seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND
ENERGY SHOW
20–21 March 2024

Rialtas na hÉireann
Government of Ireland

Traditional Buildings - Guidance and Research

March 21, 2024

Stephen Farrell – Programme Manager, National Retrofit

Introduction

- Climate Action Plan 2024 – Built Environment

- Part L 2021(para 0.6.1)

  ….The aim should be to improve the energy efficiency as far as is reasonably practicable. The work should not prejudice the character of the building or increase the risk of long-term deterioration of the building fabric.

  I.S. EN 16883:2017, Conservation of cultural heritage — Guidelines for improving the energy performance of historic buildings provides guidelines for sustainably improving the energy performance of historic buildings, e.g. historically, architecturally or culturally valuable buildings, while respecting their heritage significance.

- Heat Loss Indicator Research

Schedule of Speakers

- Carl Raftery - Architectural Conservation Advisor, DHLGH
  "Improving Energy Efficiency in Traditional Buildings Guidance for Specifiers and Installers"

- Oliver Kinnane - Head of School of Architecture, UCD
  "FabTrads– Research findings on traditional and historic building wall fabrics"

- Peter Cox - Founding member, Carrig Conservation International Limited
  "Can Older Buildings Contribute to Reducing CO_2 Emissions"

- Sarah Jane Halpin - Built Heritage Consultant, National Built Heritage Service
  "Conservation Advice Scheme for Vacant Traditional Farmhouses"

Questions

- Q&A session after all presentations

- Or submit questions to;
  - Onestopshop@seai.ie
  - Subject line: Traditional Buildings

We will respond after the Energy Show

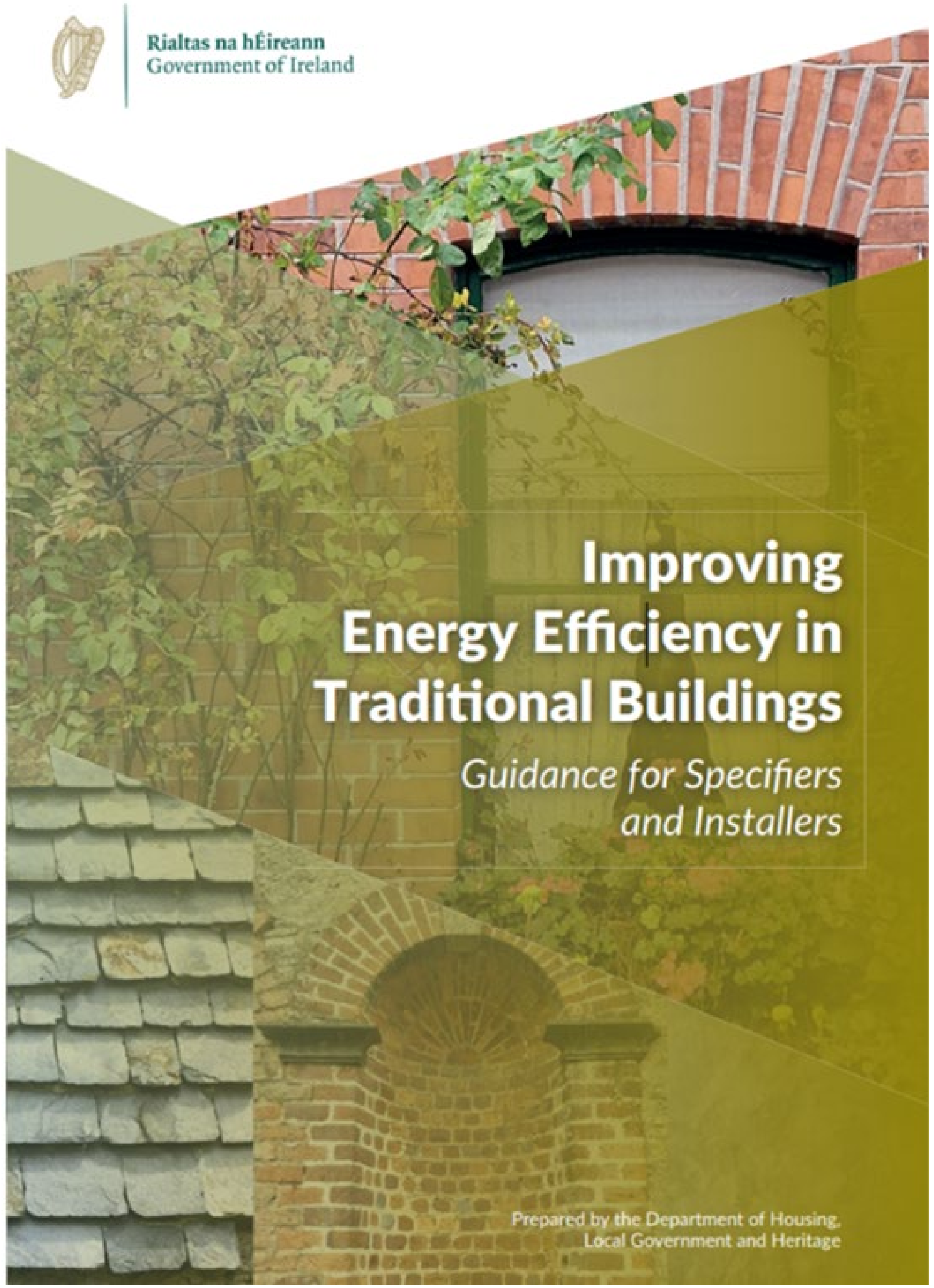
An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

Introduction to *Improving Energy Efficiency in Traditional Buildings, Guidance for Specifiers and Installers*

Carl Raftery
Architectural Conservation Advisor, National Built Heritage Service

New guidance

- Aims to provide clear and robust advice to specifiers and installers, while being accessible to a wide audience
- Guidance is strategic more than prescriptive given the nature of the historic building stock
- Illustrate good practice and establish principles and processes to be followed



Improving Energy Efficiency in Traditional Buildings

Chapter 1: Context

What Is a 'Traditional Building'?

Complying with Statutory Requirements

Recommended Skills and Experience

Building Regulations Technical Guidance Document L 2021 Conservation of Fuel and Energy – Dwellings 0.6 Application to Buildings of Architectural or Historical Interest

… the application of this Part and of the European Union (Energy Performance of Buildings) Regulations 2019 may pose particular difficulties for habitable buildings which, although not protected structures or proposed protected structures, may be of architectural or historical interest including buildings of traditional construction with permeable fabric that both absorbs and readily allows the evaporation of moisture. The aim should be to improve the energy efficiency as far as is reasonably practicable. The work should not prejudice the character of the building or increase the risk of long-term deterioration of the building fabric.

Traditional construction

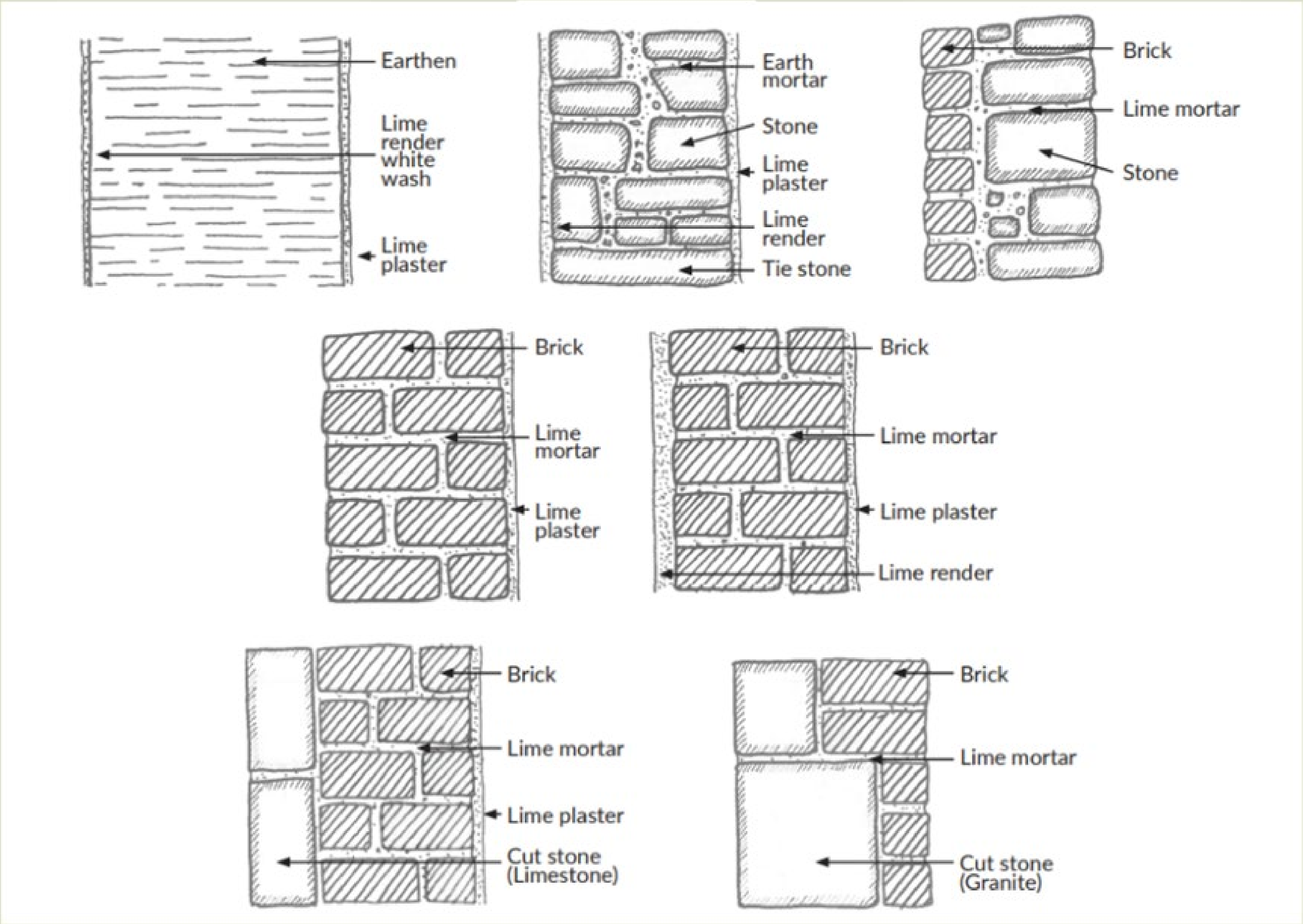


Figure 1: Illustrative examples of different types of traditional masonry walls and their typical build-up

Traditional buildings in Ireland:

- solid masonry walls of brick, stone or clay, using lime-based mortars, often with a lime or earthen-based render finish,
- single-glazed timber or metal-framed windows
- a timber-framed roof usually clad with slate but often with tiles, copper, lead or, less commonly, corrugated iron or thatch.

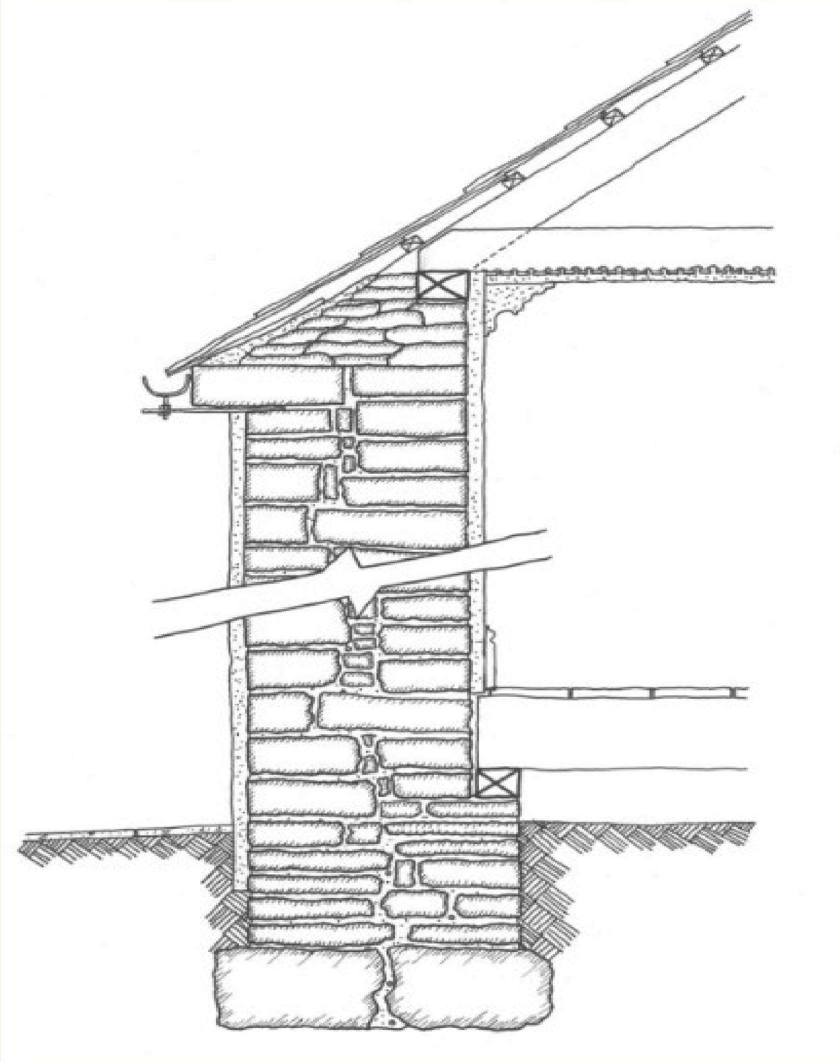


Figure 2: Typical solid masonry wall

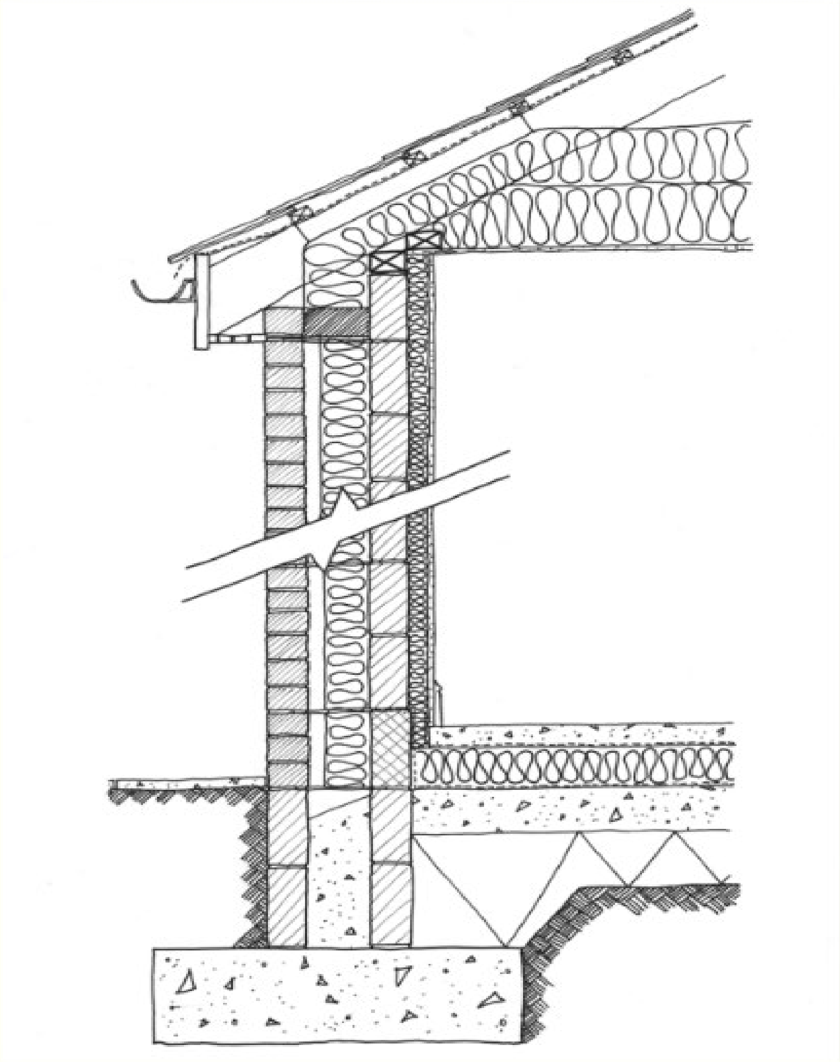


Figure 3: Typical modern cavity wall

Range of skills provided by different building professionals (Table 4 extract, core/support activity)

Services	Architect	Architect (Conservation Accredited)	Building Surveyor	Building Surveyor (Conservation Accredited)	Conservation Consultant	Structural Engineer	Architectural Technologist	Archaeologist	Mechanical & Electrical Engineer	Energy Auditor	BER Assessor	Thermal Bridge Modeller	Hygrothermal Modeller	Ventilation Validator	Air Permeability Tester
Design of fabric efficiency upgrades	●	●	●	●	•	•	•	•	•	•	•	•	•	•	•
Design of building conservation measures	•	●	•	●	●	•	•	•							
Design of structural repairs or alterations	•	•	•	•	•	●	•	•							
Design of works	●	●	●	●	•	●	•	•	•						
Building condition survey	•	•	●	●	●	●	•	•							
Heritage impact assessment	•	●	•	●	●	•	•	•							
Survey and monitoring of alterations to any historical/archaeological features in a building	•	●	•	●	●	•	•	●							

Chapter 2: Understanding Traditional Buildings

- the physics of traditional buildings, how heat and moisture move through a building and how this can be dealt with, taking into consideration the importance of ventilation and indoor air quality

- the various methods for assessment of a building to determine any thermal bridges, air leakage and existing damage

- the calculation method for U-values relevant to traditional buildings (Fabtrads)

- potential health risks associated with the build-up of harmful substances/gases in a building and how to avoid them

One of the most important principles in energy efficient retrofit is that a building should be in good condition, free from excess dampness.

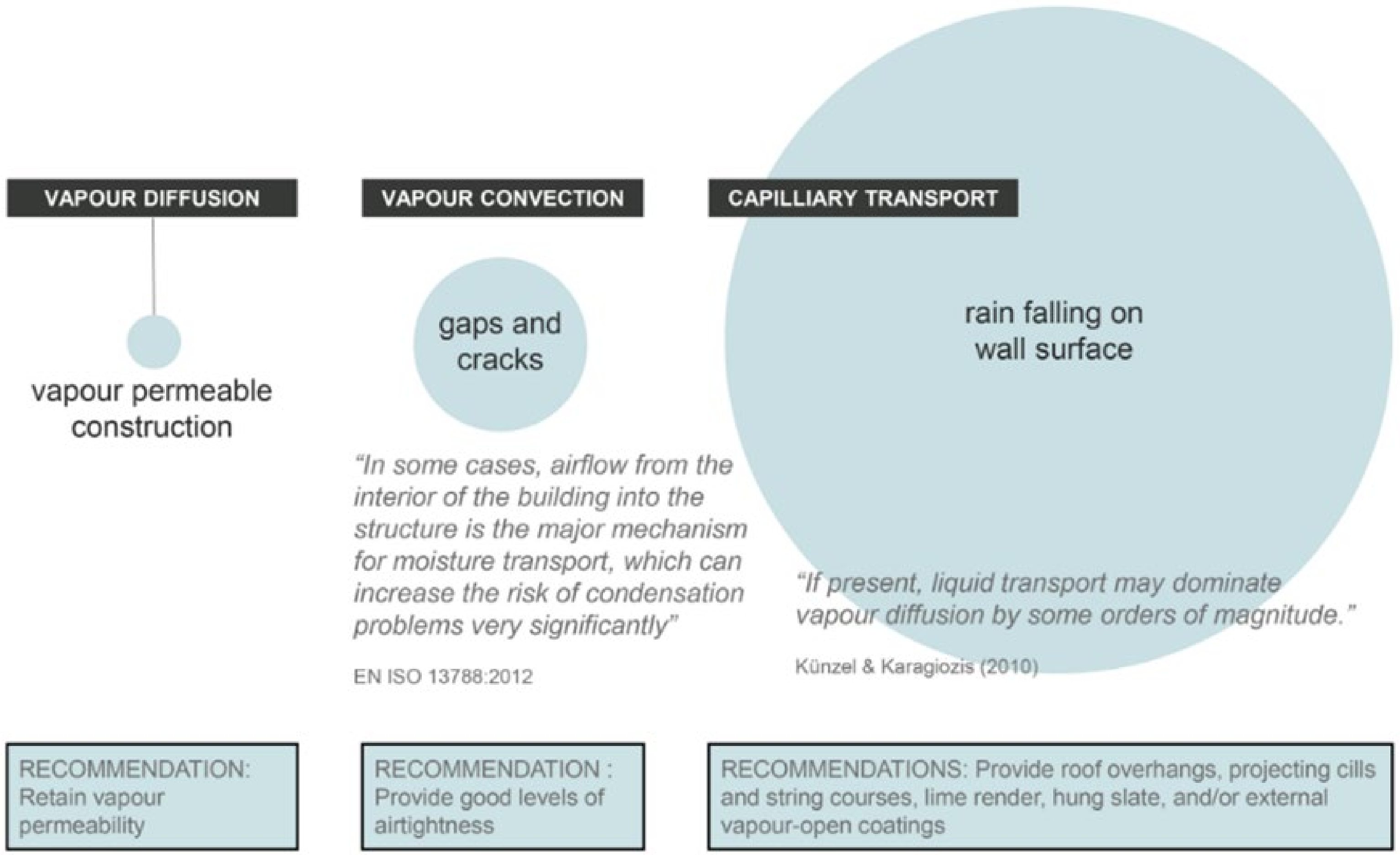


Figure 7: Relative wetting mechanisms for solid walls (Courtesy of Beñat Arregi, TU Dublin)

Poor maintenance and wet building fabric has higher conductivity and accounts for approx. 25% more heat loss

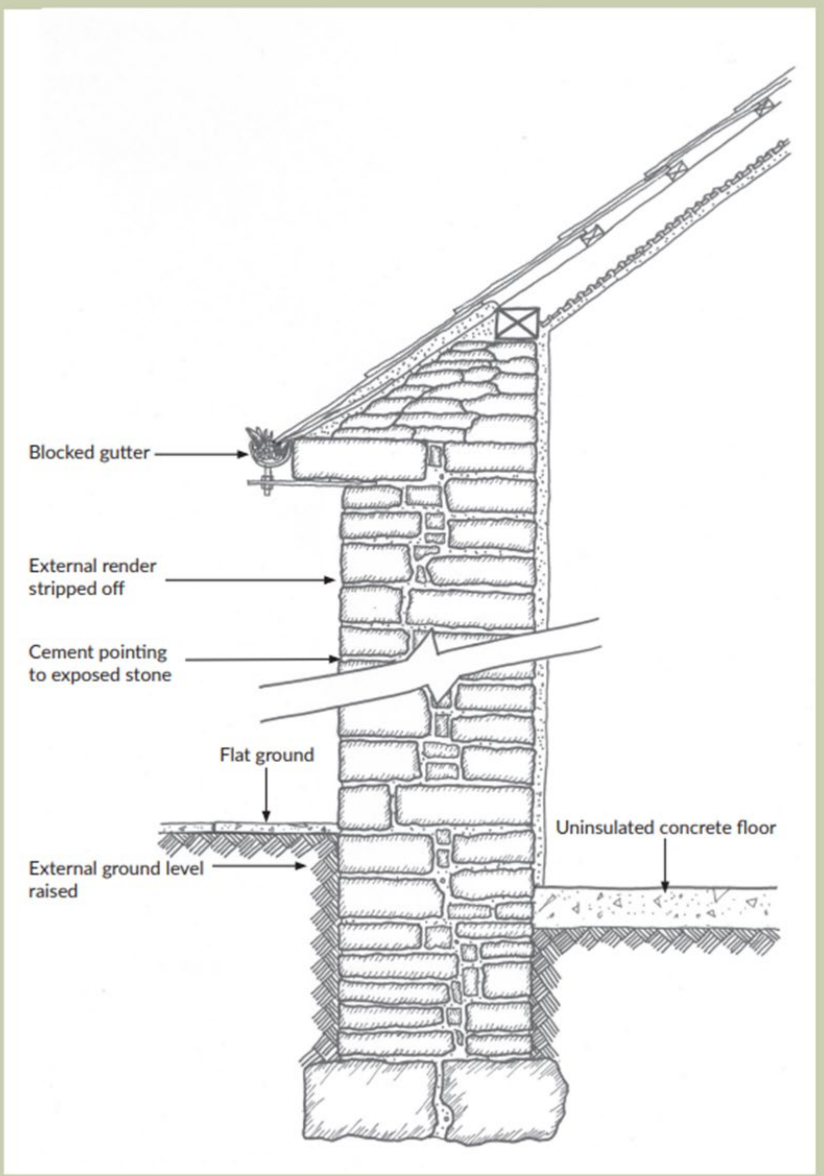


Figure 8: A traditional solid wall threatened by previous inappropriate modifications and poor maintenance

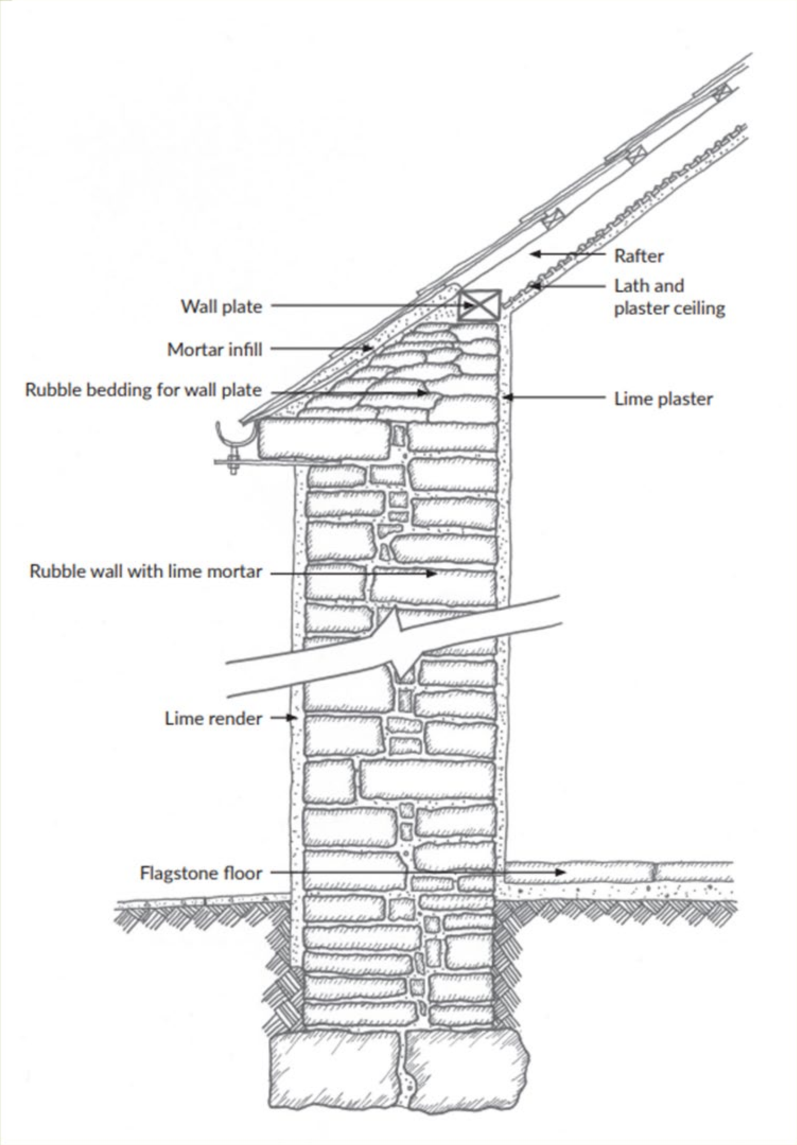


Figure 9: A well-maintained solid wall that achieves a healthy moisture balance

Performance assessment methods

Thermography
Air Leakage Testing –pressure fan
Endoscopy or Remote Visual Inspection Radar
Hygrothermal Risk Assessment
Indoor Air Quality Monitoring
Calculating and Measuring U-values - ISO 9869-1:2014

The information gathered can only be properly assessed
in conjunction with data gathered as part of a **comprehensive condition survey** and with the application of specific expert knowledge of historic construction technologies.

