BUILDING LIMES FORUM IRELAND

NEWSLETTER

NOVEMBER 2025

Recipient of ERDF - THRIVE Funding - 18 Lady Lane, Waterford
Photo Credit: NMS Photographic Archive

Comments or articles in this newsletter do not necessarily reflect the views of the board or editor.
The Building Limes Forum Ireland is a community of lime practitioners, specifiers, suppliers and producers of lime. The Forum exists to encourage expertise and understanding in the appropriate use of building limes, and education in the standards of production, preparation, application and aftercare. The Building Limes Forum Ireland is connected and affiliated to The Building Limes Forums across the world.

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NEWSLETTER

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The Newsletter of the Building Limes Forum Ireland
58 South William Street, Dublin 2.

Edited by Brian O'Connor.
Company No.408076. Charitable Status 16338.

Letter from the Chair

Dermot MacRandal

A spectacular stone/timber/steel composite staircase in Bangor Castle

Welcome to the 2025 Newsletter of the BLFI !

Let me start by giving you a fresh report on the BLF Annual Gathering in Bangor Wales in September which I attended along with a lively group of BLFI Members. This event demonstrates so clearly the strengths of the Building Limes Forum family. We draw expertise and experience from all areas of the use of lime. In the presentations we heard from Academics, Architects, Engineers and world class Craftspersons . This depth and breadth of knowledge, from exquisite plasterwork to the latest laboratory research results, leads to a profound learning experience. It reminded me that these events - and this newsletter - are an expression of our role as an educational charity.

The Gathering was opened by the keynote speaker Dr Robyn Pender who gave an extraordinary presentation on how traditional walls carry water through their fabric. She went from the molecular level to massive masonry elements in an astonishingly clear and useful analysis. I will never look at a damp wall the same way again. There were over eight speakers, each with something interesting and useful to say and practical demonstration workshops to give hands on experience. A highlight for me was BLFI's own Eoin Madigan describing working with air limes on wet Irish walls. The guided tours of a choice of historic structures on a brilliantly sunny afternoon and the visit to Penrhyn Quarry home of the famous "Bangor Blue" slates capped the day's experience.

But importantly the Gathering reminded me that learning should be an enjoyable experience. At home here in the BLFI our Lime Slam, site visits and courses all meet that objective of being highly enjoyable occasions. The responses from attendees at our events frequently mention how much fun was had along with the knowledge gained.

The BLFI have been fortunate to be partnered with the National Built Heritage Service and the All-Ireland Heritage Skills Programme for a second year, which has allowed us to expand the scope and number of the courses we run. This in turn has helped to improve our financial resources and is allowing us to look at a bigger role for our Bursaries which are open to all members. BLFI want to build on this success and to do so we need new members. If you are not a member and are reading this newsletter, please make the step up to joining us. There are many advantages. If you are in a Firm or Practice there is the option of corporate membership which will allow you share the benefits with your colleagues.

My thanks to all the contributors to the 2025 Newsletter and welcome to the new BLFI Board members, Trevor Wood, Louise O'Regan and Brian O'Connor.

Dermot Mac Randal (Chair BLFI)

BLFI Lime Slam 2025 Report

Brian O'Connor

The annual BLFI Lime Slam 2025 took place on the 19th February at the Helen Roe Theatre, Royal Society of Antiquaries of Ireland (RSAI), 63 Merrion Square, Dublin 2. The Lime Slam is an annual day-long forum for building owners, conservation contractors and, craftspeople, conservation architects and engineers, historians and researchers to share their knowledge and experience of the use of lime and related materials in traditional construction repair and reconstruction. This unique, members event is marked by the variety of projects and insights presented; and by a shared concern to follow best conservation practice.

Dermot McRandal, current chair of the BLFI, welcomed the audience and presenters to the day's events. He looked forward to the day's programme and invited all attending to participate in the Q&A sessions. He once again highlighted the Hot Lime Mortar Database and appealed to practitioners to log their sample mortar and plaster mixes online via the portal/ app. Our collective knowledge is expanded by the variety of information recorded in the database, which also serves as a practical guide to appropriate mixes.

Shane Nolan – A Selection of Specialist Interventions in historic Brick, Terracotta and Faience

Nolans Group – Conservation & Restoration are heritage contractors and brick manufacturers specialising in brick and stone repair and replacement. Shane described two projects in Dublin. First, the brick and terracotta moulded repairs to a long-concealed, original corner shopfront at the 19th c South City Markets building on Exchequer Street & Fade Street; Second, a new interior intervention demonstrating the art of faience and terracotta, at The Collins Club at The Leinster, Lwr Mount Street. Ground-breaking work by Nolans may point to a future brick manufacturing base in Ireland that will expand employment for a new generation of heritage craftspeople.

Gobnait Ni Neill – A Vernacular Homeowner's Perspective: Dreams, Plans and a Series of Unfortunate Events

Gobnait is a building owner, and described a personal 'odyssey' from dream to re-construction at her traditional cottage in the Knockmealdown Mountains in rural Tipperary. She described a journey that took her past the surrounding sandstone environment, via the NHL's and hot limes, to the clay mortar commonly used locally for domestic construction and evident in her building. With advice from Frank Keohane, Chartered Surveyor and Architectural Historian, this building owner grew in confidence and knowledge as works ensued.

Michael Kosciak – Repairs and the Use of Lime in the Restoration of the Church of the Immaculate Conception, Strabane

Michael Kosciak represented Magee Construction Heritage Contractor, with Evan Connon, Connon Stained Glass in their description of masonry and glazing repairs to a Troubles-era, bomb-damaged church in Strabane, Co. Tyrone, Northern Ireland. The multiple effects of vibratory movement on the weak Donegal sandstone masonry in the West gable from the massive bomb blast left a trail of damage - cracks in the façade, historic stained glass panels suspended precariously in their stone surrounds, and much of the stonework decayed after many, untended years. This presentation demonstrated the power of informed observation, knowledge of materials, of master craftsmanship and innovative problem-solving and working solutions. The project won the best National Churches Trust Care and Conservation Award for the UK and NI in 2024.

Leila Budd – A Hoffman Kiln in Dublin

Leila Budd, architect and architectural historian, presented on behalf of Carrig Conservation and Energy Consultants. During development works on abandoned railway sidings adjacent to Grand Canal dock, Dublin 2, the remains of an historic Hoffman multi-chamber lime kiln was discovered by Byrne Mullins archaeologists, who in turn consulted with Carrig in the recording of this surprisingly complex and important signifier of the scale of industrial lime production in Ireland from the 1870's. This presentation also demonstrated the importance of the observational and recording work carried out by archaeologists and architectural historians in large urban development teams.

Lucy O'Connor, Patrick Tyrell, Conall Doherty – Conservation Works at the Wonderful Barn, Leixlip

Lucy O'Connor, RIAI Grade 1 Conservation Architect, with her team from Howley Hayes Cooney Architecture, described a complex series of repairs at a collection of unique 18th century structures clustered around the 'Wonderful Barn' in the former grounds of Castletown House estate. Oldstone Conservation Ltd were the contractors. She described the careful repair logic employed on the part-slated, part-rendered steeply sloping sides of the conical and vaulted barn structure. In collaboration with Metropolitan Workshop and Kildare CC, the architects developed an adaptive re-use design proposal for the barn, dovecots, stewards house and walled enclosure as a destination in the wider public park. A core element of design approach is the conservation repair programme that is being carried out in phases as the site is opened up for use.

Damien Condon – The Importance of Retaining Historic Mortars, Renders and Plasters

Damien Condon, Plasterer and Mason with CALX Restoration, emphasised some important principles of minimal intervention, reversibility and ethics in his presentation on re-using and matching-in with existing internal plasters and external renders in traditionally built structures. He described how perfectly sound areas of plaster and render can be retained in sheltered locations even in ruined structures. 'A dry building is a warm building' is Damien's telling pointer to the operation of thin, breathable coatings in the active drying out process of solid masonry.

Graham Hickey – Conservation Works at Arran Street East

Graham Hickey is CEO of Dublin Civic Trust, a Fellow of RIBA and writer and broadcaster on conservation and architectural history. As an informed client his presentation brought us through the latest phase of the conservation works and adaptive re-use of the Trust's own HQ building on the corner of 18 Ormond Quay Upper & 68 Arran Street East, led by Kelly and Cogan Conservation Architects. Graham guided us through the peeling back of layers of historic interventions on the facade of the annex building on Arran Street. The importance of reading the architecture and judging the significance of each layer of evidence is a basic requirement for informed conservation work.

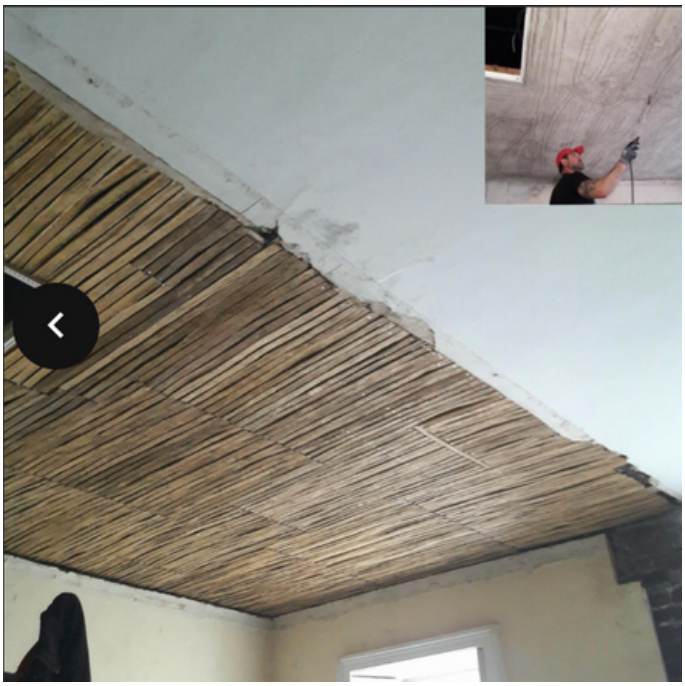
Fergal McGirl & Greg Smith – Accessing Big Walls – Former Gaol Wall Trim and Phibsborough LUAS Station

Fergal Mc Girl, conservation architect and Greg Smith of Greg Smith Conservation, heritage contractors described the repair of two very large (in excess of 8M high) historic masonry walls, each with its own access challenges, at Trim Gaol (remains of) and Grangegorman LUAS Stop, Phibsborough, Dublin 7. At Trim, both testing and actual repairs had to be carried out largely via MEWP as scaffold cost and ground conditions ruled that option out. Similarly at the LUAS station, work was severely confined by the overhead power lines. Therefore a nimble, and highly-geared programme was established to complete the project. Both jobs involved re-pointing and consolidation work but also unique challenges of handling giant copings and spalled calp remediation requiring rapid in situ plastic repairs. A wall maintenance plan was part of the handover in both cases. Practical, forensic and efficient solutions were employed by the architect-contractor team to complete two important and difficult repair projects.

Exposing behind the Canal Walls

Brian Tobin – Elizabethan Plasterwork

Brian Tobin, is a master plasterer with lime in traditional construction. Brian took us through his experience with Philip Gaches, on a workshop centered on the techniques used in historic Elizabethan Plasterwork. The wetting of laths, the pricking coat, the use of animal hair and pear tree moulding bats were all described in detail, reflecting the advanced skill and achievements in lime plasterwork possible by hand tools only.



