

# IMQS

IRISH MINING & QUARRYING SOCIETY

## ANNUAL REVIEW 2024

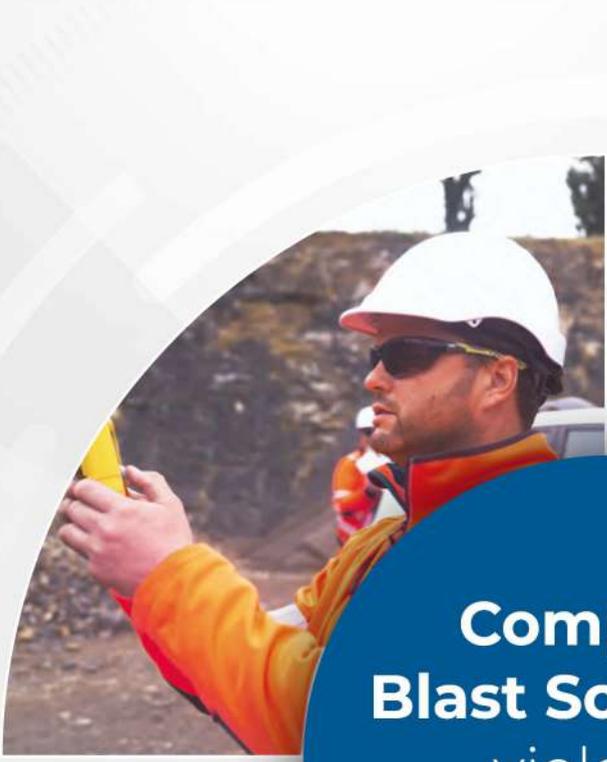
[www.imqs.ie](http://www.imqs.ie)

Linked   
Irish Mining and Quarrying  
Society (IMQS)

 Twitter: @IMQS\_IE

# kemek-

BLAST EXPERTISE



**Complete  
Blast Solutions,**  
yielding  
consistent  
results.



T: +353 (0) 46 9541086  
+44 (0) 28 93351444



[kemekltd.com](http://kemekltd.com)

# Contents

Notes from the Editors 2024 .....	04-05	Geological Survey Ireland.....	62-63
Foreword from the Department of Environment, Climate and Communications .....	06-07	Prospectors & Developers Association of Canada - PDAC 2024 .....	64
by Philip Nugent, Assistant Secretary, Circular Economy, Waste Policy and Natural Resources, Department of the Environment, Climate and Communications		by Dr Aoife Brady, Chief Operations Officer, iCRAG	
Message from the President .....	08	Sandvik Ireland - Through the Rock, Through the Years .....	66-67
by Alan Dolan, President IMQS		By Brian Carroll, Operations Manager UK & Ireland - Sales Territory Ceu & UK/Ireland	
Activities of the Society 2023-2024 .....	10	Irish Resource People Overseas - Kevin Lonergan .....	68
by Ruairi O Connor, Honorary Secretary & Vice President, Irish Mining & Quarrying Society		Irish Resource People Overseas - Jonathan Talbot .....	70-71
Minerals Matter and the succession imperative for industry.....	12-13	Finning delivers used equipment solution to Glensanda.....	72-73
by James Thorne, Joint CEO, Institute of Quarrying & Mineral Products Qualifications Council		by Mick Leonard, Strategic Account Manager, Finning UK & Ireland	
Irish Mine Rescue Committee 2023-2024 .....	14-15	Industry Leader - Michael Carvill.....	74-75
by Mike Lowther, Chair IMRC, Aoife Tallon Secretary IMRC and Anthony Moran IMRC		by Sean Finlay, Director, Geoscience Ireland	
Irish Concrete Federation .....	16-17	Drill & Blast Techniques at the Woodsmith Mine Shaft Sinking Project.....	76-79
by Gerry Farrell, Chief Executive, Irish Concrete Federation		by Neil Webster, Blasting Engineer, Joseph Gallagher Ltd.	
An overview of activities by the Institute of Geologists of Ireland (IGI) 2023-2024.....	18-19	Concrete & Aggregate Sustainability: Embrace the Numbers .....	80
by Eoin Wyse, EurGeol, PGeo, President IGI		by Conor Hayes, Head of Sustainability, Irish Concrete Federation	
Dalradian issues fifth Responsible Business Report.....	20-21	Electronic Detonator Delay Selection Fragmentation for Quarries .....	81-83
Dalradian		by Nathan Rouse, PE, PhD Thoroughbred Drill and Blast Consultants	
MPANI Regional Director's Report.....	22-23	EFEE (European Federation of Explosives Engineers).....	84
by Gordon Best, Regional Director, MPANI		by Mathias Jern, President EFEE	
IMQS Bursaries .....	24	Irish Association for Economic Geology (IAEG) .....	85
by Alan Dolan, President IMQS		by Graham Reid, Treasurer IAEG	
Geoscience Ireland.....	28	Material Preservation and Emission Reduction.....	86-87
by Dermot Duff, Director Geoscience Ireland		by Dimitris Michailidis and Ken Mulkerrins, Kilsaran	
Critical Raw Material Extraction in Environmentally Protected Areas (Ciran) - An Update .....	30-31	Estonian and Irish opportunities in the Raw Materials Sector.....	88-90
By Sybil Berne and Jerry Barnes, MacCabe Durney Barnes		by Tony Hand, Sustainable Mining Project Manager, Division of Mining and Mineral Technology, Department of Geology, Tallinn University of Technology - TalTech, Estonia	
Geological Mapping of the Cavanacaw Mine - Unlocking structural controls and trial production stopping .....	32-33	Award of IMQS Silver Medals to Geo Drilling Apprentices.....	91
by Zoë Brown, Senior Mine Geologist and Geotechnical Officer and Dr. Sarah Coulter, Chief Geologist, Galantas Gold		Copper - The Eternal Metal Conductive, malleable, ductile and non-corrosive.....	92-95
Improving access to the Geological Survey of Northern Ireland Geomaterials collections.....	34	by Brendan Morris, Managing Director, LTMS Limited and COO, Galantas Gold	
Four new Epiroc FlexiROC D55s for O'Sullivan Rockbreaking's fleet.....	36-37	The Role of Limestone Filler in Ready-Mix Concrete and Cement Based Materials .....	96-97
Irish Resource People Overseas - Eoin Wallace.....	38	by Padraic McGrath, Research and Development, McGRATHS CONG	
Mining and Quarrying Sector 'Living in interesting times' .....	40-41	LKAB's transformation and progress in the Sustainable Underground Mining Project.....	98-101
McHale Plant Sales		by Mike Lowther, Specialist - Mine Management and Magnus Brevemark SUM Project Manager	
Industry Leader - Hugh McCullough.....	42-43	FROM CRISP PACKETS TO CLINKER, circular economy in the cement industry .....	102-104
by Sean Finlay, Director, Geoscience Ireland		by Brian Gilmore, Communications Manager, Irish Cement	
The Planning and Development Bill 2023 - An Update .....	44	Innovative Shaft Sinking Techniques at Woodsmith Mine.....	105-111
by Sybil Berne, Associate, MacCabe Durney Barnes		by Stuart Walker, Deputy Engineering Manager, Woodsmith New Mine, North Yorkshire	
iCRAG Update 2024 .....	46-48	Construct Innovate .....	112-113
by Emer Caslin, Murray Hitzman and Fergus McAuliffe		by Colm McHugh, Centre Manager	
The EU Critical Raw Materials Act takes effect in Ireland.....	52-53	Saint-Gobain Mining (Ireland) Ltd 2024 Update Drummond Mine/ Knocknacran Open Cast Mine.....	116
by Geoscience Policy Division, Department of the Environment, Climate and Communications		by Benson Plunkett, Mine Manager, Drummond Mine, Knocknacran Open Cast Mine	
Irish Resource People Overseas - Emma Murray-Hayden.....	56	IMQS Golf & Dinner Dance 2023 .....	117
Roadstone develop concrete for 3D printing and Roadstone is celebrating 75 years in business.....	58-59	OBITUARY - Sean Gilmore .....	118-119
Irish Resource People Overseas - Catherine Maguire .....	60-61	IMQS Happy Colouring .....	120-121
		Membership Application Form and Advertisers Index.....	122



## IMQS ANNUAL REVIEW 2024

Published by: 4SM NI Ltd, The Old Coach House,  
12 Main Street, Hillsborough BT26 6AE

Tel: 028 9268 8888 Fax: 028 9268 8866

Email: [info@4squaremedia.net](mailto:info@4squaremedia.net)

This journal is published by '4 SM NI Ltd', at The Old Coach House, 12 Main Street, Hillsborough, N. Ireland BT26 6AE. The publishers cannot be held responsible for any inaccuracies supplied by the contributors. All rights reserved. The contents of this publication may not be reproduced or transmitted in any form, either in part or in full, including photocopying and recording, without the written consent of the owner. Nor may any part of this publication be stored in a retrieval system of any nature without prior written consent of 4 square media.

## THE TEAM

**Golda Burrows**  
IMQS Publication Manager

**Martin Elliman** General Manager

**Joel Byers** Production Manager

**Rachel Clarke**  
Accounts Administration

**Helen Beggs**

Chief Operating Officer

# Notes from the Editors 2024



The Theme for this year's Review is "Irish Minerals Professionals Across the World", where we shine a spotlight on the professional lives, experiences and successes of several Irish people working in the industry abroad.

We are delighted to include fascinating features from Kevin Lonergan, SVP Technical Services, Wesdome Gold Mines, Toronto; Catherine Maguire, Director of Exploration, Lundin Mining, Vancouver; Johnathan Talbot, Mine Manager, Gulf Rock, Ghuzayn Copper Mine, North Batinah, Oman; Emma Murray-Hayden, Group Geology Manager – Growth, Northern Star Resources, Western Australia; and Eoin Wallace, Mine Manager, British Gypsum – Brightling Mine, East Sussex, UK.

Following on from this, our "Industry Leaders" feature this year focuses on the varied and interesting careers (to date) of two very impressive individuals who have also played a significant role within the minerals industry abroad – Michael Carvill and Hugh McCullough.

**Closer to home there is good news** with the gradual resumption of zinc and lead mining operations at Tara Mines in Navan. The Quarrying Sector should also continue to grow this year, benefitting from an estimated 36,00 housing completions and a 3.9% increase in construction generally.

Industry organisations rely on each other for support and knowledge sharing, and the IMQS Review once again reflects that collaboration with contributions from leading associations including, Construct Innovate, the European Federation of Explosives Engineers (EFEE), the Irish Association for Economic Geology (IAEG), the Irish Concrete Federation (ICF), the Institute of Geologists of Ireland (IGI), the Institute of Quarrying (IQ), the Irish Mine Rescue Committee (IMRC) and the Mineral Products Association Northern Ireland (MPANI). All these partners have prepared interesting



updates on their activities in the last year. Some fascinating feature papers have also been provided by a range of contributors with a focus on case studies, showcase projects and industry updates. Articles have been prepared on Creagh Concrete, Dalradian, Finning, Galantas, Gyproc (Saint-Gobain), Irish Cement, Kilsaran, LKAB, McGraths, McHale, Roadstone, Sandvik, Thoroughbred Drill and Blast Consultants, and Woodsmith.

There is also a feature on **“Copper – The Eternal Metal”**, progress updates on the Horizon Europe funded Critical Raw Material Extraction in Environmentally Protected Areas (CIRAN) project and the Critical Raw Materials Act (CRMA) which took effect as an EU Regulation in Ireland in May of this year, alongside a state of play article on the much-discussed Planning and Development Bill aiming to consolidate and revise the law relating to planning and development.

We also have informative updates from Geoscience Ireland (GI), PDAC, Geological Survey Northern Ireland (GSNI) and Geological Survey Ireland (GSI), all included in this Review.

We are once again pleased to include an address from Mr. Philip Nugent, Assistant Secretary with the Department of the Environment, Climate and Communications. This is Philip’s fifth year contributing to the Review and we are grateful for his continued support. His Foreword **“The need for remediation of legacy mine sites in Ireland”** provides insights into the country’s proven capacity to remediate contaminated sites through notable projects, such as the Haulbowline Island project in County Cork at Kerdiffstown in County Kildare, the recently established multi-



year Historic Mines Rehabilitation Programme at the GSI, and the critical role public participation has to play in the success of remediation projects.

We pay tribute to Seán Gilmore in the “Obituary” section of this year’s IMQS Annual Review and the pivotal role he played in improving safety within the Irish mining industry. We encourage our members to forward details to the IMQS of those they wish to remember each year. Thank you to Seán’s family for allowing us to publish the details of his incredible career – may he rest in peace.

As always, we thank our advertisers

for their continued support for the Irish Mining and Quarrying Society, all our feature writers and regular contributors and our publisher 4 Square Media. Without the commitment and assistance of these parties, this publication would not be possible.

We hope that you enjoy the IMQS Annual Review 2024 and that you will avail of our open invitation to you to contribute an article to next year’s edition. Don’t forget to note the closing date for this year’s IMQS Colouring Competition (towards the end of this Review publication) – an array of very popular Lego prizes up for grabs!

## THE EDITORIAL TEAM



Dr Aoife Brady.



Sean Finlay.



Keith McGrath.



Brendan Morris.



Ronan Griffin.



Nicola Nixon.



Siobhán Tinnelly.



Alan Dolan.

# Foreword from the Department of Environment, Climate and Communications

## The Need for Remediation of Legacy Mine Sites in Ireland

Ireland's rich mining history has left an indelible mark on the landscape, contributing significantly to our national development. However, alongside the economic benefits that mining once brought, there now exists a legacy of environmental degradation and health hazards at a number of abandoned mine sites, which do not meet modern standards for mine closure. Prominent among these are the Avoca mines in County Wicklow and the Silvermines in County Tipperary, both of which have long ceased operations but continue to pose significant risks to both human health and the environment.

**The Avoca and Silvermines sites, among others, are characterized by physical hazards including open mine shafts, subsidence, rockfall, landslides and flooding; and chemical hazards including contaminated soils, heavy metal-laden mine waste, and acid mine drainage.**

These hazards represent a significant threat to the environment, property and public health and safety. At Avoca, copper mining operations date back to the Bronze Age, with intensified extraction during the 18th and 19th centuries. The nearby Avoca River has suffered from severe pollution from acid mine drainage. Similarly, parts of the Silvermines area, where mining dates back over a millennium, is contaminated with lead, zinc, and other metals. The site has a history of livestock health issues, particularly lead poisoning. Despite ongoing efforts to mitigate these risks, including the partial capping of mine waste and agricultural management guidance, comprehensive remediation remains a pressing need.

Ireland has proven its capacity to address and remediate heavily contaminated sites through notable projects such as the Haulbowline Island project in County Cork and the remediation of the illegal landfill at Kerdiffstown in County Kildare. These examples highlight both the challenges and opportunities associated with transforming hazardous sites into valuable public assets.

The Haulbowline Island project involved the remediation of a former steelworks site that had long been a source of environmental concern due to the presence of toxic waste and industrial residues. The successful cleanup and transformation of the site into a public park, complete with walkways, sports facilities, and green spaces, is a testament to the effectiveness of a coordinated remediation effort.

This project not only eliminated the environmental and health risks associated with the site but also provided a valuable amenity for the local community, further enhancing Cork Harbour's social and economic value.

Similarly, the remediation of the illegal landfill at Kerdiffstown has transformed a blighted area into a site of potential recreational and ecological value. The project involved the removal of hazardous waste, extensive earthworks, and the installation of environmental controls to prevent future contamination. This example underscores the importance of multi-agency collaboration, public engagement, and the application of best practices in site remediation. Both of the projects utilised geoscience expertise in the provision of high-quality scientific evidence to support the design of remediation works and ongoing management. For Avoca and Silvermines, minerals and mining professionals with world-class experience of mine remediation will be needed, to inform the development and execution of appropriate remediation goals and to fully explore the mine waste valorisation opportunities.

Recognising the urgent need to address the risks posed by legacy mine sites, the Department of the Environment, Climate and Communications (DECC) has established a dedicated team within Geological Survey Ireland in DECC to lead the **Historic Mines Rehabilitation Programme**. This multi-year initiative is designed to systematically assess, prioritise, and remediate Ireland's most hazardous legacy mine sites. It aims to reduce the level of risk of serious health, safety and environmental degradation to acceptable levels, and in doing so, to provide for nature restoration, environmental amenity and tourism.

The programme will require close collaboration between various state bodies, particularly local authorities,

which have already played a critical role in conducting initial make-safe works at several sites. These efforts have included fencing off dangerous areas, capping mine shafts, and conducting preliminary environmental assessments.

However, the full remediation of these sites will involve more long-term focused and comprehensive measures, including the removal or stabilization of contaminated materials, restoration of impacted ecosystems, mitigation of water quality impacts, and potentially, the reprocessing or valorisation of mining waste in line with the **EU Critical Raw Materials Act (CRMA)**, which obliges Ireland to fully characterise all mining waste that has the potential for the recovery of critical and strategic raw materials.

The concept of a circular economy, where waste is minimised and materials are reused or recycled, offers significant opportunities in the context of mine site remediation. At legacy mine sites like Avoca and Silvermines, large volumes of mining waste (tailings and spoil), which are currently considered a liability, may now hold potential for the recovery of raw materials.

One approach to valorisation is the reprocessing of mine tailings to extract residual metals that were not recovered during the initial mining operations. Advances in metallurgical technologies have made it possible to extract valuable metals from old mine waste with greater efficiency, turning what was once waste into a resource. As part of the implementation of the CRMA in Ireland, a regulatory approach to the valorisation of extractive waste will be developed, so that any reprocessing activities are accompanied by provisions for the environmental rehabilitation of remaining waste to best practice.

In addition to metal recovery, there are opportunities to use mine waste

in other applications, such as the production of cement, bricks, or road-building materials. By converting waste into products that can be used in construction or other industries, the environmental impact of mining operations can be further mitigated, while also contributing to sustainable development goals.

The successful remediation of legacy mine sites in Ireland will depend not only on the technical solutions employed but also on the involvement and support of public authorities and local communities. Local authorities have a critical role to play in coordinating remediation efforts, ensuring that works are carried out to the highest standards, and engaging with affected communities to address their concerns and aspirations.

Public participation is essential to the success of remediation projects. Local communities, who often bear the brunt of the environmental and health impacts of legacy mine sites, should be involved in the decision-making process, from the planning stages through to the implementation of remediation works and restoration of environmental equilibrium. Effective communication and transparency are key to building trust and ensuring that the needs and interests of local residents are taken into account. This kind of engagement was central to

the successful delivery of the remediation projects at Haulbowline and Kerdiffstown. Furthermore, the transformation of former mine sites into public amenities, such as parks, nature reserves, or recreational facilities, can provide lasting benefits to local communities. These projects not only improve the quality of life for residents but also can attract tourism and investment, contributing to the economic regeneration of areas that have long suffered from the decline of mining industries.

The remediation of legacy mine sites in Ireland is a complex and challenging task, but it is one that is essential for protecting the environment, safeguarding public health, and fulfilling our obligations under national and EU environmental regulations. The examples of Haulbowline Island and Kerdiffstown demonstrate that with the right approach, even the most contaminated sites can be successfully transformed into valuable public assets capable of sustaining appropriate future land use.

As Ireland embarks on its Historic Mines Rehabilitation Programme, there is a unique opportunity to not only remediate the environmental damage of the past but also to embrace the principles of the circular economy by reprocessing and valorising mining waste.

This approach can help to mitigate the costs of remediation, reduce the long-term environmental risks, and create new socio-economic opportunities.

Ultimately, the successful remediation and responsible transformation of legacy mine sites in Ireland into societal assets will require sustained commitment from public authorities, strong collaboration with local communities, a pool of multidisciplinary geoscience expertise, and the application of innovative solutions. By addressing the challenges of the past, Ireland can pave the way for a more sustainable and resilient future, where the scars of former industrial activities are healed, and new opportunities for growth and development are realised.



An Roinn Comhshaoil,  
Aeraide agus Cumarsaide  
Department of the Environment,  
Climate and Communications

**BY PHILIP NUGENT**  
ASSISTANT SECRETARY,  
CIRCULAR ECONOMY, WASTE  
POLICY AND NATURAL  
RESOURCES, DEPARTMENT OF  
THE ENVIRONMENT, CLIMATE  
AND COMMUNICATIONS



# FlexiROC Productivity & Versatility



United. Inspired.

**Flexi by name, Flexible by nature**  
Epiroc's FlexiROC surface drill rigs help to reduce operational costs and boost productivity. Based on a well-proven and trusted design, the FlexiROC range has continued to evolve, delivering high productivity thanks to the robust and powerful feeding system. It is easy to transport between work sites, and straightforward to set up for different types of rock.

The commonality of parts ensures the rig's availability and serviceability and is backed up with world-class service, consumables, spare parts supply, support solutions and training delivered locally.

**Epiroc UK & Ireland Ltd**  
salesukire@epiroc.com  
07817 959318 (NI)  
www.epiroc.ie



# Message from the President

**As president of the IMQS, I am delighted that you have taken the time to read our Annual Review.**

**To begin, I would like to thank all who have contributed articles and advertisements to make this another successful publication.**

I would also like to complement the IMQS Editorial Committee and Four-Square Media for the excellent work and cooperation while compiling and publishing this review.

The following is a brief summary of the Society's main activities since our last publication. More detail is available in the Honorary Secretary's report.

2024 has been another busy year for our society. As well as our annual events, The Annual Field Trip (Glengowla Mines), The Annual Dinner Dance (photos on the IMQS web site) and The Annual Review 2024 (viewable on the IMQS web Site), we have continued to engage with our members and other organisations on behalf of ourselves and our members.

In 2024 we inaugurated the **IMQS Bursary**, to offer financial assistance to individuals studying to gain a qualification working individuals improving their knowledge in a subject, related to the Mining, Quarrying or Extractives Industries.

**Seven Apprentices** completed the GeoDrilling Course at South East Technological University (SETU), formerly Carlow IT, this academic year. However, with the temporary closure of Tara Mines in 2023/2024, the GeoDrilling Apprenticeship for 2025 has been paused. The IMQS GeoDrilling Steering

Committee is in discussion with SETU, regarding future developments.

The IMQS continues to recognise outstanding Apprentices each year by awarding two Silver Medals. The recipients in 2024 were Jason Rehill of GSI and Conor Horan of Causeway Geotech.

Update - **Boliden Tara Mines** is in the process of re-opening. From Boliden's Q2 Report - 'Ramp up of production [in Tara] will start during the fourth quarter of 2024. Production, at an annual rate of 1.8m tonnes, is expected from the first quarter of 2025.'

We have arranged a number of Technical Talks to coincide with our Council meetings. The presentations have yet to be confirmed so please check our web site and social media platforms for updates.

The IMQS is a supporting partner of the upcoming Financial Times Mining Summit to be held in London in September 2024. The theme of the summit is "Growing the low-carbon value chain". The 5<sup>th</sup> edition of the FT Mining Summit will gather the sector's leading miners, financiers and policymakers to tackle this challenge head on, through thought-provoking keynote interviews and lively debates, all whilst setting the agenda for the London Metal Week (LME) ahead. More details on the IMQS web site or at the [Financial Times web page](#).

The IMQS will represent Ireland at the ABMEC Conference and Exhibition

in Oxford, UK, in November 2024. ABMEC are the only trade association representing the British mining supply chain, and this year they are delivering the conference in collaboration with MAUK, the UK Mining Association representing Mine Operators.

Our LinkedIn page has over 2,300 followers with an average of 10 new followers per week. We are also very active on our other social media platforms.

Behind the scenes, Nicola Nixon (Executive Secretary and Immediate Past President) and Liam O'Shea (Treasurer), have put in a lot of hard work getting our financial structure, website and IT systems to a better place.

Many thanks to the IMQS Council, past and present, for supporting me in my role. The society is a combined effort and everyone plays an integral part.

Finally, a sincere thanks to all of the IMQS members for your support. We are a voluntary organisation and rely on this support to continue to promote and represent Mining and Quarrying in Ireland.



**BY ALAN DOLAN**  
President  
IMQS





# Pat O'Donnell & Co.



## OVER 50 YEARS OF MOVING IRELAND

Each solution we supply from **Volvo Construction Equipment**, including the ground-breaking **Electric models**; **Volvo Penta** engines; **Sennebogen** material handlers; and **Kohler** engines comes with a nationwide team of qualified service engineers, a next-day parts delivery system and an all-island branch network.

ORDER ONLINE 24/7: [PATODONNELL.COM](http://PATODONNELL.COM)



### Dublin - Head Office

California Heights  
Chapelizod  
D20 YH76  
t:+353 1 616 1000

### Cork

Sallybrook, Glanmire  
Co.Cork  
T45 H778  
t:+353 21 482 1288

### Galway

Carnmore West  
Oranmore, Co.Galway  
H91 FWF6  
t:+353 91 790 722

### Portadown

Seagoe Industrial Area  
Portadown, Co. Armagh  
BT63 5QE  
t: +44 28 38 337 222



# Activities of the Society

## 2023-2024

The following are the main activities of the society in 2023/2024.

Details of all IMQS activities can be found at [www.imqs.ie](http://www.imqs.ie). I would like to take this opportunity to thank you, our members, for your patronage. The society cannot exist without your continued support.

### Council Meetings

**2023** October 11th & December 7th.

**2024** January 11th, February 19th AGM, March 13th, April 10th, May 8th & June 12th.

### Representations in 2024

- European Federation of Explosives Engineers (EFEE)
- Prospectors and Developers Conference (PDAC)
- Geoscience Ireland
- Geo-Driller Apprenticeship
- Quarry Skills Certification Scheme meetings (QSCS)
- Quarry Safety Partnership (QSP)
- Minerals Information Working Group (MIWG)
- Department of Environment Communications and Climate Change (DECC)

### Events in 2024/2025

Two of the Society's main events, The Annual Dinner Dance and The Annual Field Trip, will take place in 2024/2025.

### Annual Review 2023

The Annual Review 2023 as well as reviews from previous years can be viewed [here](#).

### IMQS Seminars

The IMQS hosted two Seminar in 2023/2024.

On February 19th, James Cousins of Wave Dynamics Acoustic Consultants presented on 'Acoustics and Noise Control.'

On Friday the 14th of June 2024 the IMQS hosted an online seminar on 'Innovation In Deep Mine Shaft Sinking Performance Using Novel Mechanised and Conventional Drill and Blast Methods at Woodsmith Mine.' Speakers were Stuart Walker, Deputy Engineering Manager from Redpath Deilmann, and Neil Webster, Blasting Engineer from Joseph Gallagher Limited.

### Annual Dinner Dance 2023

The Annual Dinner Dance took place at the Knightsbrook Hotel on the 11th of November 2023.

### Annual Field Trip

The Annual Field Trip took place on Friday the 21st of June to Glengowla Mines in Co. Galway.

### Bursary 2024

Since 1958, the Irish Mining and Quarrying Society (IMQS) has provided a focal point for those working in the extractive industry in Ireland.

We would like to continue this support by offering financial assistance to individuals studying to gain a qualification, or working individuals improving their knowledge in a subject, related to the Mining, Quarrying or Extractives Industries. Two bursaries of €1,000 were availed of in 2024.

### Mine Rescue 2023/2024

Training, equipment maintenance and emergency preparedness remained in place in the last year, at all Irish Mine Rescue Committee (IMRC) member mines (Tara, ISME, Dalradian, Gyproc and Galantas).

The Annual Meeting of the IMRC was held on-line on 22nd March 2024.

A very successful Mutual Training session was held at Gyproc's Drummond Mine on 11th June 2024.

### Institute of Quarrying - Northern Ireland, Stone Crushers Ball 2023

The annual Institute of Quarrying (Northern Ireland) Stone Crushers Ball took place in the Europa Hotel, Belfast on the 20th of October 2023.

### Corporate Membership

Being a corporate member of the IMQS can have many benefits for your organisation including free advertising on the IMQS web site, free job postings and regular information updates.

Being a corporate member is an excellent investment for any company - large or small.

Scan the QR code for membership details.



**Paying your subscription could not be easier.  
Just log onto [www.imqs.ie](http://www.imqs.ie) and click 'Becoming a member'.**



**BY RUAIRI O CONNOR**  
Honorary Secretary  
& Vice President,  
Irish Mining &  
Quarrying Society



# QME

**MINING & TUNNELLING**

**PROVIDING COMPLETE MINING & TUNNELLING SERVICES,  
EQUIPMENT SALES & RENTAL SOLUTIONS WORLDWIDE**



- UNDERGROUND MINE DEVELOPMENT CONTRACTING SERVICES
- FULL DRILL AND BLASTING SERVICES
- UNDERGROUND CONSTRUCTION AND SHOTCRETING SERVICES
- NEW AND USED UNDERGROUND MINING AND TUNNELLING EQUIPMENT SALES AND RENTAL
- EQUIPMENT AND COMPONENT REBUILD AND REPAIRS



**QME LIMITED**

Coolfore Road, Navan,  
Co Meath, Ireland C15 KXY3

**Tel: +353 (0)46 9073709**

**Email: [info@qme.ie](mailto:info@qme.ie)**

**[www.qme.ie](http://www.qme.ie)**

# Minerals Matter and the succession imperative for industry

The next generation of our workforce will have a crucial role to play in the future success of the mineral products sector. As an industry there are pressing challenges in recruiting the necessary skills, particularly technical and operational skills.

In addition, we will lose more skills and experience in the next 10 years. The average age of a worker in the mineral products industry is 56, so the industry is facing a future of highly skilled employees retiring.

There are also challenges of change, such as increased digitalisation and automation, both of which require new skillsets. Also, staff who are knowledgeable in sustainability, decarbonisation, recycling, and renewable energies will be in high demand. The industry will need greater innovation, more diversity of thought and creativity in developing efficient solutions.

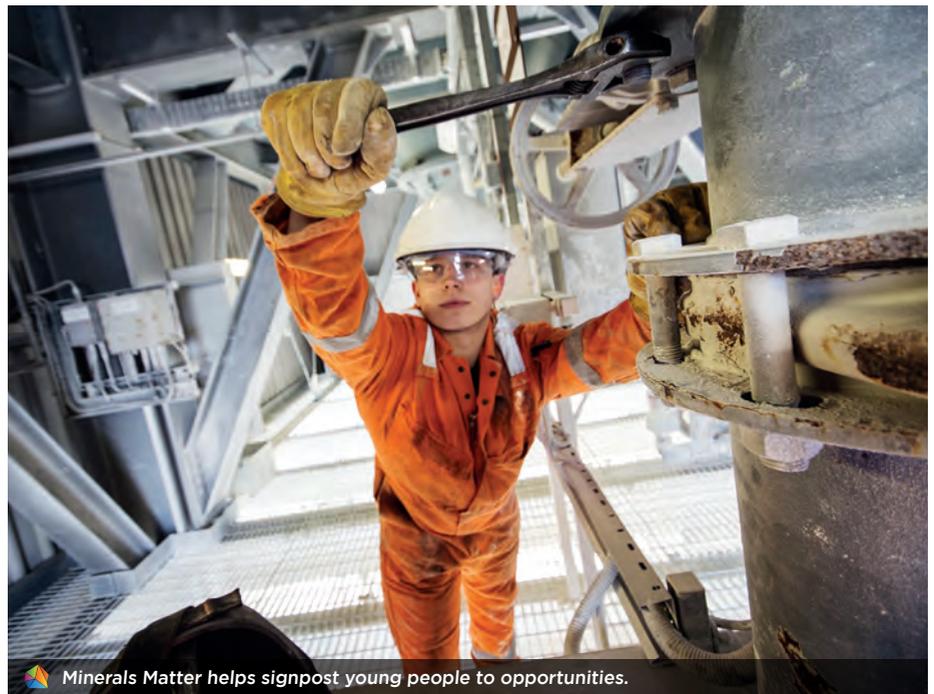
It is therefore imperative to build the talent pipeline to ensure that the industry is sustainable for the future, and critical that we take collective responsibility for attracting new people. Engaging a more diverse workforce and ensuring inclusivity will be key.

