty and discover your own creativity and skill.





Tony Wright: Rammed Earth Australia

Rammed Earth Australia Pty Ltd use Flexi-form formwork on all its builds allowing almost unlimited design capabilities. Flexi-form formwork is made from quality materials and manufactured in our own engineering department.

Emails: info@rammedearthaustralia.com.au
rivrammed@hotmail.com



Stabilised Rammed Earth Construction

In this workshop you will be introduced to the system and equipment developed and honed in Australia since the late 1970's. We are producing more new modern Rammed Earth buildings from residential to commercial than anywhere else on earth. The system creates beautiful earth walls straight off-form without need for render, plaster or paint, free of maintenance. Walls are formed into cement stabilised interlocking though distinct articulated panels with services built in. The workshop is broken into two parts. We will be constructing a corner section of SRE 300 thick. The first part goes through the equipment and machinery involved, how the system works and looks at material. The formwork will be set up. The second part involves mixing materials with the bobcat, placing it into formwork and the ramming process. The formwork can be stripped almost immediately.



Stephen Dobson built his first rammed earth house in Darwin in 1976 and since then has built over 750 rammed earth structures ranging from simple entry statements to public buildings, including the St Thomas Moore Cathedral in Margaret River, built in 1981, then the biggest modern rammed earth building in Australia. The bobcat method of batching, mixing and delivering rammed earth, the formwork system that is the basis of all rammed earth construction in Australia were developed under his direction.

Stephen will give commentary and answer any questions on any aspects of rammed earth during the workshops.



Angela Petruzzi: Livos

Angela has authored several articles regarding healthier options in the construction of healthy homes [Owner Builder; Wellbeing Natural Home]; she has delivered many talks and "hands on sessions" to architects, industry bodies and other groups from her perspective on health issues caused by many synthetic products – all based on her extensive working experience in the coatings industry in Switzerland. Angela's passion is to educate about hidden health risks associated with many commonly used synthetic coatings – paints and stains.

She recently assumed distribution of the Australia's premier ecofriendly range of products – Livos – natural products based on sustainable renewable materials where 100% of the ingredients are disclosed to the user.

Phone: (03) 9762 9181

Email: inf@livos.com.au

Website: www.livos.com.au



Conference display

Livos is available throughout the Conference workshops to answer any questions regarding safe, environmentally friendly interior/exterior applications for timber, concrete floors and furniture.

Joint Workshop Presentations

Peter Hickson: Earth Building Solutions

Verena Maeder: Director, Solid Earth Adobe Buildings Ltd NZ

Determining the Characteristics of Earth Materials

This workshop lays the foundation for working with earth materials: We will cover simple identification tests to determine the different constituents clay, silt, sand, gravel (particle size), cohesion, shrinkage and hardness, as well as discussing the intrinsic properties of earth materials, how water content affects these properties (texture, plasticity, cohesion, compressibility and reversibility) and the suitability of earth materials for various earth building techniques.



Making Mudbricks – including varying density for cold climates

In this workshop participants will get a practical introduction to making mud bricks of different densities. We will discuss admixtures with various natural fibers and additives to optimise performance, as well as strategies for mixing and work set-ups. Come prepared to get a bit muddy!





Testing Finished Earth Building Products

This co-facilitated workshop will cover the most important requirements of earth building products such as bricks and mixes for monolithic walls, with a focus on strength, durability, shrinkage and energy efficiency. A discussion of the testing requirements set out by the NZ Earth Building Standards will cover earthquakes and present simple test set-ups that give accurate results. Different options for the modification of earth building products to improve their performance will also be covered as an introduction to the follow-up seminar on Tuesday.

Mudbrick Wall Construction – dampcourse to top-plate

In this workshop participants will learn the basic design and construction of mud brick walls. You will be guided through the process of mixing mortar and then building a small load bearing wall with returns using mudbricks. The structure will include a wall box for electrical installations, a window with arch or lintel, as well as hold down bolts and top plate. Building site organization, subwall requirements, damp course, profiles and possible vertical and horizontal reinforcing of the earth wall (seismic design) will also be presented and discussed. Come prepared to get a bit muddy.



Day 3: Saturday 4 November - THE SPEAKER PROGRAM

6:30	BREAKFAST (1.5 hrs)	BBQ area - for those staying on campus
8:00	REGISTRATION	
9:00		WELCOME
9:25	Early Morning Session:	RAMMED EARTH at the Albury-Wodonga Campus
9:30	Marci Webster-Mannison	Cool Earth: a decade of rammed earth architecture
10:05	Rick Lindsay	Tale of a Rammed Earth Campus
10:30	Dirk Spennemann	Patterns of environmental decay affecting historic and modern pisé walls
10:50		QUESTIONS
11:05	MORNING TEA (30 mins)	Gums Cafe
11:35	Late Morning Session:	CONTEMPORARY EARTH CONSTRUCTION
11:40	Luigi Rosselli	Ramming the Earth Fantastic : How Architecture Can Enhance the Popular Success of a Building Material
12:15	Phil Harris	Earth Calling
12:45		QUESTIONS
12:55	LUNCH (1.0 hr)	Gums Cafe
1:55	Early Afternoon Session:	MATERIALS DEVELOPMENT & INNOVATION
2:00	Jomo Zeil	Prefabricated and climate-adaptive rammed earth construction
2:35	Pete Walker	Innovations in clay and other natural building materials
3:00	Nancy Happe	An International Economist Looks at Modern Rammed Earth Around the World
3:20		QUESTIONS
3:30	AFTERNOON TEA (30 mins)	Gums Cafe
4:00	Late Afternoon Session:	CONTEMPORARY EARTH CONSTRUCTION
4:05	Verena Maeder	Lightweight Adobe - Unstabilized, load-bearing adobe bricks for improved thermal performance
4:40	Graeme North	Earth Building Design for Wet Windy Temperate Climates
5:10		QUESTIONS
5:30		CLOSE
6:30	DRINKS	Gums Cafe - Bar open to buy your own drinks
7:00	EBAA GALA DINNER	Gums Cafe - \$60/head, Bookings and special dietary requests essential. Complimentary bottle of wine for each table of 6 people
8:30	LIVE ENTERTAINMENT	