Lenzie O'Sullivan – Conservation Works at the Mansion House

Lenzie O'Sullivan is a RIAI Grade 1 Conservation Architect and Senior Architect in Dublin City Council. Lenzie described some recent conservation-led remodelling of rooms inside the Mansion House, Dawson Street, Dublin 2, the official residence of the Lord Mayor of Dublin. Ho noted initially that with a foundation date of 1710, the Mansion House is a rare example of Queen Anne style of architecture in Dublin. The works described newly-revealed doorcases, timber flooring and room proportions from the earliest period of construction, co-incidentally adapted for re-use in this project.

Brian O'Connor – Lanistown Castle – CMF24 Conservation Works

Brian O'Connor is a RIAI Grade 2 Conservation Architect with Fingal County Council. Brian described conservation works in 2023-24 with DKP Conservation Engineers and Francis Haughey Heritage Contractors to a medieval tower house, Lanistown Castle, located in the grounds of Newbridge Demesne, Donabate. The works were supported by the Community Monuments Fund (CMF), Streams 1 & 2, in 2021 and 2023. Brian described the variety of challenges that were met at the castle highlighting the scheduling of works outside the bird nesting and bat roosting seasons; as well an innovative use of puddle mud/ clay to seal the top of the ground floor masonry vault – a giant mat of soft-capping in effect. The CMF is one of the most widely-used supports for owners of upstanding national monuments in particular.

Nicola Mathews - ERDF - THRIVE - Heritage Revitalisation Funding programme 2024-2027

Nicola Matthews is the National Contact Point (NCP) for the New European Bauhaus, a new initiative of the European Commission, and is also a Senior Architect at the Department of Housing, Local Government and Heritage. She described how THRIVE is funding the regeneration of Irish towns. The fund is connected to on-going research and best practice at a EU level, with a focus on a multi-disciplinary approach to address climate change action, vacancy and dereliction, circular economy and to build capacity and better access to traditional skills and appreciation of cultural heritage.

The 20th AGM of the Building Limes Forum of Ireland

The 20th AGM of the Building Limes Forum of Ireland took place on Thursday 29th May 2025 at the Irish Architectural Archive, 45 Merrion Square E, Dublin 2.

The AGM was preceded by a tour of the National Gallery of Ireland, with Kevin Blackwood, Blackwood Associates Architects, and Paul Griffin, Griffin Plastering, who were both involved in the remodelling and services upgrade of the historic Dargan and Milltown Wings.

Following the AGM there was a talk given on 'Timber in Older Buildings' by Gordon Knaggs F.I.W.Sc.

Gordon Knaggs has been involved in a long list of significant conservation projects in Ireland and is a familiar and trusted advisor to many Irish construction professionals. He also brought a background in timber research, standards development, and consultancy to his presentation on the role of timber in older buildings with a particular knowledge of Irish grown timber. Gordon explored how timber was traditionally used in heritage buildings, the challenges it presents today, and best practices for inspection, repair, and conservation. There was a detailed question and answer session to finish.

The talk was followed by a reception for those attending the day's events.

The BLFI Board in 2025/2026

At the AGM itself members voted in a new Board for 2025 after a number of members stepped down in line with the BLFI Constitution

- Dermot Mac Randal - CHAIR BLFI
- Feargal Ó Súilleabháin - TREASURER
- Damien Condon
- Henry Thompson
- Tom McGimsey
- Brian Tobin
- Paul Griffin
- Grellan Rourke
- Veronika Zemska
- Trevor Wood
- Brian O'Connor
- Louise O Regan

Hot Lime Mortar Database

There has been limited number of responses received to date but given the potential of this resource, we would encourage conservation practitioners to take the small amount of time required to fill out the questionnaire, with as much detail as possible, and submit a new record. ***We have included images of the questionnaire here and an easy link to the online form at the end of this article.***

The information gathered from the submissions received so far give us a glimpse into potential for a comprehensive picture of the uses of Hot Lime Mortar on the island of Ireland. By recording both successes and failures we can share and learn from each other's projects. The historic record can also be grown for the benefit of future research and to advance our technical knowledge of lime.

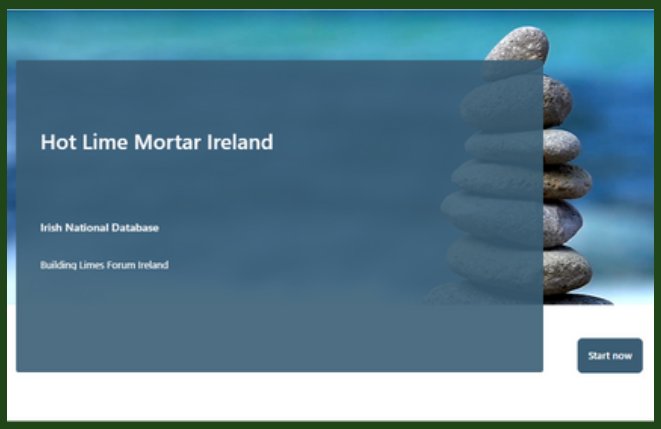
CALX is also examining the potential for an App version of the Database which may make data collection easier.

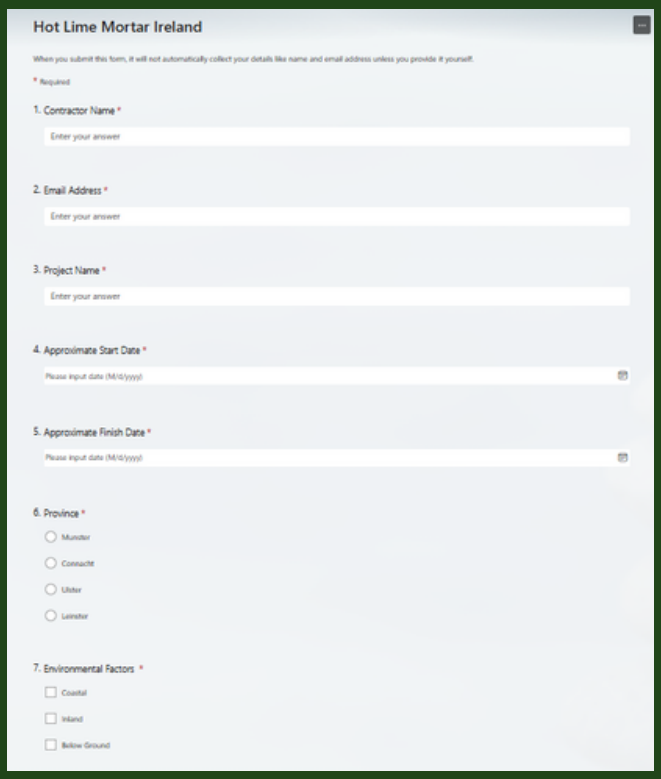
Sincere thanks to those who have already contributed!

Go to the BLFI website to access the database, scroll down the page and click 'start now'.

https://www.buildinglimesforumireland.com/

Ursula Condon, CALX Renders Ltd.





BLFI BURSARY

The BLFI offers an annual bursary to members to assist with training and education.

Each application must have an essentially educational nature, practical or theoretical, and must relate to the use of lime. It could be for attendance at a specialist course, either short-term or long-term, which could be theoretical and/or practical. It could also be used to undertake a specialist internship or practical experience master class. It has wide application. The bursary outcome should lead to a further qualification and/or increased experience and understanding of the use of lime in construction. It should be relevant to the applicant's work or future direction.

Read more about this valuable opportunity here:
https://www.buildinglimesforumireland.com/bursary

Any questions? Email info@blfi.net

BLFI National Vernacular Skills Courses Killoran & Westport - *Workshop Reports*

Feargal Ó Súilleabháin & Brian Tobin

A two-day training workshop course, held at Killoran, Co.Tipperary, on Friday 18th and Saturday 19th July 2025, was presented by the Building Limes Forum Ireland (BLFI) and sponsored by the Department of Housing, Local Government and Heritage (DHLGH). The course was designed to help experienced practitioners improve their knowledge and skills in the preparation, mixing, storage and various applications and uses of traditional lime mortars. Whereas previous courses held during 2024 considered both Natural Hydraulic Limes (NHLs) and Hot Lime Mortar mixes and were aimed at homeowners, craftspeople and practitioners, this course focussed on hot limes and how to do Dry-Slaking in Layers, as demonstrated by Damien Condon and Brenda O'Meara of Calx Restoration, and facilitated by Louise O'Regan of Madigan Traditional Masonry.

The course consisted mostly of practical demonstrations and there were lectures and opportunities for discussion and questions hosted by Tom McGimsey, Grade 1 conservation architect of MESH Architects and Feargal Ó Súilleabháin, senior architect, Grade 1 conservation architect, Office of Public Works (OPW).

At the course we learned how to prepare a layered cake from bagged lime kibble and sand. The quantities and mixing and preparation and storage were considered in great detail and there was much discussion about protection, curing, different sands, timelines according to te weather conditions and the different applications of this basic mortar mix.

Killoran & Westport BLFI Workshop Reports contd.

Damien and Brenda and their colleagues demonstrated how they layer up the sand, sprinkle this with water from a a spray nozzle on a hose to make the sand damp, not saturated, then a layer of kibble, then another of sand, and so on. We all noticed how the mortar expanded as the lime kibble hydrated to a powder. On the following day, the wooden planks were removed and the mortar was mixed in the mixer and then set aside in the yard and stored under cover with a tarpaulin. This yielded a basic mortar which could be used for all the different mortars which we classify according to function for work on all parts of an old building.

Louise discussed the differences between mortars for wall pointing, lime (binder) rich mortars for parging roof slates with lots of animal hair added, and silica sand. Having made the basic mortar and left it to slake under cover for a few days we then learned how to rendering the wall of a cottage in 3-coat work, and with 1-coat work and a limewash over.

We learned how to do a Void-Ratio Test, to determine the correct binder: sand ratio, and how to re-point a wall where the existing bedding mortars were defective or had fallen out. How to repair old render or damaged render, how to prepare a liquid grout used for re-bonding bolstered historic mortar to its substrate, the recommended way to make a lime putty and how to build and use a small limekiln.

The course was a great success. There were many discussions, a lot of hands-on work and feedback from the participants was very positive. The weather held good too !

Feargal Ó Súilleabháin

The Building Limes Forum Ireland (BLFI) were delighted to run another of their hands-on workshops in the grounds of historic Westport House, built around the original home of the famous Grace O'Malley, on 26th & 27th September 2025, giving participants the opportunity to gain real experience and learn the basic fundamentals of using lime plaster.

The BLFI continues to build confidence and awareness across the country in the importance of restoring our historic buildings with the right materials whether it is a stately home or a humble cottage, and everything in between. It is part of our ethos to help protect the historic fabric of Ireland, preserving not just our built heritage, but also our construction story thorough the ages and how we got here. All of this, we do for future generations to enjoy.

Now, more than ever, we recognise that this specialist work is not only about preserving our old buildings through the use of appropriate materials such as traditional lime mortars, but also about safeguarding our traditional craft skills. The BLFI is deeply committed to preserving and promoting these skills, giving people the fundamentals they need, whether it's caring for their own home or inspiring a new career in the field. After all, there is no point in focusing on repairing our old building stock without also preparing the next generation to continue that repair, care, and maintenance into the future.