The sector needs to positively raise awareness of the industry and educate on the critical nature of the sector, and the part we play supporting everyday living, explaining the range of career opportunities available and encouraging people to join us.

Despite the many challenges, the mineral products sector is well placed, with positive stories to tell on net zero targets and making real time interventions that are meaningful for sustainability and biodiversity. The sector is a good match for the career aspirations of younger people, so long as the word gets out.

## COLLABORATION VIA PARTNERSHIPS AND OUTREACH

Minerals Matter is the strategic industry approach aimed at engaging with multiple stakeholders to achieve all these goals. Minerals Matter seeks to engage both inwardly with industry and outwardly with education, reaching primary and secondary schools as well as further education colleges.



Minerals Matter helps signpost young people to opportunities.

It works with partners including STEM Learning UK and Engineering UK, as well as having support from leading industry bodies, e.g. The Institute of Asphalt Technology, Mineral Products Qualifications Council, Institute of Quarrying, Mineral Products Association, British Aggregates Association, as well as national and independent operators. Minerals Matter is also scrutinising current National Operational Standards, interrogating if they are fit-for-purpose, and driving change where they are not. As technology changes working practices, new standards are being created by working groups of skilled people collaborating within industry.

Minerals Matter ability to be both inward thinking and outward reaching at the same time is important in analysing the skills gap for the sector, as is evident through the 2023 Labour Market Intelligence Study, published

on the Minerals Matter website. The report identified the key skills needed by the sector for a successful future and some of the reasons why recruitment is challenging.

Hannah Higley, Future Careers Manager - Minerals Matter, explains: "It's imperative that we connect with young people and adults to highlight the variety of career pathways within the mineral products sector. It is a time sensitive mission. Almost 10 million people in UK employment are over the age of 50, equivalent to more than 30 per cent of the workforce. Succession is, as a result, survival."

## THE NEED FOR STEM AMBASSADORS

As part of the Minerals Matter approach, industry professionals are encouraged to step up and volunteer as a STEM (Science, Technology, Engineering and Mathematics) Ambassador; those



Anna Jackson, Heidelberg Materials UK, at a speed networking event for young people.



Ian Cross, Heidelberg Materials UK, works extensively with secondary schools.

with the knowledge and passion to educate and inspire young people about the mineral products sector.

**LEADING FROM THE FRONT**

As business leaders or senior managers, you can help support Minerals Matter by encouraging your staff to get involved as ambassadors, as part of your company volunteering scheme.

It is also critical that we continue to recruit young people and adult learners into the sector, training them through apprenticeships, vocational qualifications, or university study. There is also the workplace support

and mentoring that is invaluable.

“We need ambassadors to go into schools and engage with young people about the mineral products sector. As an ambassador, you might take part in a career fair or mock interviews or give a talk about your own career. If an ambassador can give just half a day a year to support Minerals Matter, we will be one step closer to developing the succession we need,” added Hannah.

For more information and resources, including how an individual can register as a Minerals Matter Ambassador, please visit our [website](http://www.minerals-matter.co.uk).

**References:** 1 - Avoiding the demographic crunch: Labour supply and the ageing workforce - Chartered Institute of Professional Development June 2015

**IQ** The Institute of Quarrying

**BY JAMES THORNE**  
 Joint CEO, Institute of Quarrying & Mineral Products Qualifications Council





IDL has carried out major site investigation and mineral exploration drilling contracts in Ireland, Britain, France and The Isle of Man.

As a well resourced and experienced Geotechnical Investigation and Mineral Exploration Drilling Company we always aim to provide a comprehensive and quality product to our clients on schedule and on budget.

**Old Galway Road  
 Loughrea  
 Co. Galway  
 Ireland**

**Tel : 353 91 841274  
 Fax : 353 91 880861  
 Email: [info@irishdrilling.ie](mailto:info@irishdrilling.ie)  
[www.irishdrilling.ie](http://www.irishdrilling.ie)**

**Irish Drilling Limited (IDL) is the leading Irish Geotechnical Investigation and Mineral Exploration Drilling Company that was established in 1968. Based in Loughrea, County Galway it currently employs over fifty people ranging from Engineers, Geologists, Drillers, Mechanics and Laboratory Technicians.**





**Fieldwork Operations:**  
 All fieldwork operations are carried out in accordance with BS5930



**Laboratory Test Facilities:**  
 Our extensive storage depot ensures that all soil and rock core samples are stored, logged and photographed in accordance with BS 5930.

# Irish Mine Rescue Committee

## 2023-2024

### OVERVIEW 2023 - 2024

**July 2023:** Boliden Tara Mines placed into care and maintenance.

**March 2024:** Annual meeting of the Irish Mine Rescue Committee (IMRC).

**May 2024:** Agreement reached to reopen Boliden Tara Mines.

**June 2024:** Mutual training was hosted by Gyproc at Drummond Mine.

Training, equipment maintenance and emergency preparedness remains ongoing at all IMRC member mines.

### IMRC MEETING #22

The 22nd meeting of the IMRC took place on 22nd March 2024 with participation from Irish Salt Mining & Exploration Co. (ISME), Dalradian, Galantas, Gyproc, Boliden Tara Mines (BTM), the Health and Safety Authority (HSA) and the Health and Safety Executive Northern Ireland (HSENI).

During the meeting it was confirmed that training and equipment maintenance at all member mines is ongoing as per legislative requirements.

It was agreed by all that no Mine Rescue Competition would take place in Ireland during 2024, the focus would be on mutual training exercises.

The continuing support from the Health and Safety Authority in the Republic



Safety Induction to Drummond Mine before the teams are briefed on the task.

of Ireland and the Health and Safety Executive in Northern Ireland was once again gratefully acknowledged.

### MUTUAL TRAINING AT DRUMMOND MINE

An excellent mutual training exercise was held at Gyproc's Drummond Mine on Tuesday 11th June 2024 with participation from all member mines.

The exercise saw two teams respond to a simulated underground emergency.

The objectives of the exercise were as follows:

- To familiarise visiting teams with the underground conditions at Drummond Mine.

- To experience working in a team comprised of Mine Rescue personnel from different operations.
- For captains to lead teams in an unfamiliar environment.

All the above objectives were achieved. Many thanks to all the crew at Gyproc for hosting an excellent event. It was once again fantastic for the exercise to be endorsed and attended by the HSA and HSENI Inspectorates.

Mutual training exercises provide all our members with the opportunity to become familiar with the layout of facilities at each site, the general underground conditions at each mine, the mine plans and equipment used.



Group photo after the exercise.



 Team 2 - captained by Ryan Carroll from ISME with team members from Dalradian, Gyproc and ISME.

They also provide a transfer of knowledge and networking amongst team members. All of which have proven to be of benefit when mutual assistance has been requested.

### GOING FORWARD

Planning for a further mutual training session in 2024 is underway.

The Iberian Mine Rescue Trophy 2024 is to be hosted in Seville later this year. No teams from Ireland will participate this year, however, it is planned that IMRC will be represented by one or several observers.

An agreement to reopen Boliden Tara Mines was reached in May 2024. This is great news for the continuing development of Mine Rescue in Ireland.



 Team 2 - carrying the casualty in a stretcher back to the Fresh Air Base (FAB).



 Tony O'Reilly, Mine Rescue Officer at Drummond Mine, leads the de-brief after the exercise.



 Team 1 - captained by Gordon Mateer from ISME with team members from Galantas, Gyproc and Tara.



Irish Mine Rescue Committee

BY  
**MIKE LOWTHER** Chair IMRC  
**AOIFE TALLON** Secretary IMRC  
**ANTHONY MORAN** IMRC



# Irish Concrete Federation (ICF)



**It gives me great pleasure to update readers of the Irish Mining and Quarrying Society (IMQS) Annual Review on the activities of the Irish Concrete Federation (ICF) over the past year and to highlight some of the more notable challenges facing our organisation and its members. I would like to thank Dr Aoife Brady, Chair, IMQS Annual Review Editorial Committee for her invitation to contribute to this publication, which is highly regarded throughout the Irish mining and quarrying industries and beyond.**

It is likely that 2024 will be largely similar in output to last year for the majority of ICF members as current economic forecasts remain positive, at least in the short term. While the most recent spring, with its seemingly never-ending high rainfall led to a sluggish start to the current year, particularly in rural areas, the second quarter has seen a welcome uplift in demand and we are cautiously optimistic that current levels of activity will be maintained for the remainder of the year.

The most recent economic forecasts have estimated that the population of the Republic of Ireland will be almost six million by 2040. The increasing population will give rise to new societal demands for investment in public infrastructure, particularly housing. It is accepted that notwithstanding the significant increase in **new house construction** to 32,000 units last year, the current level of housing output is a severe constraint for Irish society and its economy, with demand for housing running at twice the level of new home construction.

This reality represents both a challenge and an opportunity for the entire Irish construction sector. I note that the theme for this publication is “Irish Minerals Professionals Across the World”, which will showcase the lives, experiences and successes of Irish people working in the industry abroad. There is little doubt that a key challenge for the entire construction sector will be to encourage some of these people to return home and to use the knowledge, skills and experience they have gained on their travels for the future advancement of our industry, and indeed our country.

It is generally accepted that the **planning system** in Ireland is no longer fit for purpose. It is estimated that there is up to two years’ supply of housing held up in the planning system at a time when the need for new housing is at



unprecedented levels. Notwithstanding the obvious focus on housing, our own industry has not been immune from the massive delays in the planning system.

ICF has carried out a detailed analysis of **quarry planning applications** during the 2017 to 2023 period, which shows that quarry planning applications are now taking almost three years to get through the State’s planning system, even for extensions of existing quarrying operations. ICF will publish its findings in a report later this year to highlight the damage that such delays are causing to the delivery of Ireland’s national infrastructure.

This report will be a follow up to “Essential Aggregates - Providing for Ireland’s Needs to 2040” which we published in 2019. ICF is also closely monitoring progress of the Government’s new Planning and Development Bill,

which will hopefully underpin the development of a planning system that provides the social, economic and physical infrastructure necessary to meet the needs of our people in a way that protects the many qualities of our natural and built environment.

Similar to other countries and regions, there is ever-increasing attention focused on industry’s response to the **climate change challenge** across all sectors of the economy. In this respect, there is no doubt that all stakeholders will closely monitor developments in the cement and concrete sector as it continues on its journey of decarbonisation, increased circularity and reduced impact on nature and the environment.

In 2023, the ICF Council took a decision to fully resource the organisation’s activity in this area and earlier this year we appointed **Conor Hayes as our new Head of Sustainability**. Conor comes to ICF with a wealth of experience gained in Arup consulting engineers and with a keen enthusiasm to highlight the positive contribution our sector can make to society in the years to come, while also responding to societal demand for the sustainable use of materials.

It is clear that simple solutions to complex problems rarely work in reality and our sector must be prepared to engage positively, and in a balanced and informed basis with those who claim that the replacement of concrete with less durable alternatives is the correct path for all future construction practice. ICF welcomes the recent publication by the Department of Enterprise, Trade and Employment of guidelines on **reducing embodied carbon in cement and concrete** through public procurement in Ireland, which outlines the positive steps that the entire construction chain can take to reducing emissions. ICF also welcomes the publication by the Environmental Protection Agency (EPA) on the **national end of waste criteria for the production of recycled aggregates** from construction

and demolition waste concrete. However, the limited uses for recycled aggregates permitted by the national criteria are a source of disappointment for our sector and we look forward to engaging further with the EPA to seek the necessary changes to enable a greater use of recycled aggregates in construction as soon as possible. ICF is also currently engaged in discussions with the Department of the Environment, Climate and Communications (DECC) and other construction industry stakeholders on **the classification and treatment of inert soil and stone** within the waste hierarchy. There is a clear need for soil and stone to be seen as a resource which can be harnessed for sustainable uses such as the backfilling of quarry voids or as a potential supply of raw materials for construction.

As ever, the **health and safety** of employees in the industry is of the highest priority for the ICF. In May, ICF partnered with the Health and Safety Authority (HSA) on a safety campaign targeted at the management of contractors in quarries. The campaign provided an opportunity for our members to review their procedures to ensure that there is effective communication between

quarry operators and contractors, and to ensure that contractors are fully aware of risks, safety procedures and rules in quarry workplaces.

The imposition by Government of a levy on readymix concrete and concrete blocks in 'Budget 2023' was received with shock and disappointment throughout our membership. Thanks to the efforts of our membership and the support of many stakeholder organisations, the levy's impact has been negated to some extent, with the subsequent exclusion of precast concrete from its scope and its reduction to 5% of product value. The administration of the levy has involved much **consultation with the Department of Finance and the Revenue Commissioners** over the past year. ICF will continue to represent the industry to seek the most efficient means of administering the levy, which regrettably is likely to remain a feature of the industry in the years to come.

The introduction of a Government subsidy for the spreading of **agricultural lime** to promote the achievement of optimum soil pH on Irish farms was a welcome announcement by the Minister for Agriculture and Food. However, in a similar vein to my earlier comments on the Irish weather, it is somewhat ironic

that the introduction of the subsidy coincided with a 30% reduction in lime sales due to poor land conditions, arising from high levels of rainfall over the past year. Nonetheless, members of our lime producer association are confident in the outlook for lime usage as a carbon neutral fertiliser, which will play a major role in reducing emissions from the agriculture sector.

In conclusion, I hope that this brief account of some of the key activities of the ICF is of interest to you. I would like to congratulate the IMQS in producing their Annual Review and to wish all readers a safe and prosperous remainder of 2024.



**BY GERRY FARRELL**  
Chief Executive,  
Irish Concrete  
Federation



**IRISH SALT MINING & EXPLORATION CO.LTD**

**PRODUCERS OF DEICING ROCK SALT FOR HIGHWAY WINTER MAINTENANCE**

FORT ROAD, CARRICKFERGUS,  
CO. ANTRIM, NORTHERN IRELAND BT38 9BT

TEL: +44(0)28 93351151

Email: sales@irishsaltmining.com



# An overview of activities by the Institute of Geologists of Ireland (IGI) 2023-2024

The Institute of Geologists of Ireland (IGI) was established in 1999 with the mission of promoting and advancing geoscience and its professional application in all disciplines, especially the geosciences, and to facilitate the exchange of information and ideas throughout the existing community.

The IGI is a registered charity and is not a lobbying organisation and its members are required to uphold, develop and maintain the highest professional standards in the practise of their profession. To this end, all members must undertake CPD recording for approval on an annual basis.

Professional membership of the IGI is open to all practising geoscientists who meet the required standards of qualification and experience. Professional members are entitled to use the Professional Geologist (PGeo) title as well as the European Geologist (EurGeol) title as IGI are a National Licencing Body with the European Federation of Geologists (EFG). The IGI maintain a number of specialist registers of competent persons including:

- Qualified persons in respect of carrying out geological aspects of works related to pyrite described in 398-1 and EN13242, including SR21
- Geoscientists/competent persons: Regulated and Unregulated Waste Disposal/Contaminated Land Assessments following the EPA Code of Practice

The IGI also maintains a number of Mutual Recognition Agreements (MRA) with professional bodies in other jurisdictions. These agreements allow professional members from the professional bodies to practice as geoscientists in the other's jurisdiction provided the conditions of the MRAs are met. For information on how to apply to the IGI, please visit our [website](https://www.imqs.ie).

The mining and quarrying sectors have always been very well represented within our membership, with almost 30% of

our members stating 'Mining Geology and Exploration' as their main area of expertise at application stage. Many more of our members are involved in mining through associated fields such as hydrogeology, geochemistry, education, environmental assessment or regulation. The IGI recognise and support the work of IMQS in the responsible development of the minerals industry in Ireland in line with best practice.

The IGI acknowledges the continued support of our sponsoring bodies, the Irish Mining & Quarrying Society (IMQS), Geophysical Association of Ireland (GAI), Geotechnical Society of Ireland (GSI), Irish Association for Economic Geology (IAEG) and the International Association of Hydrogeologists (IAH Irish Group).

## IGI ACTIVITIES 2023 - 2024

During the course of 2023-2024, the IGI board continued to hold meetings and events online, following a hybrid model. The IGI endeavours to continue to develop, promote and advance geoscience in all disciplines through facilitating information exchange.

Initiatives such as the IGI's Early Career Network and Mentoring Scheme have huge potential to enable the community to support each other and continue to develop the profession. Early Career members have added a great deal to a number of committees and working groups in recent years and we hope this trend continues into the future.

The membership has grown in 2023 and 2024; twenty candidates were approved for Professional Membership with twenty-one approved for Membership-in-Training. This brings our total membership to 395.

## MINERALS INFORMATION WORKING GROUP

The Minerals Information Working Group (MIWG) remains the largest working group within the IGI and we are grateful to have the support of a number of IMQS members who actively contribute to the working group. The IGI as head of the IGN were requested to nominate five members for the Department of Environment, Climate and Communications (DECC) Advisory Group on Mineral Exploration and Mining.

The group began its work in 2022 and has 15 members representing the Environmental, Economic and Social Pillars. The inclusion of the IGI and IGN is testament to the relevance of the organisations and the valuable science-based contributions our members can impart to such important groups.

This year, the MIWG's focus was on the EU's Critical Raw Materials Act (CRMA). The MIWG composed a CRMA factsheet and press release for publication, issued on the 23rd of May 2024, the day the CRMA came into force. The factsheet was sent to a wide distribution list. Responses received were positive and some led to further meetings and engagement.

The press release was reported on by the RTÉ website and was covered by two articles in the Business Post newspaper. Emer Blackwell, Chair of the MIWG, gave an interview on the RTÉ Drivetime radio show, and launched the factsheet at the IGI conference "Climate & Sustainability - the responsibility of the Geoscientist".

## COURSES AND WEBINARS

The IGI continued to deliver a series of events in 2023-2024, both online and in-person. We have aimed to provide regular CPD opportunities



for our members throughout the year and, so far, have delivered:

- Contaminated Land Training Series - Seven Webinars on various topics
- Conference on “Climate Change & Sustainability – the responsibility of the Geoscientist” held over two days

The conference was a great success with over 80 attendees and 20 speakers discussing topics around the themes of Climate Change, the EU CRMA, mine closure plans, financing exploration, planning and environmental licensing legislation changes, Carbon Capture and Storage potential, skills needed for the Energy Transition and the role of Geoscience research.

There were also more talks on EU Change highlighted to ‘taxonomy, climate risk and flooding, environmental insurance, Women in Geoscience and an update from the IGI EDI Committee. Friday afternoon comprised a workshop by Nic Bilham around the theme of Geoscientists, Geocitizens and the Just Transition.

Further hybrid and in-person training is planned for the coming months with a continuation of the Contaminated Land Series (including a field-based session) and a webinar on Geoethics.

### GOVERNANCE

The IGI became members of the Charities Institute Ireland (CII). Additional training and support was needed to ensure the organisation keeps informed on governance requirements. All board members will be required to undertake the Certificate in Best Practice for

charity trustees. Further information can be found on the CII [website](#).

The IGI has continued to improve its written procedures and policies and this year has updated the following documents:

- Minerals Information Working Group Terms of Reference
- Continual Professional Development Audit Procedure
- IGI Awards Procedures (update underway)
- Guidelines around child attendance and childcare at IGI Conferences and events
- Code of Conduct for attendees at IGI Conferences and events

### REPRESENTATION

This year the IGI maintained its public profile on a number of fronts, in line with the 2019-2024 strategy. We responded to a number of issues concerning geoscience in Ireland through the year via public consultations or direct representations:

- EPA Public Consultation on Regulation 27 of the European Union (Waste Directive) Regulations 2011-2020 - National By-Product Criteria for Greenfield soil and stone used in Developments
- EU Critical Raw Materials Act Call for Evidence

The IGI provided sponsorship for the IQUA Spring Meeting in Belfast in 2024 and have agreed to provide sponsorship for the iGEO2024 event in Galway in October 2024.

The IGI continues to facilitate

collaboration in the geoscience community, through convening the Heads of Geoscience Groups forum, which met once during the year, and the Irish Geoscience Network meeting which was held in March 2024. The IGI wishes to thank all participants who have given up their time during the year to make sure that the geoscience community in Ireland is connected and working together.

The IGI continues to be involved at a high level in the European Federation of Geologists (EFG). The EFG Spring Council meeting took place in Dublin in May 2024. IGI hosted 25 delegates in-person and another nine online. The meeting was attended by IGI President Eoin Wyse and IGI Vice-President Paul McDermott as delegates, and by Gareth LI Jones, IGI Past-President, as an observer.

Items of interest from the meeting included attaining recognized profession status for geologists from the EU commission to adopting a coordinated approach to showcase what geoscientists can bring to the table at the next COP in Baku.



**BY EOIN WYSE**  
EurGeol, PGeo  
President IGI



# Dalradian issues fifth Responsible Business Report

**Dalradian, the US owned company developing an environmentally responsible copper-gold-silver mine in west Tyrone, has published its fifth Responsible Business Report (2023) providing an overview of the company's environmental, social and governance activities and performance. This report includes an update on the project's progression through the planning system as well as key metrics illustrating Dalradian's long-term commitment and responsible approach to modern mining.**

A key achievement for 2023 was certification as Carbon Neutral Plus for the fifth consecutive year, reducing carbon emissions by 75.4% measured against baseline year (2019). To offset our emissions from 2023, we chose to support an internationally certified Zambia safe water project. Over the past five years, Dalradian has planted 1,700 trees in Northern Ireland to achieve the Plus designation.

It was another strong year for health and safety, surpassing three years with no lost time incidents (LTI), and environmental performance with no instances of non-compliance. As with our health and safety culture, we are also prioritising our commitment to sustainable practices and incorporating that into our decision-making and planning.

Our sustainability team continued work on the tree nursery to supply a progressive restoration programme starting during construction, which will accumulate in planting over 30,000 native trees such as oak, hazel and rowan. We are in ongoing discussions with potential suppliers about incorporating lower-emission products into the future mine, focusing on consumables such as concrete and steel, as well as fuel and vehicle innovations.



Dalradian have reduced carbon emissions by 75.4% measured against baseline year 2019.

It is a great time to be building a new mine! Because our project is in Tyrone, we are close to some of the global leaders in engineering and manufacturing of mining equipment. There are also excellent envirotech firms locally so we will have some great partners to work with on our sustainability journey.

The report also highlights the importance of securing local supply of minerals and reducing the UK's reliance on imports for supporting industries, jobs, and the transition to a decarbonised economy. The UK launched its Critical Mineral Strategy in 2021 along with its initial list of critical minerals.

The UK Critical Minerals Intelligence Centre was created to support and update the strategy and list through ongoing research, with the next update of the critical minerals list

anticipated this year (2024). A wider range of candidates is being assessed for inclusion, including copper.

One of the goals of the UK strategy is to avoid environmental, social and governance (ESG) issues that can occur in jurisdictions with lower regulatory standards, for example, with respect to health and safety or the environment.

Dalradian is supporting ongoing research on potential availability of critical minerals in the region by both the UK and Northern Ireland governments. The Critical Minerals Intelligence Centre (British Geological Survey) published a report identifying areas of the UK as prospective for critical raw materials – mid-Tyrone was one of the eight locations highlighted.

More recently, the EU launched the Critical Raw Materials Act with the aim of increasing and diversifying supply, strengthening circularity and to support research and innovation. Under the Act, strategic projects would have priority status, i.e. a permitting decision within 24 months.

**Patrick F.N. Anderson, Dalradian's President and CEO,** said: "We are delighted to publish our fifth Responsible Business report marking our commitment to developing a multi-decade, modern mining

project using the latest technology to responsibly produce the minerals society needs every day.

“Our achievements to date have come about because of the efforts of the great team we have on the ground in Northern Ireland supported by the strong backing of our North American owners and management team.

“To date, our US owners have invested more than \$400M in advancing the project and relationships have been developed with over 530 local suppliers. Building and operating the mine will see further investment of \$1.3 billion and creation of more than 1,000 jobs – one of the largest-ever US investments in Northern Ireland. We have built the foundations for a new industry in Northern Ireland – a once-in-a-generation opportunity that aligns with government aims around securing mineral supply, growing the economy, providing good jobs, increasing productivity, and regional investment.”

**Brian Kelly, Dalradian’s Managing Director**, added: “The report outlines our commitment to supporting the community, maintaining our environmental survey work to meet regulatory requirements and highlights the importance of



mining and minerals in society’s shift to a decarbonized economy.

“Over six years on from submitting our plans to the Department for Infrastructure, our efforts remain focused on advancing our application to build a modern underground gold-silver-copper mine through the Northern Ireland planning system. We welcomed the release of the inquiry schedule earlier this year. The Pre-Inquiry Meeting was held in March and the hearing is scheduled for September 2024.

“Although delighted to have progressed in the public inquiry process, we, along with all the other stakeholders,

are disappointed that the schedule has since been suspended by the Planning Appeals Commission due to an administrative error, by the Department of Agriculture, Environment and Rural Affairs (DAERA), on our abstraction licence applications. Reapplications were immediately made for these consents, and new dates for the Statements of Case, Rebuttals and the inquiry itself have now been set. This is yet another opportunity for our planning application to be scrutinised by independent experts and provide a forum for consideration of public representations. It is a final step in a process that started in 2016 and which has included multiple public consultation events and opportunities to engage stakeholders.

“We look forward to concluding the permitting stage of the project and delivering on the immense opportunities that the mine will bring to Tyrone and beyond.”

# DALRADIAN

Dalradian.com



DALRADIAN

**1,000**  
direct, indirect and induced jobs will be created

**£15M**  
initial three-year training package

**£4M** minimum committed to future community projects

**£750M**  
planned supply chain expenditure

**20+** years mine lifespan

We aim to build a modern underground mine that draws on Tyrone’s heritage of engineering and manufacturing excellence to drive economic growth and community development in the local area and beyond.

**INVESTORS IN PEOPLE**  
We invest in people Gold

For more information visit: [dalradian.com](http://dalradian.com)

# MPANI Regional Director's Report

Last year when I began to pen this report for the IMQS 2022/23 Journal it was under a cloud of continued political vacuum in Northern Ireland with our Assembly not sitting and no Executive in place to make much needed local decisions. It's great to begin this report in a more positive frame of mind and with, what I believe, is very much a glass half full attitude as we look forward to the rest of 2024 and beyond.

**The restoration of our local Executive and Assembly is welcome and let's hope that we will now see a long period of political stability resulting in sustained economic growth and prosperity that the people and businesses of Northern Ireland so richly deserve. I have been up on the "hill" a few times since its restoration and you sense the determination to get to work on what are the many challenges facing our community and economy.**

However, we will judge the success of the Executive on the difficult and unpopular decisions they make, not the easy and popular ones. What is required is urgent decisions, some difficult and that will be unpopular, to fundamentally reform many of our key economic enablers which have been subject to years of drift and delay. We can achieve our goals and overcome these significant challenges if our Executive works collaboratively with NI Business and our community sector to catch up and repair two years, and previous closures of our Assembly, of lost opportunity costs and take advantage of the unique trading position that we now enjoy with access to both EU and UK markets.

MPANI continue to engage with the Economy, Infrastructure and Agriculture, Environment and Rural Affairs (AERA) Ministers and the Assembly Committees, briefing and updating them on the work we do with their Departments and Agencies, highlighting our concerns and offering possible solutions to the many current and future challenges facing us as a society and economy.

As we look forward positively to the remainder of 2024 and beyond, I would recommend that you take time to look

at our objectives and focus areas so you get an appreciation of the work ahead. You can view these using the link below: [MPANI Focus Areas and Objectives 2024.](#)

It is becoming increasingly clear that the pace of change created by Covid, geopolitical turmoil and the ever increasing threats from climate change is increasing faster than at any time in living memory. Many have called this change the **"Fourth Industrial Revolution"** that we began to witness an acceleration in change and transition. We have entitled our 2024/25 Industry Journal, **"A Transition Journey – Are You Prepared?"** It is a challenging question but one that is relevant to every single MPANI Member. With climate change legislation now in place, recruitment and retention of skilled people an everyday challenge it means the "triple" transition train heading for Decarbonisation, Diversity and Digitisation has left the platform and if you are not on it, or you don't intend to catch up and get on at the next stop, then quite simply you are going to be left behind.

Our MPANI membership continues to remain strong and very supportive, and my thanks again goes to our Executive Committee, ably led by Chairman Paddy Mohan, Vice Chair Willie Doherty and immediate past Chair Paul Brogan, all of whom help set the direction and focus for me and our hard working sub committees.

Our Health and Safety Committee continue to be proactive and lead on giving important leadership and advice to our wider membership. We continue to work collaboratively with Health and Safety Executive for Northern Ireland (HSENI) on a number of initiatives including machinery guarding, LOTOTO, site transport

safety, mental health and well-being and our Stay Safe Stay Out Campaign. The feedback from the (HSENI) and Members on industry engagement and improving standards is good to hear.

Over the past few years it has been pleasing to see the number of Northern Ireland members enter the MPA Health and Safety Awards and receive recognition at the MPA Conference in London. Details of all the entries into the MPA Health & Safety Awards are available on SafeQuarry.com, the free-to-access mineral products global hub for health and safety. Videos of the finalists and winning entries can be viewed on the MPA YouTube channel. Let's hope for more MPANI member success in this year's awards.

Our Health and Safety Committee will continue to advise and inform members on all aspects of health, safety and well-being. I would like to thank those members who consistently contribute to and support our lost time incident data collection. This information enables our safety committee to monitor and benchmark industry performance and progress on our journey to **"vision zero"**. It also gives us the information we need to identify high risk areas that we can then focus our efforts in assisting members.

Our Planning Committee continue their work with Northern Ireland Environment Agency (NIEA) through our liaison group, working on updates for the **"Wise Use of Water"** and **"MoU on Archaeology"** guidance and we responded to a number of consultations. We will continue to engage on the challenges of climate change and Biodiversity Net Gain.

The planning system in Northern Ireland continues to come in for high levels of criticism and MPANI continue to call for a fundamental review and



the introduction of a shared service within the local councils for mineral and waste planning applications.