Day 4: Sunday 5 November - THE SPEAKER PROGRAM

6:30	BREAKFAST (1.5 hrs)	BBQ area - for those staying on campus (1.5 hrs)
9:00	Early Morning Session:	CLIMATE APPROPRIATE DESIGN & THERMAL PERFORMANCE
9:20	Sue Roaf	Thermal Landscaping of Mud Brick Buildings: Creating Comfort in all Seasons
9:55	Dr Daniela Ciancio	Measured and simulated thermal comfort in rammed earth houses
10:15	Maria Kordjamshidi	Free running buildings and the challenges in the current building's performance evaluation systems
10:45		QUESTIONS
11:00	MORNING TEA (30 mins)	Gums Cafe
11:30	Late Morning Session:	CONTEMPORARY RELEVANCE OF VERNACULAR EARTH ARCHITECTURE
11:35	Paul Jaquin	Thermal design of historic earth buildings
12:10	Iman Khajehrezaei/ Mehrnaz Malek	Badgirs in contemporary earthen architecture
12:40		QUESTIONS
12:50	LUNCH (1.0 hr)	Gums Cafe
1:50	Early Afternoon Session:	BUILDING STANDARDS & CODES
1:55	Thierry Joffroy	Current efforts for the elaboration of norms and standards in the French context
2:30	Michael Brady	Pathways for demonstrating NCC compliance for natural building materials
3:00		QUESTIONS
3:10	AFTERNOON TEA (30 mins)	Gums Cafe
3:40	Late Afternoon Session:	MATERIALS DEVELOPMENT & INNOVATION
3:45	Jean-Marie Le Tiec	Recent history of earthen architecture in France: 40 years of revival
4:20	Pete Walker	Use of clay materials to improve indoor environmental quality
4:40		QUESTIONS
5:00		CLOSE (Thanks/Housekeeping)
6:30	DRINKS	BBQ Area - complimentary drink and drinks by donation
7:00	DINNER	BBQ area - healthy, yummy fresh cooked meals from earth oven (vegetarian options). Please book in advance. \$20/head
9:00	Evening Session (1.0 hr)	Bob Cameron, Rockcote - <i>Earth-based Building Products range available and training</i> (30 mins) Susan George, Architect who spent time at Auroville India, <i>Vaults and Dome</i> (20 mins)

SPEAKERS - Topics, Abstracts and Bios

Saturday Early Morning Session: RAMMED EARTH at the Albury-Wodonga Campus

Marci Webster-Mannison: (PhD, BArch, BDes Studies), Senior Design Architect, Melbourne Design Studios

Marci is known for state of the art ecologically inspired projects, and as a practicing architect, speaker and writer. Over a 10 year period Marci and her team designed the rammed earth Albury-Wodonga campus of Charles Sturt University, a story told in her recently published chapter "Thurgoona Campus: a living laboratory of healthy and sustainable materials" in *Materials for a Healthy, Ecological and Sustainable Built Environment: principles for evaluation*, (edited by Petrovic, Zari & Vale). Marci's design work is exemplified by creative responses to a local context and has gained over twenty state, national and international awards.

Email: marci@melbournedesignstudios.com.au, marciwebman@gmail.com
Website: www.MelbourneDesignStudios.com.au

Cool Earth: a decade of rammed earth architecture

Marci will take you on a ramble through the Albury-Wodonga campus. The buildings, articulated in rammed earth and recycled and non-toxic materials, are designed for solar access, daylight and solar energy, earth thermal exchange, night cooling and natural ventilation to suit the desert climate. The integrated rainwater tanks, the meandering constructed creeks and wetlands and over forty composting toilets respond to the criticality of water in this dry arid region. The 'living museum' of endemic planting along the waterways and the formation of vistas to the few stands of remnant trees reinforce the site's biodiversity and ecosystems.

Rick Lindsay: Managing Director, Earth Structures Pty Ltd

Earth Structures is an international group of small businesses specialising in rammed earth construction founded by Rick in 1992. Since that time they have built rammed earth walls for over 1280 buildings and including large public buildings such the, Charles Sturt University at Albury, NSW Juvenile Justice Detention Centre at Dubbo, NSW and the Science & Resource Centre at Lauriston Girls School, Melbourne, The RACV Torquay resort, as well as many rural and urban houses. The Earth Structures Group are at the forefront of rammed earth construction internationally because they are passionate about what they do – and how they do it. As founder of the Earth Structures brand, Rick is involved in developing new members, technologies, and helping run larger projects that are a conglomerate of smaller companies.

Email: rick.earthstructures@gmail.com
Website: <http://earthstructures.com.au/>

Tale of a Rammed Earth Campus

As the rammed earth contractor who informed the construction of the Albury-Wodonga Campus of Charles Sturt University, Rick will comprehensively discuss design and construction issues, materials and construction techniques. The environmental performance of the rammed earth walls includes low emission construction, no need for paint or other toxic finishes and outstanding thermal performance resulting in substantial energy savings



CD Blake Lecture
Theatre Complex



School of Environmental
and Information Sciences

over the life of the building. Rick will critique sustainable architecture from a subbies point of view - how a proper architect-subcontractor relationship can bring about seriously sustainable outcomes, or not. Particular reference will be made to the Dubai 2020 Sustainability Expo pavilion by Grimshaw.



Dirk HR Spennemann: (PhD APF MICOMOS), Associate Professor in Cultural Heritage Management, Charles Sturt University.

Dirk HR Spennemann is an Associate Professor in Cultural Heritage Management at Charles Sturt University. One of his research foci is the management of vernacular earth architecture in Australia and beyond. Dirk was instrumental in obtaining the Local Heritage listing of the rammed earth School of Environmental and Information Sciences at the Albury-Wodonga campus. Heritage futures is another key research foci including contemporary and emerging technological heritage and the threats to heritage posed by natural and human hazards. In addition, Dirk is a photographic artist, who interprets heritage issues through visual media in exhibitions in Art Galleries and Museums.

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Website: <http://csusap.csu.edu.au/~dspennem>



CD Blake Lecture
Theatre Complex

Patterns of environmental decay affecting historic and modern pisé walls

Rammed earth (pisé) buildings have a long history in Australia. Setting aside the impact of natural disasters, pisé structures exhibit great longevity as long as the roof is water tight, and the bottom of the walling is protected from splash effects. This paper will review the nature of environmental decay as it affects both historic (nineteenth century) and modern pisé walls. The paper will show that modern walls made up from a cement/earth mix are not immune from moisture induced decay.