Figure 10: Thermal image showing additional heat flow at vertical and horizontal junctions with the abutting walls and floor. Note that the corner is the coldest point because it loses heat in three dimensions

Chapter 3: Specifying Safe and Effective Energy-Upgrading Measures

- recommended steps to follow when developing a comprehensive retrofit strategy for a traditionally built building and what should be completed prior to the start of retrofit works adapted from I.S.EN 16883:2017

- recommended materials for retrofit works on traditional buildings (risks and compatibility)

- preparation and installation measures for the upgrade of roofs, floors, windows and doors, as well as solid walls

Table 5: Recommended procedure for developing a retrofit plan adapted from guidance in *I.S. EN 16883:2017 Conservation of cultural heritage-Guidelines for improving the energy performance of historic buildings*

Step 1 Initiate the process …thermal comfort, energy waste reduction
Step2: Assess the building …heritage significance, condition, address moisture defects
Step 3: Specify objectives and targets technical compatibility, economically variable, 'major renovation'
Step 4: Assess and select measures for improved energy performance …Develop long list, determine risks condensation, ventilation etc, heritage impact
Step 5: Undertake risk mitigation measures … Appoint speciality consultant or commission specialist survey
Step 6: Create a short list of measures and review their impact …will the proposed measures meet initial objectives, consider alternatives
Step 7: Revise objectives and energy-efficiency targets …revise objective based on findings of risk assessment
Step 8: Review with the statutory authority (as required) …consult/apply to statuary authorities
Step 9: Appoint suitably qualified contractors/specialists
Step 10: Implement, document and evaluate …allow for the unexpected!

Table 9: General compatibility of typical retrofit measures with a traditional building, where not otherwise precluded by virtue of its statutory protection. This table is for guidance only. Each building will require assessment on a case-by-case basis

Features	Measures	Compatibility				
Outer walls	Repair/renewal to traditional masonry, pointing, render, etc.	■				
	IWI on walls without historic features (if not a protected structure)				■	
	IWI on walls with historic features					■
	EWI on walls without historic features (if not a protected structure or in an ACA)				■	
	EWI on walls with historic features					■
Ground floor	Draught proofing between or below floorboards		■			
	Insulation between suspended timber floors			■		
	Insulation below solid masonry floor			■		
	Insulation above solid masonry floors				■	
Roof	Rafter-level insulation			■		
	Attic-level insulation		■			
Windows	Replacement of traditional windows (to be determined on a case-by-case basis)				■	
	Optimisation of traditional windows (e.g. repair, draught proofing)	■				
	Installation of double glazing				■	
	Installation of secondary glazing		■			
	Installation of insulating panel(s) to shutters		■			
Doors	Replacement of traditional doors (to be determined on a case-by-case basis)				■	
	Optimisation of traditional doors (e.g. repair, draught proofing)	■				
	Installation of insulating internal panels		■			
	Renovation of door construction (to address warping etc.)			■		
Heat & energy systems	Optimisation of existing systems (cleaning, repair, etc.)	■				
	Wholesale replacement of existing systems		■			
	Wholesale replacement of existing systems in protected structures				■	
Ventilation	Optimisation of existing systems (cleaning, repair, etc.)	■				
	Installation of mechanical ventilation systems		■			
	Installation of mechanical ventilation systems in protected structures				■	
Solar photovoltaic (PV) & solar thermal	Installation to outbuildings and open spaces		■			
	Installation to traditional building that is not a protected structure			■		
	Installation to traditional building within an ACA			■		
	Installation to a protected structure				■	

Compatability Rating	
■	Compatible.
■	Generally compatible with traditional buildings. Presents some impact to historic fabric and some long-term risk to building fabric, which can be managed with expert advice.
■	Conditionally compatible with traditional buildings where adequate mitigation measures are put in place under the direction of an expert.
■	Generally not compatible with traditional buildings. Presents significant risk of impact to historic character and/or long-term risk to building fabric. Expert professional advice will be required to fully assess these risks and specify the significant mitigation required.
■	Not compatible.

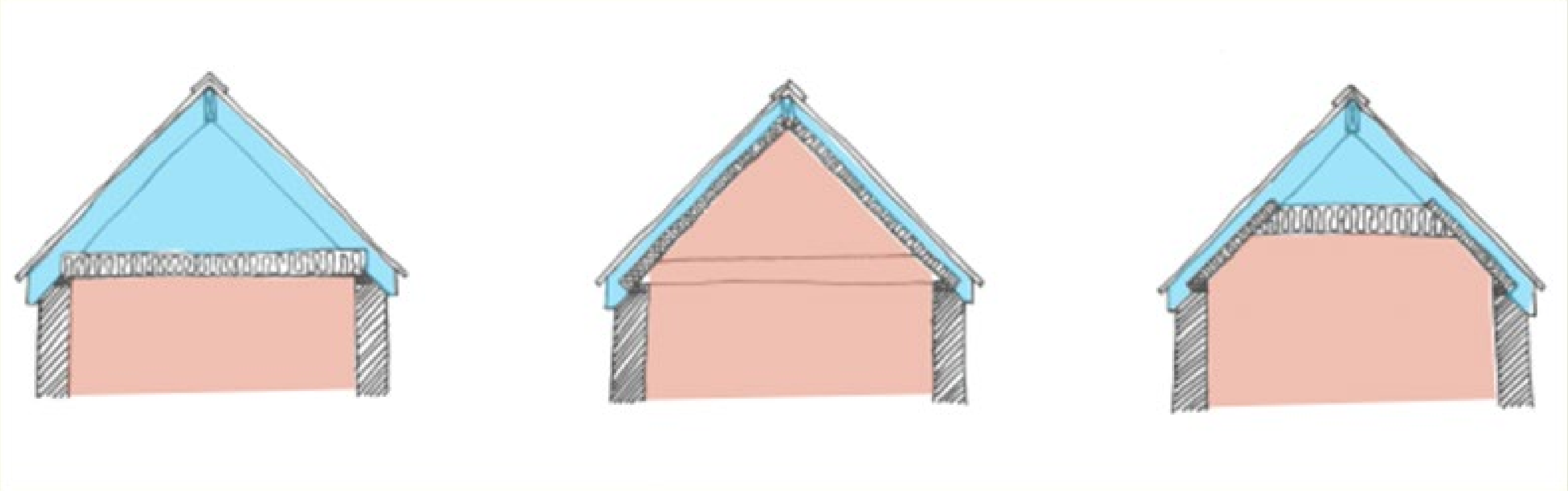


Figure 29: Pitched roofs can be insulated either at ceiling level, or rafter level, or a combination of both. The cold area of the attic (blue) must be adequately ventilated at all times

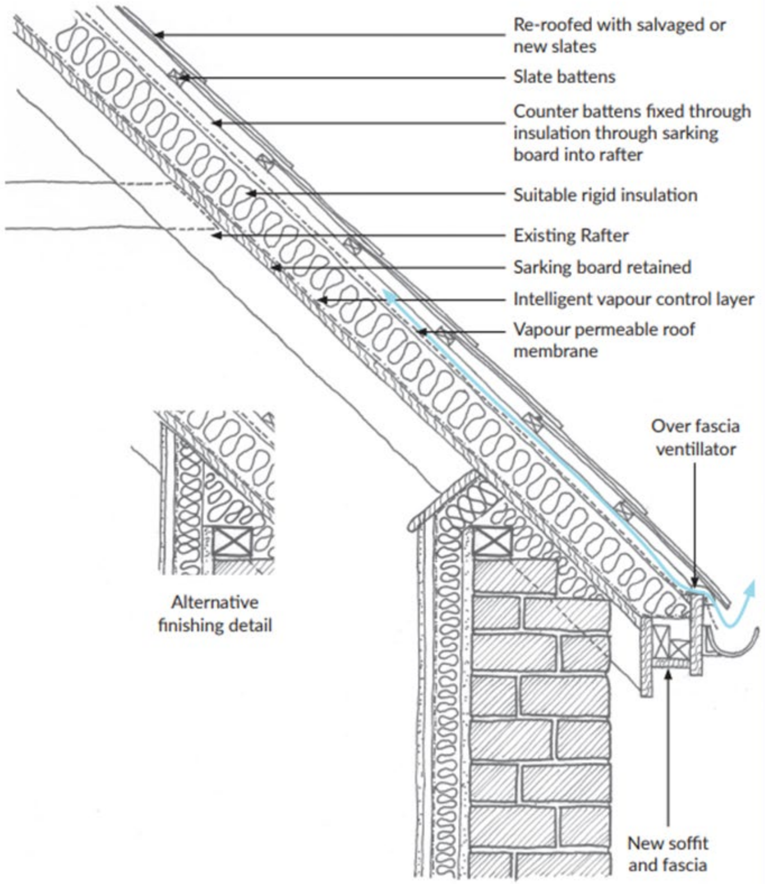


Figure 31: Insulation above and between rafters. An insulating board to the external face of the rafters reduces the chance of thermal bridging but will raise the roof level and may not be acceptable in certain cases

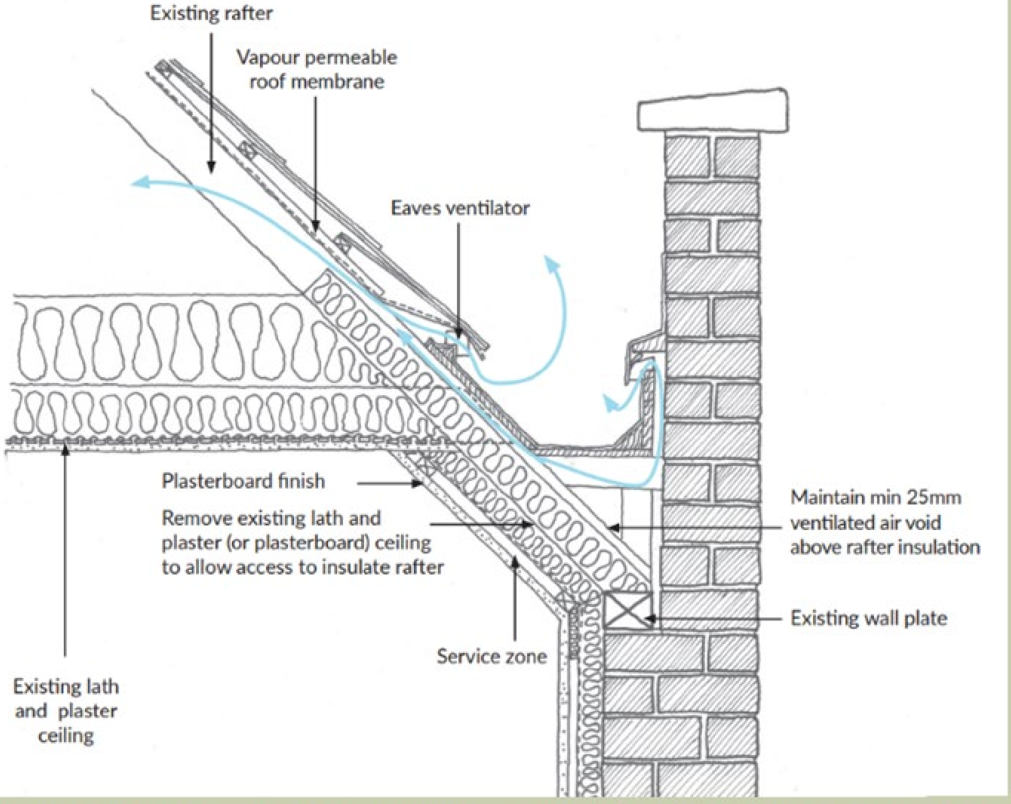


Figure 32 : A hybrid system combining horizontal insulation at ceiling level and pitched insulation at rafter level to the sloped section of ceiling can also be used

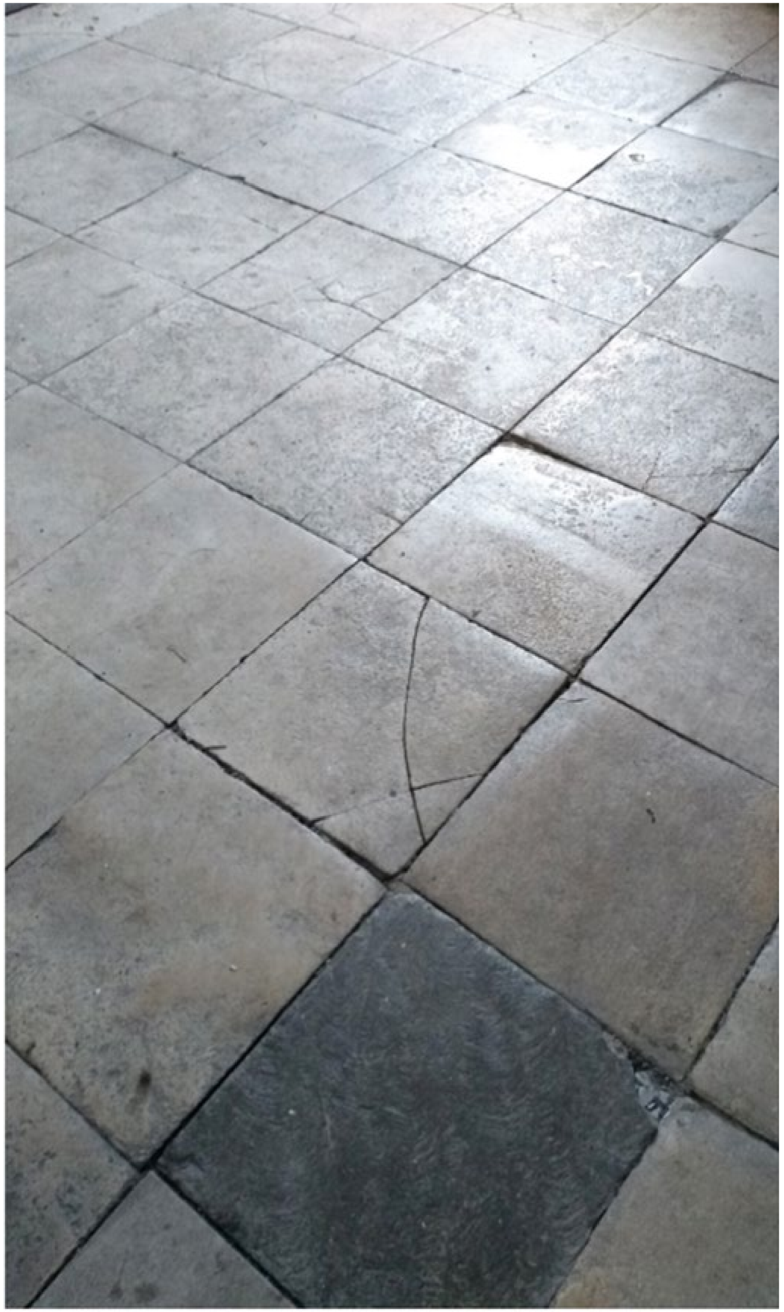


Figure 38: Care must be taken when lifting existing floorboards to conserve historic detailing like this biscuit joint

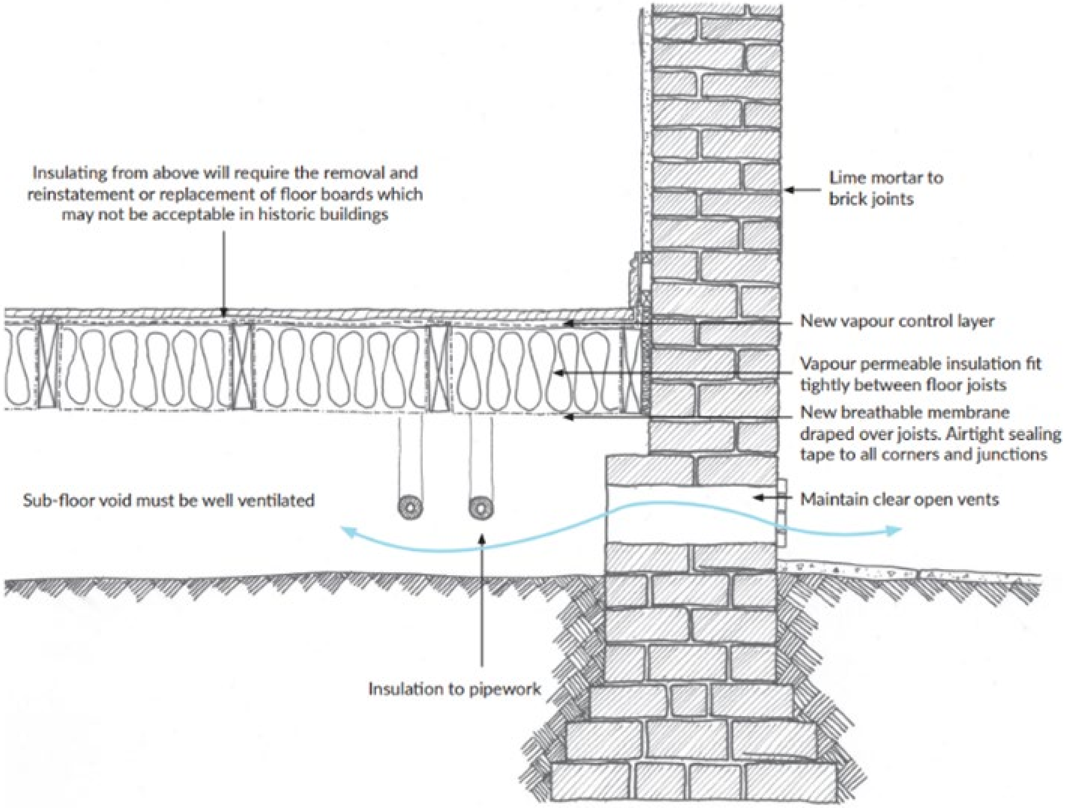


Figure 41: Typical suspended timber floor with insulation

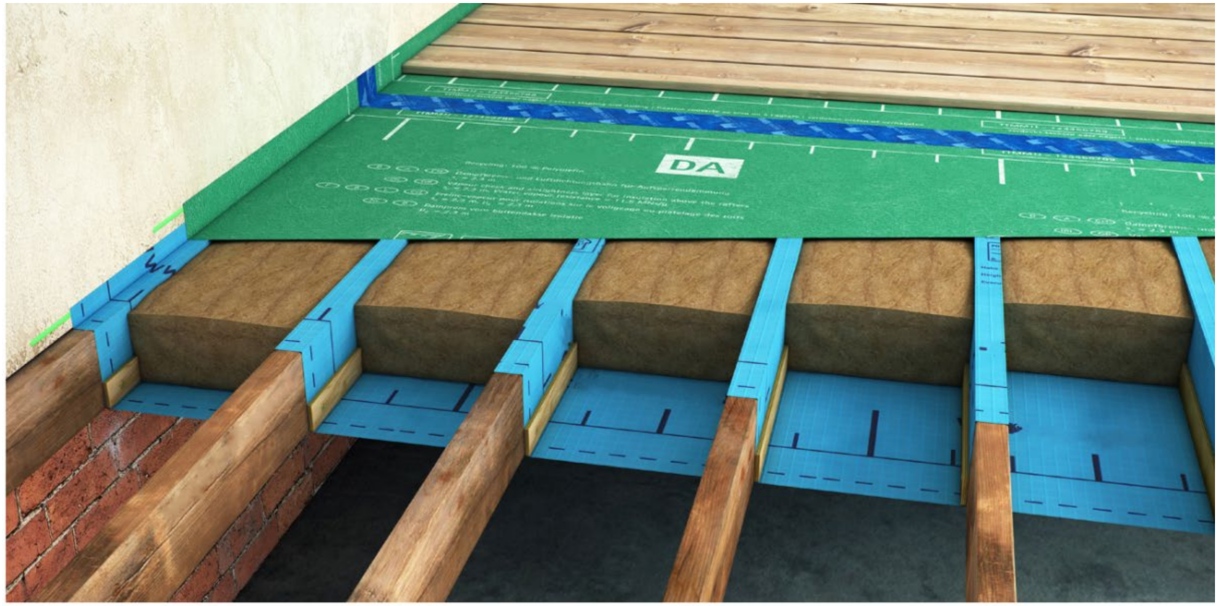


Figure 40: Slightly oversized batts of hemp insulation fit between joists over a wind-tight vapour-permeable membrane (blue) and beneath the intelligent vapour-control membrane (green). The vapour control membrane should be sealed to wall all round underneath the skirting. The solum should be cross-ventilated in accordance with TGD F and all pipework appropriately insulated

Figure 47: Aluminium draught strips can be seen to all sides of this door. Internally there is an insulated curtain

Figure 48: Carefully designed secondary glazing. Double-glazed secondary glazing is also available

Integrity of insulation materials and preparation

Insulation boards should fit tightly and neatly against each other and other components. All joints and corners should be taped. Insulating plasters may not require airtightness tapes.

Reveals should be insulated to at least the extent necessary to ensure that the critical surface temperature is achieved, see TGD L, Appendix D for details.

Depending on wall and insulation type, a lime plaster layer may be required to create a smooth suface to receive the insulation layer. Note: gypsum-based plaster should not be used on the cold side of insulation due to its moisture retention properties.