Recent years has certainly witnessed an increase in debate and activity about decarbonisation and net zero. A number of members are currently involved in collaborative networks looking at the use of biomethane and biochar in concrete products. We are engaged with the Department for Infrastructure about their own Transport and Materials Climate Action Plans. MPANI members have a strong interest in facilitating the generation of renewable or low carbon electricity for society. The location, extent and the availability of natural resource (e.g. wind and water) at our members sites means that we are well placed to facilitate lower carbon technology rollout and innovation.

The reality is that net zero will be delivered through innovation and technology by the private sector. Central and Local Government are the **“enablers”** who set strategy, policy and provide much of the incentive funding to get projects off the ground. We now need our Assembly and NI Executive to urgently address planning reform and the upgrading and extension of our electricity grid to facilitate more and cheaper connections from rural businesses that have the potential to generate renewable energy.

MPANI are partners in the exciting **“NI Decarbonisation Plan”** led by Invest NI and also supported by our colleagues in Manufacturing NI and all of the 11 local Councils. This engagement has given me the opportunity to highlight the huge amount of time and resources our industry is investing in new technologies and partnerships as we transition towards net zero.

Given the geo-political stresses across the world, Governments are now re-thinking their positions on the need for locally extracted critical minerals. I attended a Department for the Economy workshop in Riddell Hall, Queen’s University Belfast, to consider responsible critical minerals sourcing in Northern Ireland. The aim of the event was to explore and consider the role of critical minerals in the economy of Northern Ireland and consider how that activity fits with green growth, energy transition and climate adaptation.

Our Highway Maintenance and Construction Group have had a very busy two years dealing with the challenges of roads maintenance

funding and the impact of the non-performance of the BCIS R10/15 Bitumen Index. We engaged widely with BCIS, the Office of National Statistics, MPA, Department for Infrastructure and Eurobitume, the representative body for UK Bitumen Suppliers. We are pleased that this partnership approach and pro-active engagement between all stakeholders resulted in a sustainable solution being reached.

The lack of an NI Executive making local decisions and the impact of the NI budget set by the Secretary of State in April 2023 meant there was a significant shortfall in roads maintenance funding. MPANI actively engaged with the Department for Infrastructure Northern Ireland (DfI) to ensure that all funding was allocated to Road Divisions and issued through works orders. The focus for everyone must be to ensure that future budgets are multi-year, which will facilitate better planning, better investment decisions and better value for money for everyone.

Together with the DfI, we continue to keep our focus on road worker safety with two social media campaigns asking the general public to drive safely through roadworks, obey signs and diversions and show respect to our workers.

We continue to offer the Highway Maintenance and Construction Site Supervisors L4 NVQ training and assessment. To date 17 candidates have successfully completed the course.

Our Concrete Development Group also have had a busy last couple of years with changes to BS8500 facilitating the specifying of more low carbon cement and concrete. Huge change is underway, and more will follow, but it is clear that industry, particularly MPA, are at the forefront of these changes.

A highlight of recent times has been the formation of our **“Women in Minerals Group”**.

The group has set its goals to:

- Highlighting and promoting career opportunities for women and young girls
- Women’s health and well-being issues in our sector
- Working and networking with Womenstec, Construction Industry Training Board Northern Ireland (CITBNI), Women in Construction and Institute of Directors (IoD) Women in Business.

Given the high age profile of our sector, we must focus our attention in making our industry a welcoming career opportunity for young women and girls.

As I said at the start of this report we are, as an industry and society, in the process of major change and transition. This “Triple D Transition” of “Decarbonisation, Diversity and Digitisation” will see a rate of change never experienced before. The market turmoil that can be created by conflict and political upheaval across the world we cannot control, but by working in partnership and collaboration as an industry we limit the impact.

Talking of transition, the representation on our Executive Committee has also changed. Those leaving us are Stephen Robinson and Eamon Finnegan and I wish them well as they head into retirement, although I don’t think both men will let the moss grow under their feet. At the same time, we welcome Jonathan Cole of Breedon, Franklin McIlroy of RTU, Dermot Morgan of Gibsons, Marty McGrath of Mannok, Fraser Thom of Breedon Group and Peter Collen of Collen Brothers onto the Executive. It’s good to see the age profile of our Executive Committee drop somewhat!!

I am delighted to welcome Paddy Mohan of Mannok as MPANI Chairman. Paddy is the last member of the QPANI Executive Committee that I walked into on a sunny Thursday in June 2001. Paddy is well known and respected across our Industry, both North and South, and I look forward to working with him, with Willie Doherty of Creagh Concrete as our new Vice Chair, and of course, Paul Brogan, our outgoing Chair.

Finally, may I wish IMQS and all its members well over the coming months and we look forward to sustaining our valued and important relationship through what are challenging times for everyone on this island.

Best wishes and Stay Safe.



 **Northern Ireland**  
essential materials  
sustainable solutions

**BY GORDON BEST**  
Regional Director,  
MPANI



**Northern Ireland**  
life needs minerals

[www.mpani.org](http://www.mpani.org)

# IMQS Bursaries



Since 1958, the Irish Mining and Quarrying Society (IMQS) has provided a focal point for those working in the extractive industry in Ireland. We are continuing this support by offering financial assistance to individuals studying to gain a qualification, or working individuals improving their knowledge in a subject, related to the Mining, Quarrying or Extractives Industries.

**The bursaries, of €1,000 each, were awarded to two worthy applicants, Chuanyang Peng and Eamon Francis Grennan.**

**Mr Chuanyang Peng** is a PhD student in the Civil and Environmental Engineering department at University College Cork (UCC). His current research focuses on developing a superconducting quantum interference device (SQUID) based gravimeter. Leveraging SQUID's sensitivity and compactness, the proposed device aims to surpass the capabilities of current gravity measuring technologies.

The objective is to achieve a sensitivity of up to  $10^{-10} \text{ m/s}_2^2$ , enabling the detection of smaller and deeper underground features with unprecedented precision, essential for geophysical and extractive applications.

The IMQS Bursary will help broaden the application of the SQUID-based Gravimeter, allowing Chuanyang to attend specialised training and courses,

participate in conferences, workshops, and industry events, and cover smaller expenses associated with his research.

**Mr Eamonn Francis Grennan** - B.Sc. (Hons) (Geology), M.Sc. (Env.Sc.), Dip.Adm.Sc. P.Geo, is retired but a prolific researcher. His study will highlight the inter-relationships between geology and human health.

This study will focus on the many beneficial effects of metals, trace elements and minerals which have been identified as being essential for good health, as well as being essential for diagnostic procedures and for certain treatments.

Over the course of a life-time in minerals exploration and mining, he has identified over 30 'substances', mainly metals, trace elements and minerals which are in daily use in and relating to human health.

Eamonn listed many benefits of financial support but mainly to create an awareness amongst the general

public, through public meetings, about the importance of metals and minerals in the everyday life of people in Ireland, especially in respect of human health and well-being.

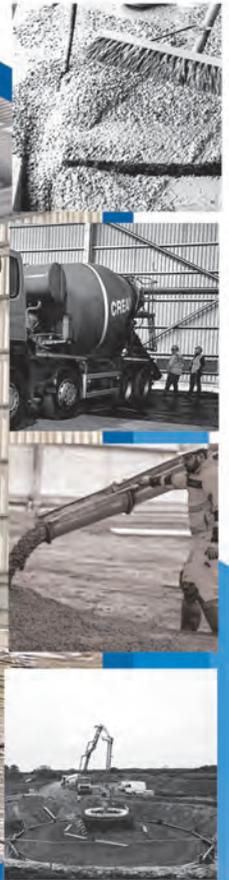
The financial support will also help focus on a definite outcome of his initial research, in the preparation of another submission for State funding.

We wish both winners the best in their research and study and look forward to an update on their activities.



**BY ALAN DOLAN**  
President  
IMQS





Get in Touch  
Today

+44 28 79650500

in f X



## Our Service

We manufacture premium quality pre-mix concrete and screed at five production facilities based at Toomebridge, Dunloy, Draperstown, Derryadd and Tandragee.



Our dedicated concrete laying teams supported by experienced sales and field manager offer a high-quality service from a green field site to a finished concrete surface.



We are able to provide a brushed, patterned, tamped or a power floated surface finish to fulfil any requirement necessary.



[www.creaghconcrete.com](http://www.creaghconcrete.com)



WE COVER  
ALL N.I.

+44 28 796 50500 info@creaghconcrete.com

# Building the Future with Creagh Concrete



**In the landscape of construction and infrastructure development, few resources are as foundational as concrete and aggregates. They form the bedrock of our homes, roads, bridges, and commercial structures.**

**At the forefront of this essential industry stands Creagh Concrete, a company whose dedication to quality, sustainability, and innovation has made it a cornerstone of the construction sector. Creagh Concrete, established in 1974, is a family owned business which recently celebrated 50 years in business.**

In June 2024, the Company acquired the Norman Emerson Group, a County Armagh based family run business which specialises in ready-mix concrete, sand and aggregates, therefore, not only strengthening Creagh Concrete's range of products but also its geographical reach.

## **THE BACKBONE OF MODERN CONSTRUCTION**

Creagh Concrete has been a stalwart in the quarries and aggregates business for decades, consistently providing high-quality materials that meet the rigorous demands of modern construction. Their

extensive portfolio includes a wide range of products, from ready-mix concrete to specialized aggregates, all tailored to suit various applications.

This versatility ensures that whether it's a residential project or a major infrastructure development, Creagh Concrete can deliver the materials needed to get the job done right.

Creagh Concrete boasts eight ready-mix plants across five locations and five quarry sites making it one of the largest producers of materials in Northern Ireland.

## **COMMITMENT TO QUALITY**

Quality is the hallmark of Creagh Concrete's operations. The company's quarries are equipped with state-of-the-art technology and operated by highly trained personnel, ensuring that every batch of concrete and aggregate meets the highest standards.



Rigorous testing and quality control measures are embedded at every stage of production, from extraction to delivery. This unwavering commitment to excellence has earned Creagh Concrete a reputation for reliability and consistency, making them a preferred supplier for numerous high-profile projects.

**SUSTAINABILITY AT THE CORE**

In an era where sustainability is paramount, Creagh Concrete is leading the way in adopting environmentally friendly practices. The company is deeply committed to reducing its carbon footprint and promoting sustainable resource management.

This includes investing in energy-efficient technologies, optimizing extraction processes to minimize environmental impact, and exploring innovative recycling methods.

Creagh Concrete’s dedication to sustainability not only helps protect the environment but also sets a standard for the entire industry.

**INNOVATIVE SOLUTIONS**

Innovation is another cornerstone of Creagh Concrete’s philosophy. The company continually invests in research and development to stay ahead of industry trends and meet the evolving needs of their clients.

This includes developing new concrete formulations that offer enhanced durability, strength, and versatility. Additionally, Creagh Concrete is at the forefront of incorporating digital solutions into their operations, improving efficiency and customer service through the use of advanced software and data analytics.

**BUILDING COMMUNITIES**

Beyond their business operations, Creagh Concrete is deeply invested in the communities they serve. The company supports local initiatives, provides employment opportunities, and engages in philanthropic activities.

This community-centric approach not only strengthens their relationship with the local populace but also underscores their commitment to social responsibility.

Creagh Concrete exemplifies what it means to be a leader in the quarries and aggregates business. Their dedication to quality, sustainability, innovation, and community sets them apart in a competitive industry.

As we look to the future of construction and infrastructure development, Creagh Concrete is poised to continue playing a pivotal role, building not just structures, but the very foundation of progress and prosperity.

In an industry where the materials used can make or break a project, Creagh Concrete stands as a beacon of reliability and excellence. Their ongoing efforts to improve and innovate ensure that they will remain a key player in shaping the built environment for generations to come.



[www.creaghconcrete.com](http://www.creaghconcrete.com)



# Geoscience Ireland (GI)



**Despite the job losses experienced by GI members due to the suspension of operations at Tara Mines in mid-2023, the GI network reported a relatively strong year in 2023. Turnover for the network was marginally down to €1.11 Bn while 77 net new jobs were created. As before, some 35+% of this turnover derives from overseas operations.**

**A buoyant Irish economy, resumption of operations at Tara Mines and strong international business augurs well for 2024. In the Minerals sector, GI members continue to operate exploration programmes in Wales, Scotland and England, the EU and Africa; drilling operations in the UK and mining operations in Portugal and West Africa.**

**Water Services** design and delivery projects are underway in Africa and the Gulf, with large marine infrastructure projects in KSA and the UAE. **Renewable Energy** projects are a central part of GI members portfolios, with onshore and offshore wind and solar projects in the UK, Poland, the Far East and the USA. Hydrogen, Geothermal and Carbon Capture studies for GI clients point the way to future projects. **The UK remains an important market for GI members** and the new Labour government has indicated increased investment in Offshore Wind and in construction.

**GI continues to represent its members in national and international arenas.** The Department of Foreign Affairs included GI in a Panel discussion on Global Europe with the Commissioner for International Development Jutta Urpilainen. GI attended two webinars with the African Development Bank. Enterprise Ireland France facilitated engagement with lead contractors NEXANS for the Celtic Interconnector while Enterprise Ireland Nordics

hosted a seminar on opportunities in Norbotten Sweden where GI companies are active. In Canada, GI again collaborated with iCrag and Enterprise Ireland at the Ireland Booth at PDAC. Closer cooperation with GSI and DECC is planned for 2025.

Closer to home, GI and several members engaged with RWE on Offshore Wind, while continuing to support Wind Energy Ireland and The Marine Ireland Industry Network. GI also contributed to the Offshore Wind Delivery Taskforce. GI member **GDGEO** remains at the forefront of policy development, contributing to the Maritime Area Consents process.

**GI also contributed to the Department of Environment, Climate and Communications Minerals Advisory Group;** to the Heads of Geoscience and Irish Geoscience Network Forums operated by the Institute of Geologists of Ireland and to several Chambers of Commerce including Canada, Britain and France. GI supported the Geothermal Summit hosted by Geological Survey Ireland and also supported the representations to the EU Parliament and Commission by the European Geothermal Energy Council regarding development of Geothermal Energy.

Unfortunately, a side effect of the Tara closure is the (temporary?) suspension in 2024 of the Geo Drilling Apprenticeship in South East Technological University. Over 30 candidates have successfully completed

the course since its inception in 2020. A review of future steps is underway.

**Policy for Cluster Development in Ireland remains poorly developed,** despite a process dating from 2021 with Seminars, Reports for Grant Thornton and another Report awaited from TCI. The absence of a coherent policy hinders the development of a cluster ecosystem which is central to successful innovation and sustainable economic growth in many other countries. GI awaits developments with interest.

Finally, a word of congratulation to Sean Finlay, my fellow director in GI. Sean has been appointed President-Elect of the Irish Academy of Engineering IAE. The Academy seeks to provide thought leadership in a time of great change. IAE produces evidence-based commentary and policy documents on a range of challenges facing society nationally and internationally. It enjoys close links with other Academies; see <https://iae.ie/>

**GEOSCIENCE IRELAND**  
Exploring  
Developing  
Sustaining



**BY DERMOT DUFF**  
Director Geoscience  
Ireland



# Trust in experience

Quarryplan have provided specialist planning and property advice to the minerals, waste management and renewable energy sectors for over 20 years, delivering a full range of services for the preparation of successful planning applications.

Quarryplan provide commercially driven advice you can trust, so you can concentrate on your business.

- Planning
- Environmental Impact Assessment
- Estates management
- Due Diligence
- Expert Witness
- Land Surveying
- Renewables

**Northern Ireland**  
t. +44 (0) 2844 832904  
e. [info@quarryplan.co.uk](mailto:info@quarryplan.co.uk)

**England**  
t. +44 (0) 1934 713741  
e. [info@quarryplan.co.uk](mailto:info@quarryplan.co.uk)



# Critical Raw Material Extraction in Environmentally Protected Areas (CIRAN) - An Update

It has been a year since the last update on the Critical Raw Materials Extraction in Environmentally Protected Areas (CIRAN) project, funded by the European Union under Horizon Europe (grant agreement no. 101091483). The project is at the halfway point, with 18 months of work completed and another 18 to go.

A lot has happened since the consortium led by INTRAW (the International Raw Materials Observatory) started work. The Critical Raw Materials Act (CRMA) was adopted during the first half of 2024. The EU's demand for base metals, battery materials, rare earths and more are set to increase exponentially as the EU divests from fossil fuels and turns to clean energy systems which necessitate more minerals (EC, 2024b).

The Act was prepared to combat the EU's heavy reliance on imports, often



from a single third country, and to address strategic dependencies. The EU currently relies almost exclusively on imports for many of these raw materials.

The aim of the Act is, therefore, to create a secure and resilient EU Critical Raw Materials (CRM) supply chain, to reduce the administrative burden and simplify permitting procedures for critical raw materials projects in the EU.

The Act acknowledges the crucial role of raw materials as the beginning of all industrial value chains. It also acknowledges the fact that in some cases, certain CRMs are either almost exclusively sourced and/or processed in third countries, such as China or the Democratic Republic of Congo, which exposes the EU to significant supply risks.



Consortium Meeting in Lisbon held in January 2024.

In addition, with widespread and accelerated transition toward renewable energy and digitisation, demand for some CRMs is forecast for sharp increases.

#### **Instrumental to the Act is the designation of Strategic Projects**

which will benefit from support for access to finance and shorter permitting timeframes (15 months for processing or recycling permits and 27 for all extraction permits).

In summary, from a permitting perspective, the CRMA is expected to significantly alter CRM projects so long as they are designated as Strategic Projects. Such projects will avail of fast-tracked permitting procedures using one-stop-shops. Notwithstanding this, it makes significant changes to the role of certain existing parties, particularly Geological Surveys Organisations (GSO) around Europe.

These will have to work closely with the government or alone, to devise, implement, monitor and report back to the Commission on their CRM exploration programmes. It is generally considered that given the heavy reliance on data and appropriate knowledge to identify Strategic Projects, the brunt of the changes derived from the entry in force of the Act would be borne by the GSOs and those organisations in charge of exploration programmes, where such do not exist at present.

In addition, it is expected that given the focus on speeding and streamlining permitting procedures, competent authorities will also need to reconsider their procedures and processes. The CRMA is another addition to an already long list of regulatory requirements imposed by the EU.

As part of Task 3.1 'Fitness-for Purpose Assessment of Regulatory Frameworks', MacCabe Durney Barnes investigated regulatory frameworks and policy formulation at EU and Member States (MS) level (specifically those forming part of the CIRAN consortium). This assessment represents a view of the current situation and discussed new policy drivers likely to generate new regulatory requirements in relation to Critical Raw Materials and environmental protection.

The objective was to facilitate a systematic analysis of how different sectoral policy objectives, societal concerns and stakeholder views are aligned within permitting processes.

Overall, MacCabe Durney Barnes carried out a cross-sectoral appraisal to understand how the CIRAN countries approach the balancing of environmental and mining interests.

It found that most of these countries were applying a balanced approach to reconciling mining and



environmental protection, although there may be some that moderately favour environmental protection.

As of the first half of 2024, no countries have yet applied the requirements of the CRMA and have also not been required to apply those derived from the Nature Restoration Law (PE-CONS 74/23). Some countries may have taken steps ahead of the entry in force, such as adopting UNFC reporting, but generally all MS will need to consider the respective requirements and adopt them into their own national framework.

As a conclusion to the D3.1 report, it is questioned whether the need to apply new requirements will offset the delicate balance, where it exists, between mining, especially for CRMs, and environmental protection. This report considers that it is likely that pressure points will be exacerbated over the coming years, with increasing requirements to search, identify and mine CRMs, but also to protect environmentally sensitive sites if regulatory frameworks are to remain the same.

In particular, the following issues were considered:

- **Governance frameworks.**
- **Resource identification, spatial planning and designation.**
- **Streamlining of administrative procedures.**
- **Stakeholder engagement and societal acceptability.**
- **IT systems, spatial data, reporting and expertise.**

There are specific areas which will require improvement in any event, if the European Union is to pursue CRM projects. Existing permitting processes in certain countries can be lengthy and riddled with risks

for potential mining projects.

These risks are, in part, derived from overly complex procedures, a lack of political support, and importantly lack of societal acceptability of such projects. The issue of acceptability is not a new issue for the mining industry but appears more prominent when combined with environmentally sensitive areas.

As a consortium, we are now looking at how to maintain the balance between mining and environmental interests. Our colleagues from La Palma Research Centre are now focusing their efforts on carrying out a foresight exercise, while our colleagues in Geological Survey of Finland are actively mapping occurrences of CRMs and protected areas.

You can regularly check our website, where we will be posting the project results, including the Deliverable for Task 3.1 - **Fitness-for-Purpose Assessment of Regulatory Frameworks**. You can visit the project website here <https://ciranproject.eu/> and sign up for the project newsletter using the QR code.

If you are interested in keeping up with the project, you can follow us on LinkedIn here. <https://www.linkedin.com/company/ciran-project-eu/posts/?feedView=all>

We also engage in discussions with experts from around Europe and beyond in a dedicated forum which can be accessed here: <https://www.linkedin.com/groups/14134912/>

If you want to get in touch to discuss the project, please contact Sybil Berne, Associate at MacCabe Durney Barnes: [sberne@mdb.ie](mailto:sberne@mdb.ie)

*Note: MacCabe Durney Barnes forms part of the CIRAN Consortium led by INTRAW - the International Raw Materials Observatory - and supported by 11 European partners.*

*CIRAN is funded under the EU's Horizon Europe research programme. It began in January 2023 and will run for a period of three years.*



**BY SYBIL BERNE  
AND JERRY BARNES**  
MacCabe  
Durney  
Barnes



# Geological Mapping of the Cavanacaw Mine

## - Unlocking structural controls and trial production stopping



Development of the ore drives at Cavanacaw provided opportunity for the geology team to see the complexity of the mineralised veins up close, revealing notable structural patterns which could not otherwise be detected and understood.

Each face, wall and back of the drive was mapped in detail, recording high resolution observations which are even masked in high density drilling programmes. The drives are shotcreted shortly after each round at Cavanacaw so timely mapping is given high priority in the mining cycle.

The 'pinch and swell' nature of the gold veins at Cavanacaw is well documented, however, smaller-scale mapping observations have enabled the team to identify a regularity to the vein patterns. Recurring zones of wider and higher grade mineralisation have been recorded in the underground development and extrapolated between the five existing mining levels on the main Kearney Vein. These sections of the vein are termed 'dilation zones' and they have since been tested through drilling beyond the limits of the developed ground. Results from the latest drill programme support the dilation zone theory and increase our confidence in the continuation of wider, higher grade zones down plunge. This information is important for the mine plan and has been taken into account in the Company's latest resource update (Micon, 2023).

In addition to understanding

the structural complexity of the deposit, the geological maps of the development drives were crucial for successful completion of our trial production stope program.

During the 2022 - 2023 production phase, six test stopes were successfully mined on the main Kearney Vein at Cavanacaw, using a narrow vein, modified Avoca longhole open stope method. The minimum stope width was 2.2 metres planned with a stope length of 10 to 15 metres. The geological maps of the top and bottom development drives were used to create a 3D model of the vein. This model allowed for precise and accurate longhole drilling and reduced waste dilution.

As the test stopes progressed, it became clear that there was a strong link between vein geology and how the stope broke out. Stope shapes were heavily influenced by the dip of the vein, wall rock geology and structures projected into the drive walls. Therefore, the detailed geological maps informed the appropriate length of the stopes and the expected ground conditions. This also allowed the team to employ any necessary ground control prevention methods before taking the stopes.

A total of 3,175 tonnes of mineralised

material was successfully mined from the six stopes in a safe and controlled manner. Reconciliation was completed for two of the stopes, and grades returned an average percentage increase of 113% from the grade modelled in the technical report (2014 Model 43-101). The trial stoping program has led to an optimized cycle of two days from the initial stope blast to completion of backfill, thus reducing the potential for dilution and streamlining the process. This mining method can now be applied to more than 240 stopes which are already planned for the Kearney and Joshua zones, with grades in the range of 2.0 grams per tonne (g/t) gold to 17 g/t.

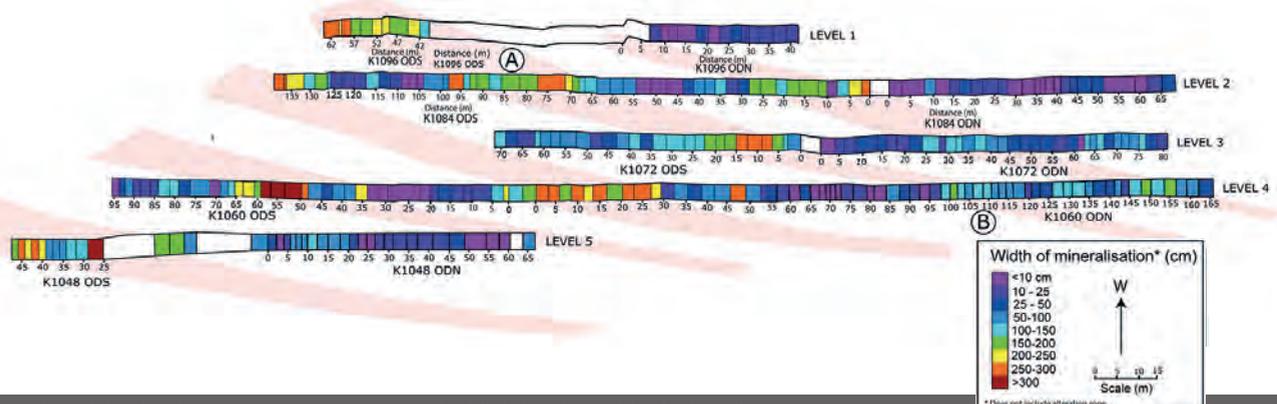


**ZOË BROWN**  
Senior Mine Geologist and Geotechnical Officer

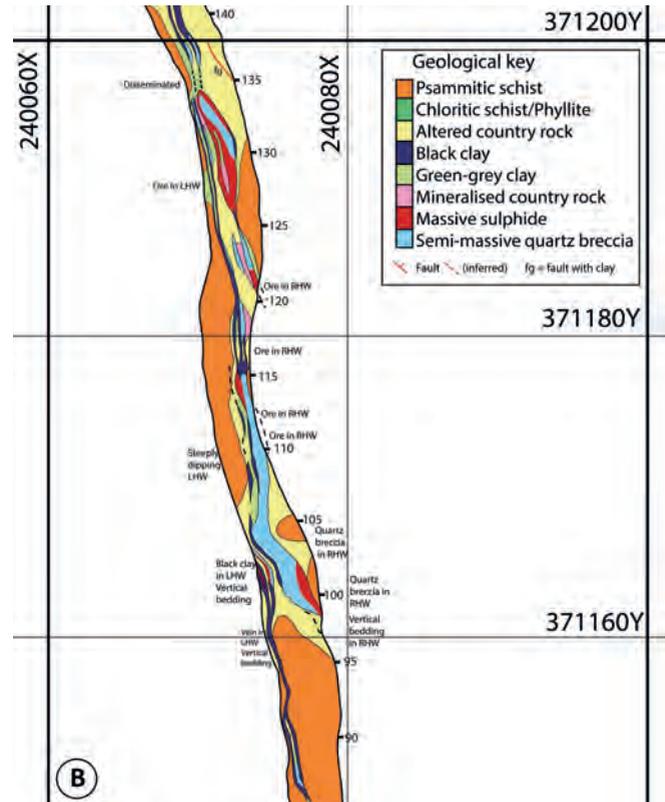
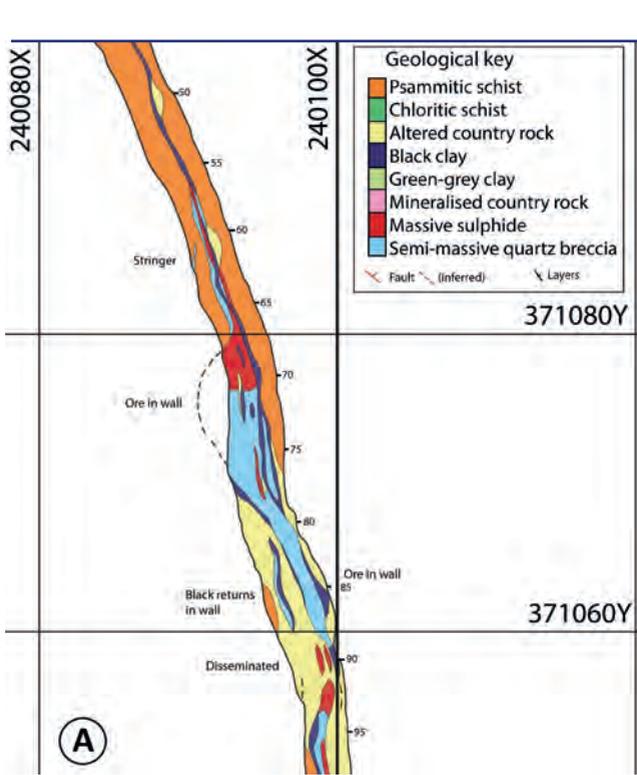
**DR. SARAH COULTER**  
Chief Geologist



Cavanacaw Long Section



Long section of the development at Cavanacaw Mine highlighting the width of mineralisation.



Geological plan map of K1084 and K1060 level.

# McGRATHS CONG

## McGrath's Limestone (Cong) Ltd

Cregaree Quarries, Cong,  
Co Mayo F31 W425

High Purity Calcium Carbonate Powders & Granules | Tarmac and Asphalt Manufactured and laid | All types of aggregates

liquid screed solutions

Readymix concrete | Concrete Blocks | Agri Lime  
Building Stone | Civil's and groundwork contracts

Head Office Cong: 094 9553900  
 Newbrook Claremorris: 094 9540940  
 UK Office: 01315 162419  
[www.mcgrath's.ie](http://www.mcgrath's.ie) / [www.congcal.com](http://www.congcal.com)

QUALITY  
ISO 9001:2008  
NSAI Certified

ENVIRONMENT  
ISO 14001:2004  
NSAI Certified

HEALTH & SAFETY  
OHSAS 18001:2007  
NSAI Certified

# Improving access to the Geological Survey of Northern Ireland Geomaterials collections

Since the Geological Survey of Northern Ireland (GSNI) was founded in 1947, its geologists have collected rock, mineral, and fossil specimens as part of their work. The sample locations are both extensive and diverse, representing the vast geological history reflected in Northern Ireland's rock record. GSNI also carried out regional soil, sediment and water sampling, and drilled, and/or received from industry, boreholes and other ground investigation materials from across Northern Ireland. These specimens are held in the GSNI Core Store and are collectively referred to as Geomaterials. They provide an important resource in understanding the ground beneath our feet.

**For the first time in its history, GSNI has recruited a Geomaterials Technician, with the role of helping to record and curate the vast collections of Geomaterials held. This will help to maximise the potential use of these collections and further improve our understanding of the subsurface of Northern Ireland.**

GSNI has begun to digitise the collections, beginning with the petrographic thin sections or 'sliced rocks' collection. Thin sections are prepared to investigate the optical properties of the minerals in the rock under a microscope.