Late Morning Session: CONTEMPORARY EARTH CONSTRUCTION in Australia



Phil Harris, Director, Troppo Architects

Troppo with practices in Darwin, Byron Bay, Sydney, Adelaide and Fremantle, has built a reputation on the back of buildings that are dynamic in form, robust, environmentally sustainable and sympathetic to their often harsh, tropical or outback environments. Amongst many international and national awards, Troppo received a distinction at Terra 2016, the first international earth architecture awards, for 3 rammed earth dwellings on SA's Kangaroo Island.

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Website: <http://www.troppo.com.au/>

Earth Calling

In Aboriginal Australia, to walk, to 'sit down' means engagement with Mother Earth: Earth speaks to us. To build with her, to use her in crafting shelter, puts shelter back into the triumvirate of basic human needs: food, sex and shelter. Earth is a natural resource, available to us all, potentially without cost. ...Yet, earth building remains a minor player in the Australian construction sector and building regulations seem increasingly to militate against its ready use. This paper begins with the pragmatics, character and meaningfulness of earth building systems. Then considers the increasing industry hurdles to their wider adoption and proposes methods to overcome those hurdles.



Kakadu National Park Visitor
Information Centre

Luigi Rosselli: Principal, Luigi Rosselli Architects

Architect, Luigi Rosselli's practice has been awarded numerous local, national and international prizes for architecture. Rammed earth is a material that embodies Rosselli's humanist design philosophy and "connects a building to the land it inhabits like no other". Rammed earth was the natural choice for the design of musterers' quarters in remote far north Western Australia completed in 2014. The thermal dynamics of the massive rammed earth walls mitigate the extremes of temperature in the harsh desert environment. The Great Wall of WA has been highly recognized with awards including the, ArchDaily Building of the Year 2016, Architizer A+ Award, and the UNESCO TERRA Award for earthen architecture.

Email: info@luigirosselli.com Website: <http://luigirosselli.com>



(Photo: Alana Landsberry)

Ramming the Earth Fantastic - How Architecture Can Enhance the Popular Success of a Building Material

Using a number of built and proposed projects as case studies, including several from his own practice, experienced rammed earth Architect, Luigi Rosselli will discuss how Architecture can enhance the popularity of earthen building materials. Avoiding discussion of the obvious environmental and ecological advantages of employing rammed earth as a construction material, Rosselli will instead focus on other Architectural considerations for its use, including: what makes a material successful, how Architectural role models can enhance the appeal of materials, the aesthetic and ethical qualities of rammed earth, the physical comfort the material provides and its psychological benefits, the obstacles to its widespread use and what the future holds for earthen Architecture.



Great Wall of WA
(Photo: Edward Birch)

Early Afternoon Session: MATERIALS DEVELOPMENT & INNOVATION

Jomo Zeil: MA Arch. BSc. Project Architect, Lehm Ton Erde Baukunst Ltd., Austria

Jomo is an architect with the world's leading firm of unstabilised rammed earth contractors, Lehm Ton Erde (Loam - Clay - Earth) of Austria headed by Martin Rauch. Loam stands for handcraft and technology, Clay for artistic design, Earth for the sustainability of earth construction. Lehm Ton Erde has built major rammed earth constructions in many countries and on several continents over 25 years. They are the undisputed world leaders in prefabricated, factory-made elements made of unstabilised rammed earth. Martin has written several books on his work and many publications reference his outstanding, innovative and often multi storey unstabilised rammed earth work.

Email: j.zeil@lehmtonerde.at Website: www.lehmtonerde.at



Prefabricated and climate-adaptive rammed earth construction

Rammed earth construction is a thousand year old building technique. This building technique has endured this time – for the most part – without using cement as a supplement to stabilise its material compounds. However to ensure a high quality, even in larger construction and with more quality expectations from all sides – Martin Rauch and our company Lehm Ton Erde have begun to mechanise and automate larger parts of the production process involved in prefabricated earthen construction. Today we produce a large range of prefabricated products – never stabilized and thus retaining all the optimum properties found in building with earth.



Prefab rammed earth



Pete Walker: (FIStructE, MICE, MIEAust), Director BRE Centre for Innovative Construction Materials

Pete is a chartered civil engineer. Pete studied in the UK at Sheffield City Polytechnic (BSc Civil Engineering) and the University of Edinburgh (PhD Structural Engineering). Having previously worked in Zimbabwe (University of Zimbabwe) and Australia (University of New England (1994-1997)), Pete joined the University of Bath in 1998. He was promoted to Professor in 2006 on becoming Director of the newly formed BRE Centre for Innovative Construction Materials. His current research interests include bio-based construction materials, materials for improved indoor air quality, and earthen construction.

Email: p.walker@bath.ac.uk

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Environmental chamber test

Innovations in clay and other natural building materials

The paper presents summary of research and development work undertaken at the University of Bath over the past 10 years in natural building materials and technologies, focussing on earthen construction. This work has included studies on durability of rammed earth, structural properties of rammed earth, development extruded unfired clay bricks, novel mortars for unfired clay masonry, and innovative clay plasters for improved indoor air quality. Greater use of prefabricated approaches to construction has been a consistent theme across different approaches. As well as presenting results from research projects the presentation draws upon experience from a variety of award winning building projects.



Nancy Happe: (PhD), Economist-Architect, USA.

After receiving a doctorate in economics from Princeton University, Nancy had a career at the International Monetary Fund (IMF) in Washington, DC, including as a Division Chief in the Policy Department where she worked on issues affecting low-income countries, and as Resident Representative to Indonesia. After the IMF, Nancy enrolled at the Graduate Architecture School at the University of New Mexico. There she developed an interest in rammed earth building and traveled around the world, talking with builders, businesses, individual homebuilders, and academics, seeking to understand why such a beautiful and environmentally friendly building material isn't used more widely.

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Rammed earth house and wine cellar of Ren Wei Zehong, Anji, China

An International Economist Looks at Modern Rammed Earth Around the World

Modern rammed earth (RE) structures are environmentally efficient, low maintenance, sound proof, fire proof, pest proof, bullet proof, and stunningly beautiful. Why isn't this building form used more widely around the world? The author searched for answers through conversations with earth builders around the globe. The results show that the RE building industry has done relatively better in Australia than in other parts of the world. What are the economics behind this? What factors have affected demand? supply? What do recent developments in precast/prefabricated RE imply for future market growth?