Wall insulation should be continuous through the intermediate floor zone to prevent surface condensation forming on uninsulated wall surfaces within the floor zone. Taping around joists will reduce the risk of exfiltrated warm air condensing in the vicinity of joist ends embedded in the wall.

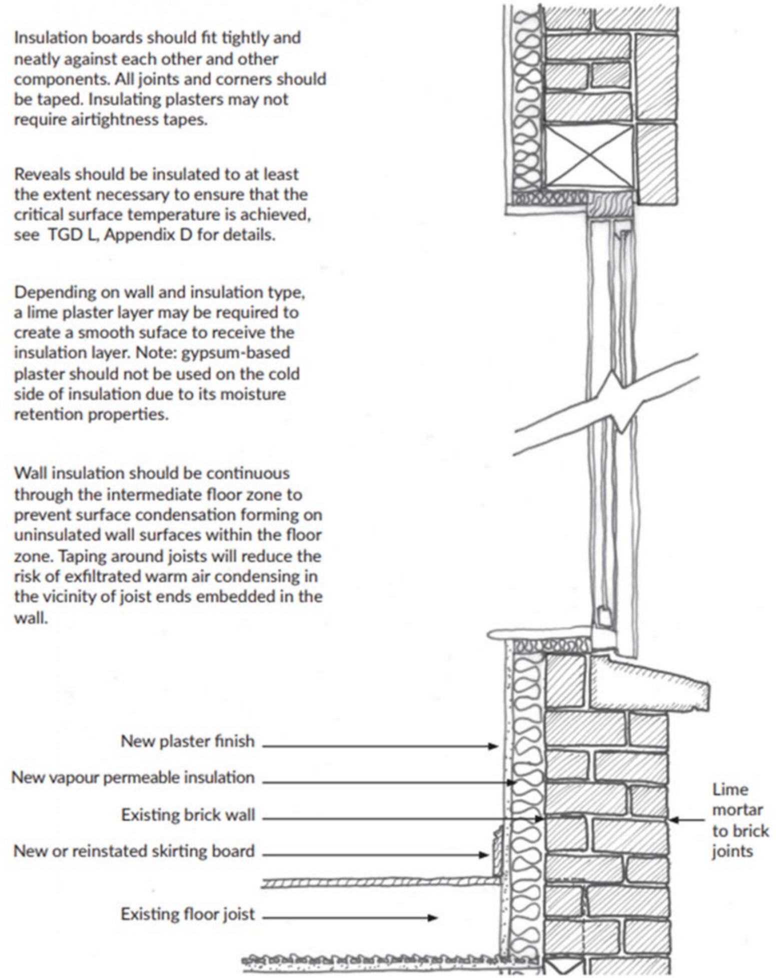


Figure 57: Typical internal wall insulation measures

Internal wall insulation to extend into the joist zone but not through the lath and plaster ceiling. Tape joist to insulation or vapour control layer if present.

A lime plaster scratch coat should be applied to the existing solid wall depending on the insulation requirements to assist in application.

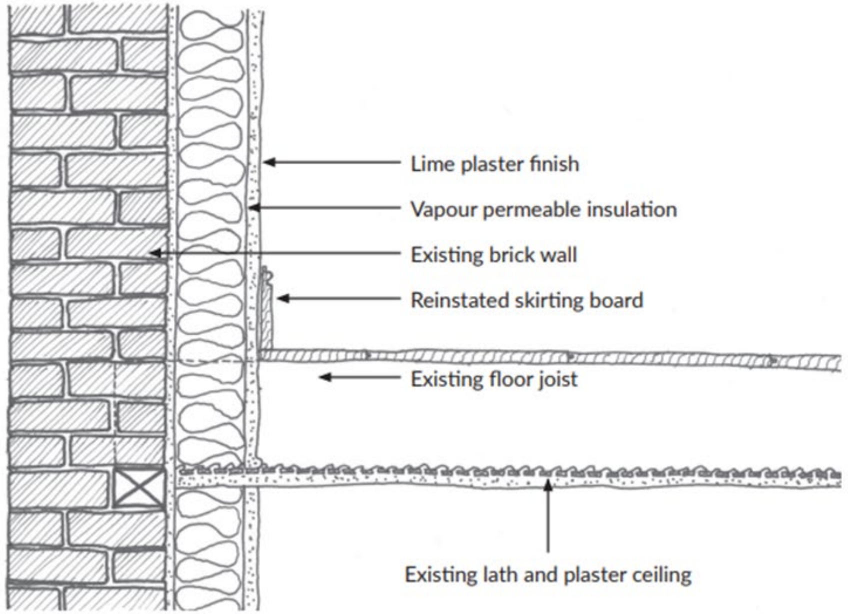


Figure 58: Intermediate floor – internal insulation

Figures 52 and 53: Insulating cork lime plaster sprayed on an uneven wall with reinforcement mesh applied below

Proper materials …..as defined

Any materials used should comply with Parts D and L. TGD D defines proper materials as materials that are fit for the use for which they are intended and for the conditions in which they are to be used, and includes materials that:

- bear a CE marking in accordance with the provisions of the Construction Products Regulation
- comply with an appropriate harmonised standard or European Technical Assessment in accordance with the provisions of the Construction Products Regulation, or
- comply with an appropriate Irish Standard or Irish Agrément Certificate or equivalent with an alternative national technical specification of any state that is a contracting party to the Agreement on the European Economic Area, which provides in use an equivalent level of safety and suitability.

Chapter 4: Low-Carbon Heating and Renewable Energy Sources

- an introduction of management systems to assess the environmental and energy performance of a building
-
- how to accommodate changes to mechanical and electrical systems and location of plan

- how to supplement energy usage with low-carbon and renewable sources of energy
-
- how to deal with existing heating systems such as plumbed heating systems and open fires

- factors to consider when choosing a heating system that is appropriate for different building types and needs

Not exempt for ACA and PS as it has the potential to materially affects the character.

Free-standing solar panel installations for houses are exempted from the requirement to obtain planning permission subject to a 25 square metre area limit and conditions requiring a certain amount of private open space to be maintained for the use of occupants. The exempted area for all other categories except apartments is increased to 75 square metres. In addition, wall mounted solar installations of 75 square metres are exempted for industrial and agricultural.

Note: In traditional buildings, where fabric upgrade measures can sometimes be limited by the character of the building, renewable energy systems can be a useful means to decarbonise and may offer a viable pathway to a BER of B2 or better.

Recent achievements and future steps

- We commissioned a study in 2023 into **embodied carbon and life cycle assessment** for the retrofit of traditional buildings which aimed developed a practical step-by-step guide to undertaking these assessments for the retrofit of case study building types

- SEAI has commissioned a RD&D project ('FabTrads') to identify the **hygrothermal properties** for a range of Irish traditional construction materials/assemblies. The project includes laboratory and in-situ testing and the findings are intended to inform the National Calculation Methodology (BER ratings) and be of use in developing further retrofit guidance for traditional buildings

- Intend to undertake a number of **exemplar projects** to establish, demonstrate, monitor and publish best practice case studies of the appropriate and sensitive energy retrofitting of traditional buildings across the country in accordance with the forthcoming guidance on *Improving Energy Efficiency in Traditional Buildings*

- Working on a pilot funding scheme through SEAI for traditionally constructed buildings and appropriate retrofits

Practical progress:

Building resilience to climate change is a now a key criterion in the conservation and repair grant schemes operated by National Built Heritage Service and the National Monuments Service in conjunction with the local authorities:

- Built Heritage Investment Scheme (‘micro’ grants to historic building owners for minor repairs and maintenance to build resilience)
- Historic Structures Fund
- Community Monuments Fund
- Historic Towns Initiative
- Vacant Traditional Farmhouse pilot scheme

Thank you

www.gov.ie/pdf/ (Improving Energy Efficiency in Traditional Buildings)
www.dublincity.ie/built-last-case-studies (Dublin City Council)
www.igbc.ie (Irish Green Buildings Council)
www.historicenvironmentscotland.com Technical papers & case studies
www.spab.org.uk Technical papers & case studies
www.cse.org.uk Warmer Bath
www.historicenvironmentengland.com Case studies
www.changeworks.org.uk Case studies
www.responsible-retrofit.org/wheel/ (Sustainable Traditional Building Alliance)

Thank you

FabTrads & TradFabs

Project Update & Project Kick-off

Oliver Kinnane, Rosanne Walker, Anna Hofheinz, Caroline Engel Purcell. 21st March 2024.

FabTrads

Project Details

- Kick-off: March 2022
- Duration: 36 months
- Lead: University College Dublin
- Partners: IGEO Spatial Modelling Ltd & Carrig Conservation International Ltd
- Collaborators: Department of Housing, Local Government and Heritage
  Office of Public Works
  Irish Georgian Society
  ICOMOS Ireland NSCES+CC

SEAI SUSTAINABLE ENERGY AUTHORITY OF IRELAND

UCD DUBLIN

FabTrads

Project Scope

- To identify the hygrothermal data of a large sample set of traditional building materials and fabrics
- To provide key data for a range of traditional Irish building materials for hygrothermal modelling
- To test the thermal performance of a range of uninsulated traditional walls in-situ typical to the Irish built environment (pre-1950)
- To consult with the SEAI, NSAI and Government Departments on the findings and potential impacts of this research

In-situ U-values

Progress to date

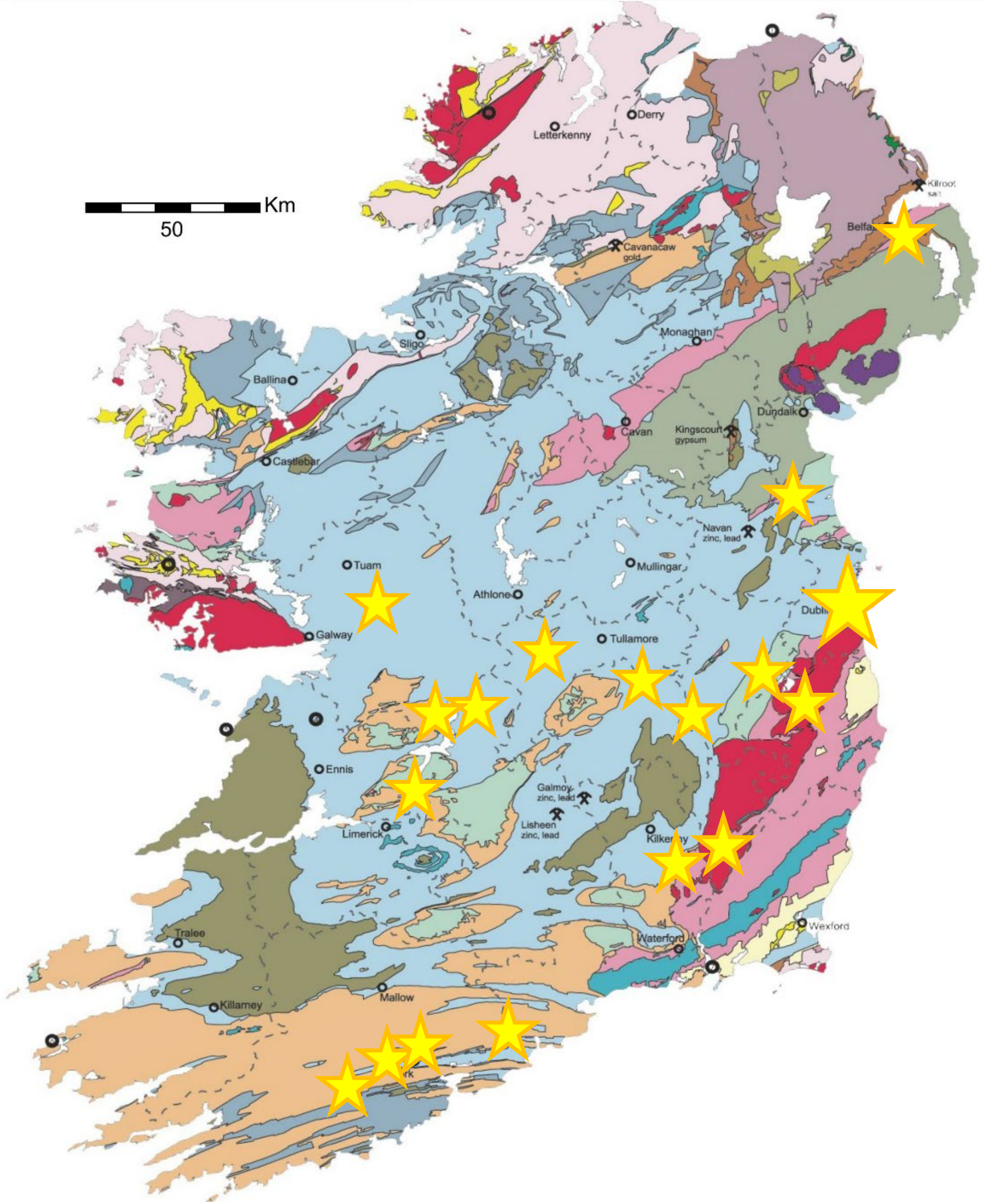
36 traditional walls tested across Ireland (18 over winter 2022/23 and 18 to date over winter 2023/24)

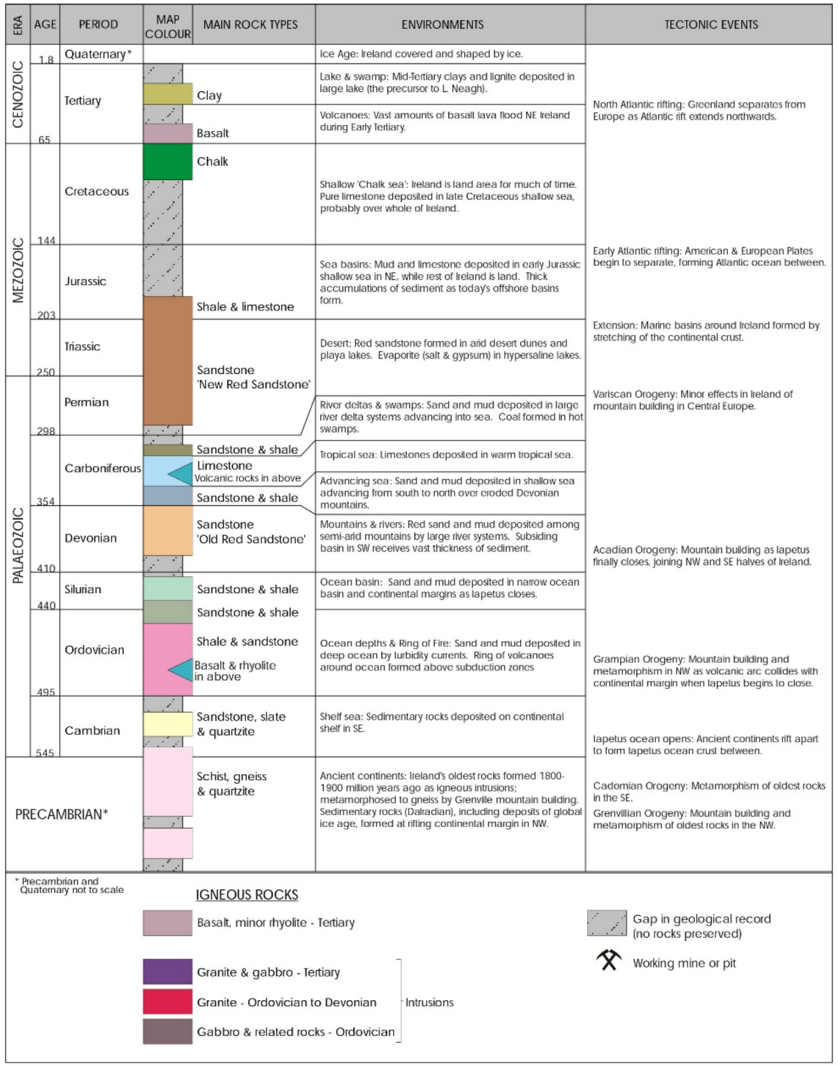
- 2 in-situ U-value tests run on each wall
- Each test run for approx. 1 week
- Full representative variety of traditional walls tested, including 1 earthen wall

1 long-term in-situ U-value test a Artane Cottages Lower (c. 1890 300mm solid brick wall)

- Ongoing since 11-2023 – until 11-2024
- Variance in results to date: 1.29 - 1.64 W/m^2K, average 1.44 W/m^2K
- Strong impact of climate (internal / external temperature and RH) factors on test results

In-situ U-value test locations







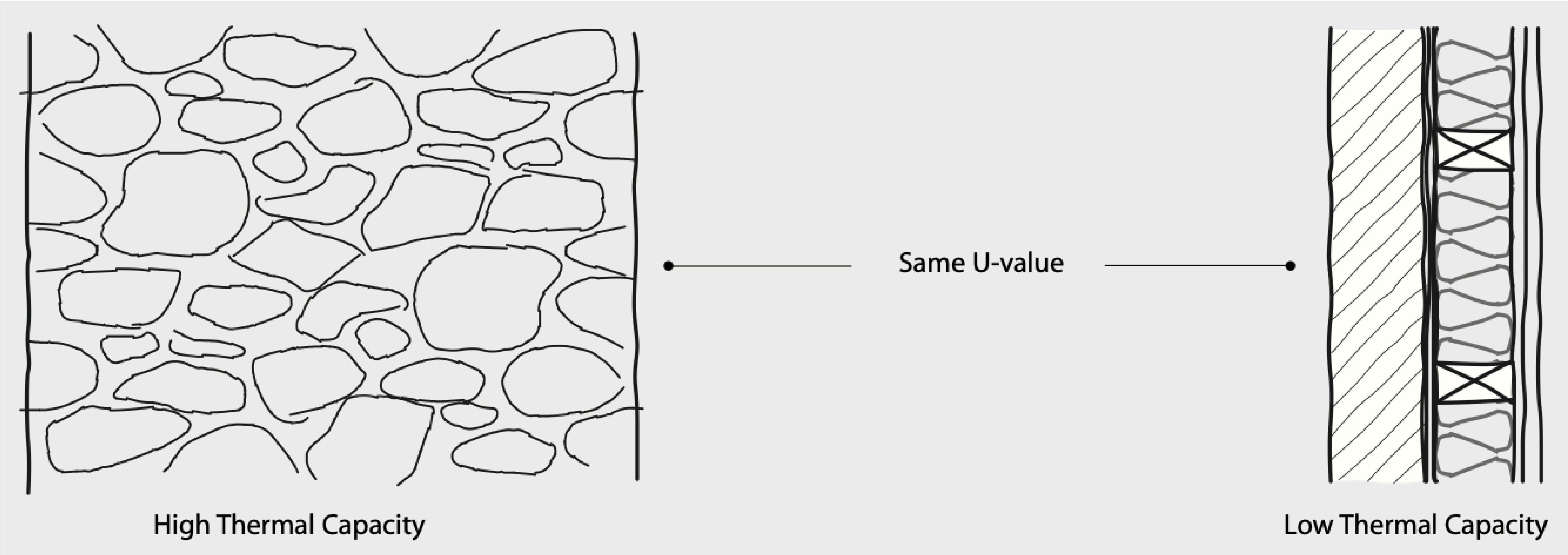











High Thermal Capacity
Same U-value
Low Thermal Capacity

DEAP

S5 Age bands

A set of age bands is defined according to Table S1 for the purposes of assigning U-values and other data.

Table S1: Age bands

Age band	Years of construction
A	before 1900
B	1900-1929
C	1930-1949
D	1950-1966
E	1967-1977
F	1978-1982
G	1983-1993
H	1994-1999
I	2000-2004
J	2005 onwards (without BER certificate already)

Table S2: Building Regulations summary[1]

Year of regulations	Applicable age band	U-values (W/m^2K)		
		Roof	Wall	Floor
1976 (Draft)	F[2]	0.4	1.1	0.6
1981 (Draft)	G	0.4	0.6	0.6
1991	H[3]	0.35	0.55	0.45/0.6
1997	I	0.35	0.55	0.45/0.6
2002	J	0.25	0.37	0.37

S6 Constructional types and U-values

U-values of construction elements are determined from the constructional type and date of construction. U-values are assessed separately for the main part of the dwelling and for any extension. Where Building Regulations are available, the associated U-value from Table S2 is used. Any other walls with insulation can have non default U-values entered.

S6.1 U-values of walls

This section details default wall U-values where there is insufficient information to enter non-default U-values. Lookup of the defaults in Tables S3 and S3a are automatically referenced by DEAP software. Values from Table S3b are entered into DEAP by the user.

Table S3: Exposed wall U-values[1]

Age Band	A	B	C	D	E	F	G	H	I	J
Wall type										
Stone	2.1	2.1	2.1	2.1	2.1	1.1	0.6	0.55	0.55	0.37
225mm solid brick	2.1	2.1	2.1	2.1	2.1	1.1	0.6	0.55	0.55	0.37
325mm solid brick	1.64	1.64	1.64	1.64	1.64	1.1	0.6	0.55	0.55	0.37
300mm cavity	2.1	1.78	1.78	1.78	1.78	1.1	0.6	0.55	0.55	0.37
300mm filled cavity	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.55	0.55	0.37
solid mass concrete	2.2	2.2	2.2	2.2	2.2	1.1	0.6	0.55	0.55	0.37
concrete hollow block	2.4	2.4	2.4	2.4	2.4	1.1	0.6	0.55	0.55	0.37
timber frame	2.5	1.9	1.9	1.1	1.1	1.1	0.6	0.55	0.55	0.37
Unknown	2.1	2.1	2.1	2.1	2.1	1.1	0.6	0.55	0.55	0.37
425 mm Cavity Wall	1.73	1.51	1.51	1.51	1.51	1.1	0.6	0.55	0.55	0.37
425 mm filled cavity	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.55	0.55	0.37

If the dwelling is of age band F or G but the roof of the dwelling is shown to have no insulation, then the wall must be assumed to be age band E (no insulation)

[1] These U-values may be used as a starting point for calculating U-values of similar walls with insulation provided evidence is available to substantiate the insulation levels used in any U-value calculations.

DEAP

S5 Age bands

A set of age bands is defined according to Table S1 for the purposes of assigning U-values and other data.

Table S1: Age bands

Age band	Years of construction
A	before 1900
B	1900-1929
C	1930-1949
D	1950-1966
E	1967-1977
F	1978-1982
G	1983-1993
H	1994-1999
I	2000-2004
J	2005 onwards (without BER certificate already)

Table S2: Building Regulations summary[1]

Year of regulations	Applicable age band	U-values (W/m²K)		
		Roof	Wall	Floor
1976 (Draft)	F[2]	0.4	1.1	0.6
1981 (Draft)	G	0.4	0.6	0.6
1991	H[3]	0.35	0.55	0.45/0.6
1997	I	0.35	0.55	0.45/0.6
2002	J	0.25	0.37	0.37

S6 Constructional types and U-values

U-values of construction elements are determined from the constructional type and date of construction. U-values are assessed separately for the main part of the dwelling and for any extension. Where Building Regulations are available, the associated U-value from Table S2 is used. Any other walls with insulation can have non default U-values entered.

S6.1 U-values of walls

This section details default wall U-values where there is insufficient information to enter non-default U-values. Lookup of the defaults in Tables S3 and S3a are automatically referenced by DEAP software. Values from Table S3b are entered into DEAP by the user.