That's why the BLFI regularly organises and promotes training courses and awareness workshops to help homeowners, craftspeople, and professionals alike to learn and share knowledge on how to properly use traditional lime mortars in old buildings.

The Westport workshop was one such event , a weekend that blended classroom learning with practical, hands-on experience. The BLFI team on the day included Dermot Randall, Feargal Ó Súilleabháin, Brian Tobin, and Damien Condon, who led the training in Westport; supported by the wider BLFI team who worked tirelessly behind the scenes to procure and deliver the event.

Westport BLFI Workshop Report contd.

Each day began with morning talks from Dermot and Fergal on the fundamentals of appropriate repair, conservation, and the use of building limes. In the afternoons, our practitioners brought the students back to the important basics how to mix lime correctly, how to prepare substrates, and how to apply the material properly. It was an ideal opportunity for participants to gain hands on experience and to work beside experienced practitioners and professionals in the field. Throughout the weekend, the team were on hand to answer questions, guide participants, and offer advice on their own specific projects.

The weekend was a complete success . We learned a lot, shared a lot, told stories, and had plenty of laughs along the way.

We would like to extend a huge thank you to everyone who attended the Westport workshop, as well as to all who supported our events throughout the year. A special thanks also to the entire BLFI team who helped make it happen.

And finally to our members, we thank you for your continued support. Please spread the word among your colleagues and friends and encourage them to join the BLFI. Your membership helps us to invest more in our workshops, develop new ones, and continue to share the love of lime.

Brian Tobin

Traditional Skills Training in Ireland – Carving a Strategic Way Forward

Tríona Byrne

As I'm sure you know, if you are reading the BLFI journal, the term 'traditional skills' in the built heritage sector refers to skills like stonemasonry, lime plastering, dry stone construction, joinery, blacksmithing, slate roofing, thatching and signwriting, to name but a few. These skills form the backbone of the built heritage sector; that is, the practice of conserving, repairing and restoring historic buildings and structures for future generations.

There is no one organisation responsible for the provision of training for traditional skills. The Dept. of Housing, Local Government and Heritage has a built heritage division, as does the Heritage Council, and while both bodies liaise closely on the topic, they do not have statutory oversight of the national training provision.

Traditional skills historically would have been handed down intergenerationally and there is still a small element of this, which constitutes a vernacular type of traditional skills training. More recently, traditional skills training has been delivered formally via four-year apprenticeships through the Further Education and Training (FET) sector, however the availability of these has decreased in recent years. Informally, many NGO's such as the BLFI, DSWAI, SPAB Ireland and others have organised training events on an adhoc basis, which has helped somewhat to address the need but which does not solve the overarching issue.

Ireland is at a critical point in terms of traditional skills. Readers of this journal will no doubt be aware that there is such limited training currently available and a lack of young people entering the sector, that the workforce is ageing and shrinking rapidly. If this trend continues, there will soon be a 'cliff-edge' at which there is not a sufficient workforce to maintain Ireland's built heritage, leading to a reduction in the amount of conservation work undertaken, and ultimately an increased loss of our built heritage.

To that end, the Heritage Council successful advocated for inclusion of a focus on skills training in the 2025 Programme for Government, with a pledge to 'explore the creation of a National Centre of Excellence for traditional skills' written into the programme.

The Heritage Council are now leading on this action on behalf of the government. In early 2025, a taskforce was established from representatives across the heritage, construction and FET sectors. Craftspeople are key members of the taskforce, as they know best what sort of training they or their employees need, what the barriers to hiring apprentices are and what they would like to see in a Centre of Excellence for skills training.

To date, the taskforce has been busy in the 'information gathering' phase. Several pieces of research have been commissioned. The first is a skills training audit, to find out what currently exists in terms of training courses available, and what gaps exist. One clear gap is short conservation courses for existing craftspeople, focusing on conservation principles. The All Ireland Heritage Skills Programme is one route for early-career craftspeople to get a deep understanding of building conservation, but it is a significant time commitment of one year of full-time training.

Plasterer Dolcie Ross hosting students of the All Ireland Heritage Skills Programme

The second piece of research is a public attitude survey, conducted by a polling company, to gauge the public appetite for traditional skills training. Over 1,000 people were surveyed and topline results indicate very strong support, with over 91% saying they think it is important that traditional skills are preserved. The final piece of research, and the most difficult, is a labour market demand survey. We need data and statistics to back up what we anecdotally believe, which is that we do not have systems in place to train enough skilled craftspeople in Ireland for the future.

We are also researching international models of skills training. We travelled to Scotland to visit the Scottish Lime Centre Trust (a private commercial organisation), Historic Environment Scotland's Engine Shed (a state-funded organisation) and Dumfries House (a charitable body governed by the King's Foundation) to look at training facilities and understand the different funding models. We also visited training facilities in the Northern Ireland Heritage Skills centre in Moira, Co. Down. Here in the Republic of Ireland, we have visited OPW workshops in Dublin and Kilkenny, training events organised by the NBHS as well as NGOs who run training, such as the Common Knowledge Centre in Clare. All of this is helping to form a picture of what the demand for training is and what a strategy to address this might look like.

As well as research, we have partnered with Kilkenny Carlow Education and Training Board to run a pilot thatch training course in 2025. This 42-week course includes the basics of thatching in straw and reed, Health and Safety modules, business modules, 6-week work placement with experienced thatchers and a group re-thatching project. Learnings from the course have been very useful in understanding the practicalities of traditional skills training, in terms of financial costs, the process of validating a qualification and the pastoral care required of students.

Looking ahead, the short-term result of this work will be recommendations to government on how a National Centre of Excellence should be set up and run, in whatever form that may take, and what is required to sustainably support such a centre. Ultimately, a coordinated strategic approach is required, to support those currently offering training to continue their great work and to ensure that gaps are filled with good quality training, so that traditional skills have a future in Ireland.

Blacksmiths forge in HED Heritage SKills Centre Northern Ireland

Tríona Byrne,
Architecture Officer at the Heritage Council

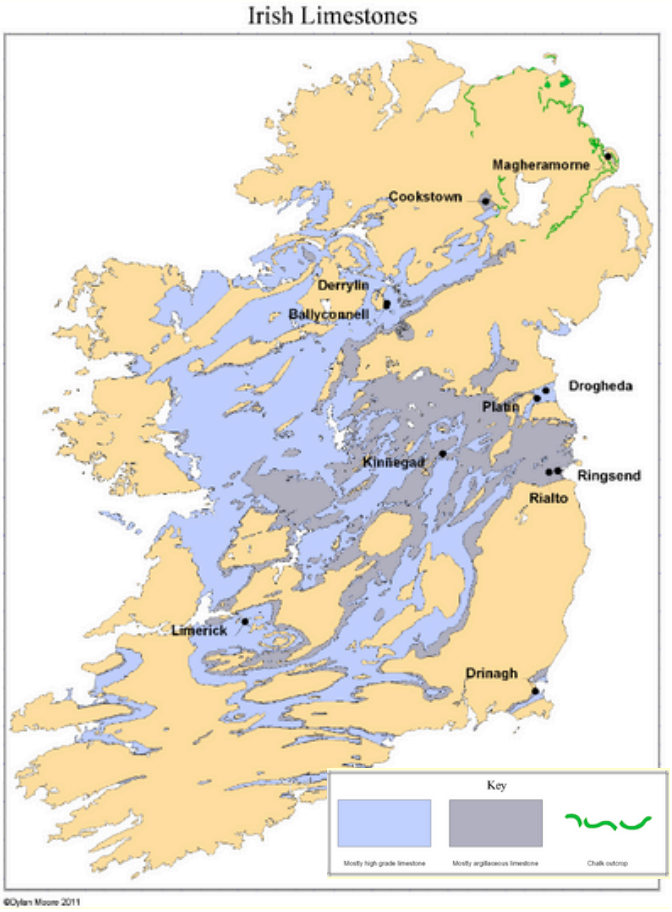
Regional Diversity and Innovation in Historic Irish Mortars

Jason Bolton

To suggest that lime might be a minor component in a conservation mortar might raise eyebrows, even more so if the idea is pushed to its extreme with the suggestion that lime mortar might not be entirely appropriate under some circumstances. From a conservation perspective, we are all generally comfortable with like-for-like repairs, and it is generally accepted that the repair of natural cement and the repair of some twentieth century cultural heritage may require non-lime binders. Would anyone suggest that Busarus (1946-53) or Michael Scott's Portlaoise hospital (1936) should be repointed with lime? However, there is a growing area, a grey area in many senses, where it is not clear where lime ends and other materials appear, and situations where both may be present. And the fault for this uncertainty lies squarely with our forebears unrelenting propensity to innovate and create new places, new buildings, new structures, new materials and new techniques.

Historic maps depict a variety of lime kilns, appearing and disappearing from maps over time and space in response to contemporary construction demands. The vast majority of these kilns produced agricultural quicklime and are found dotted across the landscape, close to a suitable stone and agricultural grasslands, and often inconveniently far from the buildings and towns of the area. That the quicklime produced was variable in nature, but also used routinely for construction is old news to BLFI members. However, in the eighteenth and nineteenth century, some kilns were positioned strategically to take advantage of the burgeoning towns and cities of Ireland. These were kilns with a relatively short working life, constructed to feed new development, and which closed when the land and quarry became more valuable to build on, or when fresh, more easily accessible stone sources were needed. However, rather than close up, a small number of innovative lime-burners took a different direction in the mid-nineteenth century, and sought to change the qualities of their own limes.

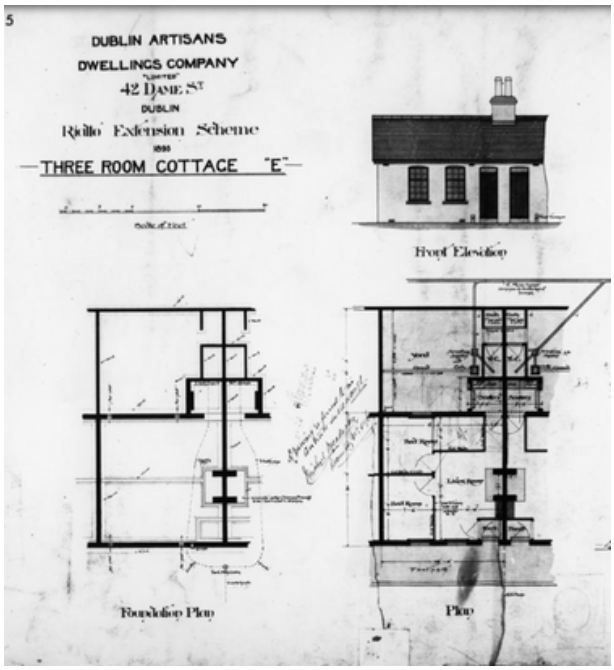
The outskirts of Dublin City contained quarry faces and lime kilns clustered around the arteries of the city. One of these, the Calp limestone quarries of Rialto in Dublin 8, produced a natural hydraulic lime. There was a growing realisation during the nineteenth century of both the potential of Irish mineral resources, and recent technological advances which provided opportunities for new businesses to be established.