Verena Maeder: Director, Solid Earth Adobe Buildings Ltd, New Zealand

Verena Maeder is an earth building artisan with 27 years of experience in the construction of earth buildings in Switzerland, Germany and New Zealand. Since 2002 she has been running her own company SolidEarth Ltd, specializing in the construction of adobe buildings, earthen plasters, restoration of historic earth buildings and R&D of load-bearing lightweight adobe bricks for improved thermal performance.

Verena has trained in Architecture and Building Biology and Ecology in Switzerland and was the chairwoman of the Earthbuilding Association NZ from 2007-2014. She is part of the sub-committee in charge of the revision of the NZ Earthbuilding Standards and has recently received the "Tradeswoman of the Year" award by the National Association of Women in Construction NZ.

Email: contact@solidearth.co.nz

Websites: www.solidearth.co.nz www.earthbuildingschool.com

Lightweight Adobe - Unstabilized, load-bearing adobe bricks for improved thermal performance

Traditional Adobe walls don't work well thermally in cooler climates, especially if there isn't optimal solar gain. In a desire to improve the thermal performance but maintain the simplicity of the Adobe technique, unstabilized lightweight bricks have been developed that are fully load-bearing. This sets them apart from the Light Earth Method. These new generation Light Adobe bricks have undergone extensive testing in New Zealand, both for strength and durability, and their use is in the process of being written into the NZ Earthbuilding Standards. The presentation shares the whole journey and hopes to inspire designers, engineers, manufacturers and builders alike.

Graeme North: Registered Architect, New Zealand

Graeme is a New Zealand architect who has been pivotally involved with the earth and natural building renaissance for over 45 years. Graeme has received various awards and commendations, and chairs EBANZ and the SNZ Committee for Earth Building Standards. He uses a wide range of natural building materials, including earthen walls of virtually all types, earthen floors and plasters, lime plasters, natural timber, and natural fibres such as strawbale, and has designed hundreds of houses that incorporate earthen materials. Now he is helping set up the Yes! In My Front Yard Trust (www.yimfy.org.nz) to foster wider use of appropriate building technology.

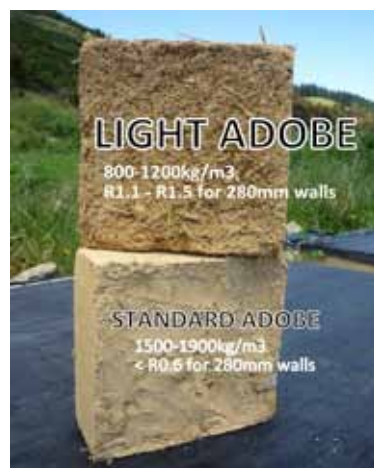
Email: graeme@ecodesign.co.nz Website: www.ecodesign.co.nz

Earth Building Design for Wet Windy Temperate Climates

Wet, cool, humid climates, especially those with wind driven rain, provide many challenges for good earth building design. This talk draws on over 45 years experience in NZ to cover climate and moisture related issues, including durability of earthen materials, humidity control, adverse weathering effects, resilient weather resistant design, and detailing of openings and penetrations. Standards New Zealand is currently revising the 1998 NZ Earth Building Standards to include provisions for lower density earthen materials, with revised measures to improve thermal, climatic, and structural performance.



(Photo: Catherine Wanek)



Owner built earth house



Susan Roaf: Emeritus Professor at Heriot Watt University, Edinburgh and MD of Ecohouse Initiative Ltd.

Sue is an award winning author, architect, solar energy pioneer and was an Oxford City Councillor for seven years. Her research covers windcatchers and nomadic architecture in Iran, Mesopotamian archaeology, photovoltaics, low carbon, resilient and sustainable design, materials and thermal comfort. Sue's Oxford Ecohouse, resulted in the best-selling book *Ecohouse: A Design Guide*. Her other books include *Adapting Buildings and Cities for Climate Change*, and *Benchmarks for Sustainable Buildings* and she is working on *How to design Comfortable Building*. She worked with the Scottish Government on Climate Adaptation. Recent awards include 2013 Top 6 - UK 'First Women' Awards as a 'Visionary' in the Built Environment.

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Historic mud brick house, Iran

Thermal Landscaping of Mud Brick Buildings: Creating Comfort in all Seasons

Global Climates are producing increasingly extreme weather. This paper outlines how and why mud brick buildings can enhance comfort in different climates, and how to ensure that the use of high mass mud construction does not cause thermal problems over a day or year. A new design approach is proposed involving the design of carefully landscaped indoor micro-climates that take account of seasonal and extreme weather. Modern buildings are often poorly designed for climate with dire impacts including extreme overheating indoors and very high heating and cooling bills. Well targeted use of mud brick in buildings can alleviate these problems.



Daniela Ciancio: (MCEng PhD Catania), Senior Lecturer, School of Civil, Environmental and Mining Engineering, The University of Western Australia

Daniela's PhD partially developed at the Polytechnic University of Catalonia (Barcelona, Spain), examines the use of zero-thickness interface elements for the simulation of cracks in quasi-brittle materials. Over the last 8 years at UWA, she has investigated the material and structural behaviour of rammed earth by using analytical and experimental approaches. She has won two prestigious grants from the Australian Research Council to support her research in this field. She has recently focused her research in the thermal performance of rammed earth buildings. She also investigates fibre-reinforced shotcrete with particular emphasis to the use on this material in mining engineering applications.

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<http://www.web.uwa.edu.au/person/daniela.ciancio>

All UWA team members are currently overseas and Stephen, an early stage contributor to the project, will discuss their work and present some of their results.

Stephen Dobson, a founding member of EBAA, graduated in engineering from the University of Western Australia, built his first rammed earth home in Darwin in 1976 and formed Australia's first rammed earth building company in 1979. In 2007 his company joined with Daniela Ciano at the University of Western Australia to help establish a rammed earth research group which has monitored two rammed earth homes in Kalgoorlie as part of a government funded research project.