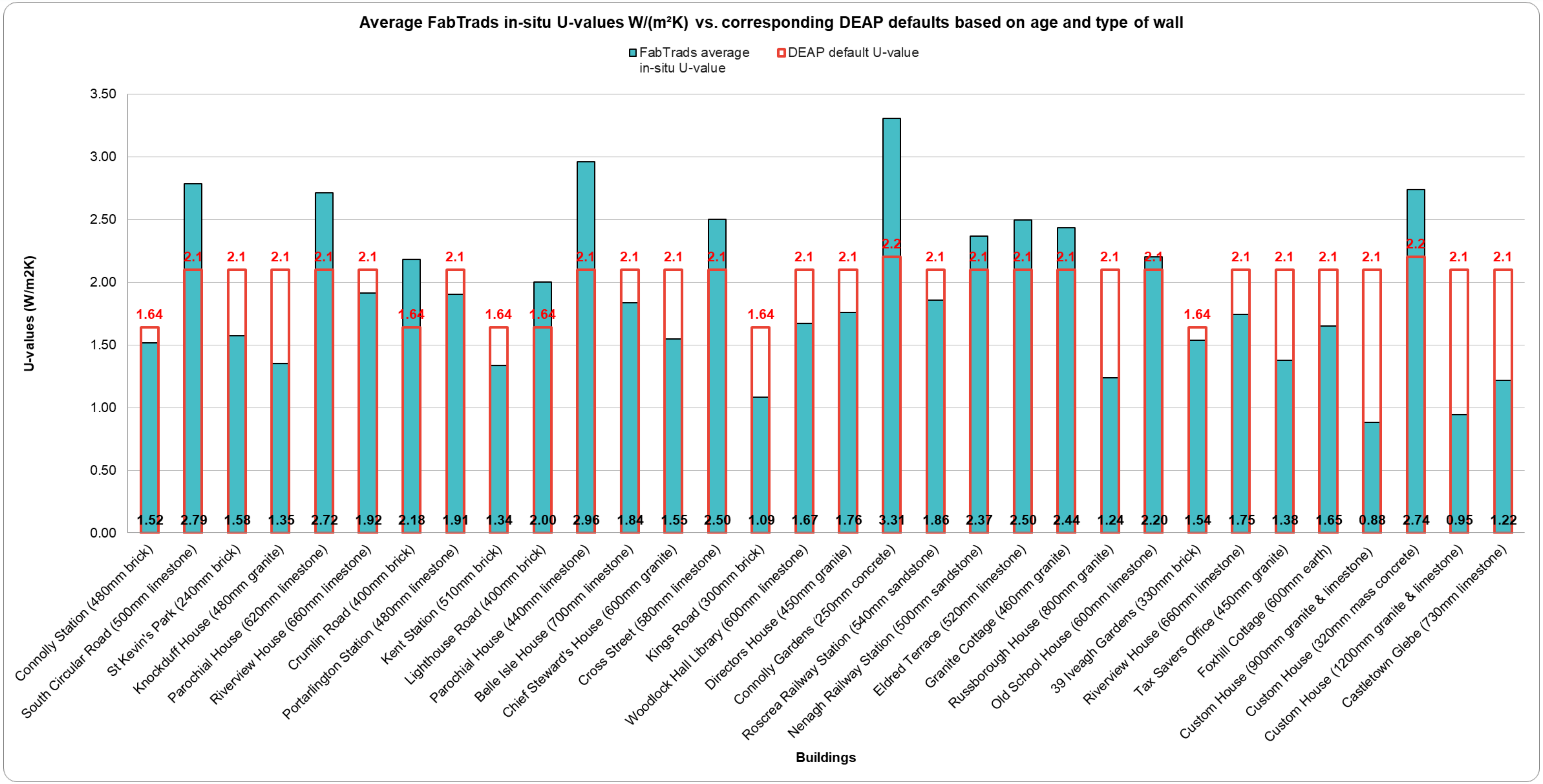
Table S3: Exposed wall U-values[1]

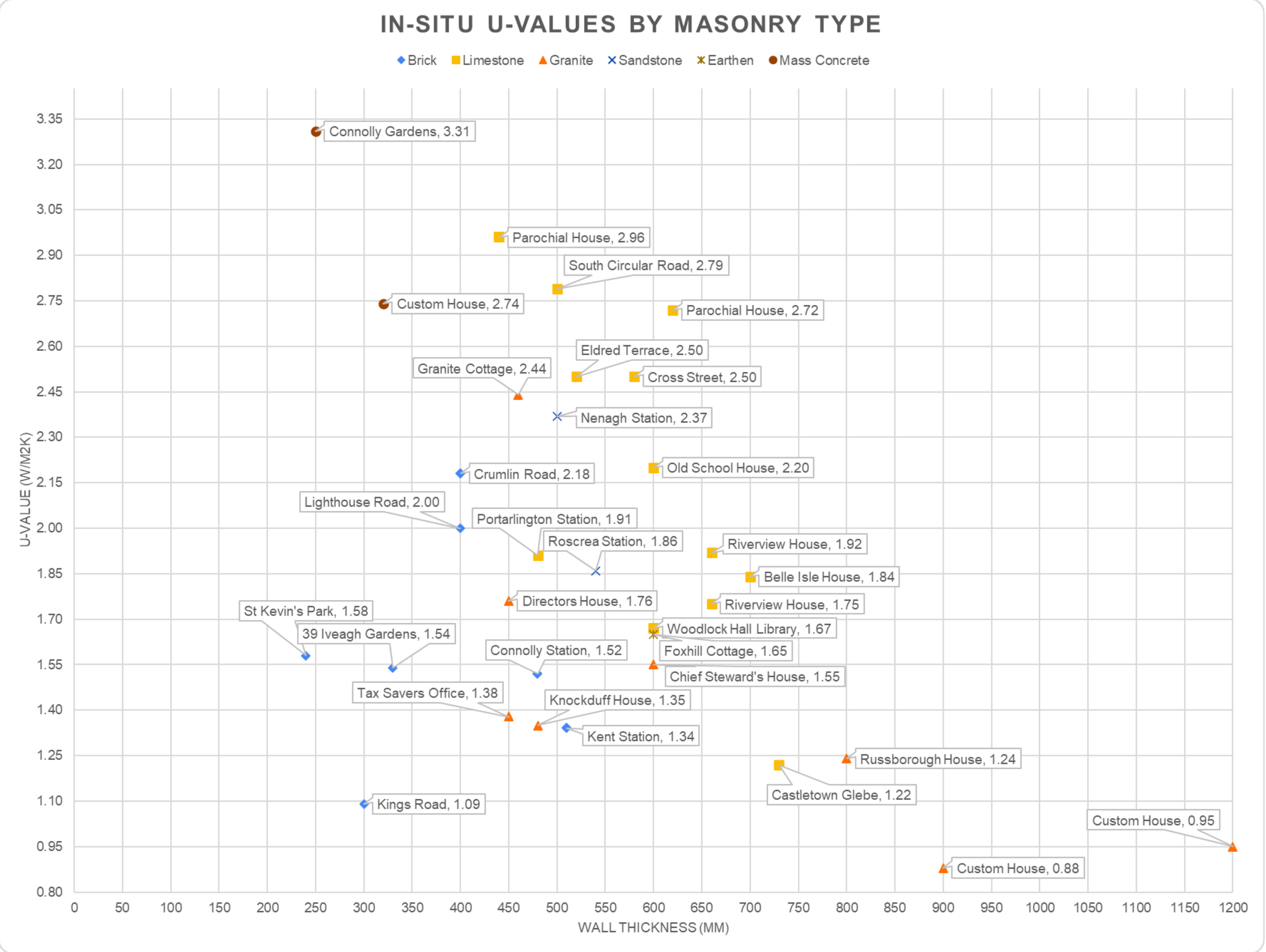
Age Band	A	B	C	D	E	F	G	H	I	J
[illegible]										
Stone	2.1	2.1	2.1	2.1	2.1	1.1	0.6	0.55	0.55	0.37
225mm solid brick	2.1	2.1	2.1	2.1	2.1	1.1	0.6	0.55	0.55	0.37
325mm solid brick	1.64	1.64	1.64	1.64	1.64	1.1	0.6	0.55	0.55	0.37
300mm cavity	2.1	1.78	1.78	1.78	1.78	1.1	0.6	0.55	0.55	0.37
300mm filled cavity	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.55	0.55	0.37
solid mass concrete	2.2	2.2	2.2	2.2	2.2	1.1	0.6	0.55	0.55	0.37
concrete hollow block	2.4	2.4	2.4	2.4	2.4	1.1	0.6	0.55	0.55	0.37
timber frame	2.5	1.9	1.9	1.1	1.1	1.1	0.6	0.55	0.55	0.37
Unknown	2.1	2.1	2.1	2.1	2.1	1.1	0.6	0.55	0.55	0.37
425 mm Cavity Wall	1.73	1.51	1.51	1.51	1.51	1.1	0.6	0.55	0.55	0.37
425 mm filled cavity	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.55	0.55	0.37

If the dwelling is of age band F or G but the roof of the dwelling is shown to have no insulation, then the wall must be assumed to be age band E (no insulation)

[1] These U-values may be used as a starting point for calculating U-values of similar walls with insulation provided evidence is available to substantiate the insulation levels used in any U-value calculations.

In-situ U-values




IN-SITU U-VALUES BY MASONRY TYPE
Brick
Limestone
Granite
Sandstone
Earthen
Mass Concrete
U-VALUE (W/M2K)
WALL THICKNESS (MM)
Connolly Gardens, 3.31
Parochial House, 2.96
South Circular Road, 2.79
Custom House, 2.74
Parochial House, 2.72
Eldred Terrace, 2.50
Granite Cottage, 2.44
Cross Street, 2.50
Nenagh Station, 2.37
Crumlin Road, 2.18
Old School House, 2.20
Lighthouse Road, 2.00
Portarlington Station, 1.91
Roscrea Station, 1.86
Riverview House, 1.92
Belle Isle House, 1.84
Directors House, 1.76
Riverview House, 1.75
St Kevin's Park, 1.58
39 Iveagh Gardens, 1.54
Woodlock Hall Library, 1.67
Connolly Station, 1.52
Foxhill Cottage, 1.65
Chief Steward's House, 1.55
Tax Savers Office, 1.38
Knockduff House, 1.35
Kent Station, 1.34
Russborough House, 1.24
Castletown Glebe, 1.22
Kings Road, 1.09
Custom House, 0.95
Custom House, 0.88

Stone

S5 Age bands

A set of age bands is defined according to Table S1 for the purposes of assigning U-values and other data.

Table S1: Age bands

Age band	Years of construction
A	before 1900
B	1900-1929
C	1930-1949
D	1950-1966
E	1967-1977
F	1978-1982
G	1983-1993
H	1994-1999
I	2000-2004
J	2005 onwards (without BER certificate already)

Table S2: Building Regulations summary[1]

Year of regulations	Applicable age band	U-values (W/m²K)		
		Roof	Wall	Floor
1976 (Draft)	F[2]	0.4	1.1	0.6
1981 (Draft)	G	0.4	0.6	0.6
1991	H[3]	0.35	0.55	0.45/0.6
1997	I	0.35	0.55	0.45/0.6
2002	J	0.25	0.37	0.37

S6 Constructional types and U-values

U-values of construction elements are determined from the constructional type and date of construction. U-values are assessed separately for the main part of the dwelling and for any extension. Where Building Regulations are available, the associated U-value from Table S2 is used. Any other walls with insulation can have non default U-values entered.

S6.1 U-values of walls

This section details default wall U-values where there is insufficient information to enter non-default U-values. Lookup of the defaults in Tables S3 and S3a are automatically referenced by DEAP software. Values from Table S3b are entered into DEAP by the user.

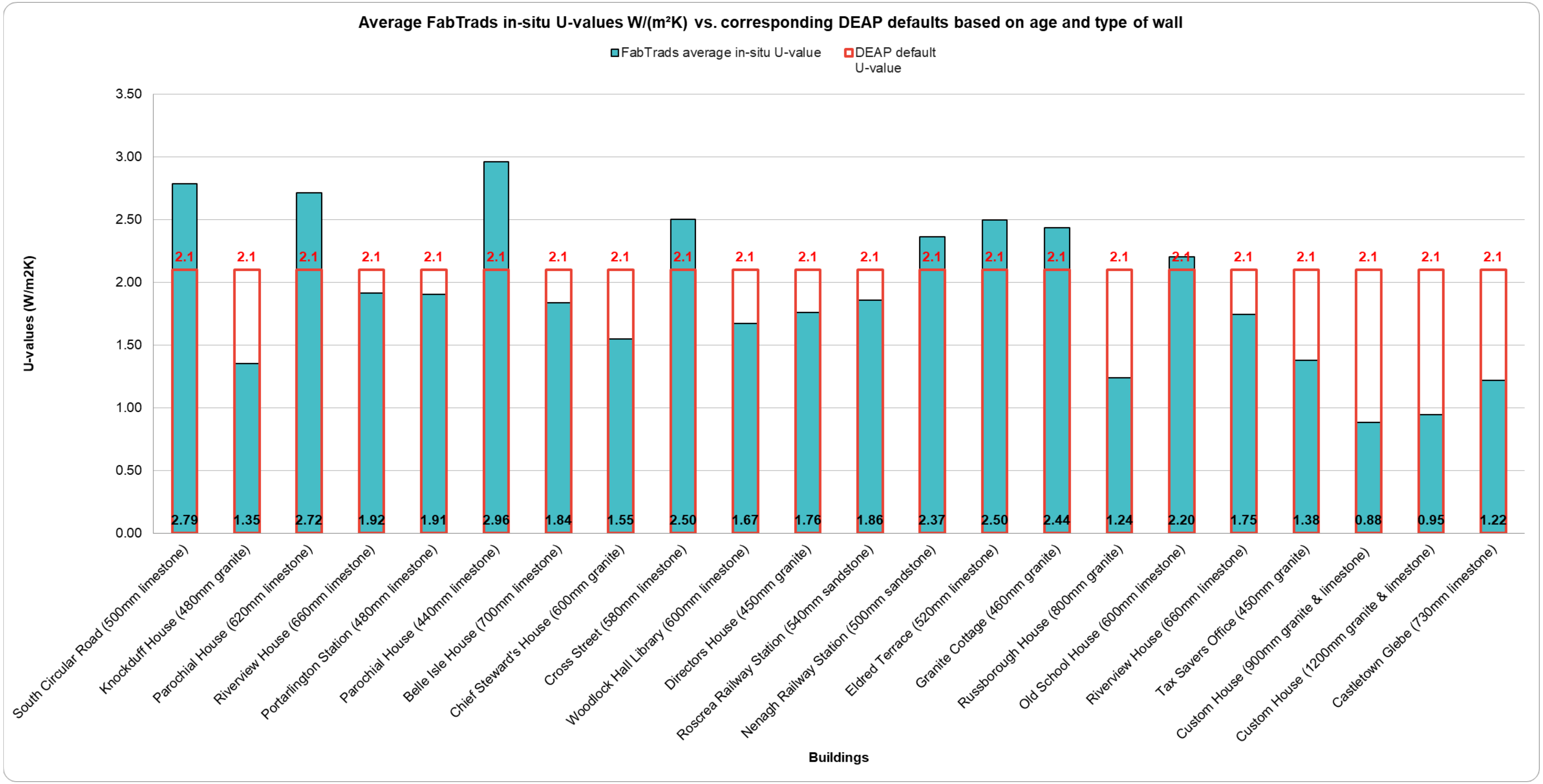
Table S3: Exposed wall U-values[1]

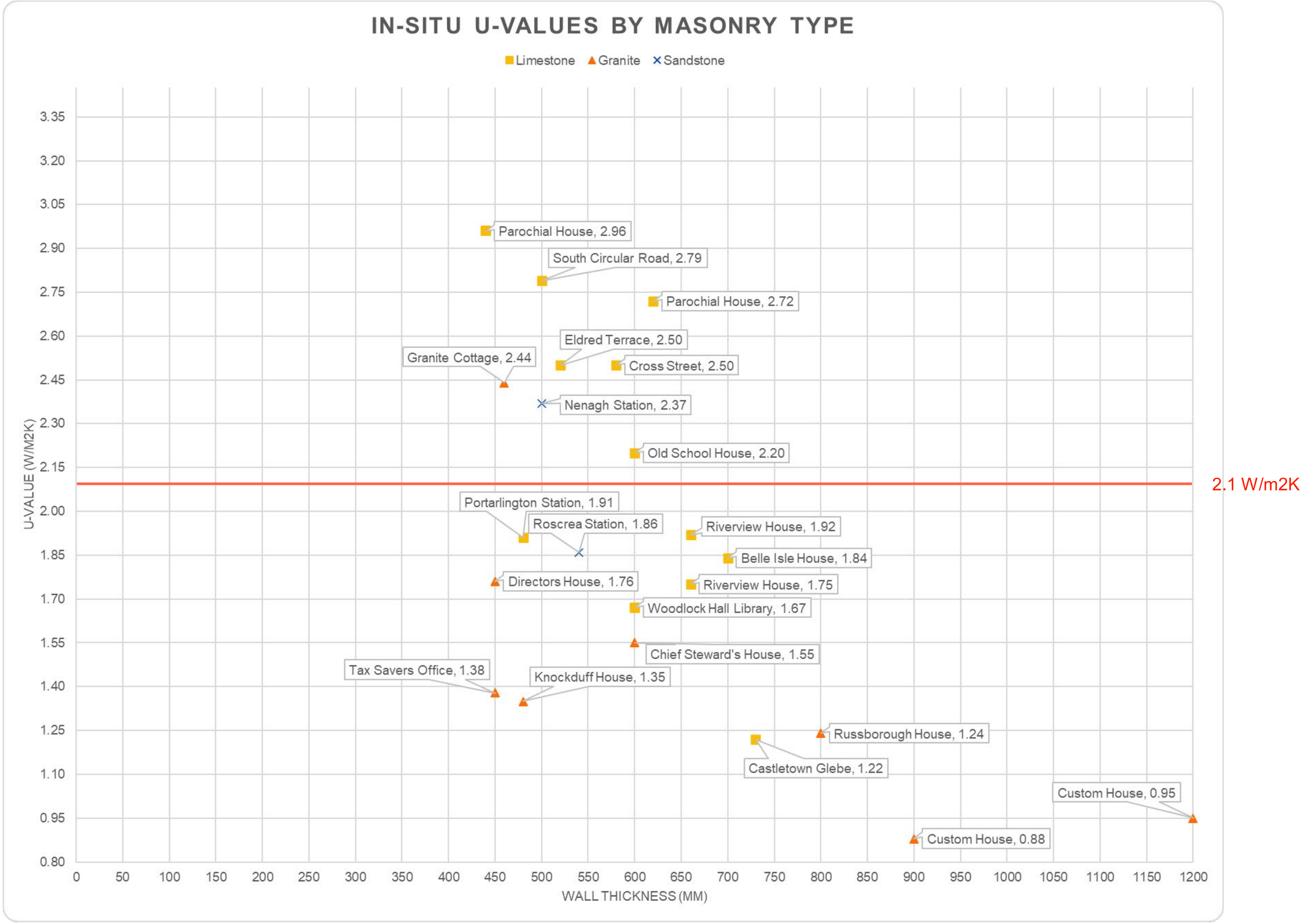
Age Band	A	B	C	D	E	F	G	H	I	J
[illegible]										
Stone	2.1	2.1	2.1	2.1	2.1	1.1	0.6	0.55	0.55	0.37
225mm solid brick	2.1	2.1	2.1	2.1	2.1	1.1	0.6	0.55	0.55	0.37
325mm solid brick	1.64	1.64	1.64	1.64	1.64	1.1	0.6	0.55	0.55	0.37
300mm cavity	2.1	1.78	1.78	1.78	1.78	1.1	0.6	0.55	0.55	0.37
300mm filled cavity	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.55	0.55	0.37
solid mass concrete	2.2	2.2	2.2	2.2	2.2	1.1	0.6	0.55	0.55	0.37
concrete hollow block	2.4	2.4	2.4	2.4	2.4	1.1	0.6	0.55	0.55	0.37
timber frame	2.5	1.9	1.9	1.1	1.1	1.1	0.6	0.55	0.55	0.37
Unknown	2.1	2.1	2.1	2.1	2.1	1.1	0.6	0.55	0.55	0.37
425 mm Cavity Wall	1.73	1.51	1.51	1.51	1.51	1.1	0.6	0.55	0.55	0.37
425 mm filled cavity	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.55	0.55	0.37

If the dwelling is of age band F or G but the roof of the dwelling is shown to have no insulation, then the wall must be assumed to be age band E (no insulation)

[1] These U-values may be used as a starting point for calculating U-values of similar walls with insulation provided evidence is available to substantiate the insulation levels used in any U-value calculations.

Stone


Average FabTrads in-situ U-values W/(m²K) vs. corresponding DEAP defaults based on age and type of wall
FabTrads average in-situ U-value
DEAP default U-value
U-values (W/m2K)
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2.1
2.79
1.35
2.72
1.92
1.91
2.96
1.84
1.55
2.50
1.67
1.76
1.86
2.37
2.50
2.44
1.24
2.20
1.75
1.38
0.88
0.95
1.22
South Circular Road (500mm limestone)
Knockduff House (480mm granite)
Parochial House (620mm limestone)
Riverview House (660mm limestone)
Portarlington Station (480mm limestone)
Parochial House (440mm limestone)
Belle Isle House (700mm limestone)
Chief Steward's House (600mm granite)
Cross Street (580mm limestone)
Woodlock Hall Library (600mm limestone)
Directors House (450mm granite)
Roscrea Railway Station (540mm sandstone)
Nenagh Railway Station (500mm sandstone)
Eldred Terrace (520mm limestone)
Granite Cottage (460mm granite)
Russborough House (800mm granite)
Old School House (600mm limestone)
Riverview House (660mm limestone)
Tax Savers Office (450mm granite)
Custom House (900mm granite & limestone)
Custom House (1200mm granite & limestone)
Castletown Glebe (730mm limestone)
Buildings


IN-SITU U-VALUES BY MASONRY TYPE
Limestone
Granite
Sandstone
U-VALUE (W/M2K)
3.35
3.20
3.05
2.90
2.75
2.60
2.45
2.30
2.15
2.00
1.85
1.70
1.55
1.40
1.25
1.10
0.95
0.80
WALL THICKNESS (MM)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000
1050
1100
1150
1200
Parochial House, 2.96
South Circular Road, 2.79
Parochial House, 2.72
Eldred Terrace, 2.50
Granite Cottage, 2.44
Cross Street, 2.50
Nenagh Station, 2.37
Old School House, 2.20
2.1 W/m2K
Portarlington Station, 1.91
Roscrea Station, 1.86
Riverview House, 1.92
Belle Isle House, 1.84
Directors House, 1.76
Riverview House, 1.75
Woodlock Hall Library, 1.67
Chief Steward's House, 1.55
Tax Savers Office, 1.38
Knockduff House, 1.35
Russborough House, 1.24
Castletown Glebe, 1.22
Custom House, 0.95
Custom House, 0.88

Brick, Earthen, Concrete

S5 Age bands

A set of age bands is defined according to Table S1 for the purposes of assigning U-values and other data.

Table S1: Age bands

Age band	Years of construction
A	before 1900
B	1900-1929
C	1930-1949
D	1950-1966
E	1967-1977
F	1978-1982
G	1983-1993
H	1994-1999
I	2000-2004
J	2005 onwards (without BER certificate already)

Table S2: Building Regulations summary[1]

Year of regulations	Applicable age band	U-values (W/m²K)		
		Roof	Wall	Floor
1976 (Draft)	F[2]	0.4	1.1	0.6
1981 (Draft)	G	0.4	0.6	0.6
1991	H[3]	0.35	0.55	0.45/0.6
1997	I	0.35	0.55	0.45/0.6
2002	J	0.25	0.37	0.37

S6 Constructional types and U-values

U-values of construction elements are determined from the constructional type and date of construction. U-values are assessed separately for the main part of the dwelling and for any extension. Where Building Regulations are available, the associated U-value from Table S2 is used. Any other walls with insulation can have non default U-values entered.

S6.1 U-values of walls

This section details default wall U-values where there is insufficient information to enter non-default U-values. Lookup of the defaults in Tables S3 and S3a are automatically referenced by DEAP software. Values from Table S3b are entered into DEAP by the user.