In 1883, the Rialto quarry set itself up as the 'Dublin Portland Cement Co. Ltd' with four 20-ton bottle kilns producing natural hydraulic lime, and began to transfer part of the production to Portland Cement manufacture using a mixture of local calp (which contained limestone and shale) and a proportion of Boston Hill limestone from quarries south of Straffan, Co. Kildare. In 1893, the Rialto plant invited Charles Spackman (1848-1932), a chemist specialising in cement manufacture who would later co-author 'Calcareous cements: their nature, manufacture and uses' in 1905, to advise on cement manufacture. The company re-branded itself as the Irish Portland Cement Co., and the Rialto site was rebuilt with six 'Spackman kilns' which could produce natural hydraulic lime, Portland Cement and also had attached brick-drying chambers. An article in the Freeman's Journal in September 1885 described the machinery, the manufacturing process and the intention to manufacture bricks from the clay which lay over the limestone. Conversions from lime manufacture to cement had also occurred at Drinagh lime and cement works in Wexford Harbour (1871-1924) and Magheramore, Co. Antrim (1824-1980).

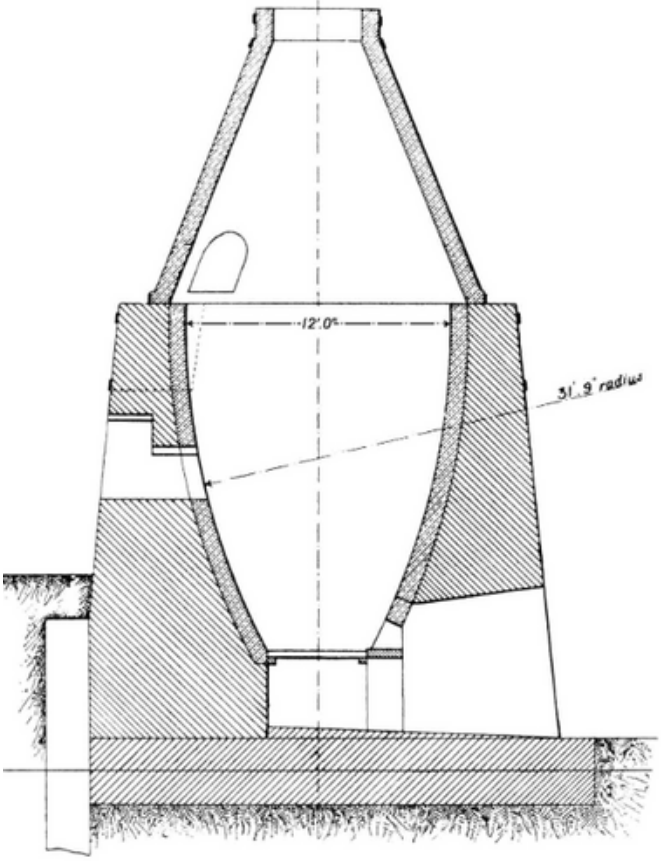
Suitable raw materials for the manufacture of cement were found across Ireland close to the ports of Cork, Belfast, Dundalk and Dublin, and turn-of-the-century writers argued that Ireland should be a major exporter of cement, rather than be reliant on imports from the Thameside plants or the Isle of Wight (who produced Vectis, the most popular cement brand in Ireland). There were various accusations of price-dumping by London cement plants to undercut Irish and Scottish businesses, and the small nature of the Irish businesses meant that they were not profitable to maintain. The Irish Portland Cement Co. was sold off in 1904, and purchased by the Dolphin's Barn brickworks who converted entirely to brick manufacture.

Yet, the conservation legacy is that from the mid-nineteenth century onwards, there is a surprising diversity of mortar types and mixes used in Ireland when towns and cities were experiencing a building boom.



Early Use of Mass Concrete in Artisan Housing in Dublin

Irish builders, engineers and architects adopted new materials relatively quickly, but not universally or uniformly,. The first use of concrete in Ireland is generally considered to be bridge foundations in Dundalk, and was used for the Dublin Port works 1871-75 and was used for seawalls and coastal defence works in the latter half of the nineteenth century. However, cements were not limited to engineering works, and unsurprisingly, the port towns offered a doorway for cement into construction. Tom Spalding has identified the earliest use of cement-based render for residential buildings in Cork in 1863. The palette of mortars available to builders and architects had now changed, and for decades, 'pure' limes, natural hydraulic limes, Portland cements, natural cement and patent mixes are used in parallel and alongside each other. Prior to the growing domination of Portland Cements after World War One, there is a surprising eclectic variety of bedding, plastering, rendering, parging and decorative mortars surviving and continuing to function in our built heritage. While most are stable, weathering, building failures and development lead to repair needs; and the solution might not be as simple as cement vs. lime. It is worth bearing regional diversity and past technological advancements in mind when considering conservation works.



Typical Bottle Kiln

Dr. Jason Bolton,
Architectural Conservation Consultant,
Historian, Archaeologist

Lime Leaching - Empirical Research and Reflections on Earth-Lime Binders

Robert Howard

(Extracts from - "Calcium Leaching and Associated Problems in Using Hot Mixed Mortars for the Conservation of Historic Mass Masonry Structures")

The following is a summary from a thesis from 2020, considering the potential implications of leaching with respect to hot lime mortars, an empirical approach to investigating this area further, and opinions as to reducing the causes.

Introduction

This dissertation was an empirical design project that hoped to extend knowledge from the research question: "Is calcium leaching in Hot-mixed mortars purely superficial, or are there more telling consequences in its occurrence, that affect the purpose of the material's use?"

This is associated with the hypothesis: Calcium leaching occurring in lime-based mortars reduces the potential of carbonation in that mortar. There is an implied reduction of strength, which may indeed be a problem structurally and is potentially quantifiable. It could however be arguably evidenced that apparently weak materials have proved to be very enduring and applicable to solid masonry structures and that any reduction of strength through calcium leaching may only have a negligible effect.

Rationale behind lime use in conservation

With the use of modern materials often seen as inappropriate, the resurgence in use of traditional materials employed within the sphere of historic building conservation has grown in the last number of decades. Within that context, the debate about the different approaches to the use of lime have continued unabated. Traditional technologies associated with both lime and earth mortar production had been largely replaced with lime putties and Natural Hydraulic Limes within the building conservation industry through the nineteen eighties and nineties. From the mid-noughties however, there has been a resurgence of interest in the use of hot-mixed and earth-bound mortars within the conservation community.

In approaching historic building conservation, using like for like materials is a logical step. Hot-mixed mortars are inextricably linked to this logic. There is significant evidence to suggest historic mortars were produced in such a fashion.

Lime is an important material in conservation terms, whilst at the same time, as far as specifiers are concerned, a somewhat fickle and difficult material to regulate through modern standards as applied to contemporary building materials.

Cong Abbey, Co. Galway. Formerly collapsed wall rebuilt and pointed with NHL 3.5-bound mortar and block-laying sand 2014. The wallhead was well protected, but water is suspected of building up from ground level upwards. Image: Author

Lime Leaching

All calcareous mortars can be subject to leaching. This includes lime mortars of any description and certainly includes hot-mixed mortars, all of which can contain significant amounts of un-carbonated lime, or " free lime" (calcium hydroxide).

Lime leaching presents when the deposition of precipitated calcium carbonate in significant amounts becomes visibly apparent, typically when it is re-deposited in an unwanted location. Rainwater is naturally mildly acidic. Carbon dioxide in the air dissolves in the droplets of rain as they descend through the atmosphere producing a weak carbonic acid. This mildly acidic water, on penetrating masonry, reacts with the calcareous elements present and forms

a solution of calcium bicarbonate. This is a particular poblem where calcium hydroxide, otherwise known as “free lime ”, is present which readily reacts with carbonic acid. The water at this stage becomes locally saturated with the bicarbonate which is easily precipitated into solid calcium carbonate and other associated minerals, producing the typically white deposit. The phenomenon of “acid rain “is where increased levels of carbon dioxide in the atmosphere effectively produces rainwater with a greater concentration of carbonic acid, which in turn increases the reaction with any calcareous building elements; be it limestone, cementitious and lime mortars or concrete.

The integrity, or specifically the compressive strength of these calcareous building elements can therefore be significantly reduced by the chemical action of rainwater. This project aimed to scrutinize the effect of calcium leaching on lime mortars, and especially that of hot mixed lime mortars, which to date has not been considered.

Recognition and re-employment of hot-mixed method

Since the early 1990’s, there has been a rejuvenation of interest in the use of hot mixed mortars. This interest has primarily evolved around authenticity issues concerning replacement mortars within the conservation/restoration community and has even found use in sustainable new build projects.

Concerns about leaching occurring

Leaching is known to occur in any mortar (or indeed concrete) that contains a calcareous binder, especially those containing an excess of portlandite, or “free lime” (calcium hydroxide).

There have been anecdotes of hot lime use that have encountered this problem; this includes experimental walls constructed at Portumna castle, Co. Galway (Republic of Ireland) as part of the Hot Lime Phase 1 Project. Following through from the original construction of these walls, a report produced five years later appraising their performance noted the proliferation of leaching , potentially from ineffective detailing.

Aims of research and approach to methodology

Experimental investigations into Lime leaching in concrete and Natural Hydraulic Limes have already been undertaken. In approaching this project, it was proposed that an adaptation of these methodologies can be applied to leaching occurring in hot-mixed mortars, which have not been as yet undertaken, to the authors knowledge. The design of this empirical approach is the focus of this research and will concentrate on the production of mortars of a controlled composition. To avoid overcomplication, it was proposed to use non-hydraulic CL90 (high calcium) air-lime for experimentation

Further information concerning the empirical approach can be found in the link at the end of the article.

Conclusions

- Concerns over leaching in mass masonry when using hot-mixed limes
- Research into this problem (visual, but potentially structural) follows on from concerns over leaching in concrete
- Empirical approach to assessing leaching of hot-mixed mortars adopts approach to that used for Natural Hydraulic limes
- Methodology used for accelerated leaching of wallets unique to this design
- Primarily comparing compressive strength of leached hot-mixed mortars with that of existing historic mortars in mass masonry. Can it help answer the question: is low compressive strength in a mortar used in mass masonry construction undesirable? Can this be evidenced (and take example) from existing historic mortars?
- Assessing whether hot-mixed mortar was used with curing in mind by the original builders; or was the use of quicklime in the mortar the most satisfactory method of utilising a predictable material that reduced point-loading in a matter of hours?

Deductions to be made from analysis

Comparisons of both non-hydraulic hot-mixed mortars and earth mortar demonstrate similarity with their compressive and flexural strength from existing data. There is a dearth of research in the area of sorptivity of earth mortars and clear and concise data is not satisfactory when attempting to make comparison with non-hydraulic lime mortars. The historical relationship between lime and earth mortars offers some suggestions that of the two binders, lime produces mortar (and coatings) with greater effective porosity, explaining its prevalent use for exterior finishes in a historical context.

Reducing Calcium Leaching through preventative measures

Build-up of water within solid masonry walls is the root cause of calcium leaching. Architectural detailing as well as wall coatings are the traditional method of avoiding damp/water build-up within a solid masonry structure. Historic Environment Scotland acknowledge this; *"...the tradition of protective external coatings is encountered all over the world on vernacular and traditional structures…"* (Meek & Addyman, 2019, p. 12).