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University of Western Australia Thermal Project at Kalgoorlie WA: the performance of dual rammed earth homes

This paper examines thermal comfort in rammed-earth houses built in the hot-arid climate of Kalgoorlie-Boulder, Western Australia. One comprised traditional solid rammed earth walls, the other walls with an insulating polystyrene core. Each room was assessed in terms of thermal stability, thermal lag and comfort. Occupants were also surveyed monthly. Results showed that the houses performed nearly identically. Both were comfortable in summer and occupants were happy with minimal use of space heaters in winter. Simulated results did not match these findings: BERS Pro considered the houses to be too cold in winter, greatly increasing heating energy demand.



Thermal monitoring
- Kalgoorlie WA

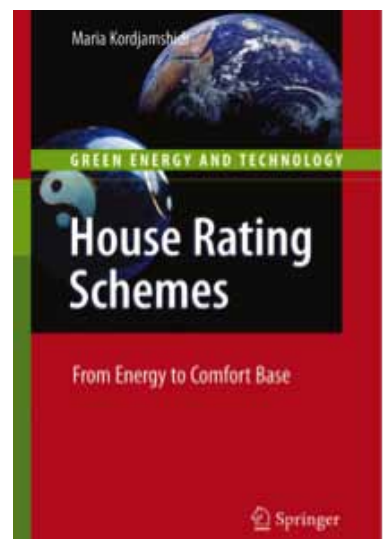
Dr Maria Kordjamshidi: PhD, Assistant Professor, Faculty of Art and Architecture, The University of Mazandaran, Iran

Dr Maria Kordjamshidi is internationally known for her work on thermal performance evaluation systems for buildings including House Energy Rating Scheme (HERS). Her research evaluates the performance of passive designed houses assessed in a free running mode. As a PhD student at UNSW, Maria won the Australian Institute of Energy's national award for the best Alternative Energy Pathways Project in 2006. Maria has published an award-winning book on House Rating Schemes. She is currently working on developing building energy labeling and investigating bionic architecture for reducing energy requirements and air pollution through building's envelope. Email: maria.kordjamshidi@gmail.com



Free running buildings and the challenges in the current building's performance evaluation systems

In response to call for environmental and energy efficient buildings more attention should be paid to passive architectural design/construction such as earth buildings. Promotion of this building type requires an accurate and reliable building evaluation system by which buildings could be assessed in free running mode. Unfortunately, most of the regulations and developed building evaluation systems undervalue the free running buildings. This presentation highlights the challenges and limitations of current regulations, standards and building thermal performance evaluation systems. It demonstrates how earth buildings have been the victim of wrong evaluation on the basis of inappropriate indicators.



House Rating Schemes



Rammed Earth- Morocco

Paul Jaquin: (PhD, MEng, CPEng), Senior Structural/Geotechnical Engineer, Opus International Consultants, Queenstown

Paul is an engineer based in Queenstown, New Zealand. His experience is in the behaviour of historic rammed earth building, and in the fundamental soil mechanics which underpins earth construction. Paul has published widely in the field of earthen construction, and has worked as a structural and a geotechnical engineer in the UK and in New Zealand on the design of rammed earth, straw bale and more conventional building materials.

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Website: www.historicrammedearth.co.uk

Thermal design of historic earth buildings

This paper reviews the thermal design of a range of historic earth buildings from around to world. Features which are common to these earth buildings have been developed for specific climate, to take advantage of diurnal or annual changes in temperature and humidity. By learning from the building design methods developed in the past, we may be able to better design new buildings to better control thermal comfort in modern buildings.



Iman Khajehrezaei (MArch): Lecturer Yazd Technical University, Yazd, Iran

Mehrnaz Malek: PhD Candidate, Department of Architecture, Islamic Azad University, Tehran, Iran

Iman and Mehrnaz are emerging researchers in the field of earthen architecture. They had worked widely in the field of earthen architecture and have presented papers at international conferences including Terasia2011, Terra2012, Lehm2012, Kerpic13, etc. Iman and Mehrnaz promote new and improved earthen construction techniques in Iran through holding numerous workshops and festivals. They have also collaborated deeply with the VARC (Vernacular Architecture Research Center) under the supervision of the Yazd University in Iran and CRAtterre in France.

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Malek.mehrnaz@wtiau.ac.ir

Reuse of Traditional Earthen 'Wind Catchers' In Contemporary Architecture

City of Yazd is well known as the 'City of Badgirs'. These earthen ventilation and cooling wind catchers (or wind towers) are being forgotten in contemporary construction. Badgirs can be incorporated aesthetically into the design of contemporary buildings in the hot-arid regions of the Iran, and other areas of the world with a similar climate, to provide summer thermal comfort with little or no use of electricity. This paper will explain the design, construction, structural and climatic characteristics of the traditional badgir and will explore the contemporary use of badgirs equipped with a water vaporisation system.



Badgir of Mortaz Historic House, Yazd, Iran

Thierry Joffroy: Architect, CRAterre, France

Thierry has been involved in earthen architecture since the mid-eighties starting with a specific interest in arches vaults and cupolas with earth bricks (adobe, CEB). He has assisted many French self-help builders and companies particularly in developing countries. By the end of the 80s, CRAterre became contracted for many low-cost housing projects. Thierry has worked globally with UNESCO assisting in the conservation of the nearly 200 World heritage listed properties. He was the Chair of CRAterre from 2003 until recently becoming the Director of the AE&CC research unit at the School of Architecture of Grenoble which works on earthen architecture and other local building materials.

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Website: <http://craterre.org/>



Current efforts for the elaboration of norms and standards in the French context

For many years, building with earth has been possible in France based on the fact that the heritage present in several areas was a reference sufficient to convince both the inspection offices and insuring companies. But since the turn of the millennium there has been a tendency to reinforce control procedures, more specifically in relation to seismic risk (even if little) and thermal performances. That led to consider the need for making progress in terms of production of technical documents that could be used to prepare norms and standards. The references being mainly for industrial products, the process has proved to be uneasy, though serious progress is now being made by and for network of professionals and new ones to come. (Authors: Jean Marie Le Tiec and Arnaud Misse)



Fire test certification

Michael Brady: (MBldgSurv CPEng NER) Director, BSE Consulting

Michael Brady is a chartered professional environmental and civil engineer and an accredited building surveyor. Michael is inspired to fight mediocrity in residential engineering design. Michael spent 8 years in the Royal Australian Air Force as an Airfield Engineer before establishing an engineering consultancy focused on providing engineering design for natural building materials. With this focus, Michael has helped his clients achieve visionary sustainable construction outcomes including many single and multi-storey straw and earth dwellings. Michael lives on a small farm in Delegate NSW with his wife and 3 children where he enjoys close proximity to world class fly-fishing waters.