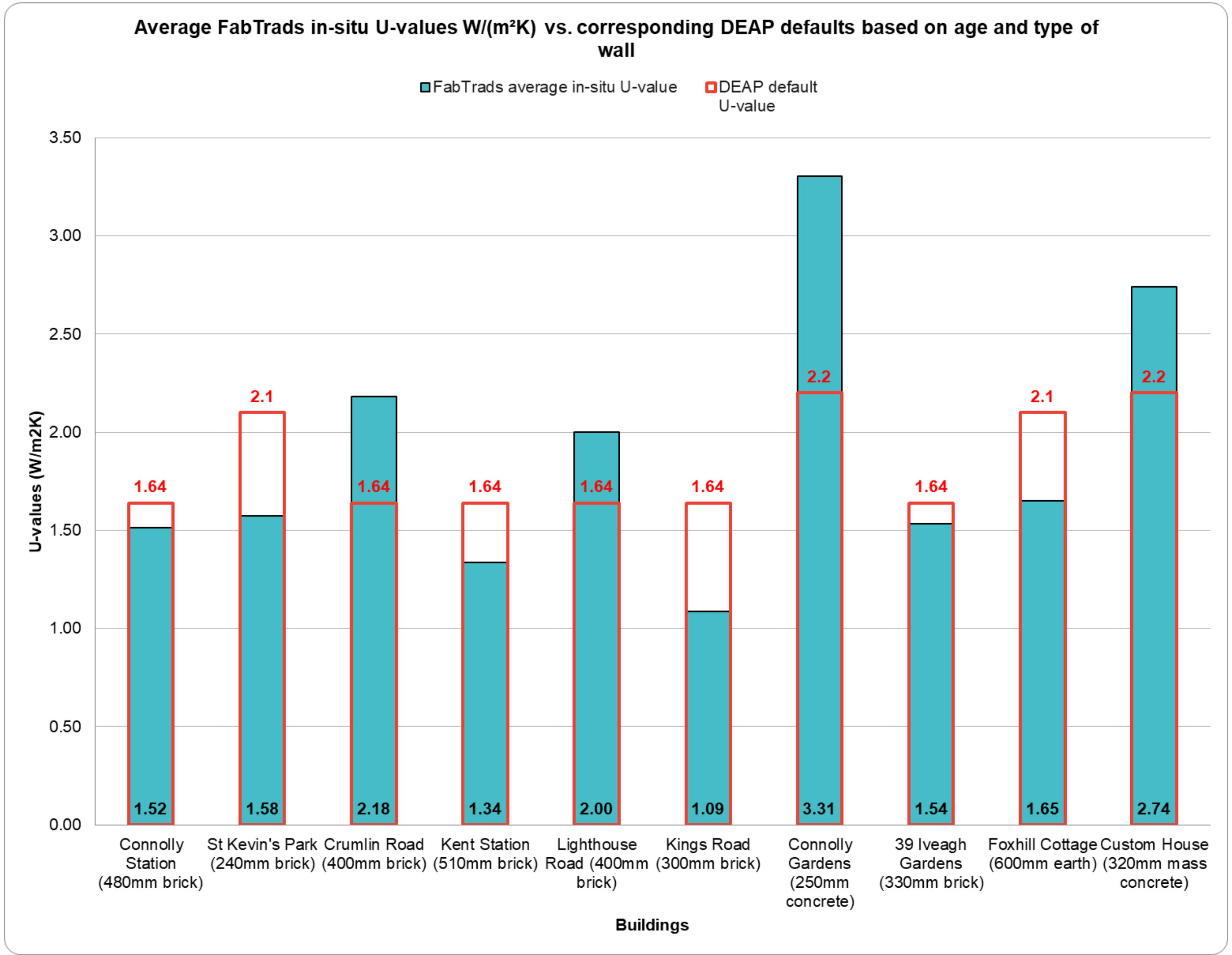
Table S3: Exposed wall U-values[1]

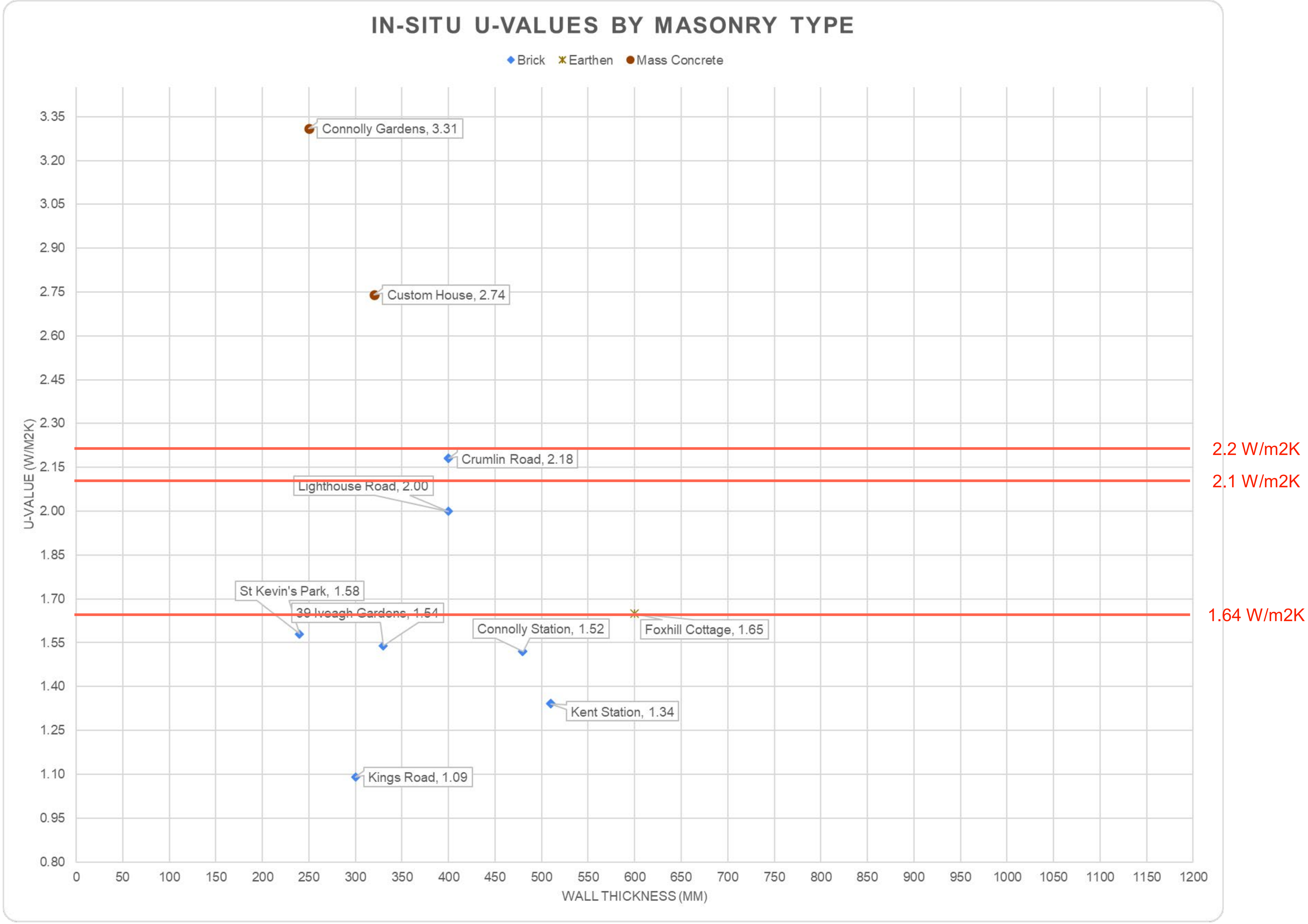
Age Band	A	B	C	D	E	F	G	H	I	J
Wall type										
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
225mm solid brick	2.1	2.1	2.1	2.1	2.1	1.1	0.6	0.55	0.55	0.37
325mm solid brick	1.64	1.64	1.64	1.64	1.64	1.1	0.6	0.55	0.55	0.37
300mm cavity	2.1	1.78	1.78	1.78	1.78	1.1	0.6	0.55	0.55	0.37
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
solid mass concrete	2.2	2.2	2.2	2.2	2.2	1.1	0.6	0.55	0.55	0.37
concrete hollow block	2.4	2.4	2.4	2.4	2.4	1.1	0.6	0.55	0.55	0.37
timber frame	2.5	1.9	1.9	1.1	1.1	1.1	0.6	0.55	0.55	0.37
Unknown	2.1	2.1	2.1	2.1	2.1	1.1	0.6	0.55	0.55	0.37
425 mm Cavity Wall	1.73	1.51	1.51	1.51	1.51	1.1	0.6	0.55	0.55	0.37
425 mm filled cavity	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.55	0.55	0.37

If the dwelling is of age band F or G but the roof of the dwelling is shown to have no insulation, then the wall must be assumed to be age band E (no insulation)

[1] These U-values may be used as a starting point for calculating U-values of similar walls with insulation provided evidence is available to substantiate the insulation levels used in any U-value calculations.

Brick, Earthen, Concrete




IN-SITU U-VALUES BY MASONRY TYPE
Brick
Earthen
Mass Concrete
U-VALUE (W/M2K)
WALL THICKNESS (MM)
Connolly Gardens, 3.31
Custom House, 2.74
Crumlin Road, 2.18
Lighthouse Road, 2.00
St Kevin's Park, 1.58
39 Iveagh Gardens, 1.54
Connolly Station, 1.52
Foxhill Cottage, 1.65
Kent Station, 1.34
Kings Road, 1.09
2.2 W/m2K
2.1 W/m2K
1.64 W/m2K
3.35
3.20
3.05
2.90
2.75
2.60
2.45
2.30
2.15
2.00
1.85
1.70
1.55
1.40
1.25
1.10
0.95
0.80
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000
1050
1100
1150
1200

Hygrothermal Testing

Stone

Brick

Lime Mortar, Render, Plaster

Early Concrete

Moisture

- Bulk density/porosity
- Sorption Isotherms
- Capillary absorption
- Vapour permeability
- Drying capacity

Thermal

- Thermal conductivity at different moisture contents

Measuring the properties of traditional Irish building materials to improve the accuracy of Hygrothermal Modeling and the selection of appropriate Internal Insulation for solid walls

Laboratory Testing

Thermal conductivity testing

- To ASTM 5334:2022 (transient line source) vs EN 12664 (steady state, guarded hot plate)
- At 30-50% RH, 80% and saturation

Bulk Density testing

- EN 1936:2006
- Vacuum chambers with water inlets
- underfloor weighing of sample submerged in water and weight of wet dabbed sample

Moisture adsorption

- To ISO 12572:2012
- Moisture content at equilibrium at different RH in climate chamber
- 50%, 80%, 95%, 98%

Laboratory Testing

Free Saturation

- To EN13755:2008
- Water absorption at atmospheric pressure
- Measured at 3days

Vapour permeability

- To ISO 12572:2016
- Moisture transfer through sample from 50% RH (chamber) to 0% RH (over salt) – dry cup

- extended to include testing of vapour permeability of water repellent / hydrophobising treatments

Capillary absorption testing

- ISO 15148:2002
- Different setups for highly absorptive and unabsorptive samples required

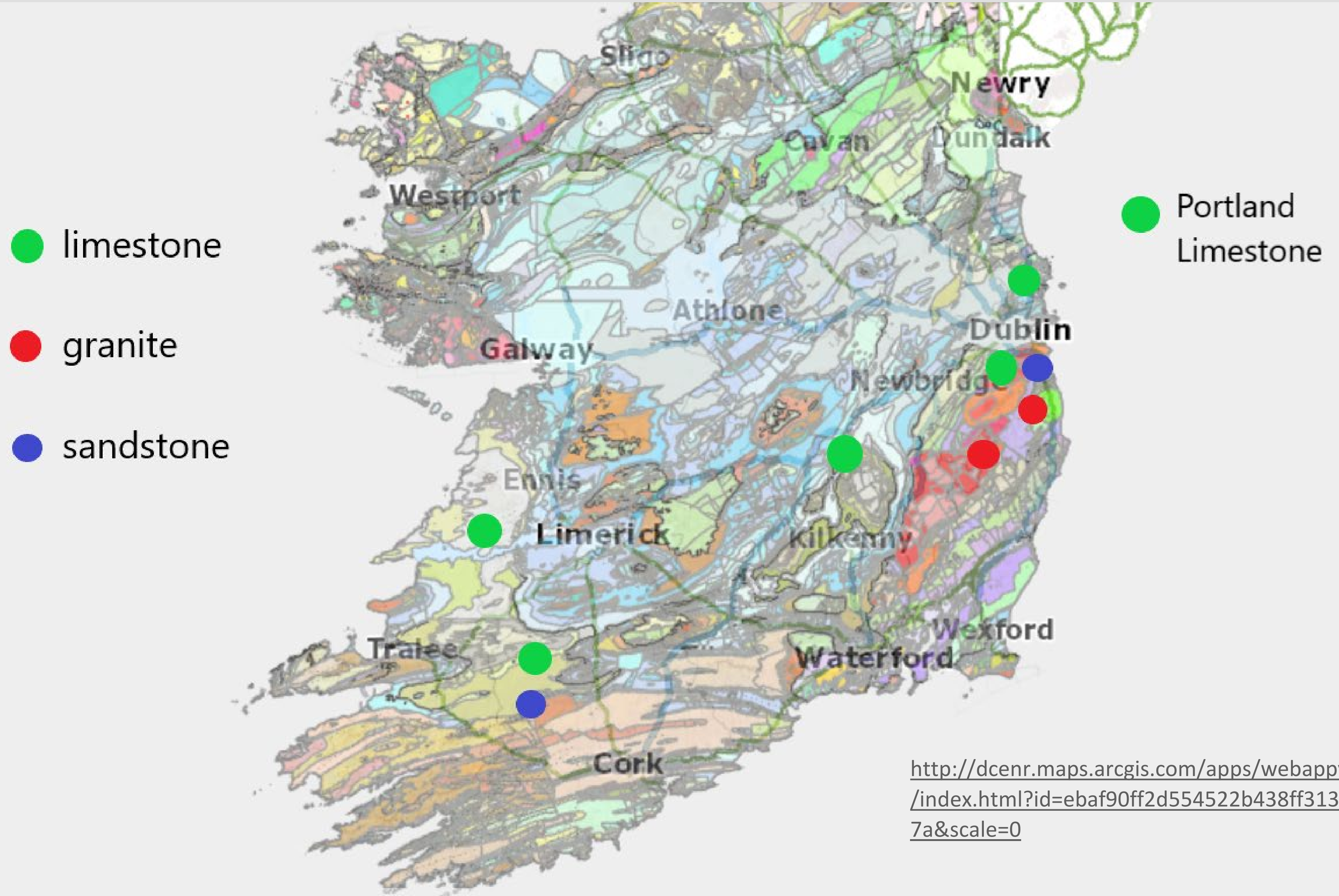
Stones

Samples tested:

1x Granite
- Carlow

3x Sandstone
- North Dublin
- Limerick red
- Limerick yellow

5x Limestone
- Laois
- Calp Dublin
- Limerick
- Ardbraccan
- Portland



http://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=ebaf90ff2d554522b438ff313b0c197a&scale=0

Site to Lab

Stones

Howth Stone (Quartzite)

Limerick Sandstone (red)

Limerick Limestone (yellow

Carlow Granite

Laois Limestone

Dublin Calp

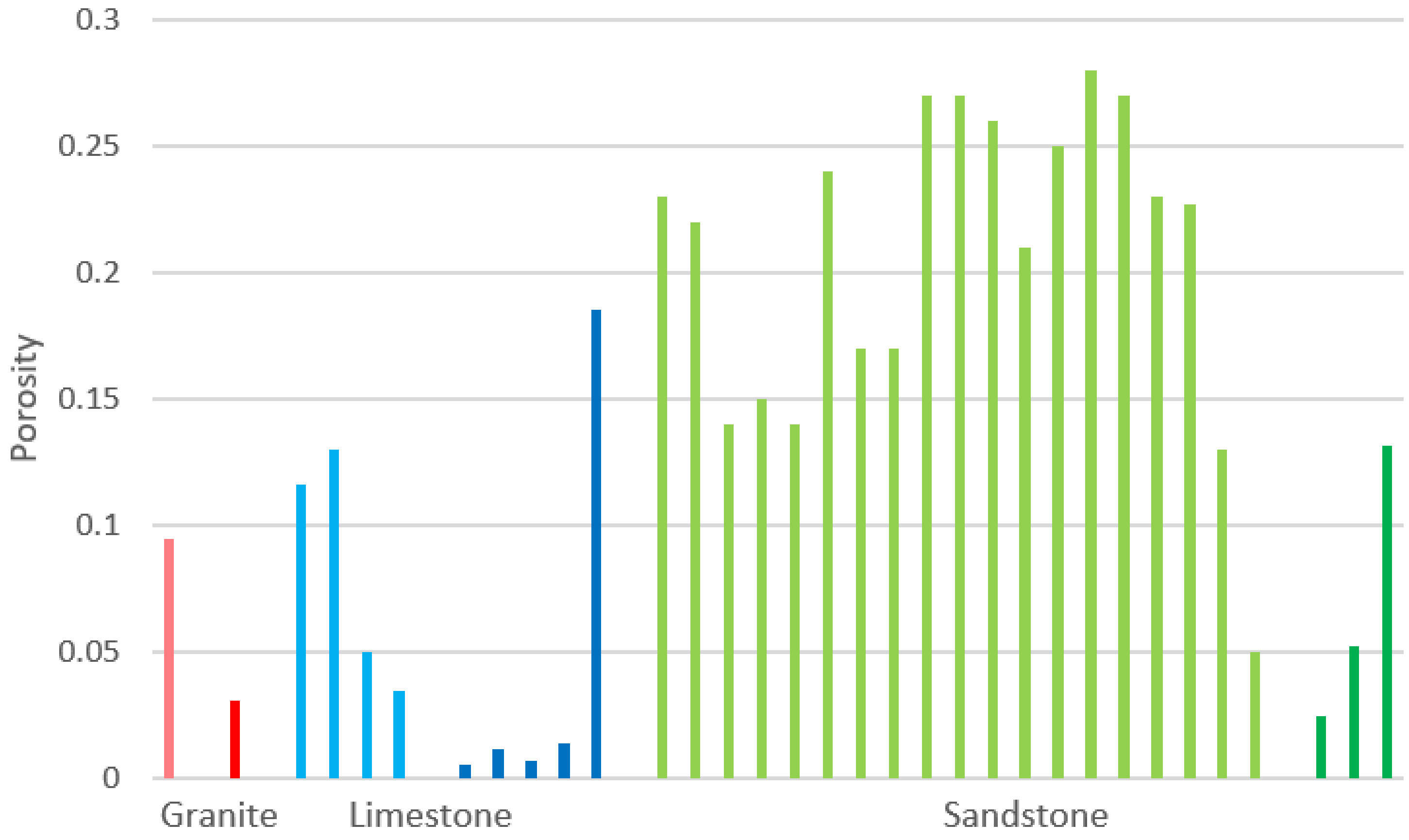
Limerick Limestone

Ardbraccan Limestone

Portland Limestone

Porosity

How do Irish (FabTrads) materials compare with other stones (WUFI database)?



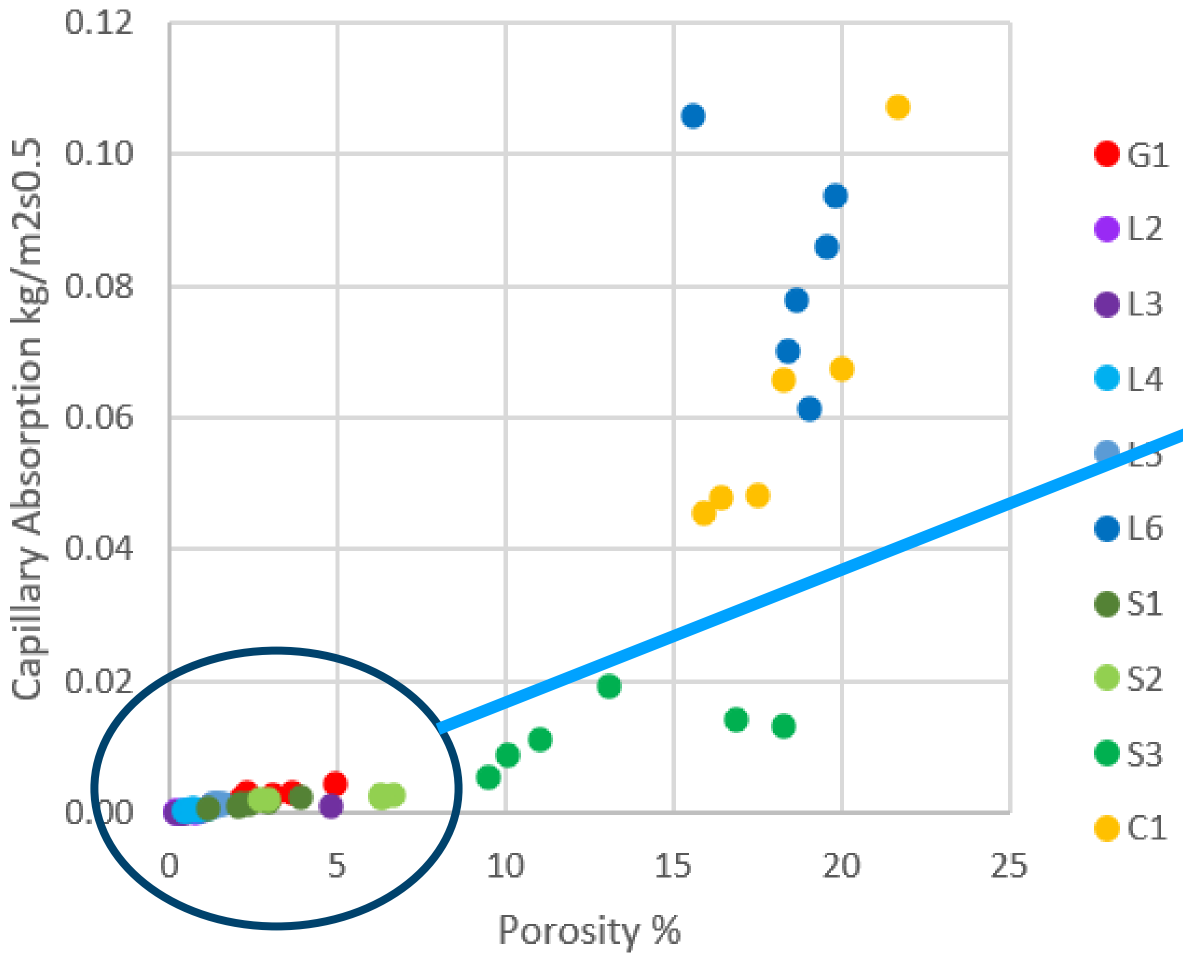
- Irish Limestone and sandstone measured by FabTrads (dark colours) have lower porosity than other stones (data from WUFI materials – light colours)
- L6 (Portland Limestone) and S3 have higher porosity and are more in-line with WUFI materials

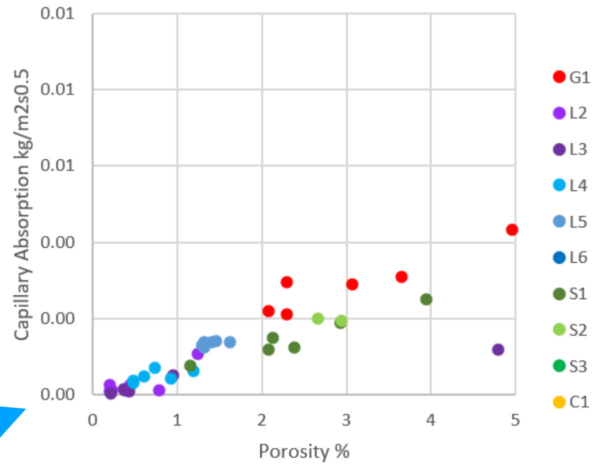
Capillary Absorption

at low porosity (<10%):

linear relationship between porosity and capillary absorption

less evident over 15%

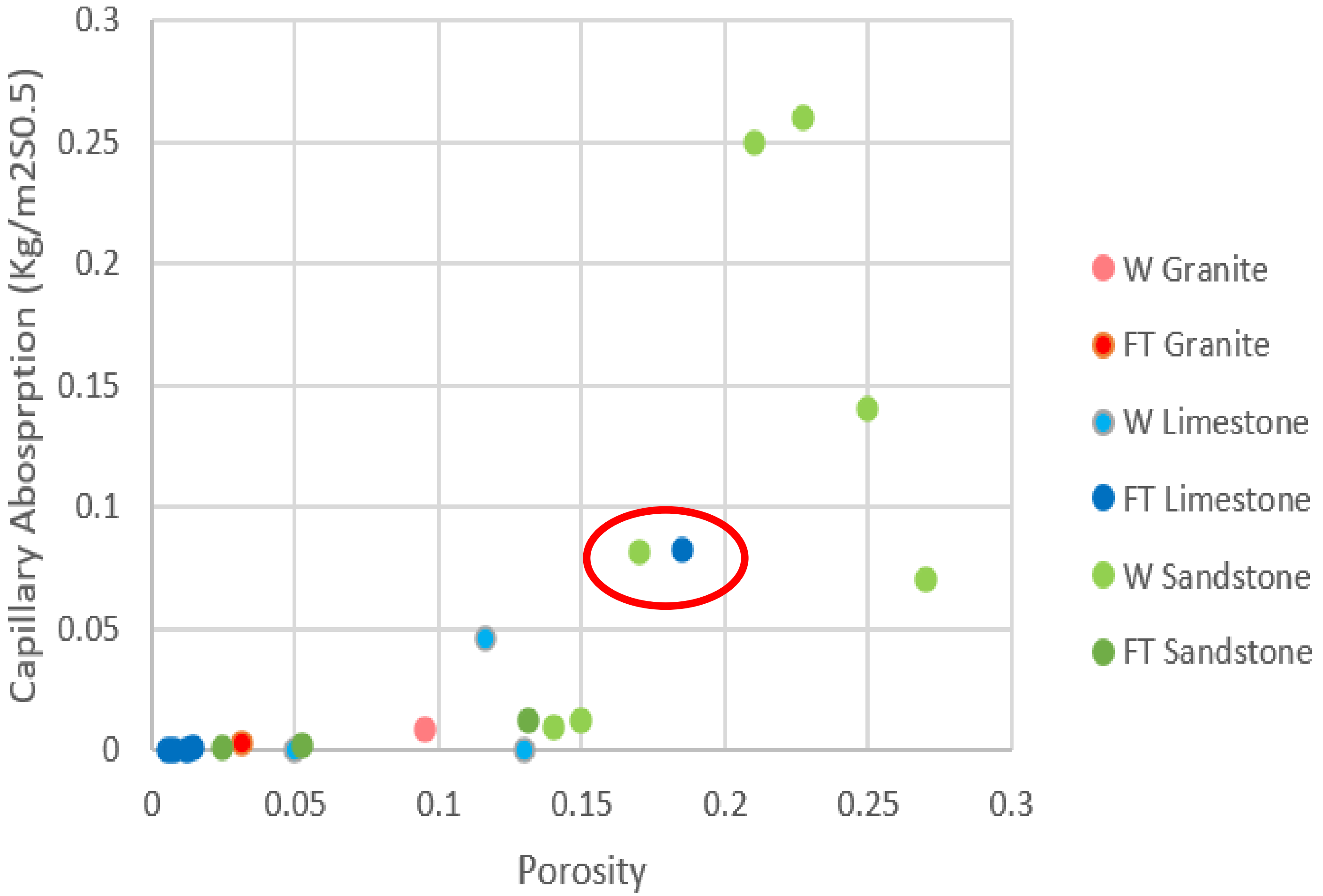




Capillary Absorption

How do Irish (FabTrads) materials compare with other stones (WUFI database)?