With the prolific influence of cement from the Victorian era onwards, attitudes to materials and aesthetics changed, unbalancing historic structures by the removal of traditional weather protection;

"Historically, the loss of lime finishes has been a natural consequence of neglect and a result of deliberate intervention. In the latter instance, the Victorian passion for exposed stonework, influenced by antiquarian interest in ruins and the development of the idea of the 'monument' created a fashion for bare masonry. Uncovered masonry was believed to create a fuller appreciation of the composition and evolution of a building. Indeed, between the mid-19th and early 20th century, new masonry buildings were increasingly designed deliberately with exposed stone exteriors." (Meek & Addyman, 2019, p. 21)

Re-establishing a lime coating to a roofed building is a positive step forward in preventing dampness been retained in historic solid masonry. But what if the walling is ruinous, and without a roof? In this case adequately capping the walls is of huge significance. Rough racking and flaunching the wall heads is commonly thapproach taken, even if localized water ingress has been known to occur. Within the last thirty years, there has been increased interest in the use of soft capping with relative success;

"Providing new works with adequate protection against moisture ingress reduces the likelihood of uncarbonated material leaching while the mortar carbonates. The use of protective materials need not be restricted to waterproof membranes and covers; the use of soft-capping has been successful in dealing with high levels of moisture in exposed conditions." (Torney, 2016)

Reducing free-lime content of mortars used in the conservation of solid masonry structures would reduce the possibility of calcium leaching occurring, certainly on any large scale. Re-establishing the earth/air lime dynamic, where historical precedent suggests earth as a bedding mortar, lime for exterior coatings should seriously be considered where intention is to reduce water ingress (reducing calcium leaching, as well as other possible decay).

Detail of wall, raked-out prior to pointing. Earth mortar (with lime inclusions) clearly visible. Dunmore Abbey (circa C14th).
Image: Author

Reflections

The extent to which binder dissolution occurs and its impact on air-lime mortar has not been studied (Forster, 2007). Where evidence of uncarbonated lime has been found in solid masonry walls (Cowper, 2000, p.52) (Teutonico, et al., 1993) is it possible to suggest that there wasn't concern from the medieval (or earlier) builder that the mortar acting as the hearting of the wall ever carbonated. The fact that the mortar was very workable, and stiffened as the building process took place, filling voids wherever possible and most importantly – reducing point loading was of primary concern. The perception of exterior mortar surfaces in contact with the atmosphere forming a hardened, protective crust was the only point at which carbonation of the mortar used was of concern to the mason, and where lime mortars came into their own. These masonry exteriors were commonly furnished with lime-based coatings – renders or washes.

With high compressive strength not necessarily a crucial issue is it feasible to substitute the employment of pure, lime-rich mortars with earth? Where at most, there is only a small addition of lime leaving the prospect of unsightly leaching virtually negligible.

Traditionally, so much solid masonry would have been bedded in earth mortars, with only the exteriors coated with lime-based coatings (render, limewash, or both).

With sustainable re-use of current building stock as well as new build, the use of materials with a historical pedigree such as earth and lime appear to have future potential (Godwin, 2011). Despite the 'muddy' image (literally in the case of earth) involved, there appears to be no reason for their discontinued use. This paper has concentrated on one potential flaw with the use of traditionally prepared lime to highlight potential prejudices which can be investigated as to been unfounded or not. Pronouncement on allaying fears about leaching of hot-lime mortars cannot be made without carrying out the empirical work proposed. In approaching this subject, it is hoped that if nothing else, it will contribute to sustaining dialogue about the future use of hot-mixed lime and earth as mortar binders.

Further information on the proposed empirical method can be found in the full dissertation.

Robert Howard, Stonemason Conservator, OPW
Contact the author via info@blfi.ie

Ardamullivan castle, Co. Galway. Coated with lime harl and limewash in 2006 by the OPW. Image: Author

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Diagrammatic comparisons of Non-hydraulic and Hydraulic Limes

Robert Howard

Lime as a material and the lime cycle

The term lime is loosely used to describe calcium carbonate, calcium oxide and calcium hydroxide, which can lead to confusion, further confounded by the fact that lime is not only confined to calcium and can refer just as easily to magnesium carbonate, magnesium oxide and magnesium hydroxide. There are many other forms of lime and hybrid lime, all of which can simply be referred to as 'lime'.

The Non -Hydraulic Lime cycle

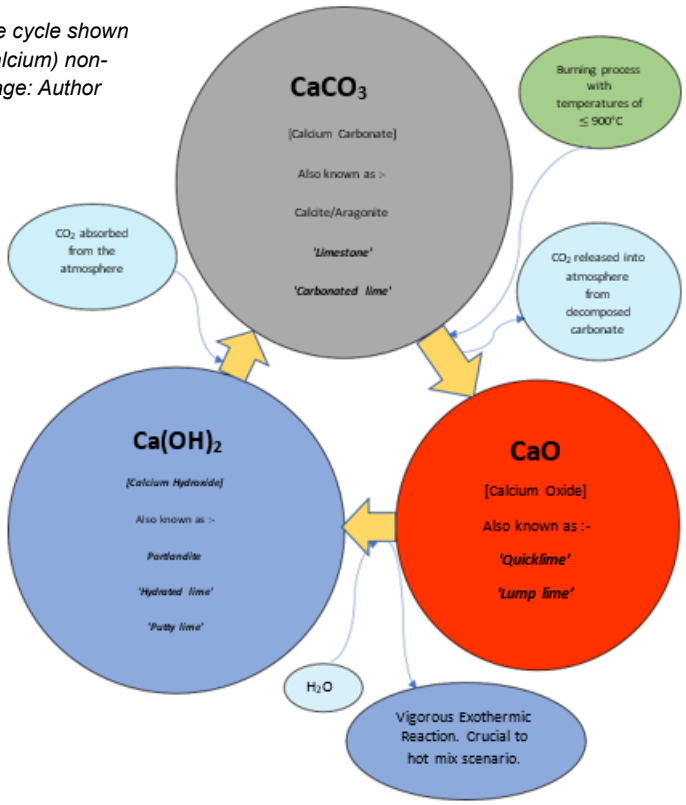
The calcium carbonate, oxide and hydroxide, can be related in the lime cycle. This is the process of lime production and use whereby calcium carbonate (commonly as limestone) is burnt to produce calcium oxide (quicklime) which is then converted to calcium hydroxide (slaked lime). Calcium hydroxide will react with the carbon dioxide in the atmosphere to form calcium carbonate (carbonated lime) - shown in Fig 1 opposite.

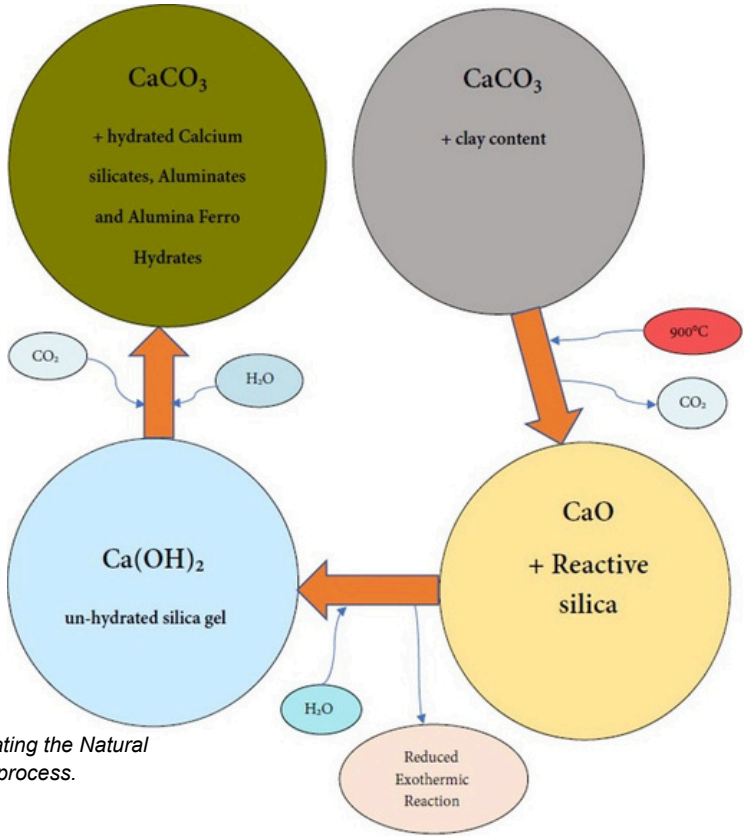
The Hydraulic Lime Process

The lime process of natural hydraulic lime (NHL) and hydraulic lime (lime with added reactive clays imparting hydraulic qualities) is also demonstrated graphically here in Figure 2. It shows an alternative to CL90 (high calcium air-lime) as a binder, illustrated in Figure 1.

Robert Howard

Figure 1 Basic lime cycle shown with CL90 (high calcium) non-hydraulic lime. Image: Author





Digure 2 illustrating the Natural Hydraulic Lime process. Image: Author

DL Lime Putty

Paul Griffin

My first introduction to DL Lime Putty was when meeting Italian Conservation Architect Daniela Re while she was in Dublin do some research for the EU. Daniela asked the BLFI it it would be possible to visit some sites where lime plaster was being used. I volunteered to show her some of our projects in Griffin Plastering. While driving around visiting the sites, DL Lime Putty came up in conversation. I admitted that I hadn't heard of it which came as a surprise to Daniela as it is widely used in Lime Plastering in Italy.

Since then I have been researching and testing DL Lime Putty and I am very impressed. I have tested it with a number of different systems and backgrounds from one coat of plaster onto riven laths to 4 coats onto brick; and whatever else I could think of in between. Due to the elastic nature of DL Lime Putty and long maturing process there is no cracking, not even on the single coat onto the riven laths. The DL Lime Putty we have been using has been maturing for 2 years in lime pits but our partners in Italy have some DL Lime Putty maturing in pits for up to 15 years for very fine plaster work.

Another big advantage is the plastering cycle time. From start to finish coat it only takes approximately 11 days which is a lot shorter than something like CL Lime Putty or even NHLs. Used along with a product such as Vierotone which is a very breathable paint, the DL Lime Putty walls and ceilings can be painted 7 days later.

We have now started using DL Lime Putty on a number of our projects including 22-24 Aungier Street on the lath ceilings with Lotts Architects and plan to use it on the ceilings in the Bank of Ireland on College Green with Consarc. As we are using DL Lime Putty on the ceilings of for example 22-24 Aungier Street, we are also using Calcilite Insulated Lime Plaster on the walls. Calcilite is another impressive Italian product which has some of the sand removed and replaced with a Pumice aggregate. This produces an excellent lime plaster with very good insulation properties. Calcilite is also very breathable and has a compressive strength of under 1N/mm2. This is similar to CL Lime Putty which makes it perfect for historic buildings. Like the DL Lime Putty, Vierotone can be used to paint over Calcilite a week after the final coat.

DL Lime Putty Quarry

So what is DL Lime Putty?

DL Lime is a form of MAGNESIAN LIME - DL refers to the mountainous Dolomites region of N/E Italy. There can be DL65, DL75, DL85 graded versions. The limestones contain a percentage of magnesian impurity. They have a light grey colour (while CL lime is brightly white). They are between CL lime putty and Lime Putty + Pozzolanic aggregates for compression resistance and breathability (NHL2 lime is the next strength up after Lime Putty+ Pozzolanic aggregates). The Compression strength ranges between 1.0 MPa and 1.5 MPa, making it suitable for restoration and decorative applications. They are used for mortars, floors, plasters/renders. You can mix the DL Lime Putty with sand to make an excellent lime plaster and you can also add Brick Dust to the mix to form a" cocciopesto" to improve the compressive strength, waterproof properties and weather resistance.