GSNI has created high resolution images, in both plain and cross polarised light, for over 7,500 thin sections, that when published later this year will allow investigators to view the collection and identify specimens of interest. This can then be followed up by inspecting the original slides in the GSNI offices or on short-term loan for research collaborators.

GSNI has also begun to digitise, with high resolution photography, over 20km

of boreholes held in the GSNI Core Store. These boreholes, often drilled to depths of up to 2000m, provide an invaluable insight into the earth at depth. While many of these were originally drilled as part of exploration programmes for oil, gas, lignite, or as part of mineral exploration programmes, they are now being re-appraised to help address current societal challenges such as geothermal heating and cooling, and critical raw materials.

The collections are important, in some cases they are the only accessible samples of sub-surface formations, and as exploration at depth is costly, the re-use of existing materials can reduce both the cost and de-risk future work.

Many of the samples held by the GSNI have been analysed using a range of techniques and the GSNI intends to link the results of these analyses to the digital assets. The existing Geomaterial collections are also available to investigators for sub-sampling/analysis.

**This work is ongoing with the target of the entire Geomaterials collection being digitised by 2026.** The outputs

of the digitisation programme, including imagery and laboratory data, will be released in phases and accessible through the GSNI Data Catalogue and the GSNI GeolIndex.

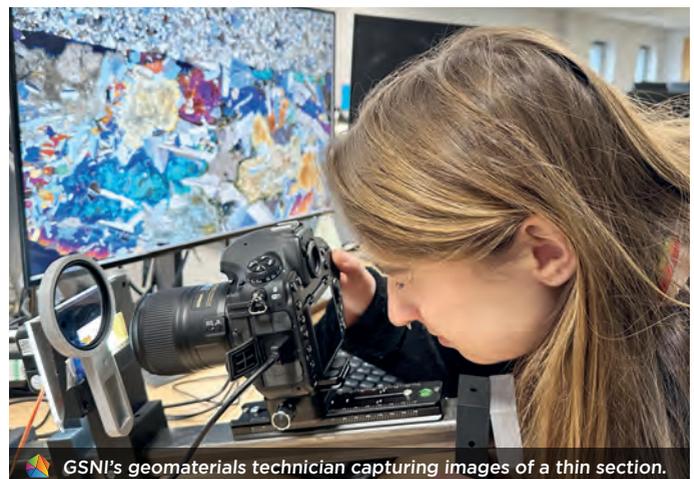
The digital Geomaterial collection will be a valuable resource for the mining and quarrying sector, but also for energy, groundwater and researchers working on climate change mitigation and adaption. The GSNI is keen for these materials to be used for a wide range of research and welcomes collaboration proposals from our partners and stakeholders.

**For more information on the work programme, contact GSNI by email: [gsni@economy-ni.gov.uk](mailto:gsni@economy-ni.gov.uk)**

**The GSNI data catalogue is available at <http://gsni-data.bgs.ac.uk>**

**GSNI** Geological Survey of Northern Ireland

[www.bgs.ac.uk/gsni](http://www.bgs.ac.uk/gsni)

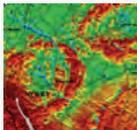




# Natural Resources in Northern Ireland

## Find the information and data you need at the Geological Survey of Northern Ireland

Source Groundwater Minerals Compressible ground  
Landscape Desktop study  
Quarries Geology Abandoned mines  
Consultation Decision making Risk management GIS Advice Aggregates  
Brownfield site Subsidence Data Knowledge Environment  
Natural resources Radon Support Geothermal Peat slides  
Sustainability Geoscience Planning Expertise  
Local Development Geotourism  
Landslides Site investigation reports  
Energy Maps Pathway Receptor  
Resources Contaminated land  
Borehole records Ground source heat  
Soil geochemistry



## Data and Services

GSNI collects, interprets and provides geological data, research and advice to central and local government, industry, academia, NGOs, schools and the public. GSNI maintains extensive digital databases and paper archives that are accessible online and through our enquiry service.

The data held by GSNI include:

- Modern and historical geological maps including 1:10k vector map data
- Borehole and site reports
- Tellus geochemical and geophysical datasets
- Exploration data and open-file reports
- Historic mines database
- Groundwater data repository
- Rock thermal properties database
- Reservoir quality data
- Geothermal prospectivity reports
- Seismic reflection data
- Gravity data
- Magnetotelluric data
- Downhole geophysical data
- Borehole temperature data
- Core, rock and thin section collections

Access GSNI data:

- **GSNI GeoIndex at [bgs.ac.uk/gsni](http://bgs.ac.uk/gsni)**
- **[gsni-data.bgs.ac.uk](http://gsni-data.bgs.ac.uk)**
- **[opendatani.gov.uk](http://opendatani.gov.uk)**
- **[spatialni.gov.uk](http://spatialni.gov.uk)**



# Four new Epiroc FlexiROC D55s for O'Sullivan Rockbreaking's fleet

When leading Irish drill and blast contractor O'Sullivan Rockbreaking Ltd was looking to replace four of their fleet of seven drill rigs, having checked out the offerings from the different manufacturers they quickly concluded that the Epiroc FlexiROC D55 was still the best match to meet their productivity, flexibility and value retention targets.

 One of O'Sullivan Rockbreaking's fleet of seven Epiroc FlexiROC D55 in action.





Even the best equipment needs to be serviced regularly to make sure it sustains peak performance. O'Sullivan Rockbreaking hold a small stock of spare parts to keep downtime to a minimum.

Since investing in their first Epiroc rig (branded Atlas Copco at the time) in 2007, O'Sullivan Rockbreaking has built up a fleet of seven Epiroc drill rigs. Managing Director Philip O'Sullivan saw no reason to change now, he said "We bought a rig from another supplier a few years ago but sold it after six months and replaced it with another Epiroc rig. The FlexiROC is ideal for us, as well as being easy to transport between job sites, our operators find them straightforward to set up as they drill on different sites with different types of rock."

Despite investing in the same model of Epiroc FlexiROC drill rigs, the operators and maintenance team have seen a significant evolution in their operation and maintenance over the years. Philip explained "With each new rig we see that Epiroc has continued to evolve their technology. In particular, we have seen huge improvements in the maintenance of the FlexiROC - from simpler and quicker jaw changes to small evolutions in speeding up the changing of the rubbers. Likewise, we have seen real advances in productivity as a result of the increased speed of the chain and the faster rod handler - with the latest rigs we estimate we can drill an additional 4 - 5 holes everyday."

Philip went on to say "Whilst our operators appreciate being able to move easily between the rigs, they have still been pleased to see improvements in the cabin, such as bringing the engine temperature onto the front screen. These little things make a big difference."

The FlexiROC D55 offers the optimum combination of air flow and air pressure which means high drilling economy and productivity. Built on a proven platform to ensure reliability and efficiency and fitted with a standard feed, the FlexiROC excels at production drilling. The FlexiROC's reliable DTH hammer teamed-up with a powerful 30 bar air compressor is a proven and effective combination - even in the toughest mining conditions. Both work together to deliver straight and smooth holes along with plenty of air to keep the hole clean. The FlexiROC D55 also features long service intervals and few parts.

Donal Cunningham, Regional Sales Manager - Ireland, explained "Based on a well-proven and trusted design, the FlexiROC D55 delivers high productivity thanks to the robust and powerful feeding system. The high degree of commonality of parts ensures the rig's availability and serviceability."

Philip summed up by saying "With seven FlexiROC machines in the fleet, we can justify holding our own local stock of spares which ensures downtime is kept to a minimum. With Epiroc's machines, when the time comes to replace a machine, we know we can sell the old one easily and at a good price."


**Epiroc**  
[www.epiroc.ie](http://www.epiroc.ie)


# IRISH RESOURCE PEOPLE OVERSEAS

## Eoin Wallace



### Mine Manager, British Gypsum – Brightling Mine, East Sussex, UK

Eoin started his career at the Vedanta - Lisheen Mine in Co. Tipperary in 1999, initially as a miner, working through the ranks to Deputy Shiftboss and then Shiftboss. In 2014, Eoin moved within the Vedanta Group to Zambia as a Trainer to the Konkola Copper Mines Complex.

In 2016, Eoin joined LTMS Limited on their Indian project as a Trainer and subsequently as the Project Manager, leading a team of trainers and miners at the Sindesar Khurd Mine (SKM) in Rajasthan. During Eoin's four years at SKM, the mine moved from two to six million tonnes per annum and Eoin was instrumental in raising their standards with miners and mine supervisors, while also managing a rehabilitation project.

At the start of Covid, Eoin and LTMS pulled out of India and have since not returned. Between 2020 and 2021, Eoin spent more than a year as a Safety Officer in the construction industry.

In 2021, Eoin rejoined the LTMS contract team as Mine Manager at Galantas Gold - Cavanacaw Mine in Northern Ireland, where he was instrumental in the restart of the mine and engagement with regulatory licensing agencies. In 2023, Eoin moved to British Gypsum



Eoin Wallace at the Brightling Mine Portal.

#### - Brightling Mine as Mine Manager.

The Brightling Mine is part of a group of five British Gypsum mines in the UK and has been in operation since 1963. Brightling produces 160,000 tonnes of gypsum and cement rock per annum, for use in the construction industry.

The rock is mined using a room and pillar mining method, crushed in the mine, moved by conveyor from the mine and then along a 5km surface conveyor

to the company's Robertsbridge processing plant. The cement rock is sold directly to the construction industry and the gypsum is manufactured into plasterboard in the plant.

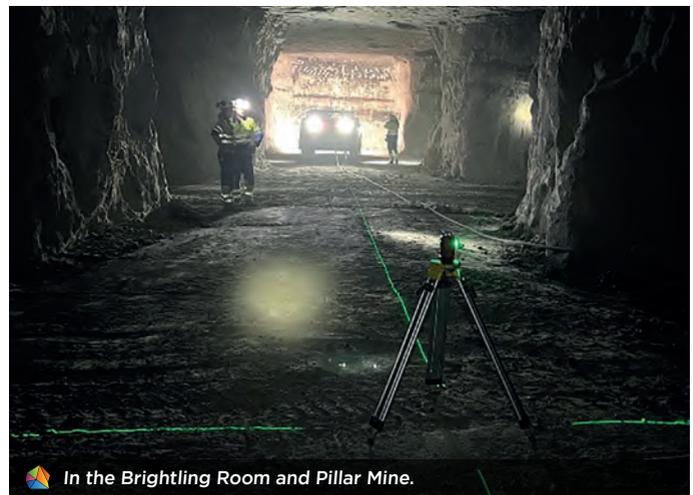
Eoin's primary focus at Brightling is to optimize the mining and maintenance arrangements at the mine in preparation of a 25% increase in production in 2025. The mine employs 41 people in mining and maintenance, working on two shifts per day, five days per week.

The daily target is to fire eight development rounds, utilizing 3.2m x 6.0m x 5.0m (cement) and 3.2m x 6.0m x 3.0m (Mill) rounds. Development faces are drilled with single boom jumbo drill rigs and charged with ANFO. Load Haul Dump units tram the rock to the underground roller crusher, located in the working district.

Eoin is working with the British Gypsum team and consultants to achieve the required targets into the future and states "The lessons learned at one mine can be brought to the next mine and used to make improvements there. Mining operations often have very similar problems involving challenging targets for safety, production, and cost."



Aerial View of Brightling Mine and Conveyor.



In the Brightling Room and Pillar Mine.

# McHALE

Plant Sales Limited



## McHale Plant Sales and Metso your one stop shop

Metso has delivered dependable solutions for demanding aggregate applications for the past 150 years, including crushers, screeners, feeders, track mounted and wheel mounted units, stationary plants and automation breakthroughs.

At McHale's we take your business personally. Backed by OEM spare and wear parts, maintenance and repair programmes, extended warranties, full Life Cycle Services and a mobile service fleet covering the entire country.

Contact McHale Plant Sales to find the right Metso mobile solution for you, or learn more at [metso.com/aggregates](https://www.metso.com/aggregates).

## Metso

Birdhill,  
Co. Tipperary  
+353 (0)61-379112

Rathcoole,  
Co. Dublin  
+353 (0)1-4018540

Tamworth,  
Staffordshire  
+44 (0) 182 721 6600

West Telferton,  
Edinburgh  
+44 (0) 182 721 6600

Email: [sales@mchaleplant.com](mailto:sales@mchaleplant.com) | [www.mchaleplantsales.com](http://www.mchaleplantsales.com)

# MINING AND QUARRYING SECTOR ‘Living in interesting times’



**Believed to be Chinese in origin - though little proof of their authorship exists - is the expression: ‘May you live in interesting times!’**

For members of the Irish Mining and Quarrying Society, it could be said that these indeed are ‘interesting times’ and, thankfully, not so interesting as to constitute a situation that one should fear.

## **MINING - OUTLOOK POSITIVE**

For those whose interest lies in the mining sector, the horizon is rich with positive news. First is the return-to-working at Navan Mines, a development that ensures Ireland maintains a presence in the base metals business, a presence that at one time in the past - when Navan, Galmoy and Lisheen were all being mined - ranked Ireland in the world’s top-10 lead/zinc producers.

On the precious metals front, there is the search for gold along the Cavan, Monaghan, Armagh border; the work being done to find diamonds in Fermanagh; and the trace discovery there of nickel, copper and platinum in stream sediment samples.

According to experts, when production gets underway at the ‘highly-prospective’ Clontibret gold target, in prospect is a development that will bring significant spin-off benefits, not least in the crushing, excavating, and dump truck transportation sectors



as a forecasted 'necklace' of quarry-like mines comes into operation.

According to geologists close to the project, industry-acknowledged JORC-compliant reserves in excess of 500,000 ounces of gold are already proven to exist beneath the surface of Monaghan's drumlin countryside – a reserve believed to be significantly greater as analyses of subsequent drilling continue to reveal.

### AGGREGATES - FUTURE ROSY

On the quarrying and aggregates front, the future is no less rosy. Always a bellwether, signals coming from the sector suggest that demand for aggregates is growing as construction, infrastructure, and civil works projects take 'front-of-stage' importance.

On the equipment side, one major player, McHale Plant Sales, has been quietly expanding its footprint in a way that augers well for the sector as a whole.

Best known for its work as distributors of Metso crushers and screeners, and Komatsu construction equipment, the Birdhill and Rathcoole-based company boasts an even more extended offering with the addition of Metso-owned Jonsson crushers, and Monaghan-made MDS trommel screens within its line-up. Acquired by Metso in 2018, Swedish-

made Jonsson mobile crushing and screening plants are described as 'an important addition' that strengthens the Metso portfolio and aligns with customer needs. With a range comprising six tracked jaw and six tracked cone crushers, and an electric-powered tracked double crusher, Jonsson bespoke machines are at home in heavy-duty applications, Irish quarry operative and leading concrete producer Kilsaran being one prominent and noteworthy user.

Adding immeasurably to McHale's position within the aggregates and crushing markets, Irish-made MDS tracked, static, and recycling trommels and conveyors offer a mobile trommel solution to quarry owners and operators – with a trommel that will take up to a 1.5m rock and the capability to process rock up to an impressive 800 tons per hour.

### CUTTING-EDGE

From Komatsu, a latest keynote addition is their new HD605-10 rigid dump truck whose many improved features include enhanced engine power and torque, and what Komatsu says is 'cutting-edge fuel-reduction technologies'.

Drawing on over a century of Komatsu expertise in quarry and mining operations, the HD605-10

sets 'new benchmarks in safety, productivity, durability, and environmental responsibility' with a focus on meeting customer demands in quarry applications.

Said by McHale Plant Sales Director, Denis McGrath, to include "a number of 'car-like' features", it comes with three selectable drive modes to match applications - Economy, Economy Light, and Power - hill start assist, cruise control, an external seat belt reminder lamp, and illuminated stair walkways.

Added improvements described by Komatsu include 'increased power and optimal performance' at the lowest cost per tonne, unparalleled safety and comfort for operators, with weight reductions, improved durability and an expanded load capacity up to 64 tonnes with a 43m<sup>3</sup> body, a powerful 610 kW Stage V engine and other enhancements.




## INDUSTRY LEADER

# Hugh McCullough

**Hugh McCullough graduated from UCD in 1972 with a 2.1 Honours degree in Geology. During his final year in College, his mineralogy lecturer, Dr. Peter Strogon, mentioned that a friend of his might be looking for a geologist to work on a project in Ireland.**

This friend was Noel Kiernan, who together with Dr. Don Burns, ran a geological consultancy called MinereX Limited from a little office over a shoe store in Exchequer Street in Dublin, just down the street from The Old Stand.

Tony Murphy, who later joined Priority Drilling also worked with Don and Noel as did the inimitable Dr. Bob Young. Noel and Don were also the dominant shareholders in a small private exploration company called Glencar Explorations plc.

### **GLENCAR; BARYTES IN SLIGO, ZINC IN NAVAN**

In the early 1970s, Glencar had acquired a lease over a large tract of ground at the top of Ben Bulbin in Co. Sligo, including the old, abandoned workings of the Sligo Bay Barytes Company. These workings extended over a large vein of high grade barytes which had been worked since the late 1800s up until about 1979. Hugh was the resident geologist on the mountain during a two-year exploration programme.

Glencar was also active in mineral exploration in Northern Ireland in joint venture with Elf Aquitaine, and also in lead/zinc exploration in Navan, adjacent to the world-class Tara deposit. Glencar's exploration there ultimately led to the acquisition of Glencar's Navan property by Tara Mines Limited.

### **THE BULA SAGA**

In 1979, Hugh was approached by Tara Mines with finding suitable geological consultants to assist with the detailed relogging of the core drilled by Tara in the early days over the Nevinstown orebody, which at this time was under the control of Bula Limited.

This very interesting exercise led on to Hugh's engagement by Tara to manage the conduct of its technical case in opposition to Bula's application for planning permission for an open pit mine north of the River Blackwater in Nevinstown.

Tara's legal team at the Oral Hearing called by An Bord Pleanála included



 Hugh McCullough.

the late Peter Sutherland and Niall Fennelly, two of the foremost legal brains of that time. The Bula Hearing was among some of the most interesting days of his geological career, and were instrumental in leading Hugh to study law, which led ultimately to the award in 1985 of the degree of Barrister at Law from the Kings Inns in Dublin, and the call to the Bar in the same year.

### **GLENCAR; GOLD IN MAYO AND GHANA**

Glencar was also active in gold exploration in Co. Mayo, which was ultimately thwarted by the actions of Mayo County Council in imposing a blanket ban on mining in the area of interest. This led to the judgement of the Supreme Court in 2001 which became an important precedent in Irish law

but, unfortunately, did not succeed in reimbursing Glencar for its expenditures prior to the imposition of the mining ban.

In 1983, Glencar had become a listed company as Glencar Explorations plc with the very valuable support and encouragement of the late stockbroker, Colm O'Briain, who became a regular supporter of Irish companies in the exploration sector, most notably perhaps, Tullow Oil plc which went on to achieve significant success in African oil exploration.

**In 1984, Glencar's interests turned to gold exploration in Africa.** Together with Noel Kiernan of Minerex, Glencar discovered what became the major Teberebie deposit in Ghana which was eventually sold to the Pioneer group Inc of Boston.

Glencar then discovered the multi-million-ounce Wassa gold deposit in Ghana, which was eventually acquired by Golden Star of Denver. Glencar later discovered the Komana gold deposit in Mali which in turn led to the takeover of Glencar in 2009 by Goldfields Limited of South Africa. All three of those gold deposits remained in commercial production for some decades after their first discovery by Glencar.

Some months after Goldfields acquired ownership of Glencar, Hugh became involved in a copper exploration project in Papua New Guinea. With the assistance of Kieran Harrington, Papua Mining was listed on AIM in London in February 2012. Papua Mining plc was acquired by new investors in 2018.

**Hugh is currently Chairman of the Mincon Group plc**, a Shannon-based company quoted on the Euronext Dublin market and the AIM market in London. Mincon is a very successful designer and manufacturer of innovative drilling tools for the exploration, mining, construction and waterwell/geothermal industries, employing more than 600 people and with eight manufacturing plants across four of the five continents.

When asked to outline his three most memorable achievements Hugh responded as follows:

1. The discovery of three significant, multi-million-ounce gold deposits in Africa, two of which are still in commercial production decades after their first discovery.
2. My involvement in the Tara/Bula Open Pit Planning Oral Hearing at An Bord Pleanála was a major

influence on my life. It prompted me to embark on legal studies in the Kings Inns leading to the award of the Degree of Barrister at Law in 1985. This course contributed measurably to my managerial career in public companies in the resource sector.

3. My 25-year career in mineral exploration in Africa, starting in 1984 in Ghana and ending in Mali in 2009. Working as we did in some quite remote parts of Africa, gave me the opportunity to work and live amongst local communities, and to experience their culture and the things that were important to them in their daily lives, so it remains as perhaps the most important and rewarding experience of my entire career in the resource sector.



**BY SEAN FINLAY**  
Director,  
Geoscience Ireland



# MOBILE CRUSHING SPECIALISTS

*All Types of*

**QUARRY CRUSHING**

**SCREENING**

**ROCKBREAKING**

**ALL TYPES OF QUARRY**

**PLANT FOR HIRE**

## McCabe Contracts Ltd.

Drumbroagh, Carrickmacross, Co. Monaghan

Tel: 0429662393 Mob: 0872642288 Email: [info@contractcrushing.ie](mailto:info@contractcrushing.ie)

# The Planning and Development Bill 2023 - An Update

**The much-discussed Planning and Development Bill aims to consolidate and revise the law relating to planning and development. It will repeal the longstanding Planning and Development Act 2000.**

**For the past year, all planning and development professionals have been talking about the Planning and Development Bill 2023. The Bill has been hailed by the Government as a new era in planning, a much-needed reform, which will deliver a better, more efficient planning system. This, in turn, would streamline the planning process and deliver more homes, one of the main issues plaguing the country in the last few years.**

As of August 2024, there is no Bill signed into law and the goalposts seem to be ever shifting. Why is that?

At the outset, it is important to remind ourselves what this piece of legislation will do. The current Planning and Development Act 2000 regulates the planning system. It sets out how we can engage in development and carry out works, distributes roles and responsibilities to the different bodies, such as An Bord Pleanála and the Local Authorities, and ensures that we carry out procedures that comply with the European Directives.

Importantly, the Act ensures that the public has access to environmental information and the necessary rights to get involved in the planning system. These rights parallel the requirements of the Aarhus Convention. The Act and its Regulations also set out the classes of exemptions or the duties of representatives of certain public bodies. The Act has been in place for 24 years and while it has come under fire for a variety of reasons, it withstood a major economic upheaval, a devastating economic recession and the rebirth

of the development sector. The Act was amended numerous times (hence, its working name 'as amended') to adapt to circumstances and new legislation. For instance, it was amended to allow for the creation of the new marine planning system.

**The new Bill was proposed by the Government with a view to fixing the failings of the 2000 Act.** After a rough few years troubled by a multitude of judicial reviews, many of which are against residential developments, and alleged breaches of public trust, the Government considered that a clean slate was needed to allow them to properly tackle the never ending conundrum that is the housing crisis.

Work began on the new Bill in November 2023. Then criticism started. Many have been commenting on the Bill, deeming it not fit for purpose, too long, too complicated, with some considering that it will cause delays to the delivery of housing, renewable energy and critical infrastructure (some of our greatest challenges as a nation). The Bill was debated and amended and continued its journey through the different steps, traveling between the Dáil and the Seanad via committee stages.

As of July 2024, the Bill had completed the Seanad Third Stage and was firmly headed to the President's office to be signed into law before the summer recess. But that did not happen. It was reported in media outlets that the reason was that a report by the UN committee responsible for overseeing the Aarhus Convention was issued criticising the Bill.

The report would echo much of the criticism that has been made against

the new Bill to date. If unresolved, it would mean that one of the fundamental principles of the Irish planning system, i.e. the participation of the public in planning processes would be somewhat non-compliant with the Convention itself, which could then give rise to a new raft of challenges when the new law is in place. Given that one of the reasons for the numerous judicial reviews and the drafting of a new Bill was in part to restore public trust in the system, this would not bode well for the new planning system.

With general elections coming up, the Government will want to resolve and enact the new legislation to deliver on its promises. It remains to be seen what steps will be taken next. Much of our societal challenges are dependent on the new Act, from the delivery of housing to combating climate change. It will be an interesting few months and possibly years...

[You can follow the progress of the Bill here.](#)



**BY SYBIL BERNE**  
Associate,  
MacCabe  
Durney Barnes



# ASHBOURNE TRUCK CENTRE

JOSEPH MOONEY

## FAYMONVILLE

TRAILERS TO THE **MAX**

Ashbourne Truck Centre, Ballymadun, Ashbourne, Co. Meath, Ireland  
Tel: 00353 18350573 Josef: 0035387 255 66 77 Sarah J: 0035386 255 66 77



authorised  
Tipper Specialist of



**NEW FAYMONVILLE MULTIMAX**  
66ton gross trailer weight, 9ft wide,  
double flip ramps, hydraulic rear legs,  
out riggers, option for  
extendable bed.

**IN STOCK  
AVAILABLE  
IMMEDIATELY.**



### NEW UNUSED MAX TRAILER

5 axle step frame, payload of 70 + tons,  
out riggers, extendable by 6.5m, 3 steer axles,  
hook on alu ramps or  
hydraulic ramps.



**IN STOCK  
AVAILABLE  
IMMEDIATELY.**



### SCHMITZ TIPPING TRAILERS

9.6m, galvanised chassis, hardox steel body,  
electric cover, sealed tail board,  
metallic silver body.



**IN STOCK  
AVAILABLE  
IMMEDIATELY.**



# iCRAG Update 2024

The past twelve months have been a very productive period for iCRAG, the SFI Research Centre in Applied Geosciences. Hosted by University College Dublin, the Centre has earth resources researchers based across a number of Irish third level institutions.

iCRAG is a world-leader in the study of sedimentary basin-hosted mineral deposits, which are vital to supplying the critical raw materials required to achieve decarbonisation. An example of the Centre's work was a seminal publication in *Economic Geology*, the premier journal in its field, by iCRAG researcher Dr Simon Jones (UCD) on the important White Pine Cu-Ag deposit in the United States.

iCRAG has continued to highlight the importance of Ireland as a major producer of critical raw materials through its work aiding the Irish Association for Economic Geology (IAEG) in its 50th Anniversary conference in Galway from 8th-10th September, 2023, which brought together scientists and industry

participants from around the globe to discuss the geology of Ireland's important ore deposits, the prospectivity of the country for additional world-class discoveries, and the results from current research, much of it conducted by iCRAG members, that could be applied elsewhere in the world.

The keynote paper for the conference, co-authored by Centre Director Prof. Murray Hitzman, describes the state-of-the-art in relation to base metal mineral deposits in Ireland and utilises recent data, much provided by iCRAG researchers, to constrain the areas in Ireland with the highest potential for future mineral discoveries.

The [paper](#) was enthusiastically received by attendees of the IAEG's

50th anniversary conference and has been downloaded extensively since it was made open access.

The Geochemistry Platform had a banner year for publications highlighting its research both developing and applying mineral chemistry to answer a widely diverse suite of scientific questions, ranging from paleoenvironments to global scale tectonics to vectors for mineral exploration.

A paper co-authored by Platform Lead and Deputy Director, Prof. David Chew (TCD) has direct and immediate application to industry. The paper describes how the diverse suite of trace elements in the mineral apatite can be utilised to help locate mineral deposits. The work is particularly important as

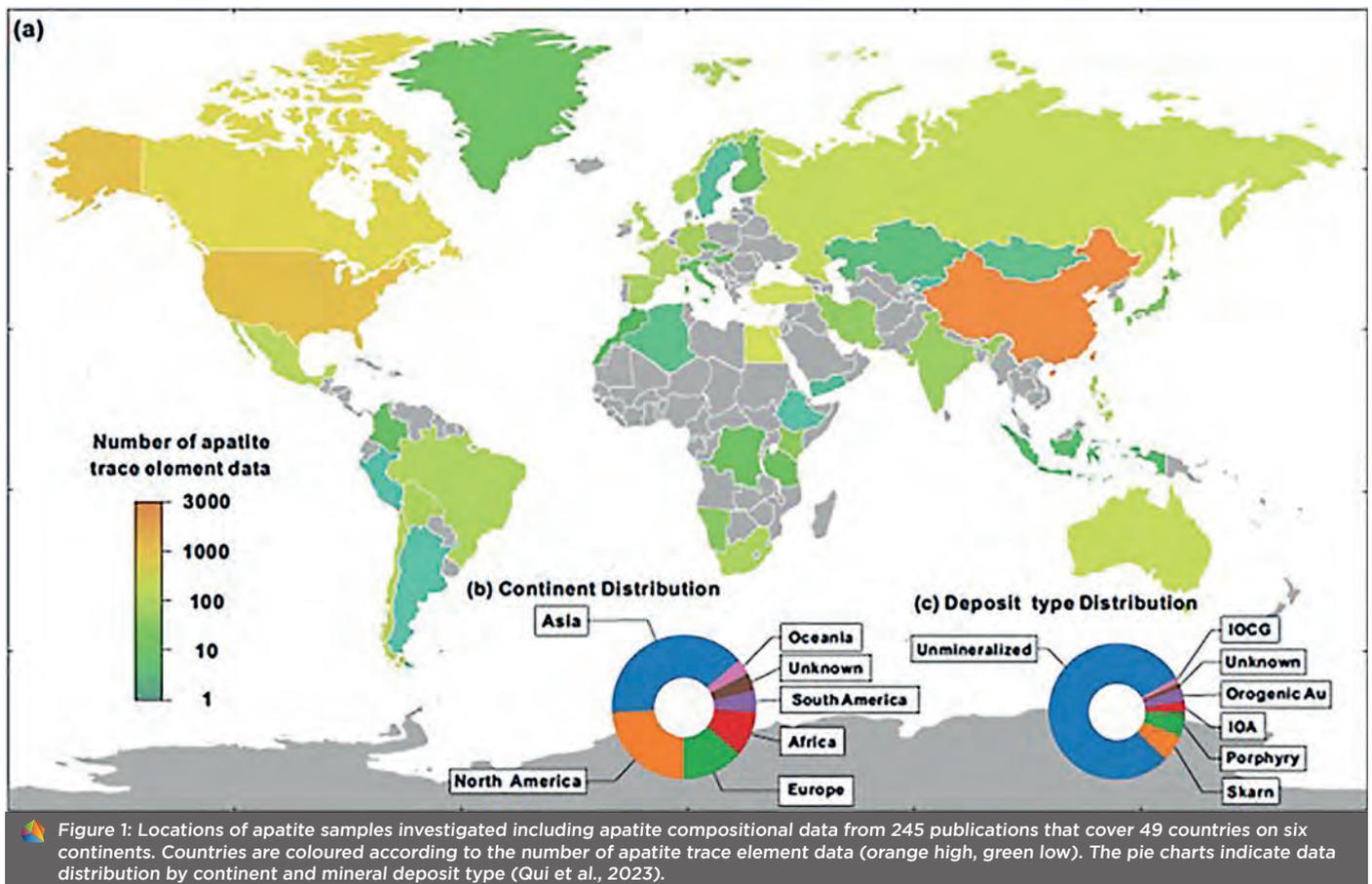




Figure 2: Centre Director Prof. M. Hitzman and participants in the United States – Democratic Republic of Congo Battery Council Workshop, Kinshasa, DRC, Sept 2023. Photo credit: SAFE.

apatite is found in a number of different ore deposit types around the planet.