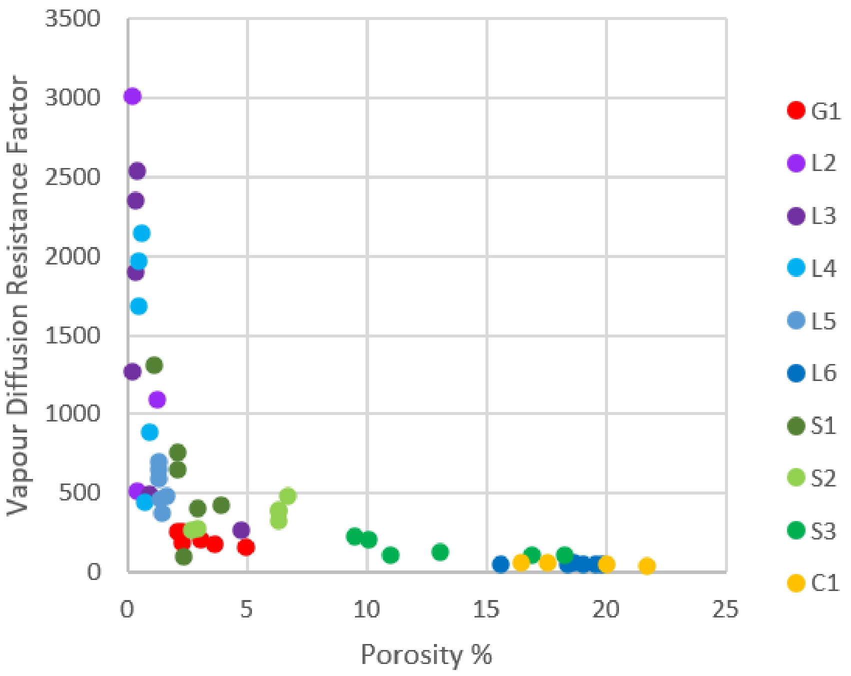
- Irish limestones and sandstones have lower porosity than WUFI materials and therefore lower capillary absorption
- In instances with similar porosity, the FabTrads materials have similar values to the WUFI materials



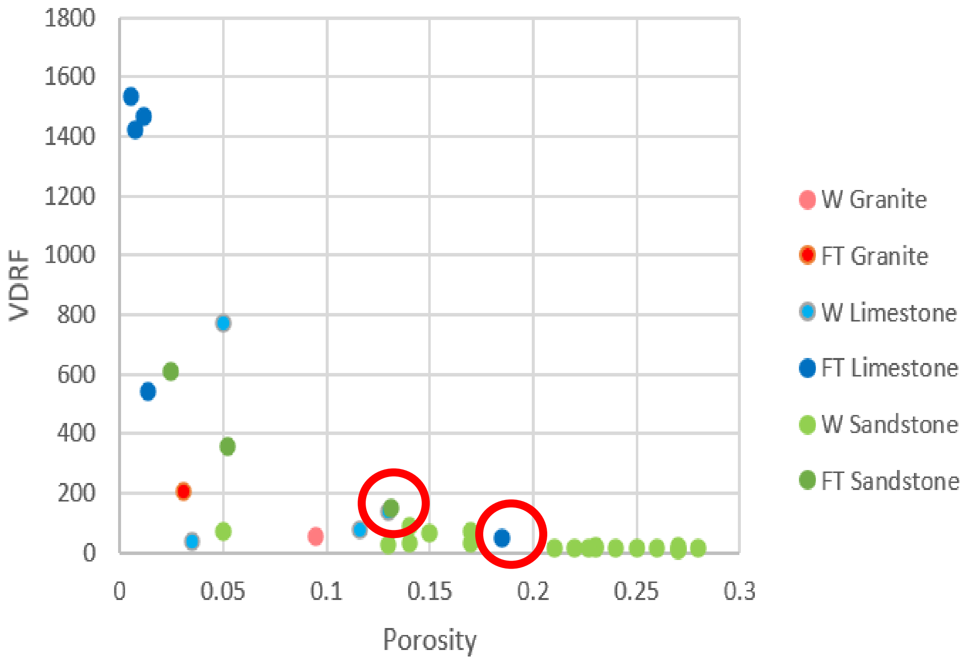
Porosity Vs Capillary Absorption for all average FabTrads samples and WUFI materials

Vapour Permeability

How do Irish (FabTrads) materials compare with other stones (WUFI database)?



Porosity vs VDRF for all FabTrads samples

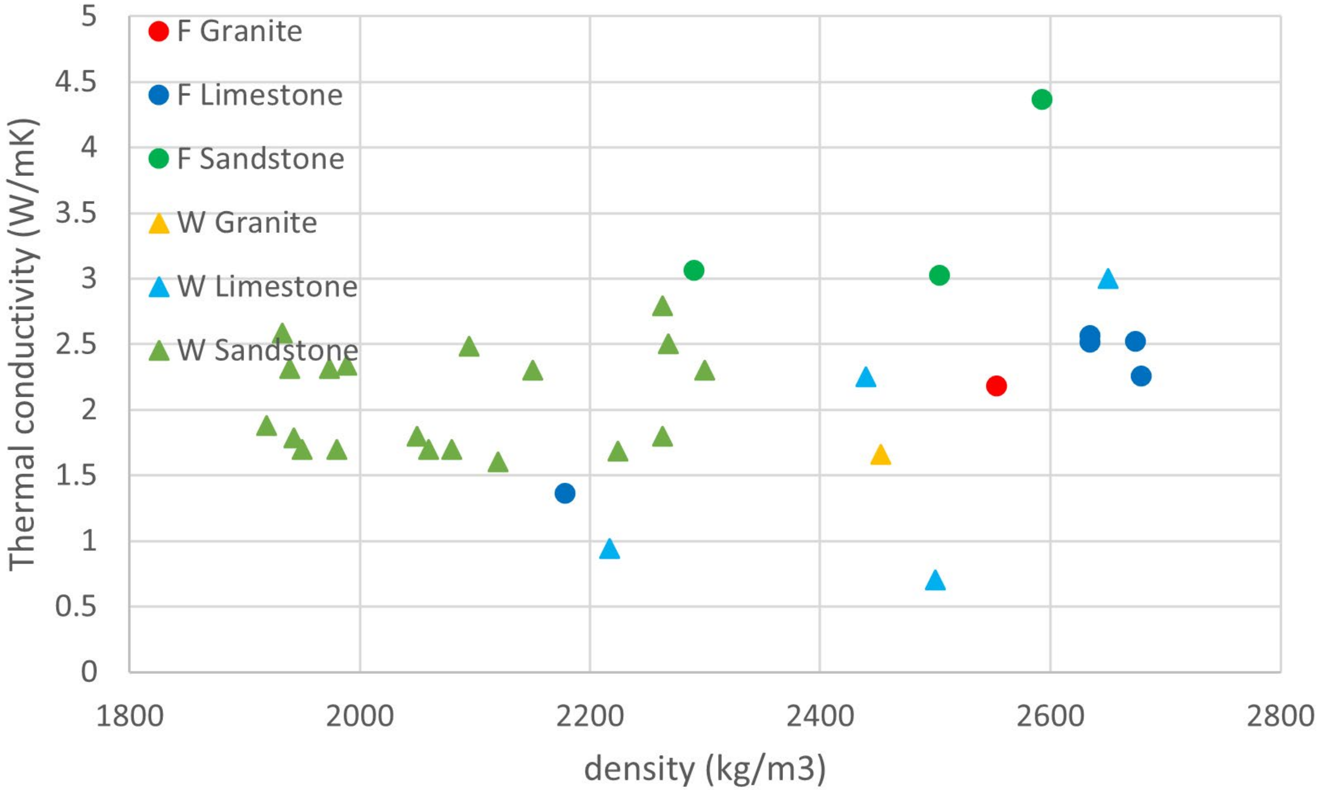


Porosity vs VDRF for all average FabTrads samples and WUFI materials

- Irish limestones and sandstones have lower porosity than WUFI materials and therefore higher VDRF
- L6 and S3 have higher porosity and VDRF and are in-line with WUFI materials
- VDRF dramatically increases at low porosities

Thermal Conductivity

How do Irish (FabTrads) materials compare with other stones (WUFI database)?



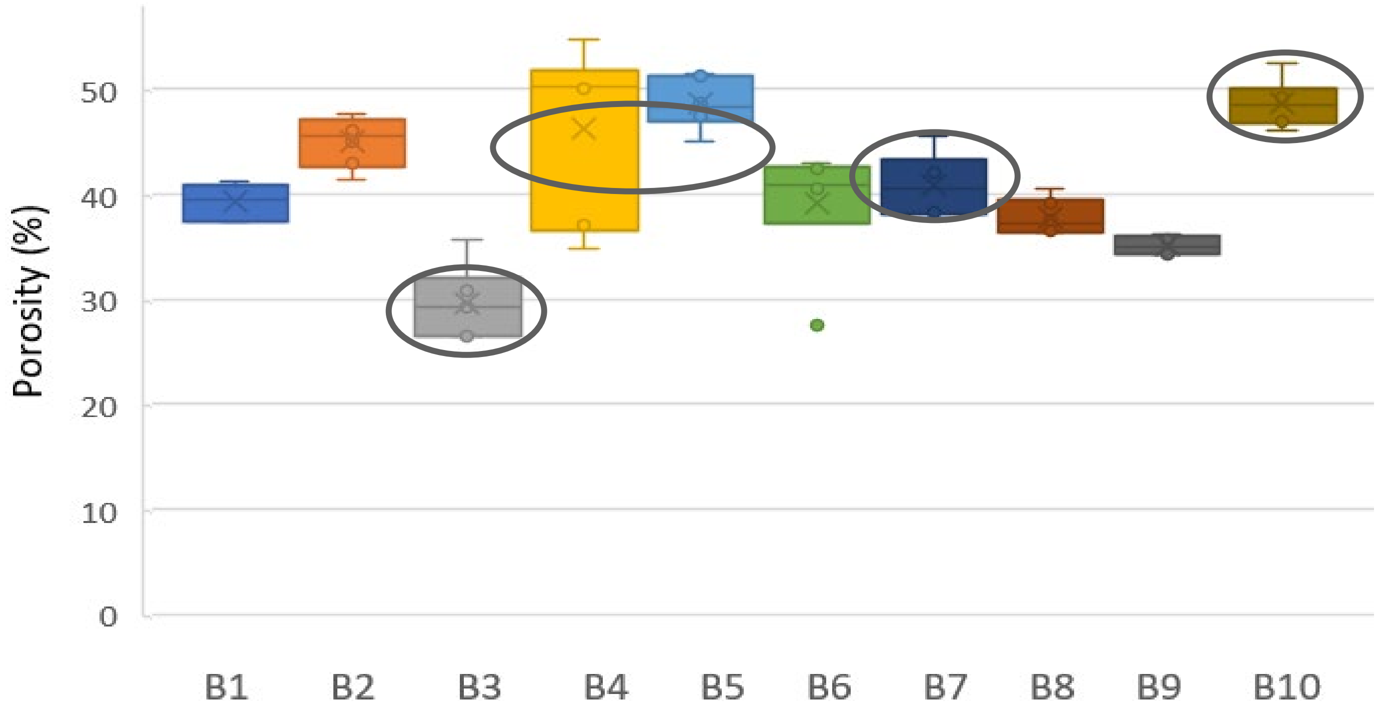
- Irish limestones, granites and sandstones have higher density / lower porosity than WUFI materials and therefore higher Thermal Conductivity (within comparable mineralogy)
- Stones of comparable mineralogy and density display comparable thermal conductivities
- The thermal conductivity of a stone is primarily influenced by its mineralogy rather than density

Bricks

5* Handmade, 5* machine made
2* 18th century, 7* 19th century, 1*20th century
3* Co. Cork, 5*Co. Dublin, 1*Co Laois

Porosity

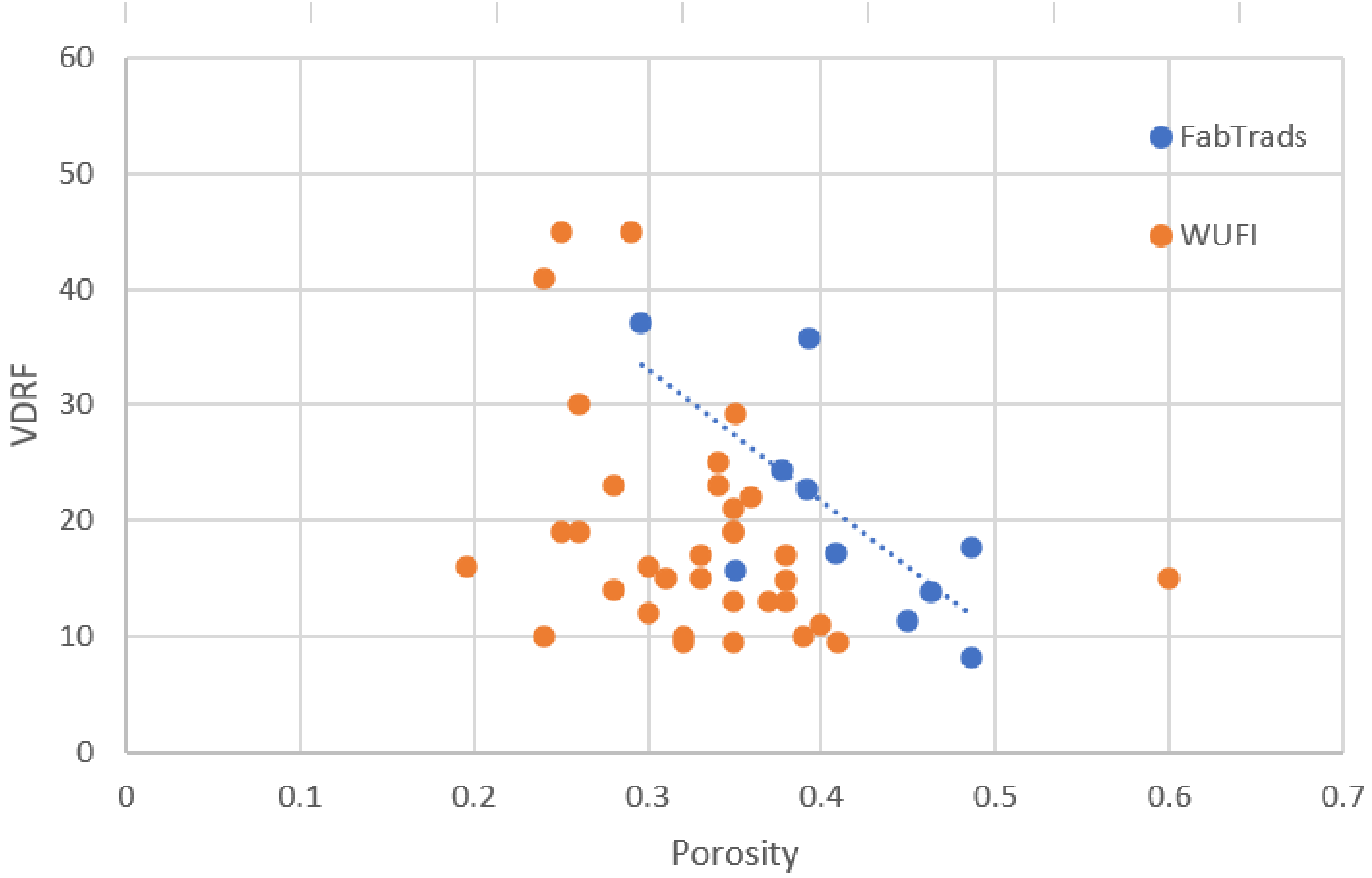
How do Irish (FabTrads) materials compare with other stones (WUFI database)?



- Irish bricks have a porosity typically over 30%
- no clear relationship between age of brick and porosity – whether they are handmade or machine-made has the biggest influence
- The traditional Irish bricks are typically more porous and less dense than the brick within the WUFI database

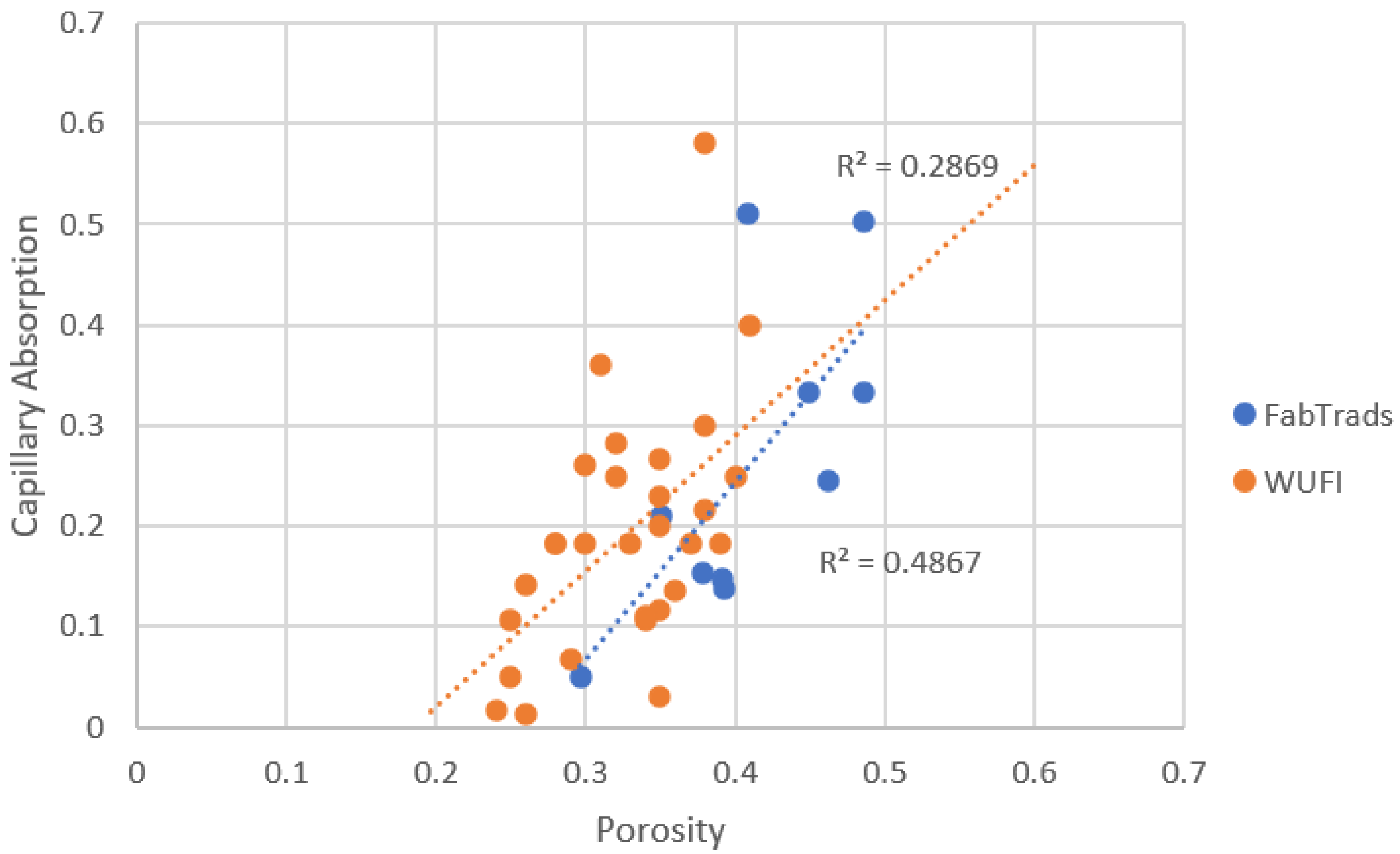
Vapour permeability

shows a trend between increasing vapour diffusion resistance factor and reducing porosity (R^2=0.38).



Capillary Absorption

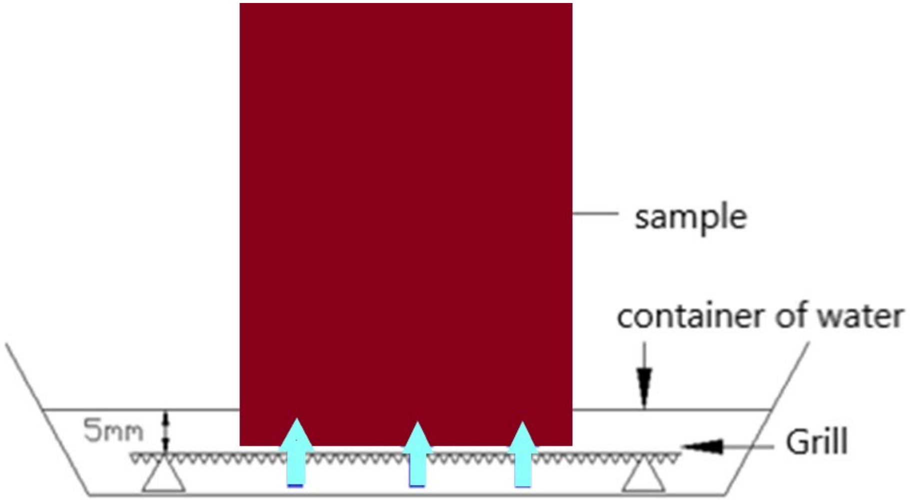
Irish bricks have porosities in excess of c.30% and no longer display a strong correlation between increasing porosity and water absorption

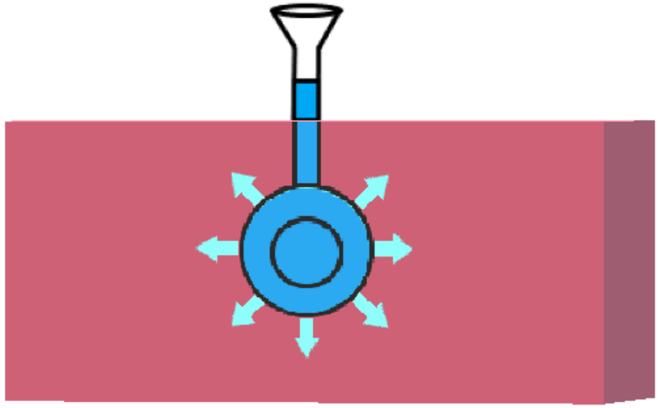


Capillary Absorption (lab) vs Karsten Tube Test

Two tests to measure how much rainwater bricks absorb

Laboratory vs in-situ





- Capillary absorption was measured in accordance with ISO15148:2002
- 1d flow
- In opposition to gravity

- Karsten tube test guided by RILEM Test Method II.4.
- 3d flow in all directions
- Pressure head of water in column

How much water do Irish Bricks absorb?