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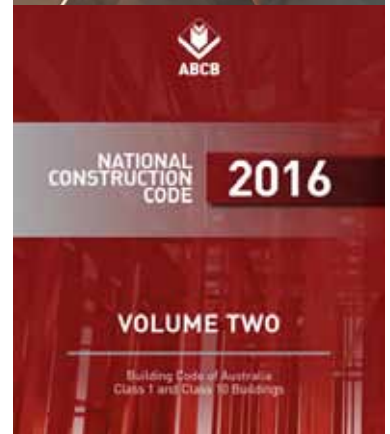
Website: www.bseconsulting.com.au



Pathways for demonstrating NCC compliance for natural building materials

Find out the Who, What, When, Where and How as we discuss the available pathways for demonstration of National Construction Code compliance. The pathways explored include:

- Adoption into the Deemed to Satisfy,
- Individual Performance Solutions,
- CodeMark certification.



We highlight the relative strengths, opportunities, constraints and weaknesses of each pathway in relation to common aspects of natural building regulation compliance.

The development of Performance Solutions is presented as an immediately available way forward for the natural building industry and CodeMark certification is presented as the most suitable way to achieve mandatory acceptance by consent authorities of natural building technologies.

Late Afternoon Session: MATERIALS DEVELOPMENT & INNOVATION



Jean-Marie Le Tiec: Head of "Dessin-Chantier" section, Architecte DPLG, DPEA architecture de terre CRATerre – ENSAG

Jean-Marie is an architect graduated from the Grenoble School of Architecture and holder of the DPEA Architectures de Terre. Since 2005, he has been working for NAMA architecture, his own company, and with CRATerre as the head of "dessin-chantier" section, whose role is to assist in the design and realization of contemporary projects in earthen constructions, but also to participate in the elaboration of the French national rules of earthen constructions. Through this dual activity, he engages in projects that put the issue of eco-responsible housing and constructive cultures at the heart of his commitment.

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Website: <http://craterre.org/>



Domaine de la Terre

Recent history of earthen architecture in France: 40 years of revival

Earthen architecture has been very present throughout the history of France, with a peak during the 19th century, following the French revolution. However, its practice was gradually lost mainly due to the successive world wars. But in the 70s the first oil crisis led to a revived interest on its potential. This started with a group of students of the school of architecture of Grenoble who discovered an incredible heritage in the Rhône-Alpes Region. The result of their first studies led to the publication of a book 'Construire en terre' which was the start of a still on-going revival. Today, new challenges tend to favour more applications, including in the capital city, Paris, though still to be confirmed. (Co-author: Thierry Joffroy)



Pete Walker: (FIStructE, MICE, MIEAust), Director BRE Centre for Innovative Construction Materials

Pete is a chartered civil engineer. Pete studied in the UK at Sheffield City Polytechnic (BSc Civil Engineering) and the University of Edinburgh (PhD Structural Engineering). Having previously worked in Zimbabwe (University of Zimbabwe) and Australia (University of New England (1994-1997)), Pete joined the University of Bath in 1998. He was promoted to Professor in 2006 on becoming Director of the newly formed BRE Centre for Innovative Construction Materials. His current research interests include bio-based construction materials, materials for improved indoor air quality, and earthen construction.

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Use of clay materials to improve indoor environmental quality

Humans can spend up to 80-90% of their time living and working indoors. It is perhaps not surprising therefore that the quality of the indoor environment in buildings has a significant impact on the health, well-being and productivity of people. This presentation talks about findings from a research project developing clay plasters with specific aims of improving indoor environment through moisture buffering, hygrothermal behaviour and capture of volatile organic compounds. The investigation included a study into the optimum thickness of clay plaster needed for effective moisture buffering.



Clay plasters



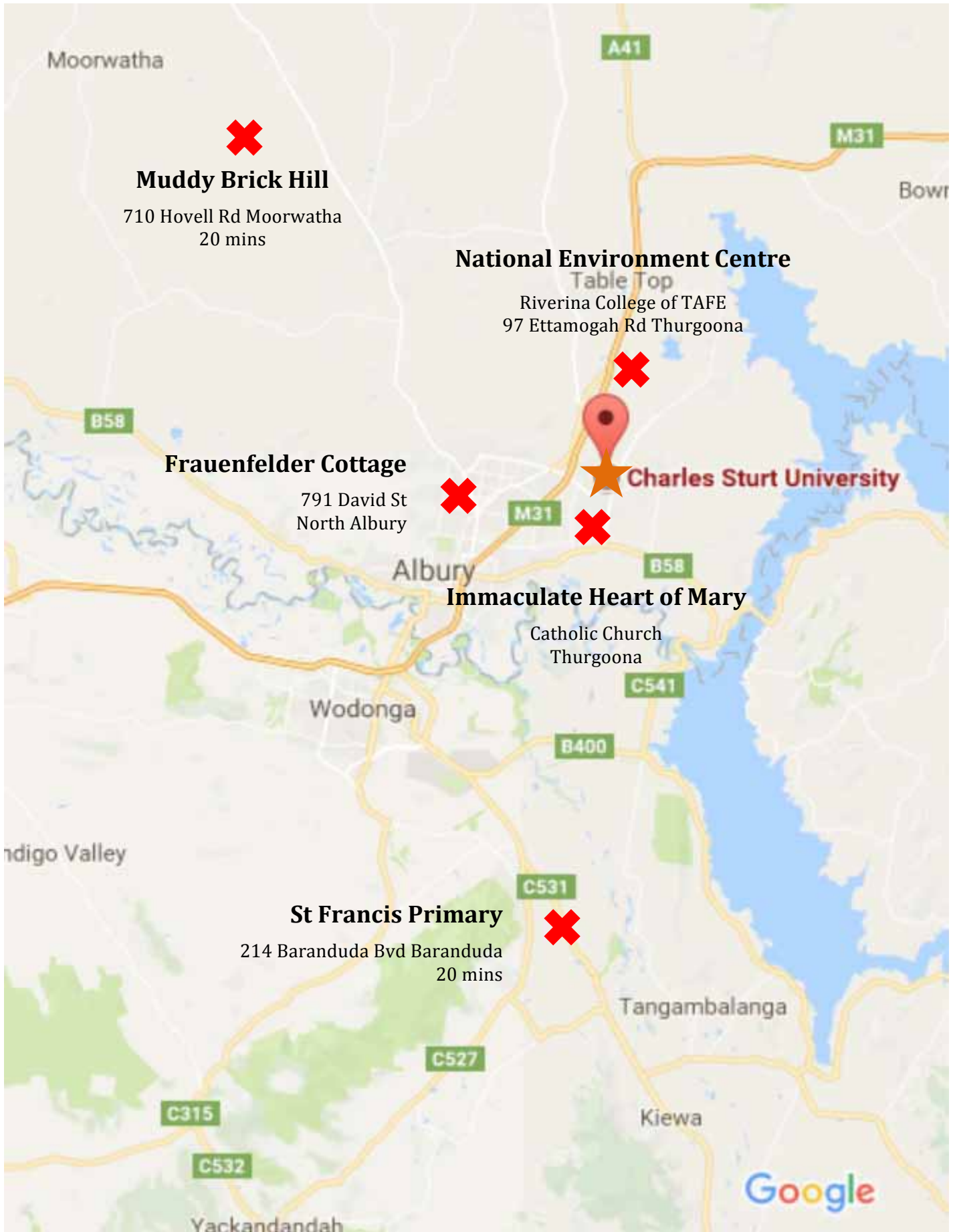
Day 5: Monday 6 November - Earth Building Tour Program