Development of apatite as an exploration tool involved utilising high-dimensional (multi-element) information accessible from high-quality apatite trace element analysis from several different mineral deposit types in a supervised machine learning approach.

Apatite is relatively stable in the weathering environment meaning that apatites eroded from ore deposits can be preserved in sediments. Thus, recognition of mineralisation-related apatites in sediments downstream can help lead to the upstream discovery of deposits.

iCRAG continues to focus on economic geology outside of Ireland as well. A number of research projects continue in the Central African Copperbelt in both Zambia and the DRC with a focus on cobalt, critical for battery production. We are also working in the Kalahari Copperbelt and are completing a project on the sediment-hosted, Volcanogenic Massive Sulfide (VMS)

type deposits at Rosh Pinah in Namibia and the Portuguese Iberian Pyrite Belt.

In addition, the research group is also investing sedimentary rock hosted copper systems in the Chu-Sarysu basin of Kazakhstan and in the eastern Andes. iCRAG continues research in the building/construction materials space as well as research on materials standards to meet EU regulations. Research Fellow Dr Richard Unitt and Dr Pat Meere, both from UCC, published a paper looking at modern petrographic analysis (digital microscopy, Raman, FTIR, SEM, Q-CT) of aggregates to better understand their frictional properties, the results of which are important for registration of new products in the construction industry, and for informing Irish and EU regulations for safer road surfaces such as TII-DN-PAV-03023.

Concrete, which is the most widely used building material in the world, carries a high carbon footprint so any reduction in CO<sub>2</sub> emissions from concrete production could have very

significant economic and environmental impacts. Two iCRAG projects directed by Dr Ciaran McNally (UCD) are investigating both cementitious binders and sustainable aggregate sources, particularly recycled concrete aggregate, to deliver a step-change in the technical and commercial viability of 3D printed concrete and to boost the circular economy in the construction sector.

Likewise, iCRAG researchers continue their world-leading work on structural geology that is critical not only for understanding how the planet functions in terms of faulting, earthquakes, and plate tectonics, but also for mitigating and adapting to climate change through storage of gases and fluids in the subsurface, and understanding the potential for subsurface geothermal energy.

iCRAG organised and participated in several industry energy and mineral resource events over the past 12 months including PDAC in Toronto, the SEG Annual Conference in London, IAEG in



Figure 3: Right: iCRAG Reception at Irish Consulate, Vancouver during AME RoundUp 2024 and PDAC 2024 Conference. Middle: The iCRAG booth. Right: Poster by Malena Cazoria Martinez PhD Researcher iCRAG at UCD.

Galway, the Near Surface Geophysics Conference in Edinburgh, the European Association of Geoscientists and Engineers Global Energy Transition conference (EAGE GET) in Paris and the EAGE Annual Conference in Oslo.

The Centre has been proactive in highlighting the crucial role of critical minerals for the energy transition through the provision of expertise and the inclusion of content in EAGE energy transition programming in recent years. Our Director, Prof. Murray Hitzman was invited to discuss alongside energy leaders the need to build synergies across sectors to advance our transition to a low carbon economy.

iCRAG co-curated The Energy Transition Area (ETA) for the second year in a row at the EAGE Annual Conference in Oslo in June, hosting three days of dynamic discussions, interactive workshops and technical talks. The ETA is dedicated to professionals in the energy sector, and academics and students who play a vital role in achieving emissions targets. Lunchtime Panels included a discussion on the evolving role of geoscience for a positive energy future, assessing the potential of Norwegian offshore wind and concluded with a compelling debate on how we can foster understanding between those inside and outside the energy sector for the green transition.

The Theatre also featured interactive workshops with industry focusing on enhancing collaboration between the sector and academia to prioritise research questions to accelerate the energy transition, alongside valuable career advice for young professionals entering this transformative field. We also hosted a panel discussion on the role of critical minerals for the energy transition, featuring leaders from both the energy sector and the Norwegian minerals forum.

iCRAG is focusing research on the societally important issue of public



perception of Earth Resources. Ensuring that the supply of renewable energy needed to achieve these goals is met will require a sharp increase in production, and a more responsible use of critical raw materials. Whilst recycling can provide an increasing portion of these materials, recycling alone cannot meet the projected demand, which implies that further mining will be required if the EU is to meet its climate goals.

Sourcing raw materials from inside the EU, where suitable environmental, social, and political regulations could be implemented, may be instrumental in securing an ethical provision of metals. However, mineral projects face complex challenges in the EU. iCRAG is a partner in VECTOR, a three-year, €7.5M project, funded under the European Union's Horizon Europe and the UK's Research and Innovation funding programmes.

VECTOR seeks to develop human-centred solutions for a socially

acceptable, responsible, and sustainable supply of critical raw materials in Europe and thus contribute to achieving the Green Deal. The project partners are investigating potential solutions that incorporate as many perspectives as possible, address environmental concerns, and solve technical challenges.

Work is already underway on developing a public engagement toolkit for use in informal education settings such as arts festivals and science festivals where people can engage with the scenarios facing the provision of raw materials in Europe. Participants can interactively choose which raw materials to prioritise, or to downgrade, in pursuit of the production of renewable energy, thereby increasing understanding of the links between raw materials and the green transition.

iCRAG's Business Development team welcomes enquiries from prospective industry partners on collaboration opportunities:

Emer Caslin, iCRAG Business Development Manager

[emer.caslin@icrag-centre.org](mailto:emer.caslin@icrag-centre.org)

Dr Aoife Brady, iCRAG COO

[aoife.brady@icrag-centre.org](mailto:aoife.brady@icrag-centre.org)



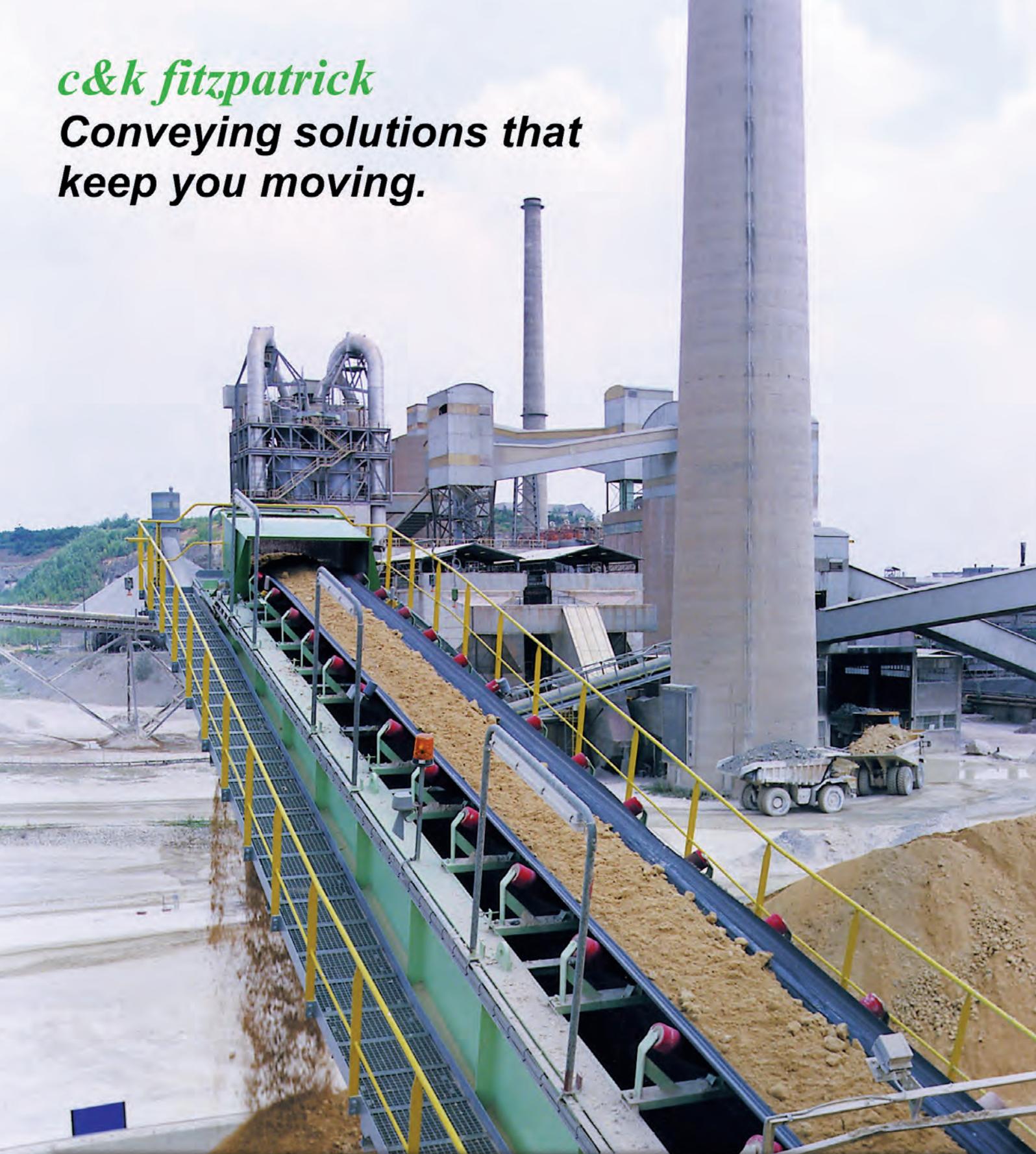
**BY EMER CASLIN  
MURRAY HITZMAN  
FERGUS MCAULIFFE**



Figure 4: iCRAG Energy Transition Theatre at the EAGE Annual Conference in Oslo.

*c&k fitzpatrick*

**Conveying solutions that  
keep you moving.**



*c&k fitzpatrick*

Conveyor Belt House,  
Castlewarden,  
Straffan,  
Co. Kildare.

Ph: 01 - 4589374/ 4588327  
Fax : 01 - 4580475

Web: [www.ckf.ie](http://www.ckf.ie)  
Email: [info@ckf.ie](mailto:info@ckf.ie)



- Dunlop Conveyor Belting
- On-Site Vulcanizing
- Flexco Belt Fasteners
- Gurtec conveyor rollers
- Belt Cleaners
- Drum Lagging
- On-Site Conveyor Maintenance
- Rubber & PU Screening Media
- Wear Protection

# More bang less bucks

The Liebherr-XPower range of wheel loaders returns outstanding fuel efficiency

L 550 | 8.94 l/h\*



L 556 | 9.91 l/h\*



L 566 | 12.21 l/h\*



L 576 | 12.85 l/h\*



L 580 | 13.94 l/h\*



L 586 | 16.59 l/h\*



\* Figures taken on 01/06/22 are a guideline based on the actual average of the model's global population in LiDAT and are subject to specific site conditions, materials, application and operator use. See how much you can save with Liebherr's real-time fuel calculator.

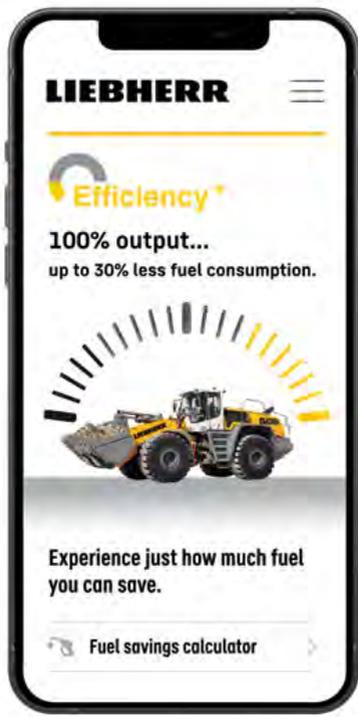
## LIEBHERR

Fuel efficient wheel loaders

Please contact Liebherr-Ireland for specification and availability.

Liebherr-Ireland

Unit 23N, Greenogue Industrial Estate • Rathcoole • Dublin • D24 P38P  
Phone +353 (1) 458 7650 • [LGBSalesLIR@liebherr.com](mailto:LGBSalesLIR@liebherr.com) • [liebherr.com](http://liebherr.com)



The XPower range of wheel loaders returns outstanding fuel efficiency. The Tier V compliant engine works with the CVT power-split driveline to automatically select the most efficient ratio between hydrostatic drive for short loading cycles and distances or mechanical drive for long distances and ascents.

Additionally the Liebherr Power Efficiency (LPE) system regulates all power management processes in the machine to ensure maximum performance from every drop of fuel.

# LIEBHERR

# Maximum performance from every drop of fuel

Find out what you could save with the Liebherr fuel efficiency calculator



Fuel efficient wheel loaders



 The EU Critical Raw Materials Act aims to strengthen the entire value chain for strategic and critical raw materials in Europe, from mining to processing and recycling. Imagine credit: European Commission.

# The EU Critical Raw Materials Act takes effect in Ireland

**In May this year the Critical Raw Materials Act (CRMA) took effect as an EU Regulation in Ireland. The Geoscience Policy Division (GSPD) in the Department of the Environment, Climate and Communications, which is responsible for coordinating and promoting the policy and legislative functions for the mineral, petroleum and geothermal sectors, is coordinating CRMA implementation in Ireland.**

**The CRMA is intended to address the rapidly increasing demand for Critical Raw Materials (CRM) and CRM supply chain vulnerabilities that place European economic, climate, digital and defence objectives at risk.**

The EU's demand for critical raw materials such as lithium, copper and cobalt is set to increase exponentially as the EU transitions to clean energy systems which requires the building up of local production of batteries, solar panels, permanent magnets and other green technologies. The transition will mark a shift from a fuel-intensive system to a material-intensive system. For instance, EU demand for lithium used in electric-vehicles batteries and energy storage is expected to increase by twelve-fold by 2030.

The CRMA aims to provide the EU with security of supply, including by strengthening international engagement, facilitating extraction, processing, recycling and substitution of CRMs,

while ensuring high environmental standards and building supports for upskilling the sector. The main provisions will improve knowledge, efficiency and cooperation on CRMs.

In addition to a list of critical raw materials for the whole EU economy, the Regulation has further identified a subset of materials that are most crucial for strategic technologies, known as Strategic Raw Materials (SRM).

## **IRELAND PERSPECTIVE**

As a mining country with a significant geological endowment; a high-quality geological database; skills and know-how in exploration and mining; and modern mineral exploration and mining policy and regulation, Ireland is well-placed to contribute to the objectives of the CRMA.

Ireland's Policy Statement on Minerals Exploration and Mining (2022) provides the foundation for the implementation of the CRMA, by providing a regulatory framework that supports environmentally-

sustainable mineral exploration and mining and a commitment to meaningful public and stakeholder engagement on these activities. Ireland has an important role to play as a producer, processor and recycler of raw materials for the European market now and into the future.

The CRMA presents opportunities to the mining sector, with support for strategic projects which make a 'meaningful contribution' to EU SRM supply, being a key provision. Mining, processing, recycling or substitution projects can apply for this special recognition from the European Commission.

Successful strategic projects can avail of access to a 'Single Point of Contact' for permitting coordination, streamlined and predictable permitting processes and will be considered to be in the public interest in planning regime, while continuing to adhere to existing requirements of environmental legislation. The Single Point of Contact is in the process of being appointed.

Applications for the first intake of strategic projects have been invited by the European Commission, and the successful projects are to be awarded strategic status by December. Another window will open for strategic project applications in early 2025. Notably, projects from third countries (i.e. Northern Ireland) are also eligible to apply if they contribute to the EU market. However, barriers remain to the practical stepping-up of activity along the minerals value chain, starting with the funding of exploration. A variety of minerals are of exploration interest in Ireland, some of which are Strategic Raw Materials (lithium, copper, rare earth elements, platinum group elements, tungsten, gallium, germanium) and Critical Raw Materials (baryte, beryllium, niobium, feldspar, tantalum), in both primary and extractive waste settings. The European Commission has chosen to support exploration activity by facilitating access to blended funding mechanisms (existing funding instruments, private equity, investment banks and State Aid where applicable, details of which to be advised), rather than direct financial supports. In Ireland, **the recent announcement of the Irish Minerals Fund by the Ireland Strategic Investment Fund is a positive development**

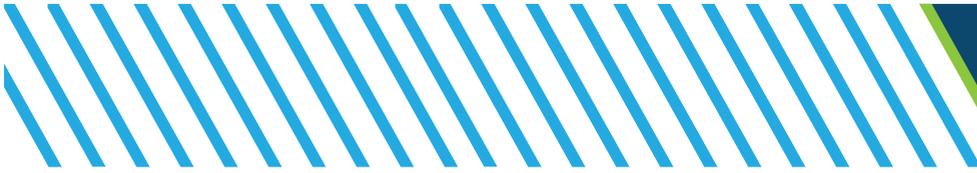
for funding later-stage bankable projects, initially focussed on zinc. **Ireland's significant minerals expertise at home and around the world means it can play an important role in the international cooperation required as part of the CRMA.** Key provisions include Strategic Partnerships, which are mutually beneficial non-binding agreements between the EU and third countries to build resilient value chains that contribute to the EU's supply of CRMs, and to build sustainable value chain activity in emerging markets and developing economies at the same time. Strategic Partnerships place an emphasis on traceability and responsible sourcing of minerals and have so far been undertaken with Canada, Ukraine, Kazakhstan, Namibia, Argentina, Chile, Zambia, the Democratic Republic of Congo, Uganda, Greenland, Rwanda, Norway, Uzbekistan, Serbia and Australia. On the whole, the CRMA presents the Irish minerals sector with significant opportunity and its affects will begin to be seen by the end of the year. The CRMA aims to support a step-up in exploration and mining activity which will place Irish geologists in demand at home and abroad. There is potential for expanded work opportunities especially in the creation of value

chains for recycled critical raw materials and the associated exchange of information and specialist knowledge. The European Commission recognises the growing skills deficit along the entire value chain for raw materials and intends to establish a large-scale skills partnership on CRMs with stakeholders and public authorities to support upskilling and innovation in the workforce. GSPD will continue to engage with the European Commission and stakeholders, including civil society and prospective Strategic Project promoters, throughout the implementation phase to ensure this important Regulation makes a significant impact at national level in further strengthening the Circular Economy.



An Roinn Comhshaoil,  
Aeraide agus Cumarsaide  
Department of the Environment,  
Climate and Communications

**GEOSCIENCE POLICY DIVISION,  
DEPARTMENT OF THE  
ENVIRONMENT, CLIMATE  
AND COMMUNICATIONS**

# TOBIN



## BUILT ON KNOWLEDGE

**52 YEARS  
IN RUBBER  
TECHNOLOGY**



**PAT O'CONNOR**

*Importer-Distributor of all types of*

- Conveyor Belting
- Fasteners
- Rollers
- Rubber Flooring

Castlewarden, Straffan, Co. Kildare, W23 W921

*Located near exit 5 of N7  
Dublin - Naas Motorway*

*Mobile:*

**087 254 4623**

*Email:*

**patoconnorqps@gmail.com**

**Brexit Belting**

**PRICE WAR**

*now in full action!!*

*New price structure in place*

**MARK our words:**

*We are always  
ahead of the posse*

**YOUR LINK TO  
QUALITY**

## **Doctor Belt**

**News: At no great expense.**

### **Conveyor Belt Manufacturing: The facts**

Production of conveyor belts in the Northern Hemisphere is more costly because of the transporting of raw materials to those plants. Labour is also more expensive because standards of living, of the work force, are higher than those of the people in the Tropical countries.

*The source of conveyor belting manufacturing components to the Northern Hemisphere come from Tropical land countries around the globe. We have never seen a rubber tree plantation, e.g in Holland, only **TULIPS!!***

So in simple terms, the manufacturers in the Tropical areas use the exact same materials as here in the Northern Hemisphere. They have laboratories under law and comply to strict health & safety standards in manufacturing. All conveyor belts, like for like in spec, are the same quality. It is marketing strategy that increases / inflates the price. It can't be said because a belt is ridiculously dearer, it is a better belt.

**Lets deal in facts and not trumped up spoof!!**

***That's why our customers keep coming back to us for the best available and consistent, quality belts & advice!!***

*Late evening - Night orders, Early morning direct deliveries our speciality*



# PAT O'CONNOR

Importer-Distributor of all types of

- Conveyor Belting
- Fasteners
- Rollers
- Rubber Cladding

Castlewarden, Straffan, Co. Kildare,  
Republic of Ireland W23 W921

Mobile: **087 254 4623**

Email: [patoconnorqps@gmail.com](mailto:patoconnorqps@gmail.com)



## *The House of Conveyor Belt Specialists!!*

# IRISH RESOURCE PEOPLE OVERSEAS

## Emma Murray-Hayden

**Group Geology Manager – Growth. Northern Star Resources.**

In 2004, fresh from completing my M.Sc in Geology and Physics at NUI Galway, I set off for Australia with plans to pick fruit for a year before returning to Ireland to pursue a career in the oil and gas industry. But life had other plans. When I arrived in Perth, I was amazed at the number of job opportunities for geologists. Seizing the moment, I landed a contract with a junior gold miner on a remote site about eight hours from Perth in the Western Australian Goldfields.

Just a few months later, the gold price skyrocketed, creating a surge in demand for geologists. I secured visa sponsorship and embarked on a career path that would take me through some of the most significant gold mining operations in Australia. I spent two years with Croesus Mining as an open pit geologist in the small town of Norseman, after which I joined Gold Fields, one of the world's major gold miners. This role exposed me to every aspect of mining including open pit, underground, advanced exploration, and resource estimation.

After 10 years at Gold Fields I was eager to expand my horizons, I moved to Saracen Minerals as the Geology Manager of their Carosue Dam Operations. Here, I managed over 30 geologists and technicians and played a crucial role in the site's overall management. This position honed my strategic thinking skills and allowed me to make significant



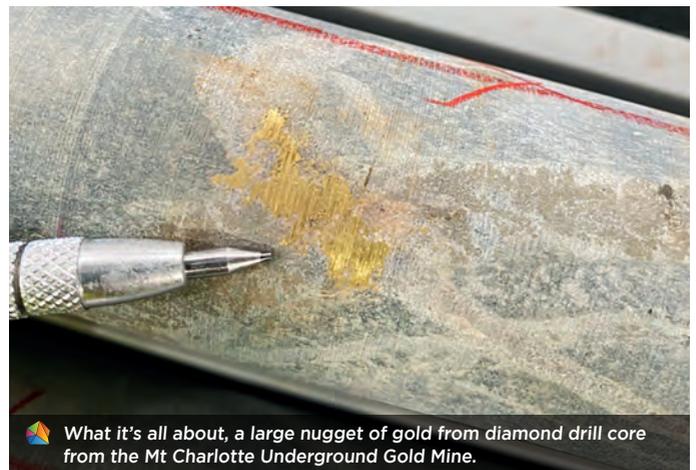
Emma (right) with KCGM colleagues in the Fimiston Processing Plant.

contributions to the company's success. In late 2019, Saracen acquired a 50% stake of the world-famous Kalgoorlie Consolidated Gold Mines (KCGM) operations, including the Super Pit. I was asked to move there as the Geology Manager, leading a team of 80 people. This role was a massive opportunity to unlock the site's potential as well as get exposure to working under a joint venture. During the first year, however, Saracen merged with their joint venture partners, Northern Star Resources, and the Golden Mine was owned by a single company for the first time in the history of the deposit. During my time at KCGM, I drove cultural and operational improvements and increased the life of mine through the

discovery and definition of additional Mineral Resources and Ore Reserves. Recognized for my contributions, I was promoted to Group Geology Manager of Growth. In this role, I focus on extending and derisking the mine life of all company assets. I work closely with mining engineers, metallurgists, finance teams, and investor relations, compiling reports for the stock market and ensuring the continued success of our operations. Reflecting on my journey, I never imagined that a one-year stint picking fruit in Australia would lead to a fulfilling career in the gold mining industry. It's been a thrilling ride, filled with challenges and triumphs, and I look forward to what the future holds.



Emma examining an ore drive in the newly established Wonder Underground Mine in the WA Goldfields.



What it's all about, a large nugget of gold from diamond drill core from the Mt Charlotte Underground Gold Mine.



# THE LEADING MANUFACTURER AND SUPPLIER OF BUILDING MATERIALS

- Concrete
- Blocks
- Stonefill
- Blacktop
- Mortars
- Paving
- Walling
- Roof Tiles

 **roadstone**  
A CRH COMPANY

[www.roadstone.ie](http://www.roadstone.ie)

T: 01 4041200

E: [info@roadstone.ie](mailto:info@roadstone.ie)

# Roadstone develop concrete for 3D printing



**Printing has concluded on Ireland's first 3D concrete printed social housing scheme for Louth County Council in partnership with Roadstone and Harcourt Technologies Ltd.**

**The project at Grange Close has demonstrated a new way to construct housing combining 3D printing technology and traditional building materials.**

After 75 years in business, Roadstone continues to innovate through the development of a unique concrete mix for 3D printing.

The Grange Close pilot project involved a unique collaboration between Louth County Council, Louth and Meath Education and Training Board (LMETB), Irish-owned company Harcourt Technologies Ltd (HTL tech), Roadstone Ltd, and a CRH company, using 3D construction printing (3DCP) technology with the aim of providing a pathway towards an

increased output of more sustainable, affordable, and efficient housing.

**The project utilised 3D construction printing technology** to provide three three-bedroom terraced units that will have a floor area of c. 110 m<sup>2</sup> over two floors at Grange Close, Dundalk.

3DCP is a method of construction that involves using large-scale 3D printers on-site to create three-dimensional structures layer by layer. In this process, layers of Ready-Mix Concrete (RMC) are sequentially deposited through a gantry-based 3DCP machine according to a digital model. The result is the creation of the housing superstructure at a rate which is up to three times faster than is possible through traditional methods. This approach significantly

streamlines construction processes and holds immense potential to revolutionise the construction industry in Ireland by providing faster, more cost-effective, and sustainable ways to build.

In preparation for the Grange Close scheme, two two-bedroom units were completed at the HTL R&D facility in Drogheda, Co Louth. This construction demonstrated that it is a fully compliant integrated Modern Method of Construction (MMC) Housing Solution. The accomplishment underscores the project's feasibility and scalability.

The contract for the construction of the project was awarded to B&C Building Contractors Ltd, Carrickmacross, Co. Monaghan.



 Roadstone, 3D Printed House, Dundalk.

The housing units will use 3D printing technology and prefabricated construction components, including windows, doors, flooring, and roofing. Combining MMC component providers within the digital construction workflow of 3DCP will ensure the precise integration of prefabricated elements, expediting assembly while guaranteeing consistency. This collaboration will streamline construction processes, enhance efficiency, and boost housing production capacity.

It is intended that **the Grange Close scheme will showcase the use of the regulatory-compliant 3DCP technology.** Compared to traditional methods, the aim is to achieve three times faster superstructure program delivery and a 25% reduction in overall project timelines. This is the first social housing project in the world to integrate 3D construction printing and Ready-Mix Concrete while using the lowest

embodied carbon mix to save 278 kg CO<sub>2</sub>e/m<sup>3</sup> in conjunction with Roadstone.

“Roadstone is a solutions-focused business committed to driving innovation and sustainability. We are delighted to partner with Harcourt Technologies Ltd to offer this future-based approach to construction. Integrating new technology and traditional building materials offers a new era of efficiency and carbon reduction - working towards a sustainable future. Collaboration between Roadstone technical staff and the team at HTL, combined with access to our industry-leading R&D laboratory, has facilitated the development of bespoke RMC designs coupled with an efficient and high-tech modern method of construction.” - Patrick Diviney, Roadstone, Commercial Manager.

The 3D construction housing project is built upon HTL.tech's use of COBOD International A/S 3D construction printing technology in collaboration

with Roadstone. This collaboration underscores a shared commitment to innovation and sustainability within the construction industry and signals the beginning of the technology's scalability for housing delivery in Ireland.

Louth County Council, LMETB, HTL.tech and Roadstone are committed to advancing this pioneering initiative. This project lays a path for future innovation and collaboration within the construction industry in relation to the production of high-quality, sustainable, and efficient housing in response to the ongoing housing demand.



**roadstone**  
A CRH COMPANY

[www.roadstone.ie](http://www.roadstone.ie)

# Roadstone is celebrating 75 years in business

**From humble beginnings in the early forties, two Dublin brothers started a small business that would transform the construction industry, and go on to become one of the largest building materials businesses in the world.**

**Tom and Donal Roche started with a sand and gravel haulage business, initially called Roche Brothers. In 1949 the brothers launched a new company called Roadstone on the Irish Stock Exchange.**

Roadstone developed quickly through mergers, acquisitions and the purchase of key land banks around the country.

The aspirational outlook and forward planning of the brothers secured a space for Roadstone to grow, and establish itself as the market leader.

In 1968 Belgard Quarry lands were acquired securing the most important stone reserve in the country. At one stage Belgard was the largest quarry in Europe, and acted as a major catalyst for the growth of the business.

In 1970 a merger between Roadstone and Irish Cement saw the formation of CRH, which today employs 78,500 people at 3,390 operating locations in 28 countries.

Today Roadstone is a solutions oriented business driving innovation and sustainability. From the



development of solar projects and Wetlands, to 3D construction printed buildings, Roadstone is enabling change and working towards the reduction of carbon in our built environment.

For the last 75 years, Roadstone has been a leader in products and

services and a key player in the construction of our homes, roads, schools, hospitals and workplaces.

The business has served as a community to colleagues and friends who have worked together over the decades.

 Catherine at Lundin Mining's Candelaria Mine in the Atacama Region of Chile.

# IRISH RESOURCE PEOPLE OVERSEAS

## Catherine Maguire



### Director of Exploration, Lundin Mining

**Catherine Maguire, an experienced professional geoscientist, has built a career grounded in her early passion for the outdoors, geography, and science. Growing up in Waterford, she regularly explored the Comeragh mountains and copper coast. This early interest laid a strong foundation for her future pursuits in the field of geosciences spanning over two decades in the exploration and mining industry.**

With dual citizenship in the USA and Ireland, Catherine has an extensive international portfolio, bringing her expertise to projects across Europe, Asia, Africa, Australia, South and North America. Her technical acumen, combined with robust project management skills, has positioned her as a leader in the field.

She has demonstrated exceptional leadership in managing and developing

large, multicultural, and multidisciplinary geoscience teams, successfully navigating the complexities of varied geological and cultural landscapes.

Catherine earned a Bachelor of Science degree in Earth Science from the National University of Ireland, Galway (NUIG Galway). Her commitment to expanding her knowledge and expertise led her to pursue further education, obtaining postgraduate qualifications in Environmental Sustainability from University College Dublin (UCD Dublin), as well as in Site Investigation, Project Management and Business Management.