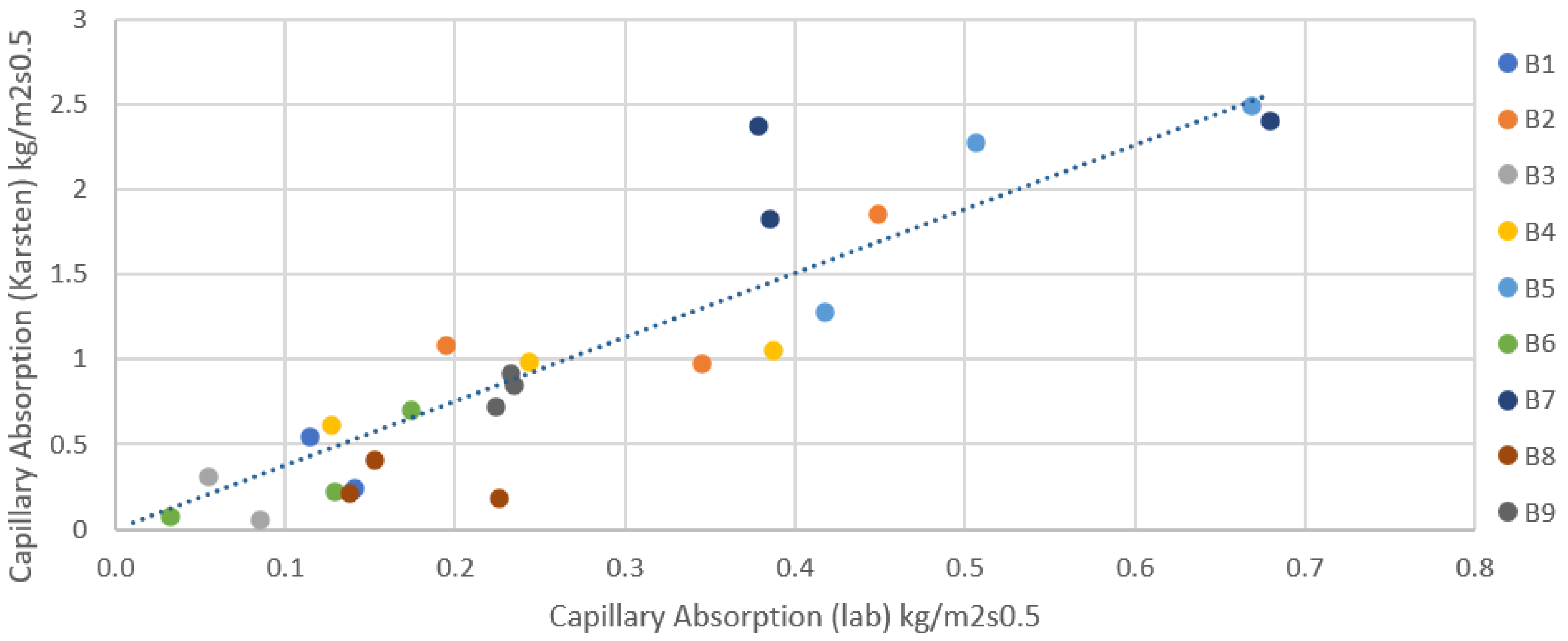
Karsten tube Results

- According to the absorption categories set out in Historic Scotland Technical Paper 15, low, medium and high absorption is categorized as 1-9ml/hr, 9-16ml/hr and >16ml/hr (Little et al., 2015).
- Brick 3 falls into the low absorption category,
- B1, B6, B8 into the medium absorption
- B4, B9 into the high absorption.
- An additional category of very high absorption could be considered for bricks with absorption >50ml/hr for B2, B5 and B7.

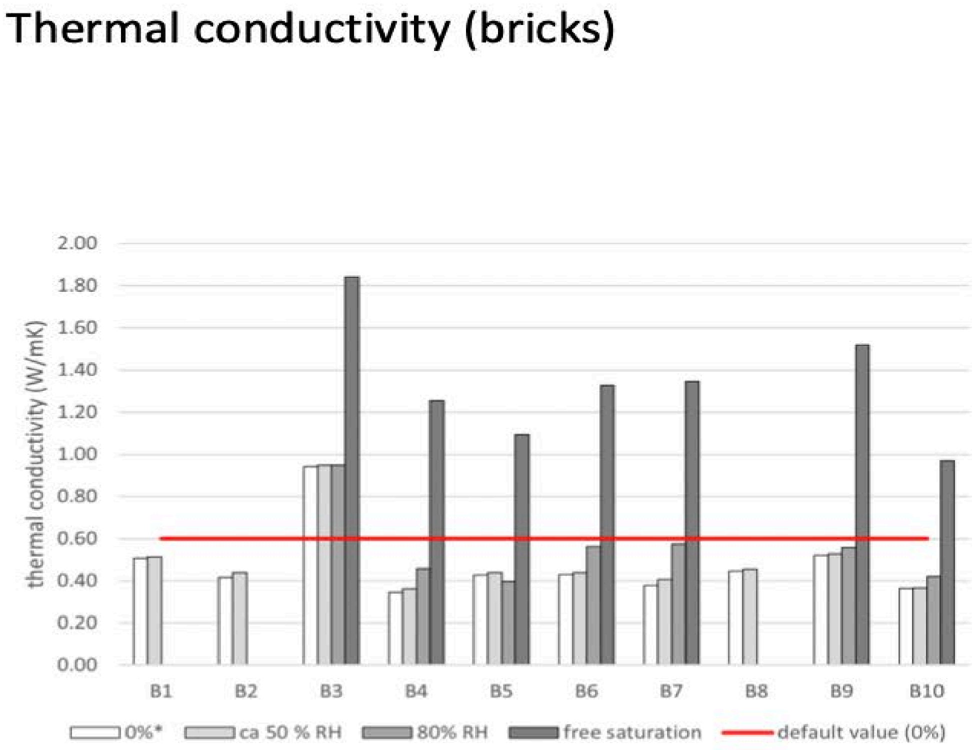
Brick	Karsten (ml/hr)
B1	13.4
B2	93.6
B3	6.3
B4	32.9
B5	176.6
B6	11.2
B7	183.2
B8	9.6
B9	36.7

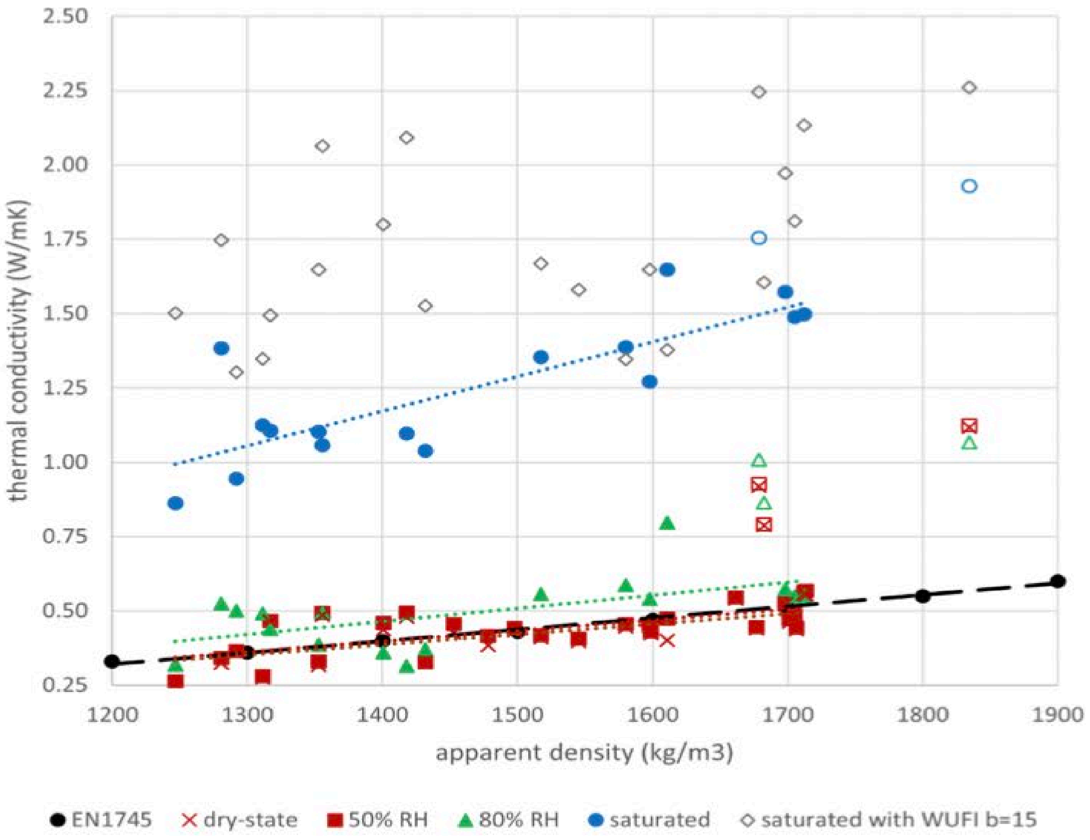
Relationship between lab and in-situ

- Relationship between Karsten tube test and their capillary absorption (lab)
- The 3-d Karsten tube is approximately 4 times greater than the 1d laboratory measured water absorption.



Thermal conductivity of bricks





… at "healthy" relative humidities is much lower than often-used dry-state defaults

… is highly dependent on the density of the brick

… on average almost triples from dry-state to saturated values

Material Datasheets

Type of Brick	Solid red brick
Likely date of manufacture	c.1700-1730
Dimensions	approx
Location collected from	Ryder Row, Capel Street, Dublin 1
Background information	Hand-made brick, likely made in Dublin
	
Physical Properties (WUFI input values)	
Bulk density	1549kg/m^3
Open Porosity	40.8%
Water adsorption at 50% / 80% / 97% rel. hum.	1.21 / 4.13 / 22.07 kg/m^3
Free Saturation	284.9kg/m^3
Vapour Diffusion Resistance Factor	17.13
Capillary absorption	0.51$kg/m^2s^{1/2}$
Thermal conductivity (dry state)	0.38W/mK
In-situ properties	
Water absorption (Karsten tube)	tbc
Internal reference number	B7_RR_D_2022-10-03

Type of Brick	Red brick, perforated with 20 holes
Likely date of manufacture	c.1870-1910
Dimensions	approx 23.5x11.5x6.5cm
Location collected from	Victorian house, Rathgar, Dublin 6
Background information	Machine-made brick, likely manufactured in Dublin but may have been imported
	
Physical Properties (WUFI input values)	
Bulk density	1644kg/m^3
Open Porosity	39.3%
Water adsorption at 50% / 80% / 97% rel. hum.	1.61 / 4.19 / 29.31 kg/m^3
Free Saturation	309.5kg/m^3
Vapour Diffusion Resistance Factor	35.8
Capillary absorption	0.14$kg/m^2s^{1/2}$
Thermal conductivity (dry state)	0.51W/mK
In-situ properties	
Water absorption (Karsten tube)	tbc
Internal reference number	B1_21OP_D_2022-08-04

Lime Plaster, Mortars, Renders (ongoing)





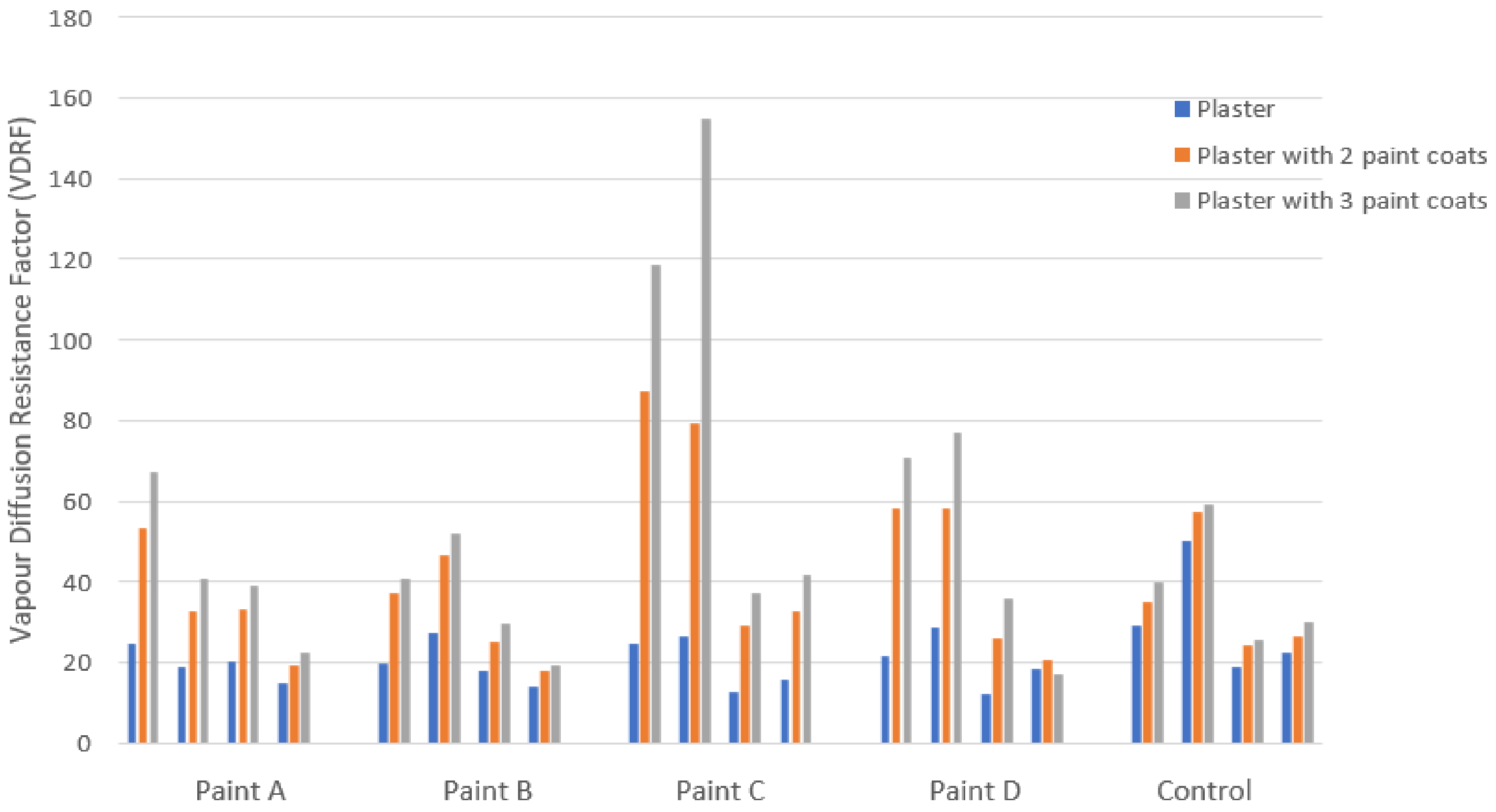






Paint on Lime Plaster

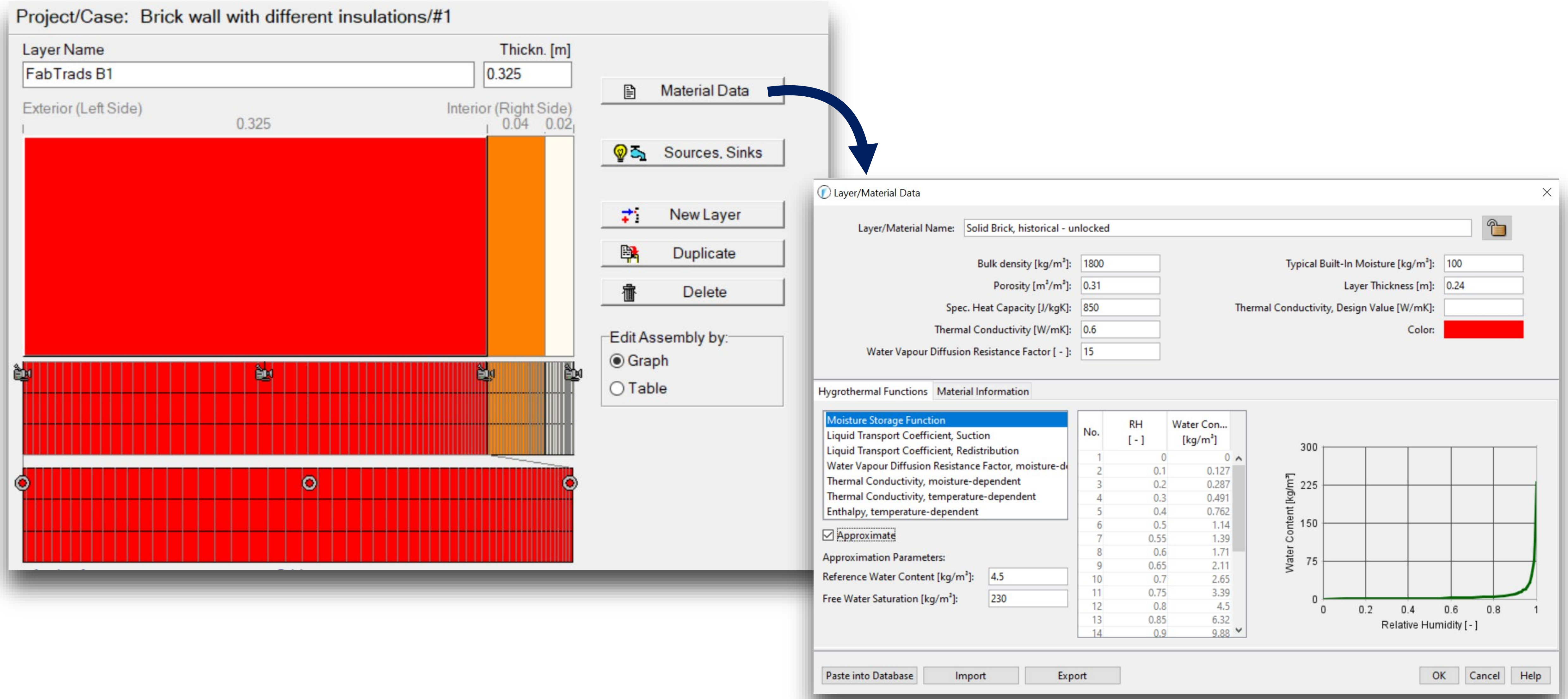
Impact of paint on the vapour permeability of lime plaster



Paint	Sd (of 2 coats)
Paint A	0.32
Paint B	0.24
Paint C	0.95
Paint D	0.51

Preliminary results – testing ongoing

Hygrothermal Testing using WUFI



FabTrads vs WUFI materials

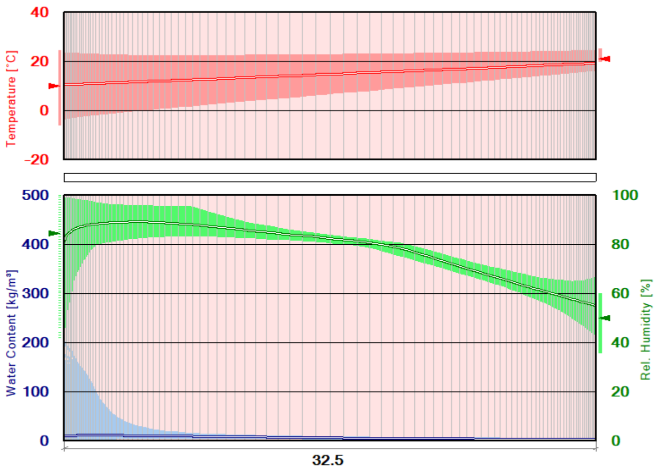
simulation of abstract wall demonstrates importance of hygrothermal input parameters

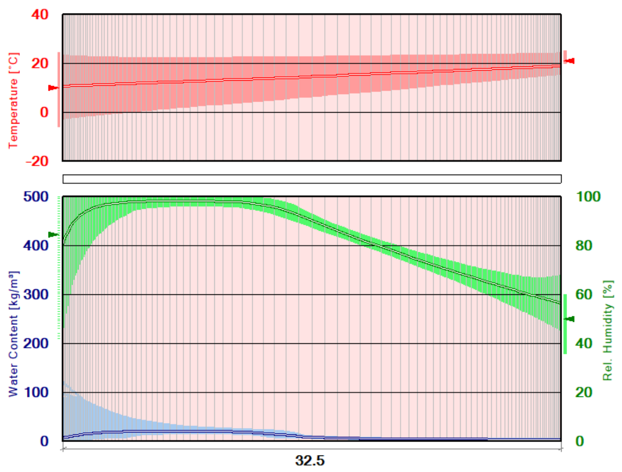
Moisture content and Relative Humidity profiles in the wall varies depending on

- properties of brick
- orientation of wall
- exposure to driving rain

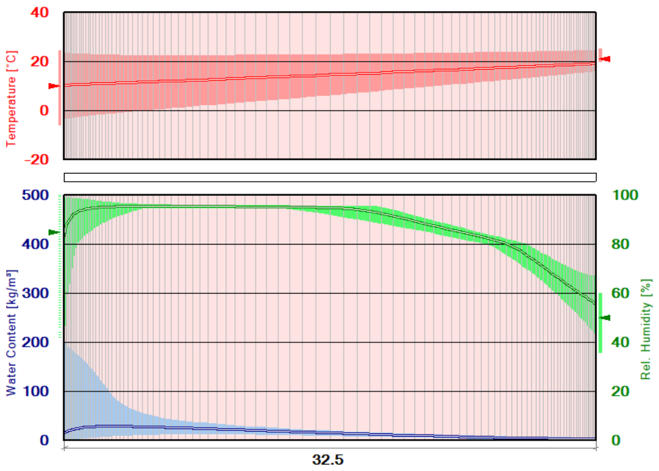
B6 FabTrads

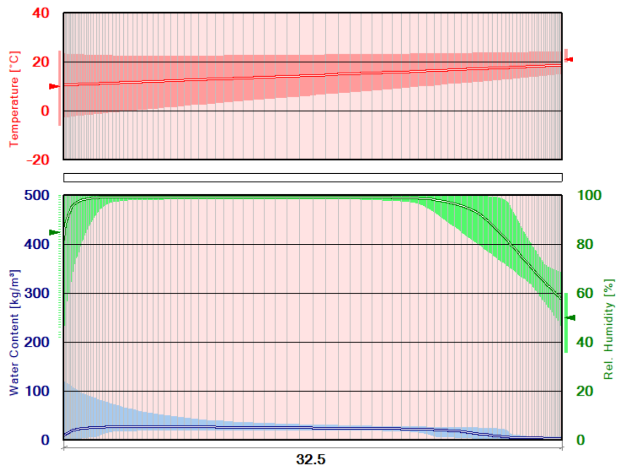
WUFI IBP Solid Brick historical





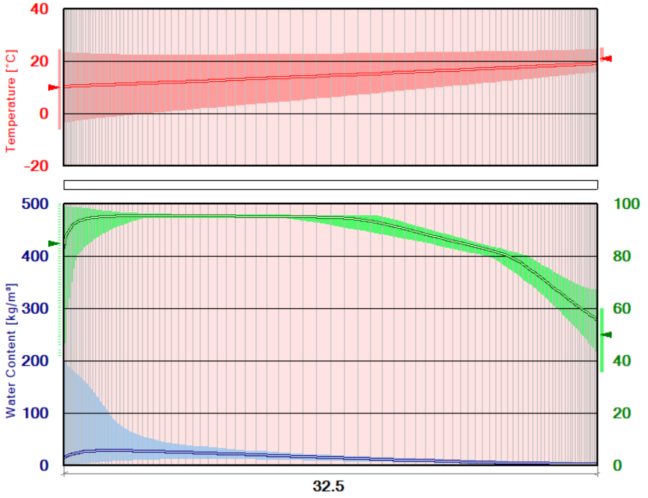
N





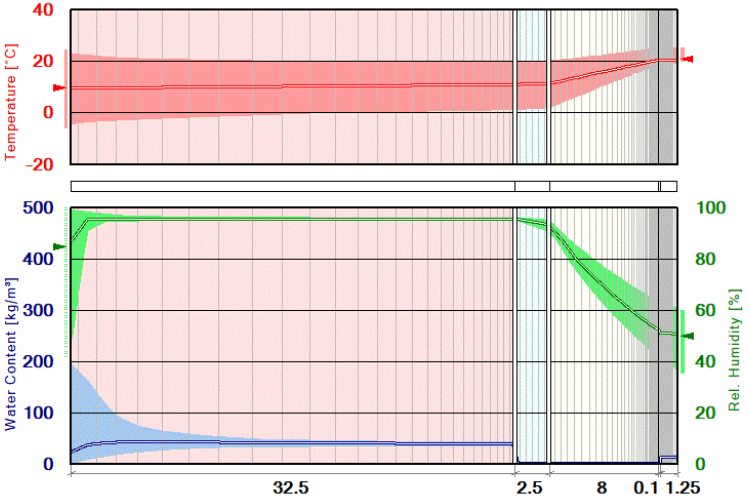
S
W

Assessment of retrofit options (WUFI)