DL Lime Putty is derived exclusively from a carefully selected high-magnesium calcitic limestone, classified geologically as Jurassic dolomitic marble, extracted from the Piasco region in the province of Cuneo, located at the foothills of the Cottian Alps in northwest Italy. This area possesses a longstanding tradition of lime production, owing to its homogenous lithological composition and the mineralogical purity of its marbles, which render them particularly suitable for the manufacture of high-performance aerial limes.

Following calcination - a controlled thermal decomposition in vertical continuous kilns known locally as fornaci a fiamma indiretta or tini. - the resulting quicklime—comprising a reactive mixture of CaO and MgO—is subjected to wet pit slaking, a traditional technique wherein the lime is immersed in an excess of water under atmospheric pressure. Calcium oxide reacts exothermically and rapidly with water, forming calcium hydroxide ($Ca(OH)_2$) and releasing substantial heat. This reaction breaks down the material into a finely dispersed colloidal suspension.

In contrast, magnesium oxide hydrates far more slowly and requires a prolonged period—often extending to several months—to fully convert into magnesium hydroxide ($Mg(OH)_2$), or brucite. The kinetics of this transformation are markedly dependent on continuous submersion in water and the absence of carbonation, making prolonged pit storage an indispensable step for the production of high-quality dolomitic lime putties.

The extended underwater maturation results in a lime putty with highly consistent particle distribution, excellent moisture retention, and low capillary tension, facilitating superior adhesion to mineral-based substrates and enhanced integration with historic masonry systems. Analytical techniques such as X-ray diffraction (XRD) and scanning electron microscopy (SEM) reveal a dominant portlandite phase, a progressively crystallizing brucite matrix, and the retention of minor relict carbonates.

Paul Griffin

DL Lime Putty Pits

Puddle Mud

Aoife Howard

Puddle mud—traditionally known as puddle clay—has played a vital role in the conservation and maintenance of canal infrastructure, particularly in heritage projects such as the restoration of Lock C4 on the Grand Canal in Dublin. As a conservation engineer, the strategic use of puddle mud is fundamental in addressing issues of water tightness, structural durability, and historical authenticity in lock restoration. Harnessing both technical expertise and heritage sensitivity, the repair of canal locks with puddle mud ensures continued function while respecting original construction methods.

Historical Significance of Puddle Mud

Puddle mud has its roots in 18th-century canal building across Ireland and the UK. Its unique watertight property was essential for the engineering of canals, where groundwater infiltration needed to be prevented to maintain navigability and reduce maintenance costs. The Grand Canal, initiated in the 1770s, made extensive use of puddle clay for lining its bed and constructing locks such as C4. Historical records document that canal locks of this era were lined with layers of puddle clay, hand-tamped to achieve impermeability—an innovative approach that set the standard for similar infrastructure throughout the country.

Conservation Challenges on Lock C4

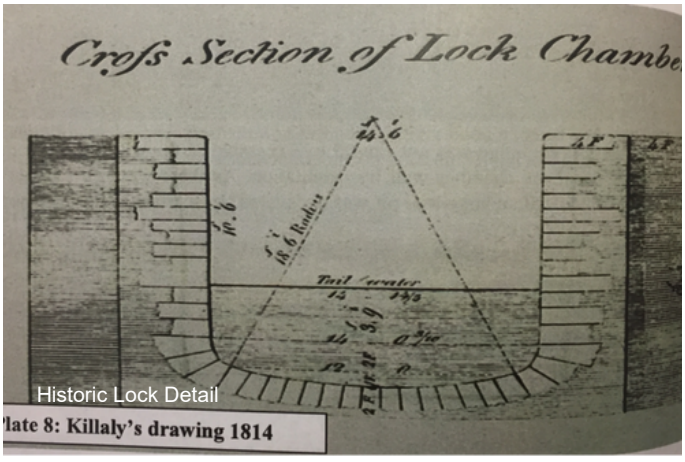
Restoration projects, including those at Lock C4, focus on both the masonry integrity and the underlying puddle mud lining. The conservation process typically involves:

- *Removal of masonry, repair and reinstatement of masonry allowing for replacement of severely damaged stone.*
- *Excavation of top layers of material to expose historical layers.*
- *Reapplication of puddle clay using traditional compaction methods.*

Challenges arise in sourcing clay of suitable quality and replicating mixing and compaction techniques. Works had to be undertaken at specific times of the year (November) due to the inland fisheries laws. Working on water needs to be carefully planned with management of water levels critical to allow lime mortars to set as well at the safety issues in working on a pontoon. Conservation engineers must balance authenticity with effective engineering solutions, especially where original construction details must be retained where possible while replacing damaged elements.

Rows 3 and 6 in particular had significant damage to the Calp Masonry

Exposing behind the Canal Walls



Historic Lock Detail

Puddle Mud contd.

Technical and Environmental Considerations

The effectiveness of puddle mud depends on its mineral composition, moisture content, and careful placement. Considerations:

- Assess and select clay-rich soils, often locally sourced for historical consistency. The site was in Dublin city centre so a local option in this case was not possible. Clay was sourced in Offaly.
- Mix clay with water until a plastic, yet cohesive, mass forms.
- Lay and tamp the puddle mud in sequential layers, ensuring each is compacted thoroughly to prevent seepage and future erosion. Such procedures minimize the risk of canal breaches and support ongoing environmental management by reducing the need for concrete or synthetic lining materals.

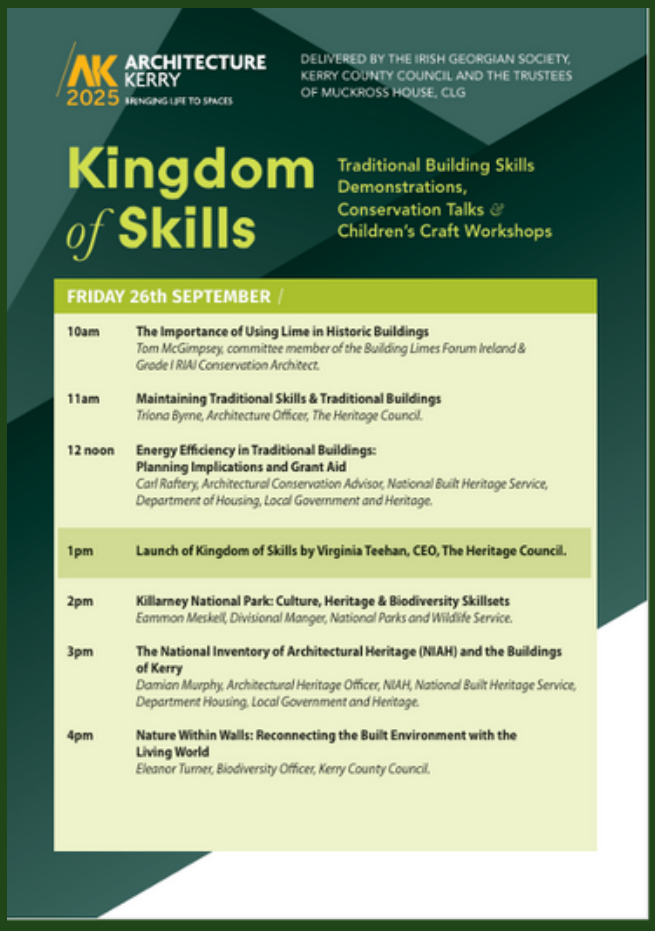
Visual Documentation and References

A survey was undertaken when the walls had been cleaned down with a steam cleaner before any further works were undertaken. Old maps, drawings and details of locks were studied to try understand what could potentially be found.

Heritage and Future Use

Lock C4 remains a testament to the ingenuity of historic canal engineers and the importance of puddle mud as a conservation material. Through careful engineering and heritage-sensitive intervention, projects like the Mespil Road restoration at Lock C4 maintain the operational and cultural value of Dublin's canal infrastructure for generations to come.

Aoife Howard, Conservation Engineer, DKP Partnership



Tom McGimsey, under BLFI auspices, repeated a presentation he gave at the same event in 2023 when he spoke at the Kingdom of Skills event on 26th September 2025 at Muckross Historic Farm, titled ' The Importance of Using Lime in Historic Buildings'. The Kingdom of Skills is a traditional building skills exhibition, run by Kerry County Council, The Irish Georgian Society and the Trustees of Muckross House. It is a well-attended event, another valuable opportunity to get the message across to a variety of well-informed and interested attendees alike, including building practitioners, homeowners, conservation officers etc.

Hygric compatibility of historic lime- based materials and newly-fabricated quicklime mortars

Rosanne Walker

Introduction

For centuries, traditional solid walls constructed from locally sourced materials such as brick and stone have been used in combination with lime-based mortars, internal plasters, and external renders. Lime's ability to regulate moisture, through its high vapour permeability and capillary absorption, is well established, particularly when compared to cement-based alternatives. It is also widely acknowledged that the use of incompatible cement-based materials in traditional buildings can disrupt moisture movement, leading to significant deterioration of the masonry and the building fabric.

As part of the FabTrads project at University College Dublin (UCD), the research team was tasked with measuring the U-values of traditional Irish walls and experimentally determining the hygrothermal (moisture and thermal) properties of historic Irish building materials, including brick, stone, lime, and early concrete. This data is used in hygrothermal modelling (computer software such as WUFI or Delphin) that predicts how temperature and moisture moves through walls, based on the materials they are made from and the indoor and outdoor conditions on each side. Until now, such software relied primarily on databases of European and US materials. The FabTrads project enhanced this by contributing detailed hygrothermal data specific to Irish materials, significantly improving model accuracy in an Irish context.

As a core component of the laboratory work, the team analysed the hygrothermal properties of historic lime-based mortars, plasters and renders, along with two newly fabricated quicklime mortars prepared using traditional hot mix methods. This article presents a comparative investigation of the moisture storage and transfer characteristics of both the historic materials and the newly fabricated quicklime mortars.

Materials

Two replica fabricated mortars were made on-site at a historic building currently undergoing conservation works. The formulation was based on the guidance of expert lime craftsman Damian Condon who prepared the samples using methods commonly used in traditional conservation practice, as shown in Fig 1. Two binder-to-aggregate ratios were prepared: 1:2 (F2) and 1:4 (F4).

While a 1:3 ratio is more commonly used in practice, the inclusion of 1:4 aimed to explore the influence of binder content on the hygrothermal behaviour of the mortar.

The mortars were produced using a traditional hot-mix method, involving a layer slaking technique of alternative layers of quicklime and damp Wexford beach pebble sand aggregate with watering of each layer. A small amount (10% by volume) of fuel ash was added as a pozzolanic component. After slaking, the mixture was transferred to a mechanical mixer, where additional water was added to achieve a workable consistency. The mortar was placed in cylindrical moulds (100mm diameter) and cured in the laboratory for 3 months prior to testing.