Catherine began her career as a graduate exploration geologist in Galmoy, Kilkenny with Lundin Mining where she gained experience in base metal exploration. She then expanded her expertise in Australia, working in the uranium and gold exploration. After a successful stint with other major companies, she rejoined Lundin in 2010 as a Senior

Exploration Geologist and worked on the Kibricken base metal project in Clare.

Her consultancy career involved project managing various geotechnical engineering, renewable energy and infrastructure projects across Ireland and the UK. She has been involved and managed many large profile mining projects in Spain, Turkey, Sweden and Romania. She was also instrumental in the completion of a site investigation project for Rio Tinto involving a 700km proposed railway from the largest global underexploited iron ore deposit at Simandou, to Conakry port in Guinea, West Africa.

Catherine continued her career in the US where she held progressively more senior positions in California, managing high-end residential and commercial geological engineering projects and exploration roles for Kinross in the world renowned, Nevada gold district. Her role as the geosciences group leader



 In the field on the Simandou Geotechnical Investigation in Guinea, West Africa.



 Catherine checking out the TMF on a resource drilling and slope stability project in Turkey.

in the Pacific Northwest for Golder/WSP saw her manage a diverse team of engineering geologists and geophysicists.

She successfully expanded the group's capabilities and client base, delivering on large infrastructure, land development, transportation, and mining projects. Notable projects included been the technical lead for the Seattle light rail project and geohazard mitigation recommendations for North American pipelines.

Currently, Catherine holds the position of Director of Exploration at Lundin Mining. In this capacity, she is responsible for overseeing all operational budgeting and corporate reporting, providing critical technical and strategic support and advice to sites.

Her role extends to business development, where she regularly undertakes project reviews and makes strategic recommendations to the senior leadership team, ensuring the alignment of technical operations with corporate objectives. She regularly travels to Lundin's exploration and operating mine sites in the US, Chile, Argentina, Brazil, Sweden and Portugal.

Leading and advocating beyond her technical and managerial roles, **Catherine is deeply committed to fostering**



Catherine taking a break from gold exploration at the Mendenhall Glacier, Alaska.

**the next generation of geoscientists.**

She serves as a board member for Women in Mining (WIM) USA, where she actively advocates for mentoring of younger geologists and engineers.

Catherine's dedication to encouraging more women to pursue careers in STEM (Science, Technology, Engineering, and Mathematics) highlights her role as a champion for diversity and inclusion within the industry.

Catherine is a recognized member of several professional organizations, including the Irish Association of Professional Geologists (PGeo), the European Federation of Geologists (EurGeol), and the American Institute of Professional Geologists (CPG).

She currently resides in Vancouver, Canada, and spends her free time hiking, fishing, golfing and exploring new countries.

# Drill bits for surface drilling



United. Inspired.

**Quality assured, reliable surface drilling.**

With Epiroc Grey line drilling tools you'll get optimal energy transmission and drilling economy every day, whatever the application or ground conditions.

**Minimising costs** – Grey line can transmit power into the rock efficiently and safely, optimising the drilling cost per metre with less wear and better fuel efficiency for sustainable drilling.

**Consistent performance** – Epiroc's Grey line quality and reliability ensure consistent performance over time.

**Compatibility** – with Epiroc's industry standard drill strings, you can combine Grey line tools with Epiroc Yellow line products, and other manufacturers' tools using the same common connections.

Epiroc UK & Ireland Ltd  
 salesukire@epiroc.com  
 07817 959318 (NI)  
 www.epiroc.ie



# Geological Survey Ireland



**Geological Survey Ireland, founded in 1845, is the Earth Science centre for Ireland. It is a division of the Department of the Environment, Climate and Communications (DECC). The following are snapshots of the work conducted by the Survey related to the mining and quarrying industry in Ireland and the EU.**

## MINERALS PROGRAMME

The minerals programme is continuing its extensive collaborations with European partners across a wide range of raw materials projects. Development is continuing on a new quarry database, and technical expertise is being provided to the Dept. of Housing and the relevant market surveillance authorities, particularly focused on deleterious materials in construction products. This has included Geological Survey Ireland arranging several research projects into deleterious materials, behaviour of sulphides, and related issues, by national and international consortia.

Within the Irish mineral exploration space, the minerals programme is continuing to collaborate with multiple industry and academic partners to improve the data availability for exploration and arranged an exhibit of the new Blue Book Lithostratigraphy data in collaboration with iCrag, at the IAEG 50<sup>th</sup> anniversary conference in Galway.

The minerals programme is also participating in projects under the Geological Service for Europe Programme of EuroGeoSurveys (GSEU), including data compilation on Critical Raw Materials (CRMs), Rare Earth Elements (REEs) and a review of Caledonide geology and mineral potential. Geological Survey Ireland is also now engaged with Department of the Environment, Climate and Communications (DECC) colleagues in relation to Historic Mine Sites, with monitoring programmes underway at Avoca and Silvermines, and plans for remediation being developed with the relevant local authorities.

The minerals programme also attended PDAC, the world's largest mining conference in Toronto in 2024 with DECC colleagues, thus supporting both the Irish stand and EU/EGS presence.

## TELLUS PROGRAMME 2024

After a quiet few years due to COVID-19 and contractual issues, the Tellus



 Final Tellus sample taken at Mizen Head by Oonagh Buckley, Secretary General at the Dept. of the Environment, Climate and Communications. Left to right: Judith Mather, Aurum, Thomas Leavy, Ray Scanlon, Geological Survey Ireland, Victoria Lowe, Aurum, Jim Hodgson, Geological Survey Ireland, Oonagh Buckley, Dept. of the Environment, Climate and Communications, and Koen Verbruggen, Geological Survey Ireland.

programme has been back surveying over the last 12 months. Tellus is Geological Survey Ireland's ground and airborne geoscience data acquisition programme and with Aurum Exploration Ltd contracted to undertake the soil sampling survey, great progress has been made. In fact, soils have now been collected from across the whole country, including one overseen by President Michael D. Higgins on the grounds of Áras an Uachtaráin in July 2020.

To mark the completion of the soil survey, Oonagh Buckley, Secretary General of the Department of the Environment, Climate

and Communications was on hand at the start of August 2024, to assist with the collection of the final sample in Mizen Head, County Cork. This completes 14 years of soil sampling across Ireland with over 41,000 samples collected. Many samples have already been analysed with data and maps published on the Geological Survey Ireland [website](#). More recently collected samples will be published over the coming months and years as they make their way through the analytical laboratories.

To help this process Geological Survey Ireland in conjunction with Trinity College

Dublin has set up the Earth Surface Research Laboratory (ESRL) based at TCD's Technology and Enterprise campus. As well as analysing the Tellus samples, this facility provides an opportunity for geochemical analysis for researchers across Ireland. The data obtained from the geochemical analysis is then used to produce maps showing the chemical variations within soil across Ireland. A StoryMap charting the progress of the soil survey over the years, along with places of interest is available to view from the Tellus page on the Geological Survey Ireland [website](#).

Another significant milestone was reached in 2014 with the conclusion of Terra Soil, a joint research project between Geological Survey Ireland and Teagasc. New analytical data, agronomic research and reports helping in the understanding of both the chemistry and fertility of the soil were released during an end of project conference held in Ashtown Research Centre, Dublin in April 2024.

The Tellus aircraft, registration C-GSGF, is back in the Irish skies flying over county Kerry and northwest Cork. The survey aircraft is operated by Sander Geophysics and based Shannon Airport, and over the coming months

new airborne geophysical data will be collected which can then be merged with the existing datasets for publication.

## RESEARCH

In 2024 Geological Survey Ireland awarded five Targeted Projects, linking academic research with the technical teams to support the work of the Survey. Successful projects include hyperspectral analysis for resource assessment of geological core, and the establishment of a national geochronological database underpinned by advanced analytical techniques. This year also saw the start of the first Research by Masters awards. These projects fund research Masters students to work on a topic of relevance to Geological Survey Ireland and the wider geoscience community, for example determining the Platinum Group Element (PGE) fertility of the Irish lithospheric mantle.

Geological Survey Ireland is also pleased to announce the continuation of the Stonebuilt Ireland partnership with Trinity College Dublin. This project is building a databases of source materials used in Irish historical sites and monuments. <https://stonebuiltireland.com/>

In collaboration with the ESRI, and supported by the EU PACIFIC project, research assessing risk

perception in minerals exploration was published. <https://www.esri.ie/publications/primacy-effects-in-the-formation-of-environmental-attitudes-the-case-of-mineral-0>

In May 2024, the Geological Survey Ireland Research team organised and hosted an international panel discussion at the European Geoscience Union General Assembly in Vienna to discuss the topic; The EU Critical Raw Materials Act – how geoscientists can directly inform European policy and regulation. The panel comprised the directors of the French and British geological surveys, a CRMA representative from the European Commission and an academic researcher working in the joint area of minerals and geothermal energy resources. (available to view online <https://meetingorganizer.copernicus.org/EGU24/sessionprogramme/5213>).



SLR has decades of successful experience advising clients at every stage of the minerals & mining/quarrying lifecycle.

- ESG & Sustainability
- Advisory: Resource & Reserves, Studies & Due Diligence
- Technical Support
- ESIA, Planning & Licensing
- Waste/Tailings & Infrastructure Engineering
- Water Management
- Restoration, Closure & Afteruse

**Dublin:**  
**Tim Paul,**  
tpaul@slrconsulting.com,  
+353 1 296 4667

**Cork:**  
**Paul Gordon,**  
pgordon@slrconsulting.com,  
+353 1 296 4667

SLRCONSULTING.COM

**Kilkenny:**  
**Barry Balding,**  
bbalding@slrconsulting.com,  
+353 1 296 4667

**Belfast:**  
**Paul McTernan,**  
pmcternan@slrconsulting.com,  
+44 330 088 663

A global leader in full spectrum sustainability solutions, providing clients with strategic advice and on the ground support.

Making  
Sustainability  
Happen

# Prospectors & Developers Association of Canada PDAC 2024



Ireland was once again well represented this March at the annual Prospectors and Developers Association of Canada (PDAC) Convention in Toronto, one of the largest mineral exploration and mining events in the world. PDAC 2024 welcomed nearly 27,000 participants, a 13% increase on last year's attendance, and with more than 1,100 exhibitors, including governments, companies and leading experts from around the world, the convention was one of the largest events in the association's history.

PDAC 2024 reaffirmed the significance of collaboration, innovation, and responsible mining practices in driving the industry forward. It showcased the significant strides being made in the realms of technology and AI within mineral exploration.

Critical minerals, unsurprisingly, remained at the forefront of discussion and a keen focus was placed on sustainability, with sessions exploring how the sector can innovate in biodiversity and electrification trends. Irish companies which exhibited at PDAC this year included Aurum, SLR, Priority Drilling, QME, WSP-Golder, Mincon, PW

Mining and QME. For the fourth year running, iCRAG - the SFI Research Centre in Applied Geosciences and Geoscience Ireland joined forces and with support from Enterprise Ireland (EI) co-hosted a booth, and Ireland was also well represented by the Geological Survey Ireland (GSI) booth. In addition, for a sixth year, the European Union and EU Member States were represented by the European Commission booth.

Mairéad Fitzsimons from the Department of the Environment, Climate and Communications (DECC) presented on Ireland's Mineral Exploration and Mining policy statement at the EU's "Building Sustainable and Resilient Raw Materials Value Chains" PDAC

networking and business session, while iCRAG Director, Prof. Murray Hitzman, opened the PDAC session on "Sediment-hosted copper deposits: Key to the green energy transition".



PROSPECTORS & DEVELOPERS ASSOCIATION OF CANADA

BY DR AOIFE BRADY  
Chief Operations  
Officer, iCRAG



iCRAG Team at PDAC - Aoife Brady, Victória Susin, Tommy Tormey, Malena Cazorla Martinez and Halleluja Ekandjo.

# Sandvik Ireland Portlaoise

## Underground Mining, Parts & Services, Rock Tools, Surface Drills, Crushing & Screening

Supporting our Irish customer base in both the surface and underground extractive industries since 1997. With a high emphasis on Environment Health and Safety and a large range of quality products, parts and services, our customer support continues from our Portlaoise facility, where we strive to deliver tomorrow's needs, today.

Portlaoise office Tel: +353 (057) 866 4538

Brian Carroll- Underground Mining Tel: +353870517195 [brian.carroll@sandvik.com](mailto:brian.carroll@sandvik.com)  
Chris Murray- Surface Drilling & Rock Tools Tel: +44 7515198233 [chris.murray@sandvik.com](mailto:chris.murray@sandvik.com)  
Gareth Orritt- Crushing & Screening Tel: +447395880344 [gareth.orrith@sandvik.com](mailto:gareth.orrith@sandvik.com)  
Oliver Boland- Service & Tech Support Supervisor Tel: +353860289323 [oliver.boland@sandvik.com](mailto:oliver.boland@sandvik.com)  
Gerry Quinlan- Parts, Service & Warehouse Coordinator Tel: +353877696627 [gerard.quinlan@sandvik.com](mailto:gerard.quinlan@sandvik.com)

Unit C, Zone 5, Clonminam Business Park  
Portlaoise, Co Laois, Ireland R32 EP03



# Sandvik Ireland - Through the Rock, Through the Years



Sandvik DI650i Leopard  
in operation.

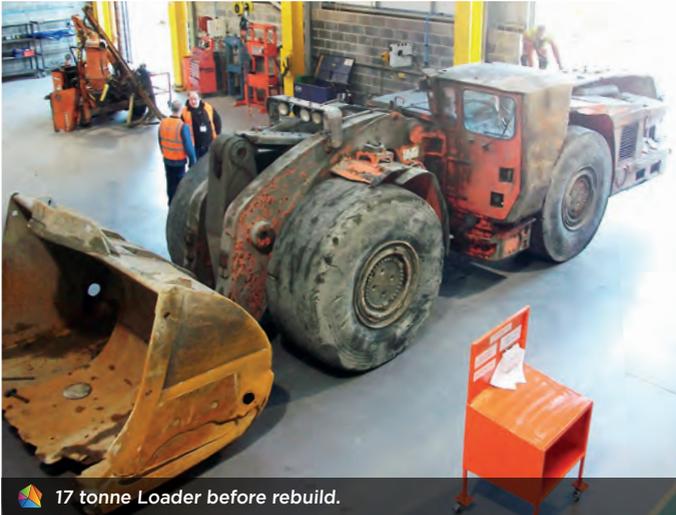
**The 2nd of December 1996 marked a day in Sandvik's global footprint when Sandvik Tamrock OY registered as a legal entity in Ireland. In those early days, Sandvik Tamrock Irish Branch initially started its operations in Portarlinton in Co. Laois alongside an on-site full-service contract at Arcon Mines, in Galmoy, Kilkenny.**

By the end of 1998 and into 1999, the company transitioned to a workshop in Crosspatrick, Kilkenny, situated between Arcon Mines and The Lisheen Mine in Tipperary. This move was pivotal in expanding our service offerings throughout Ireland and enhancing our capabilities in equipment maintenance and rebuilding. Launching operations and training personnel in specialized equipment is a formidable challenge, yet our close ties with the Sandvik Tampere factory in Finland proved invaluable. The steady influx of specialists from Finland to Ireland bolstered our expertise in equipment rebuilds, surface drilling training, and on-site mining services.

As time progressed, we relocated to facilities in Rathdowney and, subsequently, Portlaoise. Today we operate from a modern bespoke, highly spec'ed workshop and warehouse facility in Portlaoise, Co. Laois. The facility serves as a major repairs facility for our sister operations in the UK where we have similar onsite and field service support but major works take place in Ireland at our workshops.

In response to our growing customer base and their increasingly critical demands, we have continuously evolved, developing our workforce, operations, and methodologies. The complexity and technical sophistication of our equipment necessitate our unwavering support for our customers' businesses.

In the highly competitive and rigorous sectors of mining and construction, the maintenance and repair of surface drilling equipment, on-site service and technical support, high precision rock tools, dependable spare parts supply, our team's expertise, component rebuilds and repairs, local inventory, and the option for machine rebuilds are essential for the operational success of our customers. Initiative-taking maintenance services are the bedrock of equipment reliability. Sandvik's comprehensive maintenance program is designed to avert breakdowns and prolong machinery life. Routine maintenance inspections, prompt repairs, and regular monitoring are integral to our strategy to optimize uptime and readiness.



17 tonne Loader before rebuild.



17 tonne Loader after rebuild.

When equipment nears the end of its initial service life, Sandvik presents “ReBorn” machine rebuilds as an economical alternative to new purchases. This process involves meticulous inspections, part replacements, system updates with innovative technology, and stringent testing to uphold high-quality standards. Not only does this extend the machinery’s lifespan, but it also boosts its performance to rival or surpass new models. The benefits of Sandvik’s “ReBorn” program include:

- **Cost Savings:** Depending on customer budgets, rebuilding can be more cost-effective than buying new, enabling more efficient resource allocation.
- **Sustainability:** Opting for rebuilds aids environmental conservation by minimizing waste and raw material consumption.
- **Customization:** Our rebuild services allow for machinery customization to meet unique operational requirements, incorporating the latest technological advancements.
- **Technology Upgrades:** Outdated models can be modernized to the latest specifications with support from the factory and necessary liability approvals.

Our commitment to maintenance and rebuild services reflects our deep understanding of industry needs. By offering these vital services, we ensure that our customers in mining and construction can maintain smooth, safe, and efficient operations, with an emphasis on cost-effectiveness and sustainability. As the industry progresses, Sandvik’s dedication to innovation and customer service solidifies our position as a leader in the field.



Sandvik's Automated BEV loader - LH518iB.

Our daily operations also encompass the sale of new equipment for both underground and surface drilling. In our consultations with our existing and current customers, we delve into the specifics of our offering and underscore the substantial advantages that the most recent technological advancements, backed by OEM expertise, offer to

our customers. Including our service offering, bundle deals and financing, we can assist in building a package to suit all customer needs and budgets.

The development of our team in Ireland has led to some of our current team members becoming key personnel to the success of Sandvik operations in the wider sales area of North Europe, whether it's BEV load and haul trucks and loaders in Norway or underground drills in Sweden or technical and operational trainings and expertise in Bulgaria, Poland and Germany. Today we are in the midst of recruiting and developing the next generation of people in Ireland to ensure our customers success continues to be achieved. A phrase that I always use is.... “a successful business for our customer means that we are successful too.”

**SANDVIK IRELAND**

Supporting our Irish customer base in both the surface and underground extractive industries since 1996 with technical support and operating from our midlands workshops over the past 27 years, since 1997. With a high emphasis on Environment Health and Safety, a product range of quality products, parts and services and an exceptionally skilled workforce, our customer support continues today from our Portlaoise facility, where we strive to deliver tomorrow’s needs, today in Ireland and around Europe.

**Mining Equipment, Parts & Services (rocktechnology.sandvik)**

Contact map (rocktechnology.sandvik)



Sandvik Service Van at site works in Ireland.



**BY BRIAN CARROLL**  
OPERATIONS MANAGER UK & IRELAND - SALES TERRITORY CEU & UK/IRELAND



# IRISH RESOURCE PEOPLE OVERSEAS

## Kevin Lonergan

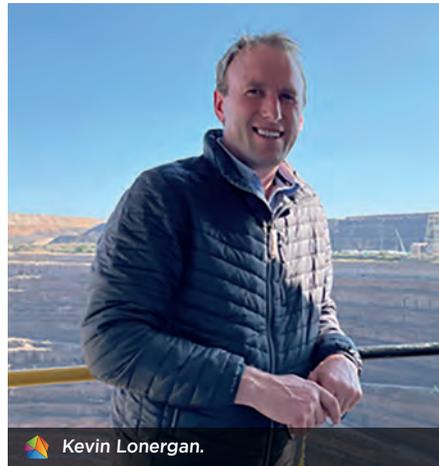
Senior Vice President (SVP) Technical Services, Wesdome Gold Mines, Toronto

Kevin is a Mining Engineer having completed initial studies in Mineral Engineering at Athlone RTC before completing his Mining Degree in Camborne School of Mines, University of Exeter, UK.

His working career overlapped with the education process, having the opportunity to work at Galmoy Mine during university before entering full-time employment upon course completion in 2000.

Kevin worked initially as a miner to learn the trade and progressed from there through the supervisory and management levels, having the real advantage of gaining a wide berth of experience that comes with a small mining company. Moving on then to Gypsum Industries in 2004 to take on the Assistant Mine Manager's role, which involved overseeing the open pit operations and managing the brownfields construction of the new underground mine which started in 2005.

In 2006 he joined Anglo American Plc at its Lisheen Mine, a tier one mining company which provided a lot of opportunity for personal and career growth. Starting off as the Paste Backfill Engineer before moving through Mine Captain and Superintendent roles prior to Lisheen's closure in 2015, under the new ownership of Vedanta Resources, Kevin was fortunate to be part of the team that managed what is considered to be a world



Kevin Lonergan.

class closure of a modern day mine. Taking a significant switch from management to consulting, LTMS was established in 2015 with Brendan Morris and Padraig Barrett, both mining engineers. In the role of Operations Director, Kevin provided technical and operational consultancy services domestically and internationally, including feasibility studies, optimization studies, training operations on supervisory and operational effectiveness. The world of consultancy certainly opened the opportunity to appreciate cultures and learn about mining in regions such as India, Russia, RSA, Brazil, and Kazakhstan. In 2020, Kevin joined Ero Copper, as Director of Mining, progressing to Vice President (VP) for Mining,

providing operational oversight for the two underground copper and one underground gold mine, and a copper open pit mine in Brazil. While at Ero Copper two major projects were initiated, the deepening expansion project at the flagship copper mine sought to increase the reserves and to justify the build of the deepest material movement shaft in South America, a 1500m, 6.9m diameter, 2.2mtpa shaft. In parallel with this work, the BOA Esperanza Open Pit project was also initiated; a 4mtpa project was fast tracked through feasibility study to early works and within the space of three years will be producing in 2024.

Moving to his current role, Kevin joined Wesdome Gold Mines, Canada, in 2023, providing technical insight, and is currently the SVP for Technical Services. Wesdome Gold Mines has two operating gold mines, Kienna Mine in Quebec and Eagle River in Ontario, both with a long history of mining and great potential to grow through technical optimization and application of technology and innovation. The role of the technical division is to ensure the strategic imperatives to achieve this growth are aligned throughout the business, properly resourced, communicated and executed accordingly.

The mining industry has offered Kevin a world of opportunity to travel the world, meet great people, appreciate different cultures, and promote mining to the next generation of engineers, geologists and scientists.



Kienna Gold Mine, Quebec, Canada.



# CEMCOR

Setting the Standard

**CEMCOR Ltd.**

**29 Sandholes Road, Cookstown,  
BT80 9AP, Northern Ireland**

**General Enquiries**

**T: 028 8676 7201**

**E: [enquiries@cemcor.com](mailto:enquiries@cemcor.com)**

**Sales Enquiries**

**T: 028 8676 7281**

**E: [sales@cemcor.com](mailto:sales@cemcor.com)**



# IRISH RESOURCE PEOPLE OVERSEAS

## Jonathan Talbot

Mine Manager, Gulf Rock, Ghuzayn Copper Mine, North Batinah, Oman

Jonathan studied Geology at NUI Galway graduating in 2003. After a brief stint at Tara Mines, he worked as a production geologist at the Galmoy Mine before studying for a Master's Degree in Geotechnical Engineering at Camborne School of Mines. Jonathan then worked in consultancy for two years focused on projects in the USA, before joining Lisheen Mine as a senior geotechnical engineer and worked his way up to Mine Captain.

When Lisheen mine closed, Jonathan started Advanced Mining Solutions Limited, a mining consultancy, and Trove Metal Ltd, a company dedicated to researching mine tailings re-processing. For three years, Jonathan worked on projects in Ireland and abroad, including Azerbaijan, South Africa, Greenland and Kazakhstan, before taking a role as the General Manager at Galantas Gold in Tyrone. After this, Jonathan worked at Boliden Tara Mines as the Head of Section for Technical Services. **Jonathan is now employed by Gulf Rock as the Mine Manager of Ghuzayn Copper Mine in Oman.**

Ghuzayn Mine is an underground Copper mine in the foothills of the Western Hajar mountains in Northern Oman. The project is owned and funded by Mawarid Mining and Gulf Rock is the mining contractor on the site and managing all of the mining including development, production and backfill.



Jonathan Talbot (right) at Ghuzayn Mine Oman.

The project started in February 2023 and in that time Gulf Rock has excavated and supported the portal area and driven over 2.5km of linear development. In March 2024, the mine blasted its first ore face with grades of up to 2% copper present. Ore is currently being stockpiled onsite while the processing plant, over 100km away near Sohar, is being commissioned with shipments of copper concentrate starting soon after. Oman is a beautiful country with friendly, welcoming, outward looking people and spectacular geography. There are the clear blue waters of the Gulf of Oman, the harsh but beautiful desert, and the Western Hajar mountains with

towering peaks, such as Jebel Shams, gigantic canyons, and narrow gorges with seasonal blue streams called wadis that hikers can trek up and swim in. Mining can be difficult in Oman, and as the only underground mine in the country it is difficult for Ghuzayn Mine to source mining consumables and especially difficult to obtain good quality explosives. Ghuzayn blasting engineers must make the drill and blast plans work depending on what is available. Gulf Rock are working on getting emulsion explosives licensed in Oman and this should solve this issue. Another issue facing Ghuzayn is the



Aerial View of Ghuzayn Mine.



Ghuzayn Mine Ore face.

heat, with temperatures in summer on surface rising to above 50° Celsius and wet bulb temperatures underground hitting 31.5°C or higher, and work often needs to be stopped due to temperature.

The future for Ghuzayn Mine looks good with copper prices high and still rising, and there are many exploration targets near the mine that could extend production well beyond its current project life of eight years.

Jonathan's primary focus as Mine Manager is to hit the current targets safely but also to build a sustainable operation with a professional and innovative team. There are currently 140 people working at the mine from multiple countries including, India, Nepal, South Africa and Ireland.

While it is currently the only underground mine in Oman, there are a number of other operations looking to go into production over the coming years, so Ghuzayn can set an example for them on how to safely produce copper in the country. The lessons Jonathan has learned at other operations can help to achieve this.

Jonathan states "All mines should focus on creating a safe and technically



Jonathan Talbot.

focused operation. There is a massive global skills shortage of mining engineers, geologists and miners which is set to become even more acute over the coming years. Good, experienced mining personnel are worth their weight in gold (or copper) and will be well sought after in the coming decades.

I would encourage young Irish people to consider a career in mining as with the volume of metal required for a clean, green transition to decarbonize the western world there will be good careers in this sector for many decades to come, particularly if you are willing to travel."



# Finning delivers used equipment solution to Glensanda



When building materials supplier Aggregate Industries resolved to bring operations at Europe's largest granite quarry in-house, they challenged Finning to supply a fleet of Cat® machines and complete full operator training to enable the company to take over operations in just eight months without impacting production on the site.

While the supply timescale was tight, the location of the site at Glensanda Quarry posed its own set of logistical challenges. Situated off the Western Coast of Scotland, Glensanda Quarry is a unique site where any machinery being delivered must first navigate the Highlands roads complete with police escort before finally reaching the site via barge.

Finning, the world's largest dealer of Cat machines parts and services, sourced, fully prepared and managed the delivery of 18 Cat machines to the site, as well as delivering full operator training on site ready for a go-live date on January 3<sup>rd</sup> 2023.

Discussions between Aggregate Industries and the Finning team began over the summer of 2022.

The Finning team first conducted a detailed site production analysis to assess the scope of equipment required to ensure they maintained the levels of production on the site. Once the scope was agreed, Finning went on to source the equipment from its wide portfolio of used equipment.

**Mick Leonard, Strategic Account Manager from Finning UK & Ireland** said: "We've had a long relationship with Aggregate Industries having supplied them with new equipment many times over the years. However, the solution we recommended to meet their short time frame and to ensure production could continue without any interruption, involved purchasing used equipment. This not only enabled them to maximise their financial investment - using a solution provided by Cat Financial alongside Capex, but also ensured they were able to meet their mobilisation deadline and supported their sustainability ambitions with used machines using less energy through manufacturing than new."

"Through our network within the UK and Europe we sourced a fleet of three Cat 992 large wheel loaders, 12 Cat 777 off-highway trucks, a Cat D9 dozer, a Cat 16-motor grader and a Cat 966 medium wheel loader. All the equipment was then transported to the Finning workshop in Glasgow to



CAT 777s on route to Glendansa Quarry.

have any component repairs carried out, before being fully prepped and all the necessary safety features added so they could operate on site.”

“Having sourced the equipment, we next needed to overcome the logistical challenge of getting them to the site – which is only accessible via the sea. All the equipment was first transported by truck to Oban, before being loaded onto barges and taken to site.

“Once delivered, we then arranged for our internal equipment operating training team to go to site, to facilitate training for more than 30 of Aggregate Industries’ operators.

“With the right operator skills, the used equipment offered significant fuel savings when compared to their ageing fleet. The deal also included a five-year service agreement, with parts delivery planned on site to coincide with service schedules and plans for delivery of an on-site hose solution that would further ensure machine uptime.”

**Calum Carnie, Works Manager at Glensanda Quarry** said: “A changing and challenging set of circumstances led to a very demanding timescale and delivery schedule for Finning and Aggregate Industries to ensure the Super Quarry was able to continue producing uninterrupted.

“Working toward this shared objective, the management teams of both companies worked closely to plan and coordinate everything from repair work, tyre fitting, road movement orders, barge bookings and sailings, right through to machine assembly, commissioning and operator training. While the capability of Cat equipment is well known, the condition and reality of a used fleet is not, so the Finning team worked hard to make sure inspections were carried out, available machine history was shared and an overhaul and component



replacement programme was understood for both pre and post delivery.

“One year in and the team continues to work well together to make sure we achieve high availability, productivity and the best possible cost per tonne from our assets.”