6.30	BREAKFAST (1.5 hrs) - BBQ area - for those staying on campus	
8.30	Annual General Meeting - Earth Builders Association of Australia (1.0 hr)	
10.00	MORNING TEA - BBQ area	
10.30	Charles Sturt University Campus - Tour of a living learning laboratory. Starts from BBQ Area. A behind the scenes look at the Residences, earth-covered Lecture Theatre, mixed mode systems of the Gum’s Café, Academic Offices, Herbarium and more. Join us for an in-depth tour of these award-winning rammed earth buildings and hear the inside story of the first ten years of the design, construction and occupation from the lead architect. Find out about the passive, naturally ventilated low energy design including night cooling, a unique solar heating and cooling system, earth thermal exchange, mist cooling, and wind power. Check out the the composting toilets and grey-water treatment. Learn about what works and what doesn’t work.	
12.30	LUNCH - BBQ area	
1.30	Immaculate Heart of Mary (Thurgoona) - Anthony Wright assisted by Father John Fowles - modern church with stained glass. Rammed earth (2003), associated buildings.	
2.15	National Environment Centre, Riverina College of TAFE, Thurgoona Tour and presentation by Mr Rob Fenton (TAFE) Four administration buildings on the TAFE campus. Allow 1:15 hrs	
3.30	AFTERNOON TEA - BBQ area	
4.00	Extension Tour options:	
	Tour Group A	or Tour Group B
	“Muddy Brick Hill” - adobe brick Compact cottage at moorwatha - 1980 Random rubble fireplace; slate inlaid floor; mezzanine sleeping. 20km	St Francis Primary School - rammed earth Extensive school development - hall admin two classroom houses. 24km; 22min
	“Frauenfelder Cottage” Nat Trust - cob Albury’s oldest residence, now operating as B&B. Exterior only.	
6.30	DRINKS - BBQ area - a complementary drink and then drinks by donation	
7.30	DINNER - BBQ area - healthy, yummy fresh cooked meals from earth oven (vegetarian options). Please book in advance. \$20/head.	
8.30	Evening Session (1.0 hr) - Jomo Zeil, Lehm Ton Erde, Austria - <i>Rammed Earth Floor construction</i>	

Industry Seminar & Summit (7 & 8 November)

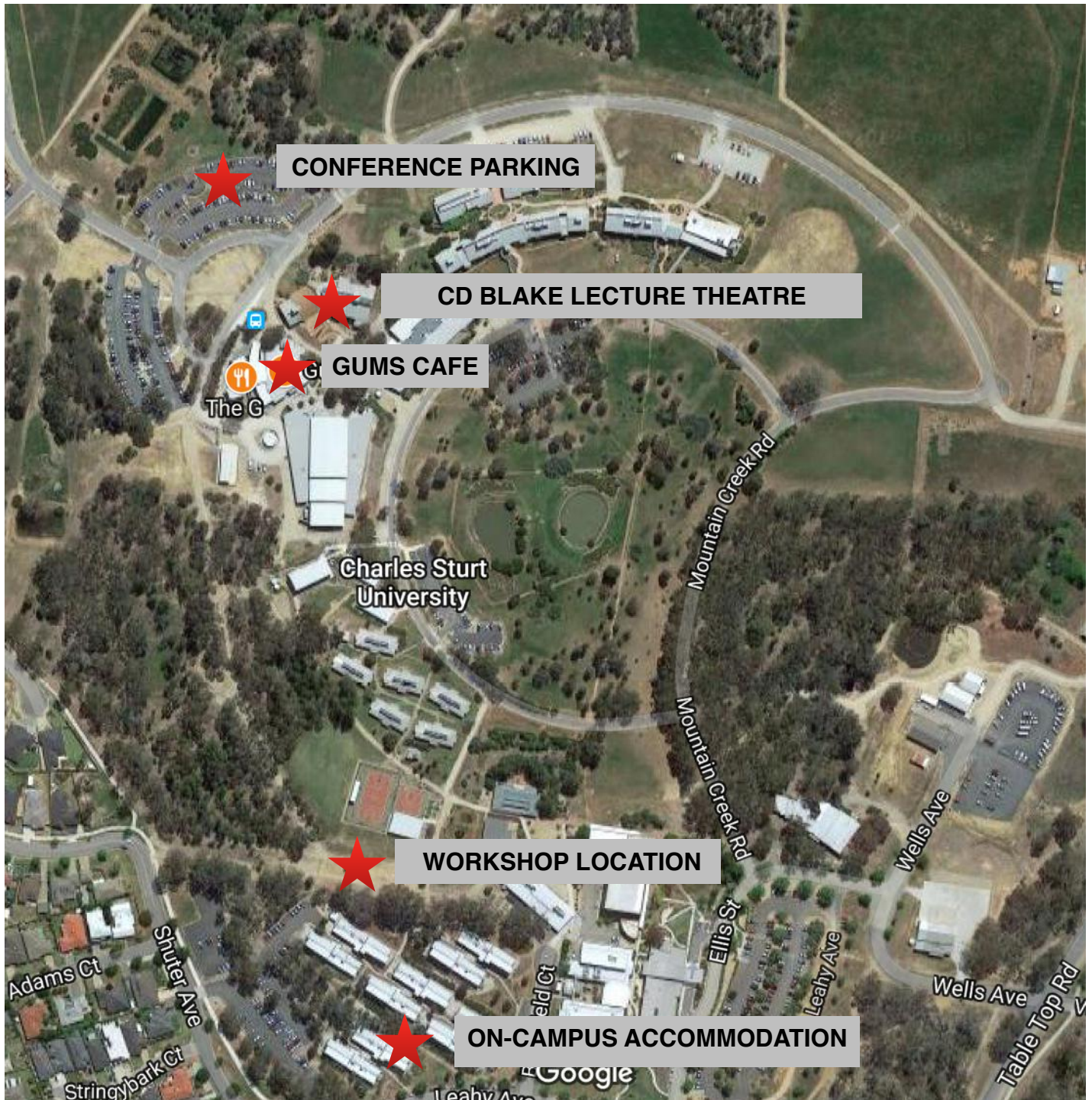
Our International Conference continues its work with sustainable earth building on these two days. The Seminar day allows for a more informal engagement with our international speakers and presenters as we discuss our industry's future and plan for the Summit. Our Summit Day allows our industry engagement with our policy makers and government bodies. Although both days are by invitation, members of the Earthbuilders Association are welcome. Agendas for the Seminar and Summit will be published prior to the conference and made available as part of the conference package. If anyone is interested in attending and has questions please call Peter Hickson 0408 425 855.