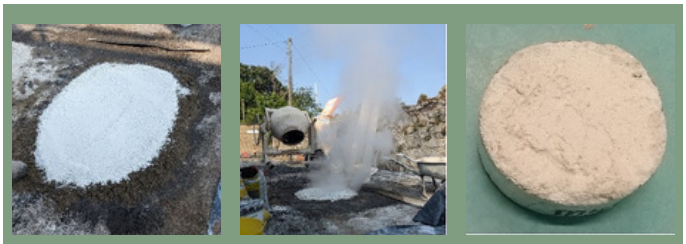


Fig 1. Preparation of quicklime samples (a) layers of quicklime and sand aggregate; (b) release of steam during exothermic reaction and (c) cylindrical samples

Seven lime-based mortars, plasters, and renders were sourced from historic buildings (constructed before 1900) in Ireland, that were undergoing renovation as shown in Fig 2 and listed in table 1. The samples were irregularly shaped and often friable, making it difficult to cut them into uniform pieces. These samples are referred to as the historic samples with mortar (M); plaster (P) and render (R).

Name	Description	Approximate date
F2	Fabricated mortar 1:2	2023
F4	Fabricated mortar 1:4	2023
M2	Lime-based mortar from rubble granite wall	c. 1740
M6	Lime-based mortar from brick wall (rear elevation)	c. 1870
P1	Lime-based internal plaster from Georgian townhouse	c. 1800s
P2	Lime-based internal plaster (lath and plaster – lath not included in test)	c. 1850s
P3	Lime-based internal plaster	c. 1850s
P5	Lime-based internal plaster	c. 1890s
R1	Lime-based external render from stone outbuilding	c. 1800s

Table 1. List of fabricated and historic plaster samples tested

Fig 2. Plaster on a rubble stone wall during removal (a) removal of sections of lath-and-plaster (b)

Properties and testing

Open Porosity

Open porosity refers to the volume of interconnected voids within a material that are accessible to water. To measure open porosity, samples are weighed in three states; dry, saturated (after soaking), and while suspended in water. These measurements are used to calculate both porosity and bulk density.

Adsorption (Sorption Isotherm)

Adsorption describes how much moisture a material can hold from the surrounding air at different levels of relative humidity (RH). This property was tested by placing samples in controlled environments at 50%, 80%, and 95% RH and monitoring their weight gain. As RH increases, the amount of moisture the material absorbs also increases. This behaviour, known as hygroscopicity, varies between materials, for example, timber generally adsorbs more moisture than lime-based plaster.

Free saturation

Free saturation is the total amount of water that a material can hold when immersed in water for three days.

Vapour Permeability

Vapour permeability indicates how easily water vapour can move through a material. This was measured by exposing each side of a sample to different humidity levels (typically 0% RH on one side and 50% RH on the other) and measuring the amount of vapour that passes through. The opposite of vapour permeability is vapour resistance (μ) which is the value often shown on material data sheets.

Capillary Absorption

Capillary absorption measures how much liquid water a material can absorb through its pore network. To test this, samples were partially immersed in water and weighed at regular intervals. The increase in weight over time reflects the rate and amount of water absorbed.

Results

The results are shown in table 2 below. Laboratory investigations revealed that the fabricated quicklime mortar F2 falls within the mid-range of density and porosity observed in historic mortars, while F4 exhibits lower porosity and correspondingly higher density. Both fabricated mortars demonstrated mid-range capillary absorption, despite the lower porosity of F4. Adsorption and vapour permeability do not directly correlate with open porosity. Both fabricated mortars exhibited low moisture uptake at 50% RH but showed closer alignment with historic mortars at higher humidity levels (80% and 95%). A reduced moisture adsorption at 50% RH may limit the plaster's ability to buffer indoor relative humidity. Vapour resistance for both F2 and F4 was at the higher end of the historic range.

Material	Bulk Density	Open Porosity	Moisture content 50%	Moisture content 80%	Moisture content 95%	Free saturation	Vapour permeability	Capillary absorption
	kg/m³	%	kg/kg	kg/kg	kg/kg	kg/m³		kg/m²s$^{0.5}$
F2 (1:2)	1595.59	37.23	2.26	19.81	41.48	318.65	33.65	0.24
F4 (1:4)	1733.05	30.84	3.44	11.35	30.41	253.98	32.11	0.20
M2	1463.42	43.59	9.84	16.21	35.64	369.06	36.04	0.48
M6	1747.72	33.65	10.42	19.84	59.37	270.10	22.65	0.24
P1	1492.27	42.78	13.77	16.97	27.94	370.18	24.86	0.28
P2	1617.93	36.37	8.66	11.12	23.34	326.47	22.61	0.23
P3	1589.68	38.66	6.34	9.91	32.50	288.28	25.44	0.27
P5	1628.89	36.58	6.87	13.48	30.56	302.34	16.33	0.19
R1	1573.24	38.24	13.98	25.01	48.88	319.23	23.39	0.19

Table 2. Measured experimental properties

Seven lime-based mortars, plasters, and renders were sourced from historic buildings (constructed before 1900) in Ireland, that were undergoing renovation as shown in Fig 2 and listed in table 1. The samples were irregularly shaped and often friable, making it difficult to cut them into uniform pieces. These samples are referred to as the historic samples with mortar (M); plaster (P) and render (R).

Hygrothermal modelling

While the individual materials were measured in the laboratory, hygrothermal modelling (using WUFI Pro 7) provides a more realistic representation of simultaneous moisture storage and transfer mechanisms. Two simplified wall simulations were undertaken; firstly to understand the behaviour of the fabricated mortars (F2 and F4) compared to the historic mortars (M2 and M6) and a second simulation to compare a rendered brick wall with historic render (R1) compared to the two fabricated mortars (F2 and F4) used as render.

Simulation 1 is a simplified wall model, consisting of 80mm of brick, 80mm of mortar, and another 80mm of brick, forming a "brick–mortar–brick" sandwich (Fig 3). This approach allows the complex two-dimensional structure of brick and mortar to be estimated as a one-dimensional simulation. The model simulates a south-west-facing wall located in Dublin. The brick is a red brick from Cork c.1890 (B9 from the WUFI database) and two historic mortars M2 and M6 and the two fabricated mortars F2 and F4 are investigated.

Simulation 2 is a rendered brick wall comprising 20mm of render and 240mm of brick (Fig 3). It has the same boundary conditions as simulation 1. The brick is also B9 and the external render is historic render R1 and the two fabricated mortars F2 and F4 are investigated.

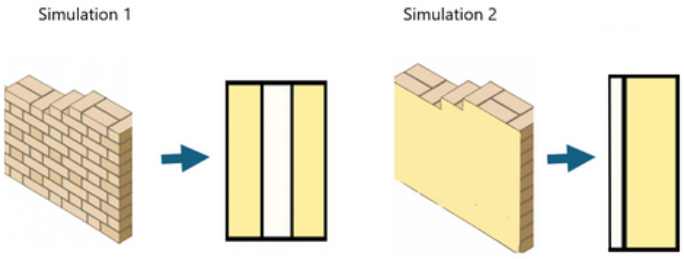


Fig 3. Simulation 1 - real world brick wall modelled as a brick (80mm), mortar (80mm) and brick (80mm) sandwich and Fig Y Rendered brick wall simulated as 20mm render and 240mm brick

Findings

As the simulations were based on just two models with a single set of boundary conditions, the results reflect specific scenarios but likely indicate broader performance trends. The findings are therefore representative of those specific scenarios but are likely indicative of broader performance trends. The moisture content and RH in the models were monitored over one year, once the moisture levels in the walls had stabilised. For Simulation 1, measurements were taken at the centre of the wall, while for Simulation 2, they were taken 50 mm from the external side. These positions are highlighted as stars in Fig 3 above.

The graphs show tightly grouped lines, suggesting that the various lime-based materials exhibit similar moisture behaviour (Fig 4-7). The main exception is Simulation 1, which displays greater variation in moisture content across the different mortars. In this case, the lines are more widely spread. However, the fabricated mortars remain within the range of variation exhibited by the historic samples.

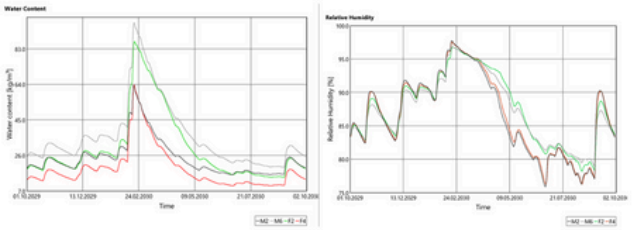


Fig 4. Water content at the centre of the wall M2- black, M6 – grey, F2- green and F4 – red (LHS) and Fig 5. Relative Humidity (RHS)

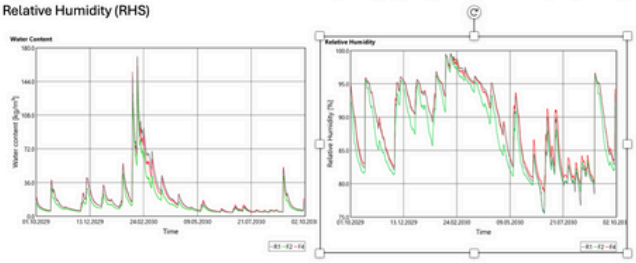


Fig 6. Water content at 50mm from external side of rendered wall R1- black, F2- green and F4 – red.9 (LHS) and Fig 7. Relative Humidity (RHS)

Conclusion

The fabricated mortars exhibit experimentally measured hygric properties mostly within the range of those found in historic lime-based materials. While the modelling simplifies the complex moisture dynamics found in real-world wall conditions, it nonetheless supports the finding that the fabricated mortars are likely to perform similarly to historic materials, thereby reducing the risk of moisture-related deterioration. More detail on this research can be found in the two journal papers - The hygrothermal properties and behaviour of historic mortars, plasters and renders published in Construction and Building Materials and The hygric behaviour of historic and newly fabricated lime-based mortars, renders and plasters soon to be published in Special Issue: Strategies for Architectural Conservation and Adaptive Reuse.

Both will shortly be available to view on the FabTrads website www.ucd.ie/biace/projects/fabtrads.

Acknowledgements
This research conducted as part of the FabTrads project is supported by the Sustainable Energy Authority of Ireland under Grant Agreement 21/RDD729. Thanks to Dr. Ciaran McNally and Civil Engineering at UCD for the long-term use of space and facilities.

Rosanne Walker, Anna Hofheinz, Damian Condon, and Oliver Kinnane, University College Dublin

Brackenstown House Cascades, Swords, Co. Dublin
Site Report

Mark Nugent

Remnants of the designed landscape at Brackenstown(Breckdenstown), home of Robert and Lettice Molesworth, dating from the first decade of the 18th Century were prioritised for repair by Fingal County Council as part of The Ward River Regional Park Development Project. Finola O'Kane has written about the design, engineering and hydraulics of Brackenstown by Molesworth in her book 'Landscape Design in Eighteenth Century Ireland' (2004).

This article focuses on the use of building lime below the waterline in the repair of the Cascades feature in particular. In order to formulate a mortar mix for use in the repairs to those parts of the structure normally covered in water, Dr. Jason Bolton analyised mortar samples from the structure. Following this analysis, together with Luise Volschenk and Peter Staunton of Coady Architects and Michael O' Boyle, Conservation Architect, the ratio of 2:1:1 Sand:lime:prompt respectively was specified for use.