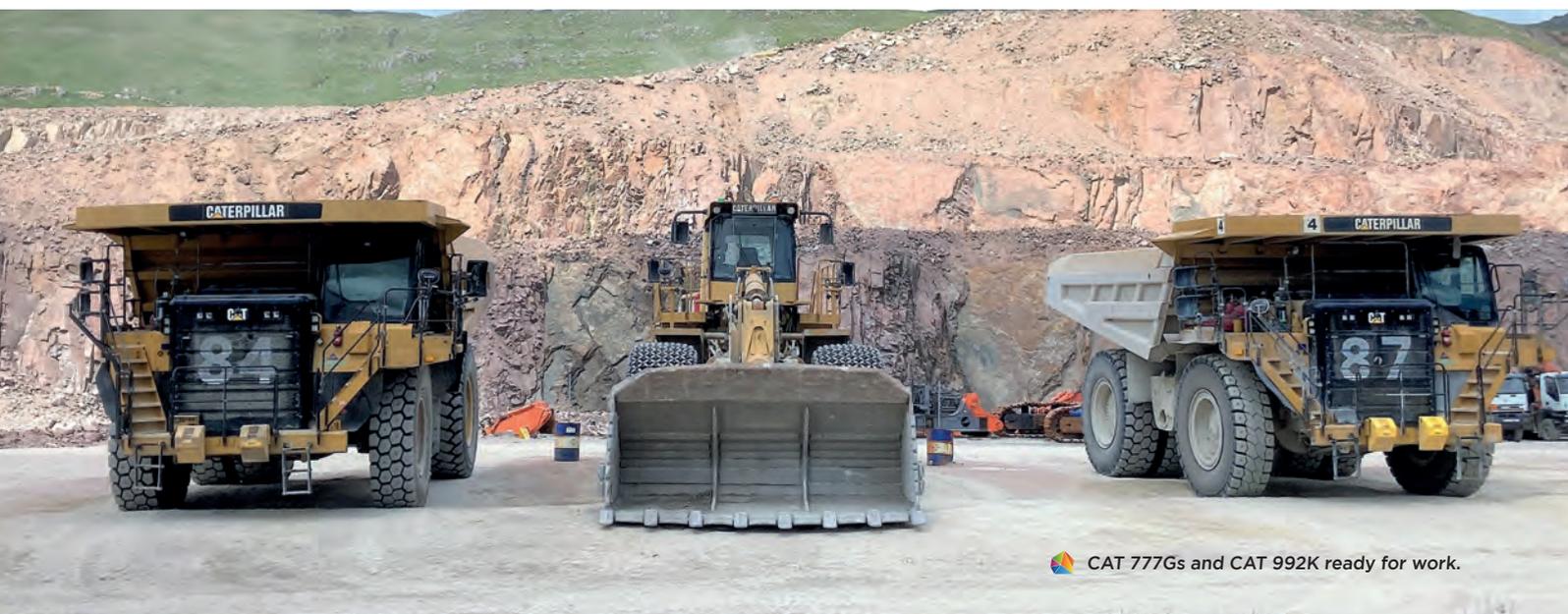
With more than 54 quarries around the UK, being able to access Cat Finance to fund the fleet without compromising their other operations was key for the Aggregate Industries team, while choosing a used fleet means they have maximum flexibility to take advantage of new machine technologies going forward as they update their equipment.

Mick adds: “Our on-site support at Glensanda and work with Aggregate

Industries continues as our team are now assessing their site operation and will be providing technology solutions and data reporting, so they can maximise their cost per tonne and increase their output which is a priority for them over the next five years.”



**BY MICK LEONARD**  
Strategic Account Manager,  
Finning UK & Ireland



 CAT 777Gs and CAT 992K ready for work.

# INDUSTRY LEADER

# Michael Carvill



**Michael Carvill is a native of Warrenpoint, Co Down. Given his family’s background in construction and quarrying, it was no surprise that Michael qualified with a degree in mechanical engineering from Queen’s University Belfast (QUB) in 1981.**

His first job was with Tara Mines Ltd as a project engineer. Michael’s father Charlie was a non-executive director of Tara Mines Ltd., the company which developed the world class zinc lead mine near Navan, Co Meath.

A long labour dispute at Tara in late 1982 saw Michael depart for Algeria where he worked as a mechanical engineer with Tarmac building hospitals. He then moved to the USA, where he studied for an MBA in Wharton College.

### KENMARE RESOURCES AND THE WORLD CLASS MOMA MINE

Returning to Ireland in 1986, Michael became involved in the restructuring of Kenmare Oil Exploration PLC as Kenmare Resources PLC, with the emphasis on minerals exploration and development. Initially focussed on gold exploration in the Philippines, Kenmare also focussed on Mozambique from 1986 and developed a graphite mine at Ancuabe in Mozambique which operated from 1994 to 1999 when it closed due to low prices.



Michael Carvill.

Kenmare developed a titanium resource near Moma in Northern Mozambique. A definitive feasibility study (FS) was completed by Davy McKee. Unable to finance the project on a stand-alone basis, Kenmare formed a JV with Australian major BHP in 1995.

BHP took over development but later withdrew from the sector and the JV in 1999, leaving Kenmare with exclusive mining rights in 2001.

**Development of the Moma Mine began in 2004 and entered production in 2007.**

The Moma operation supplies 8% of the world’s need for titanium and has over 100 years on mineral reserves. It also produces Zircon and Monazite, a precursor to Rare Earths Oxides.

Michael served as CEO of Kenmare from 1986 until August 2024, guiding it through the transitions noted above and through many challenging events, including a damaging lightning strike at the Moma facility and significant increases in production and development of new reserves between 2018 and 2020.

Perhaps the most difficult times for Kenmare were in 2015, when prices for its products were at record lows and debt levels were high following major capital expenditures. A \$245 million restructuring package was arranged with part of the funding coming from





the Oman Investment Authority which enabled Kenmare to restructure its debts, continue operations and to reject a predatory takeover offer.

Kenmare has successfully focused on operational and environmental safety, and on delivering community benefits. It is the most successful Irish minerals explorer to have developed a world class mining operation which will be in production for many years to come.

**When asked what his three greatest achievements were, Michael answered:** "Creating a long-term sustainable industry where there are few alternative jobs: Creating Kenmare Moma Development Association (KMAD), a non-profit focused on community development which was initiated before any mining was undertaken, and enjoying the myriad challenges and opportunities provided by working with outstanding colleagues".



**BY SEAN FINLAY**  
Director,  
Geoscience Ireland





Photo 2: Holes marked-out and jumbo ready to drill

# Drill & Blast Techniques at the Woodsmith Mine Shaft Sinking Project

**Mining in Whitby:** At a depth of 1 mile beneath the seaside town of Whitby in North Yorkshire, UK, lies a 100+ year resource of Polyhalite. Polyhalite is a naturally occurring mineral that contains potassium, sulphur, magnesium and calcium, making it an ideal natural fertiliser.

Sirius Minerals began shaft sinking operations around 2017, with Anglo American buying-out the project in March 2020.

There are seven main areas within the project:

1. Materials Handling Facility at Wilton, Redcar.
2. 37km material transport tunnel (MTS) from Whitby to Wilton.
3. Lockwood Beck intermediate ventilation shaft.
4. Ladycross intermediate ventilation shaft.

5. Service Shaft at Woodsmith.
6. Production Shaft at Woodsmith.
7. MTS Shaft and tunnels at Woodsmith.

Initially, the MTS Shaft at Woodsmith Mine was the main focus for our drill and blast activities, but as the shaft progressed, more blasting was and will be required to complete the construction of the mine.

## MTS SHAFT

The MTS Shaft was sunk by VSM methods to around -120m and then a Galloway Stage was lowered in

to continue sinking operations to around -340m.

2 x Komatsu vertical jumbos were used to drill approximately 95 holes at 64mm diameter and 4.5m depth. The holes were charged with around 8.3kg of 53mm Orica Senatel Powerfrag and initiated by Orica i-kon III Electronic Detonators.

The jumbos can be seen being lowered and getting ready to drill in **Photos 1,2&3**.

A drill pattern can be seen in **Diagram 1**.

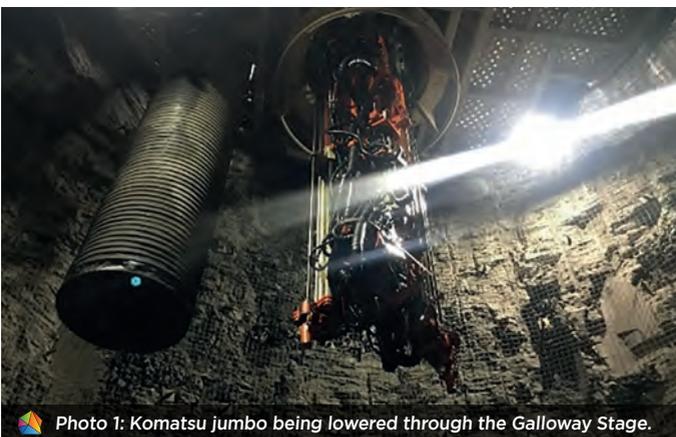


Photo 1: Komatsu jumbo being lowered through the Galloway Stage.



Photo 3: 2 x jumbos ready to drill.



Photo 4: Wall control using Orca Senatel Powersplit.

The rock type was predominantly Mudstone of strength 20-70MPa, with occasional Siltstone layers and hard layers of Ironstone.

Powder Factors ranged from a staggering lower value of 0.64kg/m<sup>3</sup> to an upper value 2.13kg/m<sup>3</sup>, dependant on the compressive strength of the rock encountered.

Perimeter Holes were charged with Orca Senatel Powersplit to enhance the stability of the vertical walls – see **Photo 4**.

Explosives were transported down the shaft in a dedicated cylindrical pod, of which only the Shotfirers had access to – See **Photo 5**.

Around 400kg of Powerfrag and 85kg of Powersplit were used in each blast, with a total of 55 blasts been undertaken to reach the shaft bottom.

Detonators were carried in tough Peli Cases – see **Photos 6&7**.

### MTS SHAFT CAVERN

At the -321m level, the shaft changed from a 10m diameter circle to more a rugby-ball shaped cavern.

At this point, the Komatsu jumbos were put to test as we maximised their capabilities on reach and angle – see **Diagram 2** and **Photo 8**.

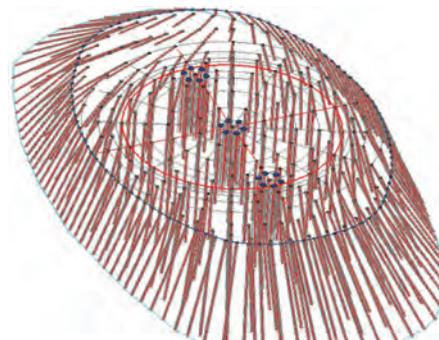


Diagram 2: Drill plan for one of the cavern blasts using 1,927kg of explosives.



Photo 5: Packaged explosives being unloaded from the explosives pod.

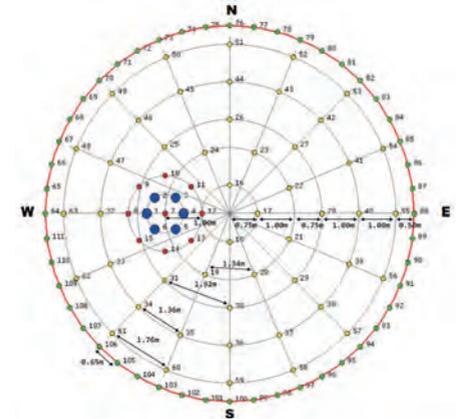


Diagram 1: Drill plan for 111 holes.

### MTS SHAFT LATERAL DEVELOPMENT

Once the cavern was excavated, the next phase to begin was lateral development. Initially, there was no room to employ a jumbo, so hand drilling techniques using a 41mm drill bit and 32mm Senatel Powerfrag were used.

Of notice immediately, was that the Mudstone required between 0.5-1.0kg more explosives per cubic metre to blast than in the shaft sinking operation. We found that the reason for this was not due to the smaller hole diameter because after a few months of hand drilling, we employed an Epiroc TID to drill a 64mm hole and the requirement was still the same.

We concluded that because the Mudstone was horizontally bedded we were going 'against the grain' during the lateral development.



Photo 6&7: Detonators carried in Peli Cases.

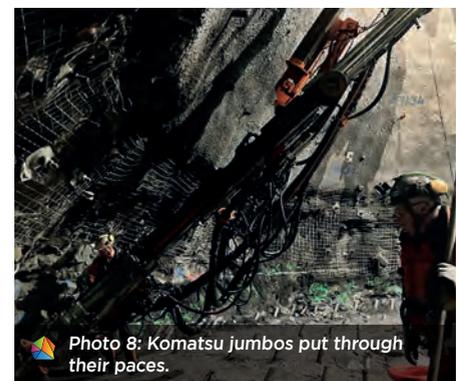
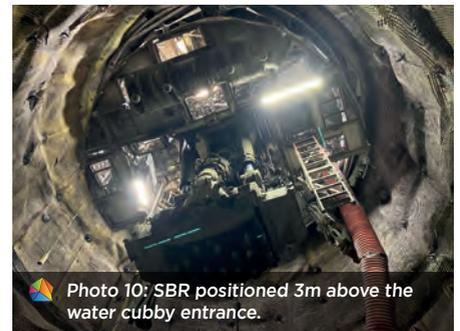
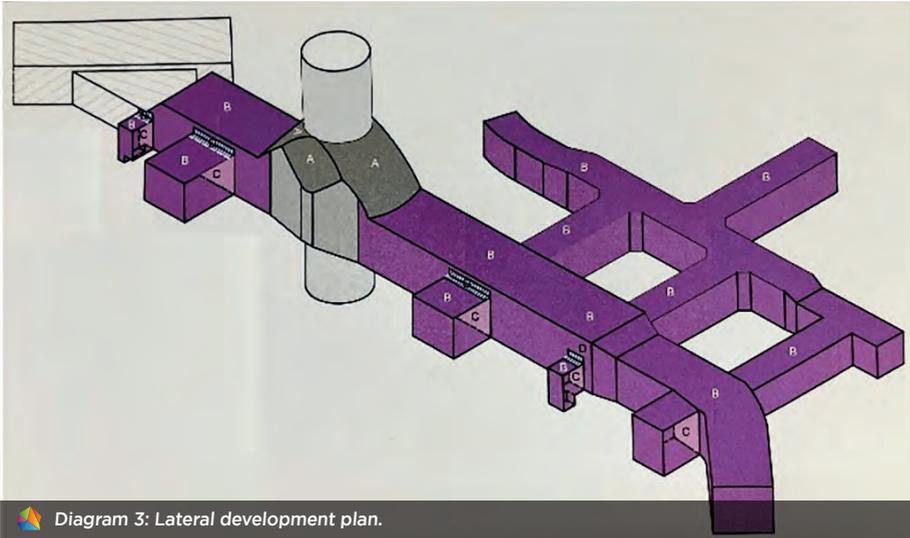


Photo 8: Komatsu jumbos put through their paces.



### SERVICE SHAFT WATER CUBBY NO. 1 – A WORLD'S FIRST

Each of the two deep shafts (Service Shaft and Production Shaft) require four water pumping cubbies to be excavated at regular intervals along their lengths. An attempt was made to mechanically remove the rock from the first one encountered on the Service Shaft, but the Mudstone proved quite hard to remove and thus it was decided that the floor would be blasted out.

106 holes were drilled by hand at 38mm diameter, charged with approximately 115kg of 32mm Senatel Powerfrag. Never before have Herrenknecht (manufacturer of the SBR) blasted close to a Shaft Boring Roadheader (SBR) and in this occasion it was positioned just 3m above the entrance to the cubby. The blast was fired with no damage to the SBR. There was also no damage to the ground support mesh, which can be seen in **Photo 11**.

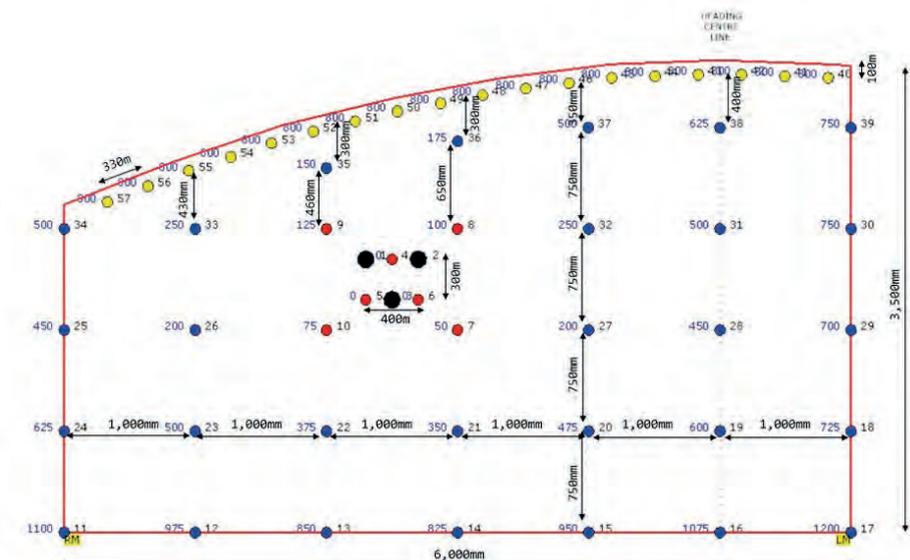


Diagram 4: 1st lateral blast.

### PRODUCTION SHAFT WATER CUBBY NO. 1

Upon reaching the first water cubby in the Production Shaft, the decision was made to blast the full width and height to improve excavation efficiency times. Again, the SBR was positioned about 3m above the entrance and again no damage was encountered. All subsequent cubbies will now be blasted.

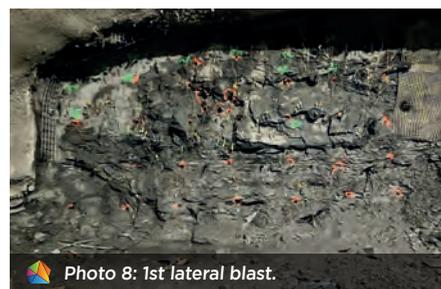




Photo 14: Connecting the i-kon III Detonators.

### PRODUCTION SHAFT SANDSTONE TEST BLAST - ANOTHER WORLD'S FIRST

Within the two deep shafts there is a 200m thick band of Sandstone sitting at approximately 800-1,000m. There is a possibility that the SBR will not cut through this band efficiently and so blasting may be required to assist the cutting rate.

These blasts would be slightly different to the cubby blasts in that they would be now directly underneath the SBR and not to the side. To help gather information on the effects of blasting directly underneath the SBR, a trial blast was organised in the Production Shaft at -510m where there was a 2m layer of Sandstone.

We hand drilled a 1.2m deep blast with

38mm holes and chose a charge weight to suit a Scaled Depth of Burial of greater than 1.4. Cartridges of 32mm Senatel Powerfrag were carefully cut to suit the measured hole depths.

The blast was a success as the SBR suffered no damage even being positioned 3m directly above the blast and the fragmentation was suitable to be excavated with minimal effort from the SBR.



Photo 14: Charging holes.



Photo 13: Post-Blast Inspection.

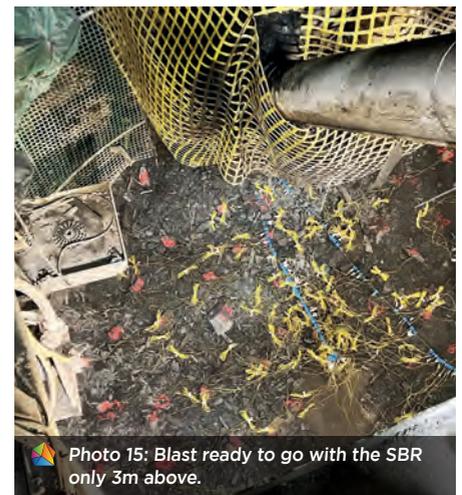


Photo 15: Blast ready to go with the SBR only 3m above.

 **Joseph Gallagher**

**BY NEIL WEBSTER**  
Blasting Engineer,  
Joseph Gallagher Ltd.



#### About the Author

Neil is the Blasting Engineer with Joseph Gallagher Ltd. who specialise in shaft sinking, tunnelling, micro-tunnelling and labour supply.

Neil has worked on the Woodsmith Project since January 2021 and is responsible for blast designs, explosives ordering, shotfiring and training'

# Concrete & Aggregate Sustainability: Embrace the Numbers

**This coming decade promises to be both an exciting and daunting time for the concrete industry and for quarrying which sits at its heart. Government policy represented in the National Development Plan and Housing for All contains ambitious targets for construction of housing and infrastructure and thus, inevitably, strong demand for concrete in this period. Exciting and daunting too because there are significant risks and opportunities for the sector as we grasp the challenge of sustainability.**

Furthermore, a simplistic narrative has gained ground. In contrast to the moral of the children's fairytale, 'the Three Little Pigs', many policymakers have begun to turn their attention to the produced carbon associated with our primary binder, cement, and are seeking ways to reduce this by proposing various measures to encourage the substitution of cementitious materials in construction with biomaterials, primarily timber.

A key focus for the Irish Concrete Federation's (ICF) newly adopted sustainability plan is that we, along with our members, shall 'Embrace the numbers'. This includes carbon footprinting, producing verified lifecycle environmental impacts (Environmental Product Declarations), optimizing mixes and designs for carbon, and KPIs in terms of our adoption of sustainability measures. It should also include metrics on other related topics such as biodiversity, circularity and supply chain resilience.

This focus is not at the expense of reducing environmental impacts but will help us make improvements in a more targeted fashion, and will allow the industry adopt environmental impacts as a parameter alongside more traditional criteria such as practicality, cost, strength, stiffness and durability.

This is not a brand-new concept. Many ICF members involved in very large infrastructure projects, such as commercial developments in Dublin and those exporting to Britain, are already significantly progressed on this journey. This development in capability has been in response to client demand and depends on market focus. However, regulation is clearly approaching in a number of different directions.

Generally, this has begun at project level planning stage with the burden



placed upon the project sponsors and design team. Examples here include assessments to 'justify demolition with respect to embodied carbon' as part of planning applications to Dublin City Council and the Greater London Authority Whole-Life Carbon London Plan Guidance. Inevitably, this means that scrutiny on the embodied carbon associated with construction products is ultimately passed onto suppliers.

A number of European jurisdictions already have similar assessment and reporting requirements on a national basis. Government departments and the Climate Advisory Council are pointing in this direction here also. Ultimately, the revised Energy Performance of Buildings Directive will require the Energy Performance Certificate both to include whole-life carbon and to be issued and shown at more trigger points than today, including in the case of major renovations and the renewal of rental contracts.

The revised Construction Products Regulation will include various changes, and significant among them will be, a new combined Declaration of Performance and Declaration

of Conformance which will include product-specific embodied carbon information (GWP indicators).

All of this will mean time, effort and cost for the industry to adopt and to mainstream; however, ultimately it can be to our benefit. Embracing the numbers will allow the industry to demonstrate that concrete can be competitive in carbon terms with other materials, and will further allow the industry to capture and communicate over time the carbon reductions that we do make.



**BY CONOR HAYES**  
Head of Sustainability,  
Irish Concrete  
Federation



# Electronic Detonator Delay Selection Fragmentation for Quarries

If you are in the quarry industry and wish to review your timing with respect to fragmentation optimization, whether as a quarry manager, blaster, or other interested party, this article should contain information that could be useful to you. This article teaches how to approach delay selection in a quarry scenario using electronic detonators, both as a site using electronic detonators or a site looking to adopt electronic detonator technology.

Optimizing detonator delay timing between holes in a row (HH) and between rows (RR) is a topic that has drawn significant focus in the blasting industry since the invention of electronic detonators in 1984 (United States of America Patent No. US4674047A, 1984).

Optimization work typically focuses on one of two (or both) requirements: fragmentation and vibration control. This article discusses some of the methods that can be used for delay and sequence optimization with respect to fragmentation. Vibration control and optimization will be

covered in next year's article.

Note that this article strictly concerns delay selection. Many other factors affect fragmentation, some to a greater and some to a lesser extent than timing, including, burden, spacing, stagger vs square pattern, stemming length, explosive selection, timing sequence, geologic structures, etc.

## FRAGMENTATION OPTIMIZATION STUDIES

Luckily for quarries, most published studies concerning timing for fragmentation have focused on optimizing HH timing with the free-

faced bench blasting geometries found in quarries. Free-faced means that the blast is a bench blast without material piled against one or two open faces. A number of free-faced timing optimization studies are summarized in Table 1.

Table 1 provides the sonic velocity, or speed a vibration waveform travels through rock, and optimum and range of timing in milliseconds (ms) per meter of burden for each study. The optimum HH delay value can be calculated by multiplying the milliseconds per meter value by the burden amount in meter. The value can then be adjusted using the sonic velocity (see equation 1).

Source	Rock	Sonic Velocity (m/s)	Test Size	Optimum (ms/m)	Range (ms/m)
Cahill (2017)	Granite	5840	Large	6	2.5-6
Gkikizas (2016)	Granite	6000	Large		
Hettinger (2015)	Granite		Large	3.8	
Gkikizas (2016)	Granite	3200	Medium	3.2-6.3	Gas escaped face at 8 ms/m
Gkikizas (2016)	Grout	4000	Medium		
Katsabanis and Liu (1996)	Granite		Medium	3.2-6.3	2-9
Stagg and Nutting (1987)	Dolomite		Medium	8.8	
McKenzie and Adamson (2011)	N/A	N/A	N/A	3 to 8	
Katsabanis et al. (2014)	Grout	4000	Small	10	0.1-16
Katsabanis, et al. (2006)	Granodiorite		Small	7.4	
Schimek, et al. (2015)	Magnetite Concrete	2900-3900	Small	2	0-2
Cunningham (2005)		5200		3	
Otterness, et al. (1991)					3.3-13
Stagg and Rholl (1987)					1-26

Table 1. Summary of optimal timing studies for HH timing.

McKenzie and Adamson (2011) stated that assuming that surface mining occurs in rocks with a p-wave velocity in the range of 2000 m/s to 5200 m/s, inter-hole delay (HH) times in this environment are expected to lie in the range of 3 to 8 ms/m of burden, similar to the range shown in Table 1. Figure 1 provides an illustration of the effect of the HH delay on fragmentation for two general rock types. In this figure, the lower the value on the y-axis, the finer the fragmentation.

The original work for the data found that the best fragmentation occurred with a HH time of 3 ms/m and a RR time of 10 ms/m. Anything less and fragmentation suffers greatly. Anything more and fragmentation does not suffer as much, which is partly why longer HH and RR delay ratios are typically seen. In general, McKenzie and Adamson (2011) found a HH time of 8 ms or more is good for quarries.

### FREE-FACE MECHANISM HOLE-TO-HOLE CALCULATIONS

#### Hole-to-Hole Delay

The simplest free-faced blasting scenario HH delay equation is based on Cunningham (2005). This equation is the best value based on a sweet spot from empirical data.

$$t_{HH} = 3 * \frac{5.2}{V_p} * B$$

#### Equation 1

This equation for recommended HH timing (ms) uses a particular site's sonic velocity,  $V_p$  (km/s), to provide the milliseconds per meter of burden that can be multiplied against design burden (m) to calculate the desired HH delay. This is based on the baseline study that found 3 ms/m to be the optimum delay time for fragmentation in material with 5200 m/s sonic velocity.

#### Row-to-Row Delay

The minimum RR delay (ms) for material interaction between rows that allows material from the first row to swell and move out of the way of the subsequent row of blastholes can be calculated using the following equation (Worsey and Silva, 2023). This equation for row timing is only applicable to a bench blasting scenario.

$$t_{RR} = \frac{B * M}{V_F} * 1000$$

#### Equation 2

Where B is the burden (m), M is the material swell (i.e. 0.3 for 30% swell), and  $V_F$  is the face velocity of the rock (m/s). Face velocity (ft/s) can be estimated by dividing 75 by the square root of

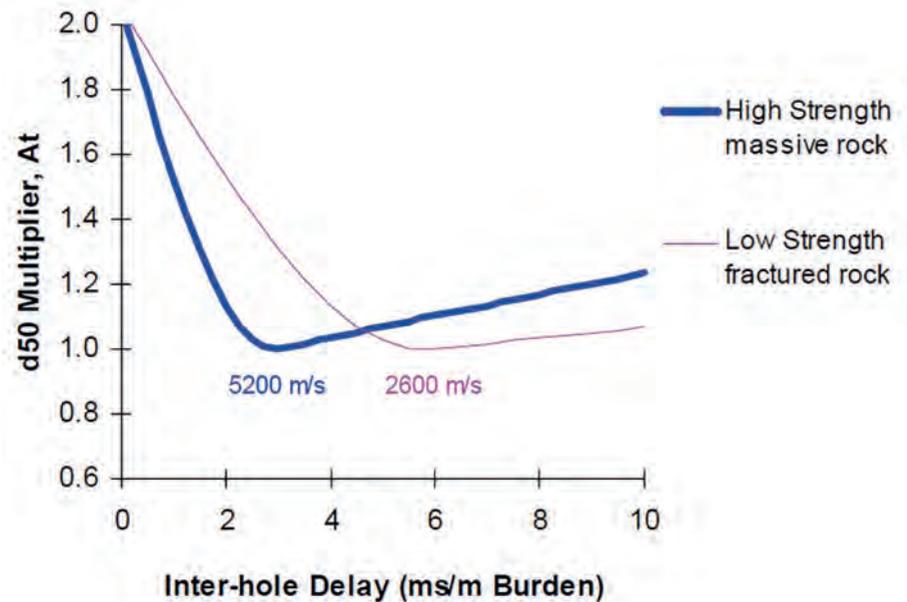


Figure 1. Hole-to-Hole delay vs fragmentation size for two rock types (McKenzie and Adamson, 2011).

the powder factor (tons/lb). The face velocity will then need to be converted to metric units to be used in the equation.

Equation 2 can be calibrated to the site using a single-hole test. For this test, Worsey and Silva (2023) recommend conducting at least four single-hole tests and collecting 3D scan data prior to detonating, after detonating, and then after mucking.

It is recommended that a video camera with greater than 1000 frames per second be used to measure face movement velocity as well.

Worsey (2020) found that longer delay times between rows (RR) produced finer fragmentation. In that report, regular rhythmic timing was used (one constant delay between every hole in the blast).

The finest fragmentation was found by detonating the entire front row of the blast before initiating the second row of the blast.

Worsey's dissertation indicates the optimal RR delay for fragmentation is likely much higher than the minimum that would be calculated by Equation 2.

### HOW TO USE EQUATIONS

The following list provides step-by-step instructions for applying the rule of thumb equations as a starting point.

#### 1. HH Time

- Determine sonic velocity by measuring (using vibration monitor with trigger wire) or estimating (using data from similar rock type)
- Determine burden
- Calculate HH time using Equation 1 and inputting sonic velocity and burden values.

#### 2. RR Time (Minimum)

- Determine burden
- Determine swell percentage
- Determine face movement velocity by measuring (high speed camera) or estimating (using powder factor equation mentioned above)
- Calculate minimum RR time using Equation 2 and inputting burden, swell, and face velocity values.

#### 3. RR (Optimum)

- Can be a function of vibration control, movement and throw direction requirements, or an other factor.
- Should be no more than the total delay time of the first row plus the first row HH delay time (for example: the RR delay time may not be more than 165 ms for 10 holes in a row at 15 ms HH delay)
- If measuring, the maximum value can be found by videoing with an action camera or high speed camera. The camera can be used to identify the time the throw takes to reach its apex after firing (max RR time) before falling to the pit floor. After the throw's apex point, muck will start to bind the face, reducing fragmentation.

### CONTINUOUS TESTING

A site can use these guidelines as a starting point. Fragmentation measurements, using a tool like Wipfrag™, should be taken to complete a baseline fragmentation distribution analysis.

Once a timing optimization approach is implemented, a site should continue to take fragmentation measurements and use that information to make educated adjustments to the delay timing.

**Citations**

Cahill, P. M., Hettinger, J. Nawrocki, and C. Johnson, 2017. "Full-Scale Testing of Delay Timing Effects on Rock Fragmentation in the Shock Collision Regions." *Blasting and Fragmentation Journal*. Vol 11. No 1.