EARTH BUILDING TOUR MAP



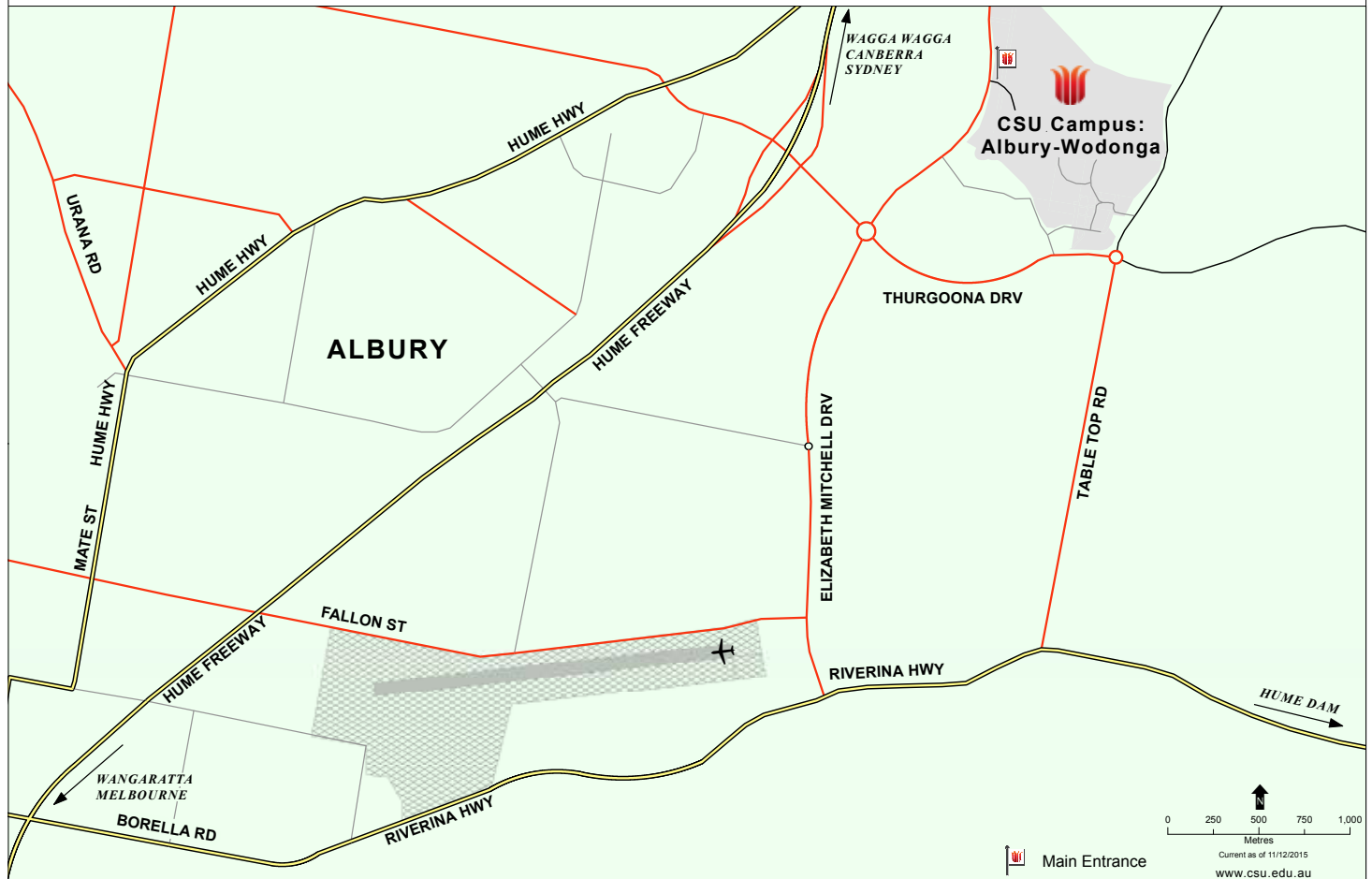
Tour contact 0423 989 963

EBAA2017 LOCATION MAP



The best access for the conference is through the main Charles Sturt University entrance off Elizabeth Mitchell Drive, Thurgoon, NSW.

The best access for the Workshops and Accommodation access is from Shuter Ave, Thurgoon, NSW.



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