Padraig Haughey, Tony Treanor and Gary Hanna of Francis Haughey Construction and Brian Rooney, Declan Fitzpatrick and Martin Stephson of Thomas Rooney Stonemasons worked with the architects on how to implement the mix for various applications. As the structure conveys the River Ward, the lime mixing had to be done remotely from the repairs to prevent lime entering the river. In masonry work below the water line, Otterbein NHL 5, Vicat Ciment Naturel Prompt and 5mm sand were used. All lime and aggregates used were supplied by Traditional Lime Company who also offered advice on usage. During periods of cooler weather, the mortar was usable for up to 30 minutes. However, in milder conditions the mortar could only be used for 15-20 minutes and as a result the prompt was mixed into buckets of premixed lime and aggregate closer to the repairs to allow for the maximum amount of time to work with it.

2 layers, 30 and 20mm thick, of render were used to coat the steps of the cascades feature. Initially 3 samples were prepared. One sample mix was as described above, another was 2:1:1:1 5mm Sand:lime:prompt:5-8mm stone respectively and the third was 2:1:1:1 3mm Sand:lime:prompt:5-8mm stone respectively. The mix with the 5mm sand and 5-8mm stone was selected.

On the floor of the structure, beneath the 2 side arches there was a requirement to bed in cobbles. This was done using a slurry of the 2:1:1 Sand:lime:prompt respectively mix. Another variation of the mix was used in brickwork. Otterbein NHL 3.5 was used instead of the NHL 5 due to the lighter nature of the brick. A set time of 24 hours is specified in the data sheets, but as luck would have it, rainfall amounts were low during the repairs and the dams and temporary water diversions held which allowed for several weeks of setting time. The below water mix was used to a level 500mm above the waterline in the repairs. Unlike working on land where a mortar's performance can be monitored and adjusted, the underwater mortar only gets tested when the water is let back in and thus makes it very hard to make any later adjustments.

Mark Nugent, Senior Executive Landscape Architect, Fingal County Council

Coady Architects with
Michael O'Boyle, RIAI Grade 1 Conservation Architect
Punch Consulting Engineers

BLFI Cavan Workshop 2024

Dominic Keogh Plastering Workshop Roscommon

Lime – We have the Country Covered

National Built Heritage Service (NBHS)
BLFI Collaboration

In recent years, the National Built Heritage Service (NBHS) have supported a number of traditional skills training events to include dry stone walling, thatching and hedge laying. Given the interest in traditional mortars, renders and plasters, a significant number of events have been dedicated to the topic of lime. Some have covered the appropriate use of NHL's while others, driven by a growing resurgence, have focused on the place of hot mixes.

Last year NBHS directly supported the BLFI to deliver three events at Birr, Co. Offaly, Virginia Co. Cavan and Westport, Co. Mayo. This year NBHS supported the two BLFI workshop events at Killoran, Co. Tipperary in July and at Westport House, Co. Mayo on 26th and 27th September.

Aside from collaborations with the BLFI, NBHS have partnered with a number of other training providers across the country, from Limerick to Roscommon and from Kerry to Donegal. These events offer high quality practical training to owners, builders and specifiers who wish to gain an understanding in the use of lime for the repair of traditional buildings. For further information please follow NBHS on Facebook, X and Instagram.

Sarah Jane Halpin - NBHS

Agri-Heritage Week Wexford 16th July 2025

Damien Condon mounted and fronted a BLFI information stand at the Agri-Heritage Week Wexford on 16thJuly 2025. This event, and the considerable interest shown, was an opportunity to reach out to home owners, farmers and others interested in the 'how to' aspect of built heritage protection.

Killeen Castle/ Caisleán a' Chillín
Site Report

Henry Thompson

The tower house at Killeen, Castlegar, Co. Galway was originally built by Redmond Burke in 1493. More recent modifications include a two-storey extension added in the nineteenth-century and in 1990 another stone and cement extension, plus various material alterations.

The tower itself was a roofless ruin until 1990, when the new owner installed a rather strange pyramid roof on it and consolidated the wall caps. This work was carried out entirely in new masonry and Portland cement, including a massive 400 mm square reinforced ring beam over the battlements. The entire tower exterior masonry was pointed in cement. Needless to say, the building became a damp, mouldy mess.

The following works summary were undertaken or planned by OldBuilders with Design Team support:

- *Removal of 1990s cementitious thin flat stonework to the battlements, and recreating a typical fifteenth-century configuration, with a parapet walkway stepped and leaded in Code 6; around a new steeply gabled roof; plus other structural interventions.*
- *External lime pointing using St. Astier NHL 3.5.*
- *Interior acrylic paint removal which had been layered in alternate limewash acrylic paints and then lime washed again - a light shot blast was used to deal with that conundrum.*
- *Preservation of daub and wattle plaster remnants to vaulted ceilings, lime plastering (hot lime) of walls, as well as repairs and new works - the latter phased for next year.*
- *Installation of stone- corbelled and timber-beamed floors to the second floor.*
- *Truss-beamed roof and ceiling to the top floor.*

Completed Works

The original base of the crenelated battlement walls was deemed too thin on its own to support rubble stone walls. The conservation engineer, Ivor McElveen, specified a hybrid lime and Portland cement mix with an embedded 8mm stainless wire rope, encircling the tower, inserted just below the battlement embrasures. A lead sheet was laid below each cap stone a to protect against water ingress. A Hydrophobating fluid was also applied over the stone and joints.

Part of the masonry work included an entirely new machicolation for dropping nasty stuff on unwanted visitors - not many of us get to design and build one of these ! Missing stone window mullions were also replaced.

Roof trusses, were fabricated in Douglas Fir, morticed and tenoned the old way, and craned into place, the new way; the trusses supported off new stone corbels. Insulated clay blocks were used to rebuild roof gables complemented with 300mm hemp wool between the pitched roof timbers.

A prolonged discussion occurred between the builder, the engineer, the owner and the architect - as to whether or not to plaster the external walls, or point them. In the end it was decided to go with the re-pointing only. And to be fair the stonework was of a much more uniformly large unit size, typical of that end of Galway, and with thinner joints unlike the bulk of rubble stones walls usually seen in tower houses. There also was no sign of plaster residuals on the stone face.

Henry Thompson, The OldBuilders Company

Grants for Works, Advice & Training for 2026–2027

Non-exhaustive list of current and upcoming Irish grants and supports

NOTE - Strict Application Deadlines operate for most Grants

Built Heritage Investment Scheme (BHIS) – 2026 Round
Supports small-scale conservation works on protected or historic structures.
https://www.gov.ie/en/department-of-housing-local-government-and-heritage/services/built-heritage-investment-scheme-bhis/

Historic Structures Fund (HSF) – 2026 Round
Larger grants for major conservation or reuse projects with clear public benefit.
https://www.gov.ie/en/department-of-housing-local-government-and-heritage/services/historic-structures-fund/

Heritage Council – Community Heritage Grant Scheme
Funds community-led heritage and training projects, including traditional building skills workshops.
https://www.heritagecouncil.ie/funding/heritage-funding-opportunities/community-heritage-grant-scheme

All-Ireland Heritage Skills Programme (King's Foundation × Heritage Council)
A 12-month hands-on training course in heritage craft skills.
https://www.heritagecouncil.ie/our-work-with-others/all-ireland-heritage-skills-programme

Community Monuments Fund (CMF)
Supports conservation and management of and repairs to archaeological monuments.
https://www.archaeology.ie/advice-and-support/grants-and-funding/community-monuments-fund/

Heritage Stewardship & Philanthropic Funds
Occasional national or charitable funding calls for projects with training or community value.
https://www.heritagecouncil.ie/funding/heritage-funding-opportunities/heritage-stewardship-fund

Traditional Farm Buildings Grant Scheme
Award-winning Traditional Farm Buildings Grant Scheme.
https://www.heritagecouncil.ie/funding/heritage-funding-opportunities/traditional-farm-building-grant-scheme

SEAI Traditional Homes Pilot
SEAI assisting standard energy retrofit applications but with specific advice for owners of traditionally-built structures.
https://www.seai.ie/grants/home-energy-grants/one-stop-shop/traditional-homes

Conservation Advice Grants (operated by Department of Housing, Local Government and Heritage)
The Conservation Advice Grant Scheme for Vacant Traditional Houses associated with the Vacant Property Refurbishment Grant.
https://www.gov.ie/en/department-of-housing-local-government-and-heritage/services/conservation-advice-grant-scheme-for-vacant-traditional-houses/

Thatching Grant For Residences (operated by Department of Housing, Local Government and Heritage)
A housing grant of up to €3,810 or two thirds of the approved cost (whichever lesser) may be payable towards necessary works to renew or repair the thatched roofs of houses.
https://www.gov.ie/en/department-of-housing-local-government-and-heritage/services/thatching-grant/

Local Authority Heritage Grants
Many county and city councils run annual heritage or conservation grant schemes (small works, training bursaries, workshops). Example: FCC Fingal County Council's Conservation Office runs/ manages four schemes: Built Heritage Investment Scheme (Historic Thatched Buildings Stream); Historic Structures Fund; Architectural Heritage Fund's "Stitch in Time Grant" – Small Repairs & Conservation Advice; Built Heritage Investment Scheme (General Stream)
Check your own local authority's Heritage & Conservation webpage.

What is Building Limes Forum Ireland?

The Building Limes Forum encourages expertise and understanding in the use of building limes.

It aims to achieve this goal by:

- exchanging, collating and disseminating information, through publication of a regular journal and by holding meetings and conferences;
- encouraging practical research and development through field studies, trials, monitoring and analysis;
- encouraging development of appropriate industrial and craft skills and techniques;
- educating building professionals, builders, conservators, craftsmen and women, and property owners in the appropriate use of lime in building through demonstrations, publications and courses;
- developing contacts with institutions and individuals outside the forum and in other countries that have relevant experience or knowledge.

Contact Us:

If you would like to get involved please contact us by email on info@blfi.net

Follow us on :

@blfireland **building-limes-forum-ireland**

Membership:

Membership of the Building Limes Forum offers:

- the opportunity to participate in conferences, courses, workshops, demonstrations and visits organised by the Forum
- an informal network of contacts that is prepared to share information and to discuss matters of general interest
- annual bursary to assist with training and education

For a membership form, previous Newsletters, access to the HLM Database - go to:

https://www.buildinglimesforumireland.com

Exciting news! From January 2026, BLFI will be introducing a new membership directory platform to improve how our members connect, renew, and engage with the Forum. We're currently working on this in the background, and the rollout will happen step-by-step over the coming months. These updates will also bring changes to our payment system (but please note: there will be no changes to the annual fees or pricing structure), which may cause some small interruptions — thank you in advance for your patience. Our goal is to create a smoother and more modern membership experience for everyone. Detailed information will be emailed to members soon, so please keep an eye on your inbox and bear with us during this transition. Thank you.

Upcoming Events

- **BLFI 2026 LIME SLAM** - **24th February 2026** - *New Presentations Welcome Now!*
- BLFI SPRING WALKING TOUR - Details TBC
- BLFI BURSARY AWARD
- VERNACULAR SKILLS WORKSHOPS - SUMMER & AUTUMN 2026

Training & Education

- Madigan Traditional Masonry, Co Clare ph:0857679753 email: madigantraditionalmasonry@gmail.com
- Stoneware Studios Ltd., Co. Cork, ph:024 90117 · email: mail@stonewarestudios.com Visit www.stonewarestudios.com/
- The Lime Store, Dublin 12 ph:01 450 8624 email:info@thelimestore.ie Visit www.thelimestore.ie/
- Traditional Lime Company, Co Carlow ph:059 9151750 email:info@traditionallime.com Visit www.traditionallime.com/