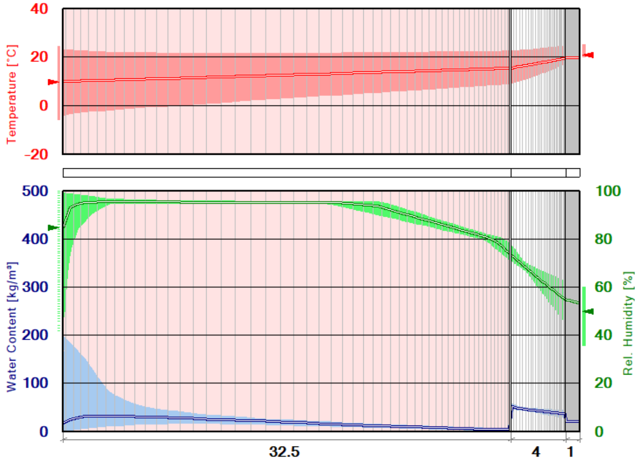
uninsulated brick wall

EPS insulation

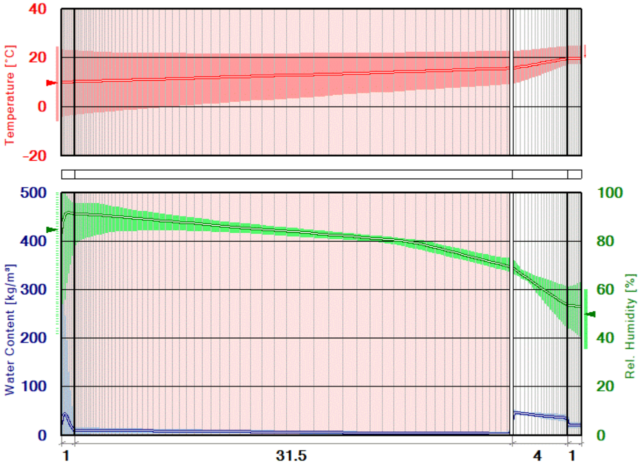


drylined brick wall

drylined brick wall – impact of water repellent



cork + lime render



B6 FabTrads (preliminary)

RH at inner face of brick

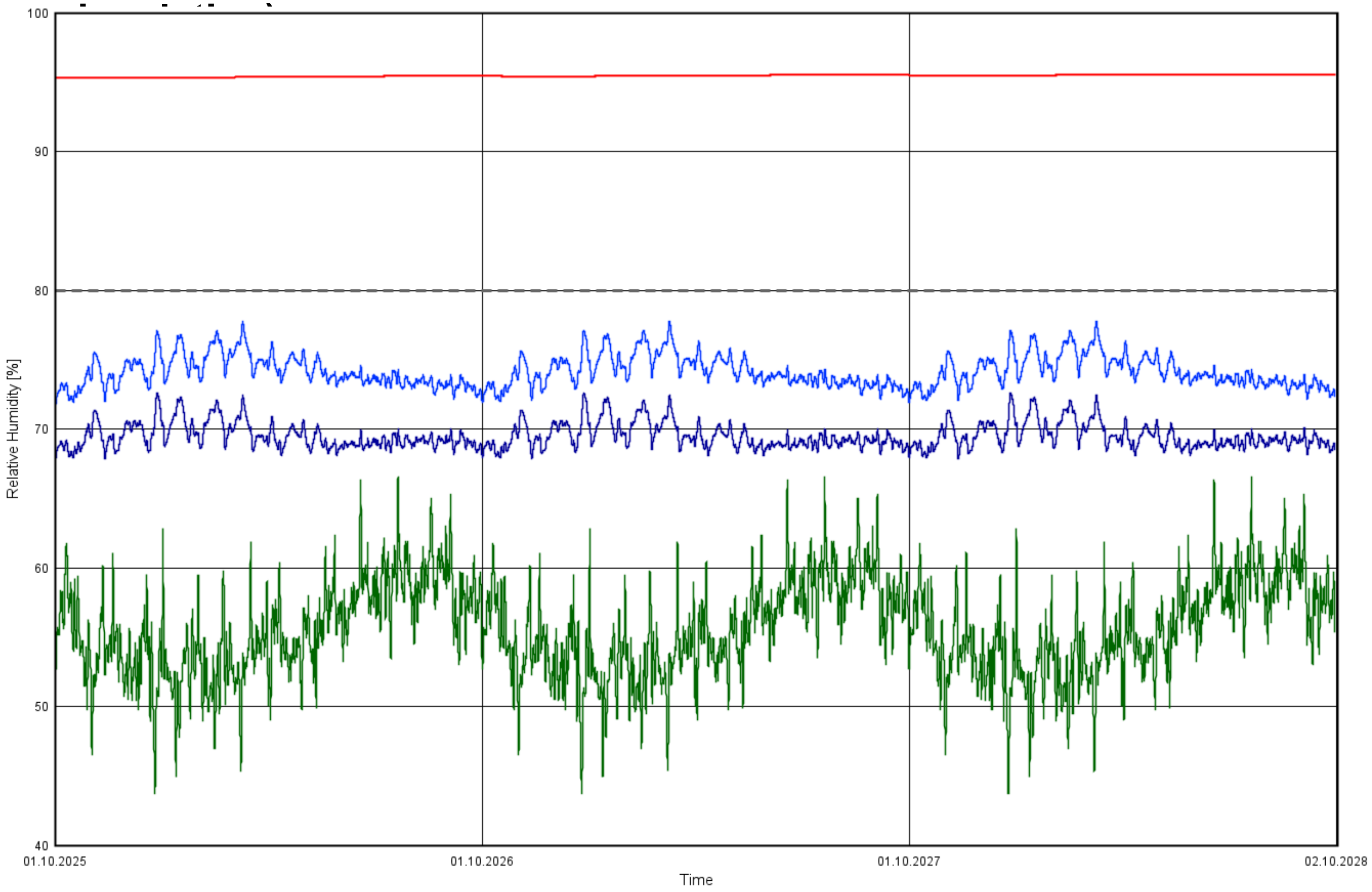
92.5mm drylining on battens

80% RH risk threshold for mould growth

50mm internal cork lime plaster
~ with externally applied water repellent

no insulation (B6 FabTrads prelim.)

Relative Humidity at inner face of brick (at interface with



TradFabs

Project Scope

Oliver Kinnane, Rosanne Walker, Anna Hofheinz, Caroline Engel Purcell.

TradFabs

Project Details

- Kick-off: March 2024
- Duration: 36 months
- Lead: University College Dublin
- Partner: IGEO Spatial Modelling Ltd
- Collaborators:
  Department of Housing, Local Government and Heritage
  Office of Public Works
  Irish Georgian Society
  ICOMOS Ireland NSCES
  Carrig Conservation

seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

UCD DUBLIN

The objective of TradFabs is to provide knowledge and increased certainty around the appropriate thermal upgrading of solid masonry walls and traditional windows and doors.

TradFabs

Project Scope

i. To determine the laboratory-based hygrothermal properties of traditional wall assemblies including air voids and interfaces between mortar, masonry and insulations;

ii. To monitor the in-situ moisture and thermal performance of both laboratory constructed walls and existing traditional buildings pre- and post-retrofit with a range of internal insulations;

iii. To develop 2D hygrothermal models using results from lab tests; and

iv. To monitor and model heat transfer through complex areas of walls, such as floor junctions and through openings, to investigate optimum and safe retrofit strategies.

Questions?

Or comments

Thanks to the FabTrads research team; Rosanne Walker, Anna Hofheinz, Caroline Engel Purcell.

Can Older Buildings Contribute to Reducing CO_2 Emissions?

SEAI Energy Show RDS

March 21st 2024

SEAI SUSTAINABLE ENERGY AUTHORITY OF IRELAND

Location: RDS
Speaker: Peter Cox, Carrig Conservation
Date: 21st March 2024

CARRIG CONSERVATION INTERNATIONAL LTD

Welcome

- Introduction
- One Simple Message
- We, as an industry have to do SOMETHING

About Carrig cont

Our aim is to provide a holistic approach to the conservation, Adaptive Reuse & protection of our built heritage.

- CONSERVATION
- ENERGY
- ARCHITECTURE
- RESEARCH
- TRAINING

CARRIG
CONSERVATION INTERNATIONAL LTD

What do these buildings...

... have in common?

CARRIG
CONSERVATION INTERNATIONAL LTD

What do these buildings...

... They're no longer there

CARRIG
CONSERVATION INTERNATIONAL LTD

What’s the issue?

CARRIG
CONSERVATION INTERNATIONAL LTD

What's the Issue?

EMBODIED CARBON

&

WHOLE LIFE CYCLE ASSESSMENT

How heritage affects climate change

12.7% of Ireland's **total greenhouse gas emissions** in 2017 were from **the built environment.**

- **Global Emissions for the Construction Industry**
- **34% of Global Energy Demand**
- **37% of Energy & Process-related emissions**
- **As of 2021 and they are Still rising**

CARRIG
CONSERVATION INTERNATIONAL LTD

Understanding Carbon in the Built Environment

~ a Study for Historic England

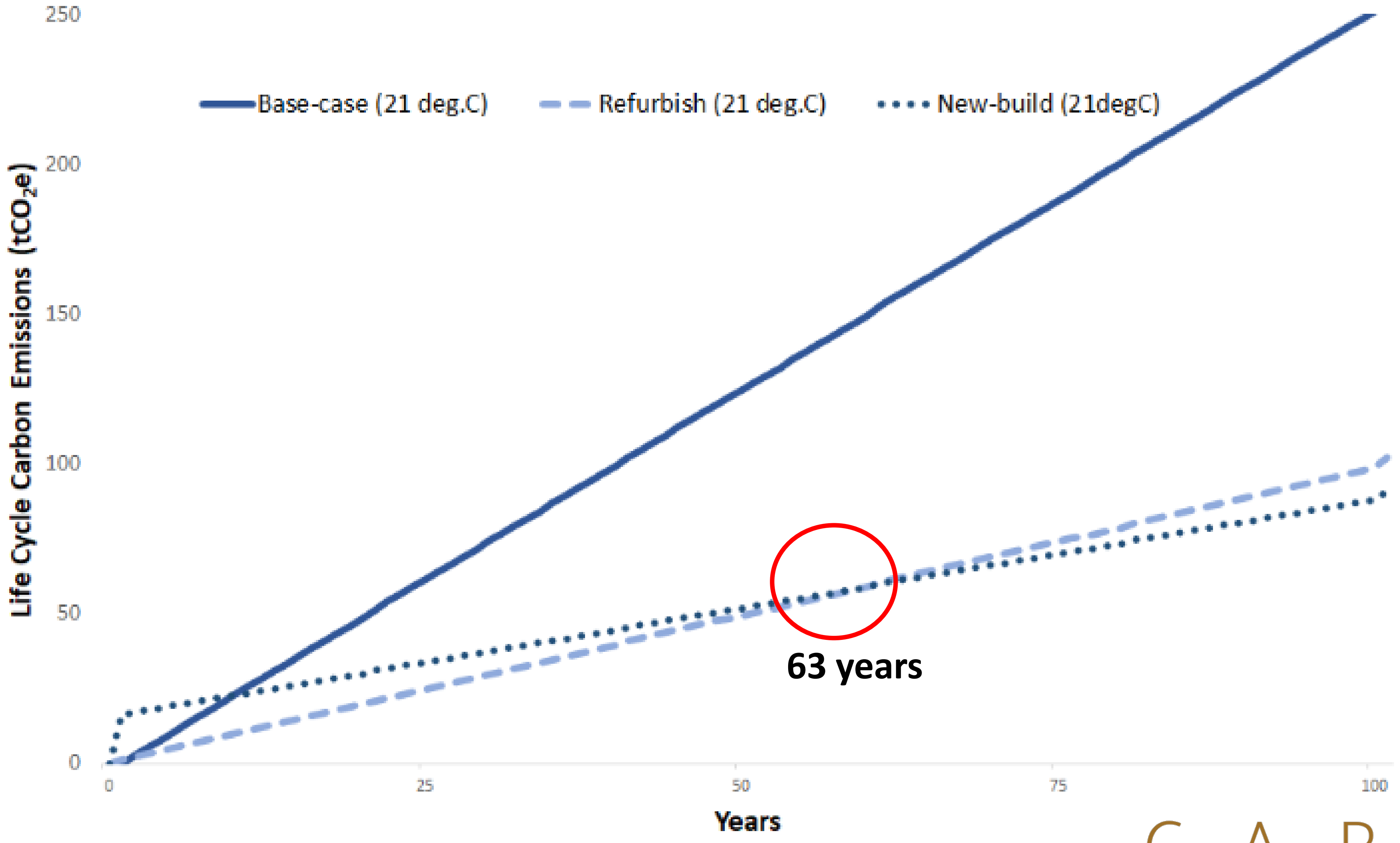
We looked at 4 Buildings
& evaluated 4 Scenarios

CARRIG
CONSERVATION INTERNATIONAL LTD

Understanding Carbon in the Built Environment

- Carbon footprint of a building as is
- Carbon footprint with a light energy retrofit
- Carbon footprint with a deep energy retrofit and
- Demolish, dump and replace with a modern building to the same volume & size

Understanding Carbon in the Built Environment



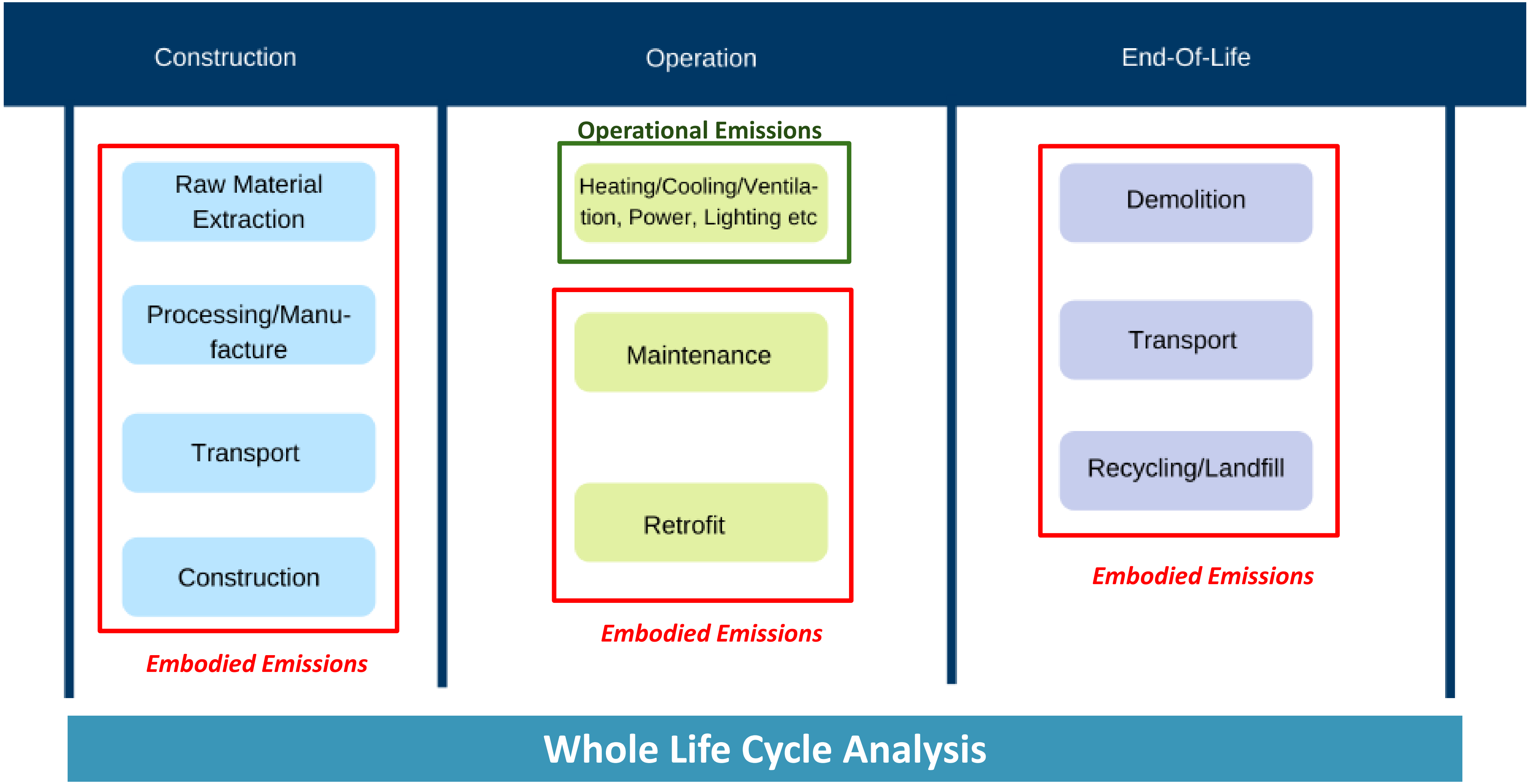
Whole Life Cycle Assessment

An assessment of the environmental performance of materials, from the raw extraction and manufacturing to the disposal and recycling. It was the ‘cradle-to-grave’ approach of environmental assessment of buildings we must take.

Now it’s Cradle to Cradle

CARRIG
CONSERVATION INTERNATIONAL LTD

Life Cycle Assessment



CARRIG
CONSERVATION INTERNATIONAL LTD

Calculating Embodied Emissions

[Quantity of Material × Emission factor of material × Material Waste Factor] × No. of replacements within RSP = Embodied Emission of Material

Sum of all material embodied emissions = Building Embodied Emissions within RSP

Calculating Operational Emissions

CO_2e emissions intensity of fuel × Quantity of fuel used = Operational Emissions of a particular fuel in one year

Operational emissions of each fuel per year × Reference Study Period = Building operational emission within RSP

CARRIG
CONSERVATION INTERNATIONAL LTD

Calculating Demolition Emissions

C&D Recovery Rates ✖ Emissions Intensity of C&D ✚ Landfill Recovery Rates ✖ Emissions Intensity of Landfill

= Demolition Emissions

Cost of Carbon…

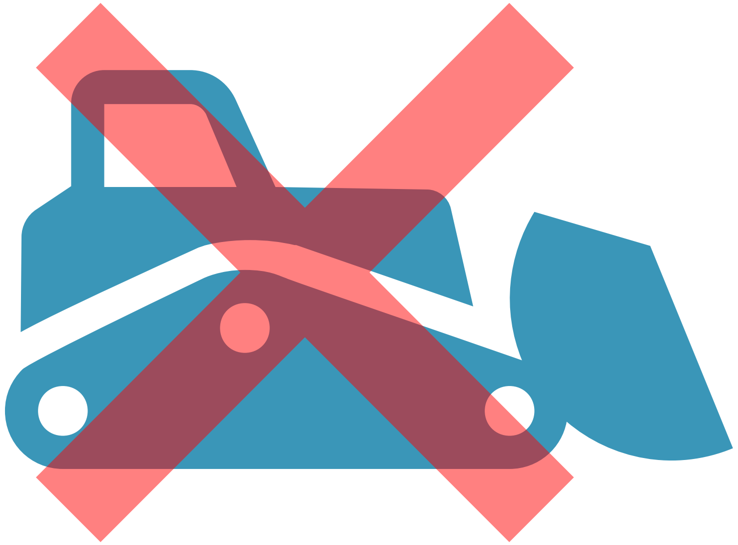
If this modest building is demolished and takes 63 years to pay back the carbon….

…. What would a building like this take?

C A R R I G
CONSERVATION INTERNATIONAL LTD

What's the Answer ?

- STOP DEMOLITION!
- Understand your Building
- Do a Detailed Analysis
- Take a Holistic approach to adaptive reuse
- Use Renewable Energy, PV, Wind, Geothermal
- Employ Low Carbon Solutions



CARRIG
CONSERVATION INTERNATIONAL LTD

Getting the balance right

- Better to save 40 - 50% of Energy Costs than to try to achieve 100%
- Do the right thing at optimal cost whilst respecting the historic or traditional value.
- This will reduce running costs, reduce carbon emissions and contribute to saving the planet.

CARRIG
CONSERVATION INTERNATIONAL LTD

Adaptive Reuse Projects

C A R R I G
CONSERVATION INTERNATIONAL LTD

Adaptive Reuse Projects

CARRIG
CONSERVATION INTERNATIONAL LTD

Ireland is doing their bit

There are 6,613 20th Century Buildings on the National Inventory of Architectural Heritage (NIAH) Register with a further review over the next 12 – 18 months.

We Need More Protected

CARRIG
CONSERVATION INTERNATIONAL LTD

A UK Welcome Surprise

UK recently refused Planning to demolish Marks & Spencer's Building on Oxford Street on **CARBON** Grounds.

We need to set a Standard

CARRIG
CONSERVATION INTERNATIONAL LTD

Training

SEAI Energy Show

There is a **GREAT** need for training & education at all levels within all sectors about Embodied Carbon

CARRIG
CONSERVATION INTERNATIONAL LTD

SMARTLAB

Source: European Commission

SMARTLAB is testing new ways to make buildings smarter, so they can better respond to occupants' needs, cost less to run, and be ready to interact with a future decarbonised energy grid.

c.70 building owners and occupants in Limerick city have installed sensors provided by SMARTLAB to monitor their building's temperature, humidity, and carbon dioxide levels.

As part of the monitoring Carrig have carried out in-situ U-value testing on a representative range of traditionally-built buildings of varying heritage significance.

The project team are supporting participants to understand more about how their buildings use energy, giving them more power to lower energy costs and make good decisions about their building's future.

The SMARTLAB project uses a living lab approach and works with project participants to explore the real-world challenges and opportunities of making buildings smart-ready.

Project outcomes will be used to create policy guidance concerning the adoption of the EU Smart Readiness Indicator in Ireland.

https://smartlablimerick.ie/

This project has been funded by the Sustainable Energy Authority Ireland under the SEAI National Energy Research, Development and Demonstration Funding Programme 2021, Grant number 21/RDD/634.

SEAI Energy Show

SEAI SUSTAINABLE ENERGY AUTHORITY OF IRELAND

w. carrig.ie
e. info@carrig.ie
t. +353 1 552 9080

I'm Peter Cox

Thank you for your attention!

Follow us on Social Media

@CarrigINT

@CarrigINT

Carrig Conservation International

CARRIG
CONSERVATION INTERNATIONAL LTD

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

Pilot Conservation Advice Scheme for Vacant Traditional Farmhouses 2023

Sarah Jane Halpin
21st of March 2024

National Inventory of Architectural Heritage

Types of Building

Vacant vernacular/traditional farmhouses

Modest houses constructed using local materials and traditional techniques by 'ordinary' people

Excludes formal buildings and the work of professional builders and designers

Do not have to be Protected Structures

Aims of Scheme

Provide expert conservation advice to owners availing or considering the Vacant Property Refurbishment Grant.

Enhance owners' awareness and understanding of the potential of their traditional farmhouses, and prompt long-term investment in our traditional building stock.

"Action 13: Promote vernacular-friendly repair and maintenance"

"Action 14: Present models of gentle rehabilitation"
(A Living Tradition, the National strategy on Built Vernacular Heritage 2021).






Applications

- Advertised between May & September 2023
- 100 applications
- 34 successful




Typologies

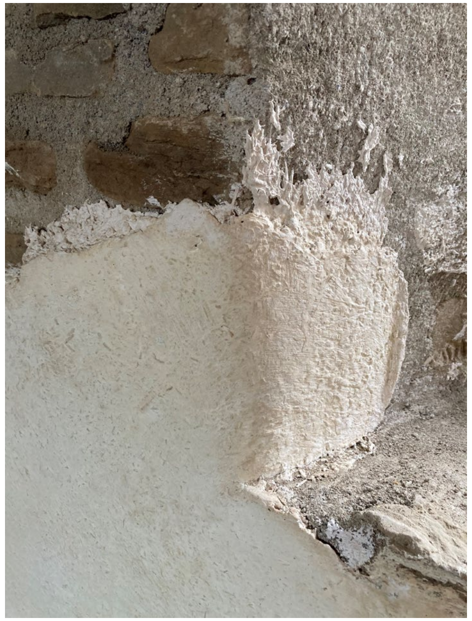
- 22 single-storey farmhouses includes:
  - *3 thatched roofed houses*
  - *7 tin/corrugated iron roofs*
- 12 two-storey farmhouses

Models of Gentle Rehabilitation

- Providing bespoke conservation, reuse and retrofit advice
- Empowering building owners to make evidence based decisions
- Helping identify case studies

Owners Training

TAKING ON A TRADITIONAL FARMHOUSE: The Repair and Reuse of your Vacant Traditional Building



Feedback on Training Weekend

Informative and thought provoking

I now understand a lot of the pitfalls that we need to avoid when carrying out our renovation.

The information has given us the right place to start in the process of bringing our cottage back to its original, vernacular beauty and functionality. It has pointed us in a sound direction as to how to bring it up to comfortable living standards whilst honouring its solid-wall construction and local, vernacular features.

Thank you for a very rich day of learning

The day was most beneficial and informative

Most interesting and informative day

2024 Actions

- 2024 *Conservation Advice Scheme for Vacant Traditional Farmhouses* (2nd quarter of year)
- 30 taster traditional skills events
- *TAKING ON A TRADITIONAL FARMHOUSE* course at 5 locations around the country

Thank you

NATIONAL INVENTORY of ARCHITECTURAL HERITAGE