Cunningham, C., 2005. "The Kuz-Ram Fragmentation Model – 20 Years On. Proceedings of the Third European Federation of Explosives Engineers Conference. Brighton, England. pp. 201-210.

Glikizas, N., 2016. Examination of the Effect of Time Delay on Fragmentation. Thesis. Department of Mining Engineering. Queen's University. Kingston, ON.

Hettinger, M., 2015. The Effects of Short Delay Times on Rock Fragmentation in Bench Blasts. Thesis. Missouri University of Science and Technology. Rolla, MO

Katsabanis, P., O. Omid, O. Riello, and P. Ross, 2014. "A Review of Timing Requirements for Optimization of Fragmentation." Proceedings of the 40th Annual Conference on Explosives and Blasting Technique. International Society of Explosives Engineers. Denver, CO.

Katsabanis, P, A. Tawadrous, C. Braun, and C. Kennedy, 2006. "Timing Effects on Fragmentation." Proceedings of the 32nd Annual Conference on Explosives and Blasting Technique. International Society of Explosives Engineers. Grapevine, TX.

Katsabanis P. and L. Liu, 1996. "Delay Requirements for Fragmentation

Optimization." Measurement of Blast Fragmentation. Balkema.

McKenzie, C. and W. Adamson, 2011. "Exploring Optimized Delay Timing for Fragmentation." *Explo Conference*. Melbourne, VIC. November 8-9.

Otterness, R., M. Stagg, and S. Rhol, 1991. "Correlation of Shock Design Parameters to Fragmentation. Proceedings of the 7th Conference on and Explosives and Blasting Technique. International Society of Explosives Engineers. Las Vegas, NV.

Schimek, P, F. Ouchterlony, and P. Moser, 2015. "Influence of Blasthole Delay Times on Fragmentation as well as Characteristics of and Blast Damage behind a Remaining Bench Face through Model-scale Blasting." 11th International Symposium on Rock Fragmentation by Blasting. Sydney, NSW.

Stagg, M. and M. Nutting, 1987. "Blast Delay Influence on Rock Fragmentation; One-Tenth Scale Tests." United States Bureau of Mines Information Circular 9135. pp. 79-95.

Stagg, M. and S. Rhol, 1987. "Effects of Accurate Delays on Fragmentation for Single-Row Blasting in a 6.7 m (22 ft) Bench." 2nd International Conference on Rock Fragmentation by Blasting. Keystone, CO. pp. 210-223.

Worsey, T, 2020. The Effect of Delay and Sequence on Blasting Fragmentation Results. PhD Dissertation, University of Kentucky. [https://uknowledge.uky.edu/mng\\_etds/58](https://uknowledge.uky.edu/mng_etds/58).

Worsey, T. and J. Silva, 2023. "Worsey-Silva Equation for Modelling Fragmentation Caused by Row Timing." European Federation of Explosives Engineers 12th World Conference on Explosives and Blasting. Dublin, Ireland.



**THOROUGHbred  
DRILL AND BLAST  
CONSULTANTS**

**BY NATHAN ROUSE  
PE, PhD  
Thoroughbred  
Drill and Blast  
Consultants**

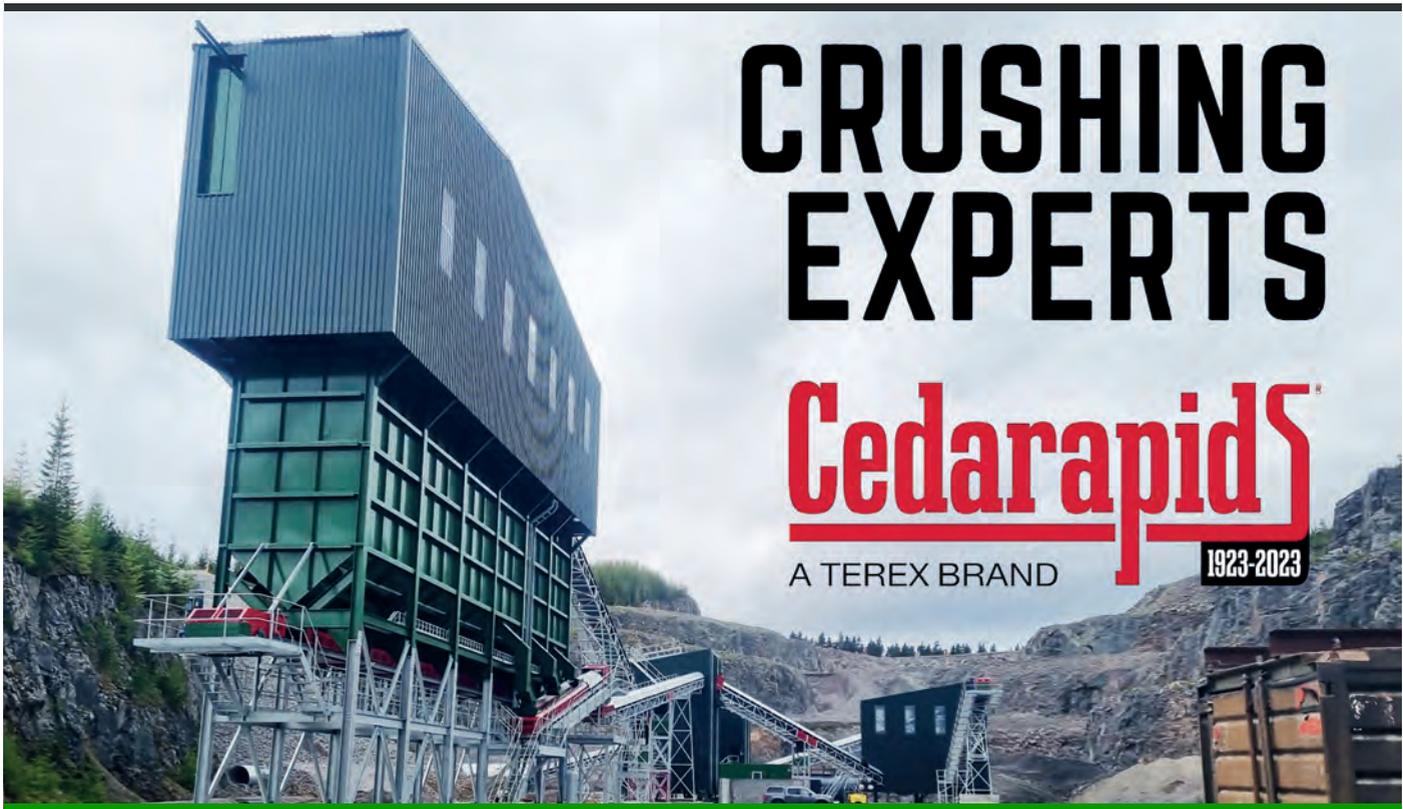
**About the Author**

Dr. Nathan Rouse is President of Thoroughbred Drill and Blast Consultants, a corporate member of IMQS based in Thurles, Co. Tipperary. Nathan's career has been focused on drill and blast troubleshooting, instrumentation, root cause analysis, and training. He has completed drill and blast optimization initiatives for surface, underground and quarrying operations globally.

**Web Site - <https://tbredblast.com/>**



📍 10 Coolmaghry Road, Donaghmore, Dungannon BT703 HJ  
 ✉ mark@qrs.ie  
 ☎ +447587 790030  
**SALES/SERVICE/HIRE**

# EFEE (European Federation of Explosives Engineers)



EFEE's goal is to connect people within the blasting industry from all over Europe to exchange experiences and knowledge, to work with harmonization, standardization, education and the promotion of technologies. We try to achieve this in several ways, perhaps most notably through the conference held every two years, but also through our newsletter and the committees within EFEE where more specific issues are discussed.

EFEE was founded in 1988 and today has 26 national members. Additionally, there are corporate members and individual members.

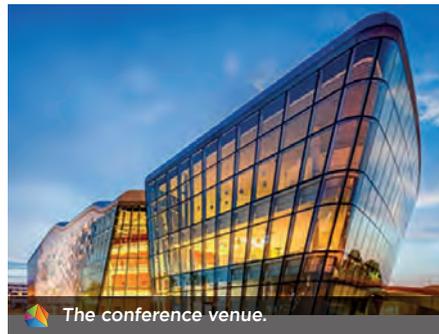
Last year, the EFEE conference was held in Dublin, and since this is an Irish publication, I would like to take the opportunity to thank everyone involved for a fantastic conference held in a fantastic location.

Next year, the conference will be held in Krakow, Poland. Krakow is a city with a rich history, and many are probably aware of the centuries-old salt mining that has taken place in the area.

I believe this will be yet another fantastic conference, and I hope to see many of you there.

Within EFEE, there are several committees that work on specific issues:

- The Shotfiring Committee, which primarily works on European harmonization of blasting training through a project called PECCS



The conference venue.

(Pan-European Competence Certificate for Shotfirers).

- The Environmental Committee, which mainly deals with vibrations and vibration standards, emissions/CO<sub>2</sub> from blasting, and incident reporting.
- EU Directives, that follow and comment on new EU legislation that impacts our industry.
- There are also several committees more focused on internal work:

Conference, Newsletter, Membership and Marketing, Election, Finance and Audit, and Constitution.

The committees are open to all members who are interested in working on any of these issues within the framework of EFEE.

Both the newsletter and information about the committees and other topics can be found on the [EFEE website](#).

Please visit and have a look.

See you in Krakow in 2025.



BY MATHIAS JERN  
President EFEE



The salt mines.



Wawel Castle.

# Irish Association for Economic Geology (IAEG)

The IAEG annually organises a lecture series, conference and short courses aimed at industry professionals, academia and students. Its membership is made up from geoscientists working in Ireland and internationally.

## 2023 PROGRAMME

Event	Date	Location	Title
Annual Conference	08-10th September	Galway Bay Hotel, Salthill	IAEG50 - Irish Type Zn-Pb Deposits around the World
Student Logging Course	10 <sup>th</sup> October	Lisheen Core Store, County Tipperary	Student Logging Course - led by Miller O'Prey
Lecture Series	21 <sup>st</sup> November	Virtual via GoogleMeet	The Critical Raw Materials Act - Mairéad Fitzsimons (Geoscience Policy Division)
AGM and talk	12th December	Pillo Hotel, Ashbourne	AGM - Russell Rogers "Using Geological Survey Ireland hyperspectral data as a tool for lithological interpretation"

The Annual Conference in 2023 was a major undertaking with delegates in attendance from around the world and included a published volume of papers presented - "Irish-type Zn-Pb Deposits Around the World".

The IAEG council put together a bid for the Society for Geology Applied to Mineral Deposits (SGA) 2027 international meeting with input from Bord Fáilte and others, however, this was won by Perth in Australia.

With the sad passing of David Hall last year, his family approached the

IAEG to set up a fund to support students entering the exploration industry. The council agreed to this and "The David Hall Mineral Exploration Fund" was established. This fund has successfully already raised over €10,000, with two students - Caroline Grant and Joseph Donoghue having been awarded bursaries of €3,000 each.

A Student Logging Course is planned again for this October-November as it was very popular last year and over-subscribed. This course will be held at Lisheen Core Store with thanks to the continued support of John Güven.

All updates to our planned programmes will be notified to members and on the [IAEG website](#).



BY GRAHAM REID  
Treasurer IAEG





IAEG Online Lecture Series 2024

"Geo-Metallurgical Block Modelling:  
Making the most of your data to  
maximise project economics"

James McFarlane

Mining Plus

TUESDAY

26TH MARCH

7PM

HOSTED VIA GOOGLEMEET

REGISTRATION IS REQUIRED TO RECEIVE THE INVITE  
LINK TO THIS TALK. REGISTRATION OPEN AT [IAEG.IE](http://IAEG.IE)

The IAEG Lecture Series continued in 2024 with a lecture on Metallurgy in March.

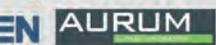
Conference Sponsors

Platinum





Silver

Bronze





European Green Transition

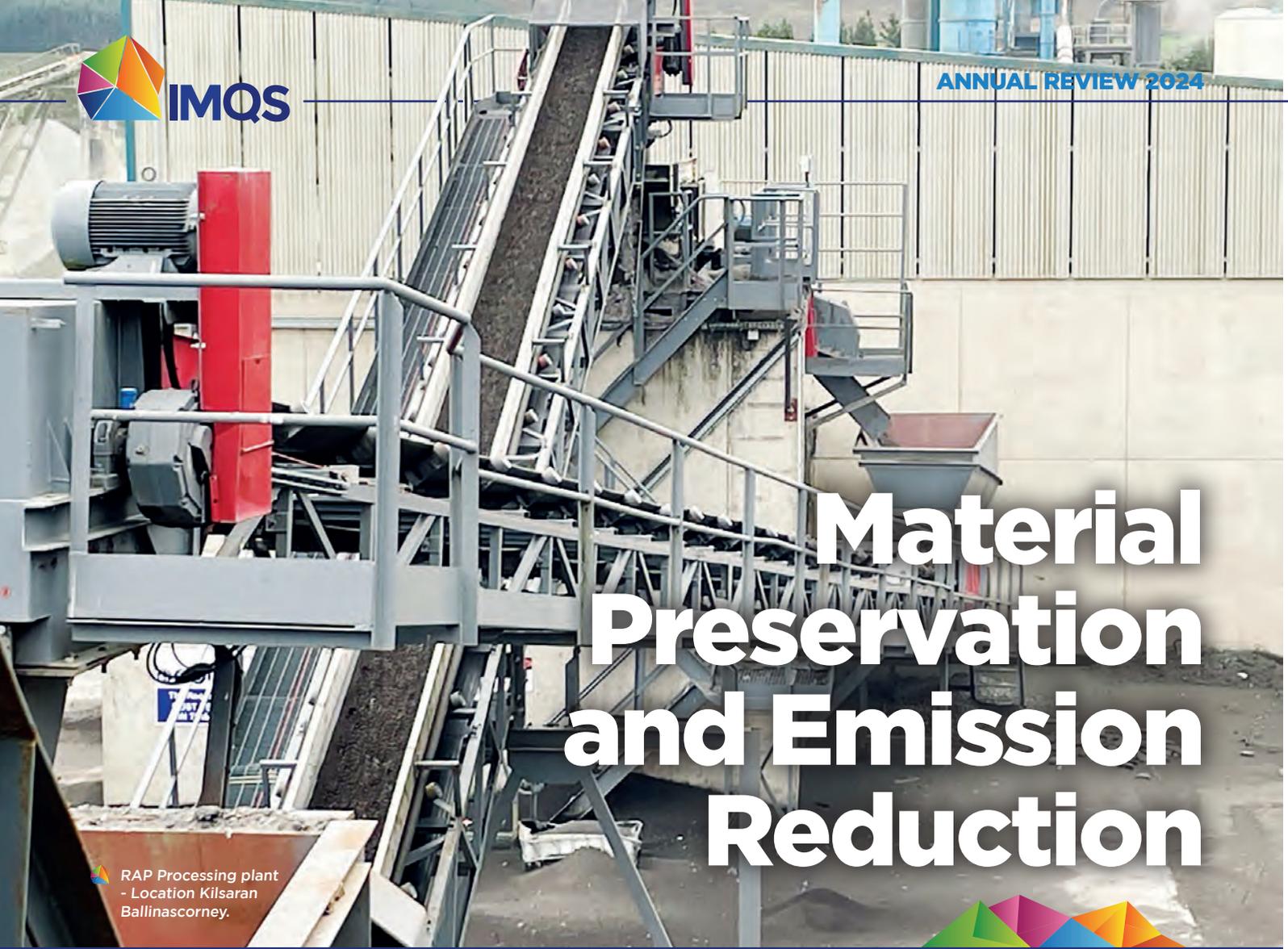
SLIGO

14 & 15TH SEPTEMBER

IAEG 2024 Conference

SECURING RESOURCES: CRMS IN EUROPE

The proposed topic for this years Annual Conference is based on Critical Raw Materials (CRM) with a planned 14-15 September date.



RAP Processing plant  
- Location Kilsaran  
Ballinascorney.

# Material Preservation and Emission Reduction

The global shift towards sustainability and a circular economy requires products with lower environmental impacts which have the same or better performance compared to the current technologies. New products might be designed to allow their reuse, remanufacturing, or recycling, avoiding waste production and the need for waste disposal at the end-of-life.

One of the major challenges of pavement engineering world-wide is to meet the ever-increasing demand of economic and physical resources related to construction and maintenance by means of environmentally sustainable technologies.

Sustainability and the environment are at the forefront of world issues right now and this is no different in the industry of Quarrying. As technologies continue to improve, so do our capabilities of mitigating the impacts that quarrying entails. Advances in recycling and reuse technology are allowing for the recycling of construction materials, such as concrete and asphalt. This can reduce the demand for new materials and decrease the need for new quarry operations.

Kilsaran has responded positively to increasing global concerns over shrinking natural resource reserves and worsening environmental conditions. Since 1964, the Kilsaran Group has endeavoured to operate as a responsible business.



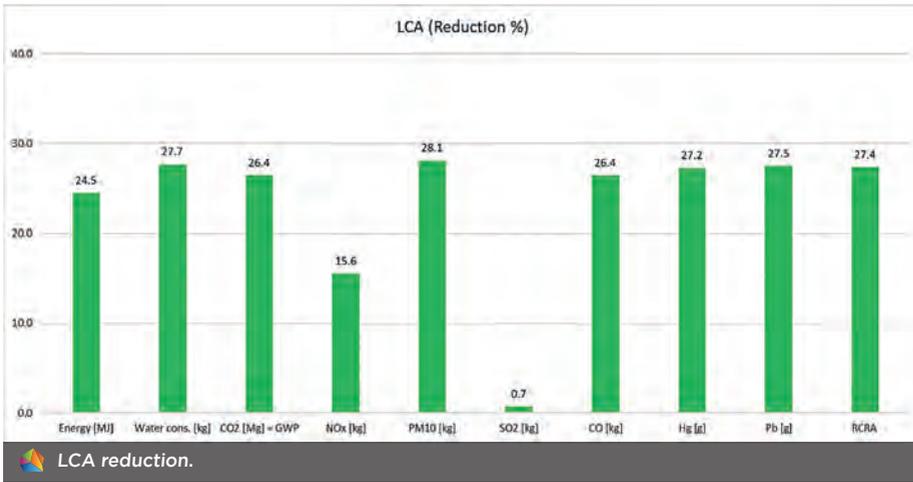
We are always striving to offer our clients the most innovative and sustainable solutions. 2022 marked a pivotal moment for our Group where we embarked on creating a structured, documented and functional ESG model centred around the UN Sustainable Development Goals.

Our aim is to provide the very best of building solutions while working tirelessly to ensure that the impact on the environment is kept to a minimum. We do this by adhering to our four ESG pillars, **Planet, People, Solutions and Performance**. This strategy will help shape and accelerate a new era of growth for us that is both sustainable and inclusive.

One resource safeguarding initiative we are very active in is the development of sustainable asphalt mixes and deployment of warm-mix asphalt technologies. In order to promote sustainable practices, measures with sound sustainability credentials need to be widely implemented.

Kilsaran, through their newly established research and innovation team, are developing novel materials and technologies to integrate greener material, waste, and recycled materials into the production cycle of asphalt mixtures as a solution that improves both sustainability and cost-efficiency of the asphalt pavement industry.

Kilsaran's aim is to understand and quantify the environmental benefits resulting from the use of reclaimed asphalt pavement (RAP) and warm mix asphalt (WMA) technologies to lower temperature of production in plant. All the stages of the lifecycle have been considered, from extraction of virgin materials to the end of life.



(RAP) produce larger reductions in GHG emissions, energy, and water. Kilsaran's focus has been on the use of recycled materials in road construction in order to promote pavement sustainability, given that pavements are material intensive assets. A sustainable pavement can be defined as a pavement that supports long-life engineering reliability, with minimum environmental impact. Through the application of warm and RAP technologies a greater degree of sustainability can be achieved while maintaining the long-term performance of the pavement.

Utilizing RAP in hot mix asphalt (HMA) is proven to be a green alternative to produce environment-friendly asphalt mixes. Adding RAP in asphalt mixes is suggested not only to conserve the aggregates and bitumen, but also to have at least the same long-term performance. In order to ensure that RAP is effectively employed as a supplementary component of asphalt mixes and that the potential benefits associated to its use are fully exploited, it is necessary that it is managed as a valuable resource rather

than as a waste material or by-product. The sustainability analysis performed by Kilsaran considers both Life-cycle assessment (LCA) economic and environmental effects of using recycled materials in pavement structures. The economic analysis indicates that using recycled materials in asphalt pavements can result in significant economic benefits. The environmental assessment of case studies indicate that higher percentages of recycled materials



# ideas taking shape



**Kilsaran**  
PAVING & WALLING

**Kilsaran**  
**KPRO**  
FAÇADES & MORTARS

**Kilsaran**  
CONCRETE PRODUCTS & AGGREGATES

**Kilsaran**  
PRECAST

**Kilsaran**  
ROAD SURFACING & CONTRACTING

**Kilsaran**  
MATERIALS RECOVERY & RECYCLING

info@kilsaran.ie | www.kilsaran.ie  
Pierectown, Dunboyne, Co Meath, Ireland A86 W820



# Estonian and Irish opportunities in the Raw Materials Sector

Last May, the Estonian Mining Society, Eesti Mäeselts MTÜ, held its annual conference in conjunction with the “HEMA” heavy machinery exhibition in Tuula village, roughly a twenty-minute drive southwest of Tallinn, the Estonian capital. I was honoured to deliver a presentation to an audience comprising industry professionals, academics, and suppliers from the Estonian extractive sector. The title of the presentation was ‘State and Private Sector Collaboration: The Example of Ireland.’

The focus of my talk was the relationship between stakeholders in managing Ireland’s natural resources, particularly now that the EU’s Critical Raw Materials Act is in place. An overview of Ireland’s mining industry and the importance of collaboration between the state and private sector was provided. Also touched upon was an outline of current mining laws and regulations, and the roles and responsibilities of state agencies and private companies.

Two brief case studies were presented. The first highlighted Boliden Tara Mines, Europe’s largest zinc producer on the outskirts of Navan, with its large urban population, river courses and prime agricultural land. The second showcased the successful closure of the Lisheen mine and the subsequent revitalisation of its site and buildings.

While these examples underscore the extensive work and planning involved in such projects, the main point emphasised the necessity of involving mining companies, local and national governments, and community representatives throughout the process, from opening to mine closure and aftercare. Judging from the questions that followed the presentation, it was, in the main, successful in delivering this message.

## THE ESTONIAN MINERAL SECTOR

Estonia does not spring to mind as a major mining jurisdiction, especially in hard rock mining. Nonetheless, Estonia’s mining and extraction sector has a rich history spanning several key periods. The first written records of

extracting limestone in Estonia date back to 1777. However, the actual mining on an industrial scale began in 1916.

**Peat Production:** Estonia has a long history of peat mining, dating back to the 17th century. Estonia accounted for an estimated 3.3% of the world’s peat production, ranking the country eighth in global peat production and hosting 0.5% of the world’s peat reserves.

Initially, peatlands were drained for agriculture and forestry. By the end of the 18th century, as forests were depleted, peat became a crucial fuel source for both industrial enterprises and households.

Estonia’s geological deposits of peat are significant, with an estimated 2.37 billion tonnes, making it one of the top ten countries in the world for peat reserves. In the past, there have been reciprocal visits and studies on peat extraction between Estonia and Ireland.

Today, just as in Ireland, work to restore and conserve peatlands is underway, recognizing their importance for biodiversity and carbon storage.

**Oil Shale Production:** Estonia is a major producer of oil shale and refined products, including oil shale gas and oil shale oil. Kukersite is a light-brown marine-type oil shale of Ordovician age. It is found in the Baltic Oil Shale Basin in Estonia and North-West Russia. It is a type of sedimentary rock that contains a significant amount of organic material called kerogen.

When heated to high temperatures (around 450-500°C), kerogen can be converted into liquid hydrocarbons, like crude oil. The Estonia deposit is the world’s largest commercially exploited

and best-studied oil shale deposit.

The Kohtla mine, located in Ida-Virumaa, in the Kohtla-Järve region of eastern Estonia, is one of the country’s oldest and longest-operating oil shale mines.

Room and Pillar is the usual method used in mining the mineral underground, but there are open pit mines also. Longwall mining has been introduced in some mines which reduces oil shale losses to 5-10% as the room and pillar method can leave 22-35% of oil shale below ground to underpin the surface.

The British-owned New Consolidated Gold Fields Ltd. began operations in Kohtla in 1931. The mine operated until 2001, when it was closed and Kohtla Mining Park started operating. The park, also known as the Estonian Mining Museum, is now a reminder of how communities in this region relied on mining for their livelihoods. Instead of being abandoned, the site became a museum and historic park. Visitors can explore the underground tunnels and the old mining equipment and learn about the history of oil shale mining in Estonia. The park also features a multi-million dollar visitor centre that provides insights into the significance of the oil shale industry and the life of miners.

Oil shale extraction had been wound down in recent years as the move away from fossil fuels increased. Unfortunately, the events in Ukraine have ensured increased production of oil shale as a secure source of energy for the country and in order not to rely on its eastern neighbour for its gas or oil supplies. Estonia have restarted its shale oil power plants which have set back its efforts to phase out heavily polluting fuels.

**Phosphorite Mining:** More than 80% of phosphorite and phosphate fertilizers are imported into the European Union. Phosphorite is on the EU's critical raw materials (CRMs) list. Estonia is home to one of the largest, if not the largest, phosphorite deposit in Europe.

Phosphorite mining in Estonia has a complex history, beginning in 1924 near Maardu, approximately 25km east of Tallinn. The industry expanded significantly in 1940 with the opening of a larger mine and a factory producing low-grade phosphorus fertilizers. This operation continued until 1991, causing several environmental issues in the area.

In the 1960s, the Soviet Union began large-scale mining operations, which led to significant pollution problems. The extraction process often involved removing layers of oil shale, which were then dumped near the mines, causing fires and groundwater contamination.

The situation escalated in the 1980s when plans to open new mines in northern Estonia sparked widespread protests. This period, known as the "Phosphorite War," saw significant public opposition due to environmental concerns and fears of demographic changes. The protests were successful, and the new mining projects were halted.

However, there are ongoing discussions about the potential for future exploration and mining, given the strategic importance of phosphorus for fertilizers. From 2020 to 2022, the Geological Survey of Estonia (EGT, established in 2018) carried out a survey of phosphorite and associated resources, focusing mainly on historical data from the Soviet and more recent times.

A forthcoming three-year study aims to better understand the economic potential of Estonian phosphorite and related resources, and their environmental impact, so that Estonia will be in a better position to make an informed decision as to whether it should advance, and if so how, with the valorisation of phosphorite and related resources.

**Uranium Mining:** The history of uranium mining in Estonia can be traced back to the 1940s when the Soviet Union discovered uranium deposits in the country. The first uranium mine was established in Sillamäe, northeast Estonia, in 1946. This mine operated until 1990, primarily extracting uranium as a byproduct of oil shale mining.

After Estonia regained independence in 1991, uranium mining ceased, and the Sillamäe mine was closed. Currently, there are no active uranium mines in Estonia, and due to low global demand, there are no plans to restart uranium mining.

**Limestone Extraction:** The limestone industry in Estonia is significant with a long history and modern advancements.



 **Drilling a round. The grey layer is limestone and is harder than the layers of Kukersite above and below it, thus requiring separate drilling to mitigate dilution. Photo by author.**

The country has several major limestone quarries which produce a variety of limestone products used in construction, agriculture, and other industries.

The industry has embraced modern technologies to improve efficiency and reduce environmental impact. Limestone Factories of Estonia OÜ, one of the oldest companies in the sector, has been a leader in implementing these technologies. The company has continuously invested in new equipment and processes, making it a modern European enterprise.

## THE FUTURE OF THE ESTONIAN EXTRACTIVE SECTOR

Estonia ranked 18th in the World Bank's Doing Business Report (2020) regarding ease of doing business in the mining sector. While the report primarily focuses on general business regulations and their enforcement, it indirectly impacts the mining sector by highlighting areas such as:

- **Starting a Business:** Streamlined procedures make establishing operations easier for mining companies.

• **Dealing with Construction Permits:** Efficient processes for obtaining permits are crucial for mining infrastructure development. However, this can be a protracted process in certain cases.

• **Electricity Supply:** A reliable and transparent electricity supply is vital for mining operations. Nevertheless, the supply of 'green energy' is still problematic due to the Ukraine conflict, but advancements are being made as Estonia has set ambitious goals to transition to 100% renewable electricity by 2030.

• **Registering Property:** Efficient property registration systems help secure mining rights and land ownership.

• **Paying Taxes:** A straightforward tax system reduces the administrative burden on mining companies.

• **Trading Across Borders:** Efficient customs procedures facilitate the export of mined materials.

These factors contribute to a favourable business environment for the mining sector in Estonia. The country's regulatory framework supports mining activities, ensuring that companies can operate efficiently and with increasing emphasis on sustainability.

## MINERAL POTENTIAL

Estonia holds significant potential for the mining industry, particularly in the exploration, extraction, and processing of critical mineral resources. Some of the key areas of opportunity are:

• **Critical Mineral Resources:**

Estonia has the potential to explore and extract critical mineral resources. The country's geological composition includes resources like the aforementioned phosphorite with associated black shale and various commodity metals.

• **Black Shale:** The black shale in Estonia, an extension of Swedish Alum Shale, contains elevated amounts of vanadium and other metals. This resource could potentially be monetized as a by-product of phosphorite. The extraction and processing is a complex procedure and will take time to study and research how this will be done.

• **Crystalline Basement:** The crystalline basement of Estonia, last explored in the 1980s, holds potential for discovering new raw materials needed for the industry. The Estonian Geological Survey will partner with Tallinn University of Technology and European partners in an upcoming Horizon Europe project to

work on the potential of the crystalline basement.

• **Rare Earth Metals:** Estonia could potentially become a powerhouse in the strategic rare earth metals industry. These metals are vital for the development of clean energy technologies. Estonia's phosphorite deposits contain significant concentrations of rare earth elements, averaging 1200-1500 ppm. This presents another potential source for REE extraction in the future.

However, it's important to note that environmental concerns, outside competition, and opposition to mining could pose challenges to these opportunities.

Despite these challenges, the potential for growth and innovation in Estonia's mining industry is substantial. With the right strategies and policies in place, Estonia could significantly advance its mining industry.

There is also a ready-made, experienced mining workforce that can move from the oil shale sector to the extraction of these new minerals.

## HOW CAN IRISH EXPERIENCES HELP ESTONIA?

### Fostering Education, Training and Research

Tallinn University of Technology provides the perfect platform to foster education, training and research in the mining sector. The mining education delivered at the Mining School has concentrated on the industry in Estonia. However, incorporating international case studies into the curriculum can prepare students to tackle global mining challenges.

Furthermore, collaborative research with Irish raw materials institutions to drive innovation in mining technology and practices can benefit all. The university trains and upgrades miners, technicians and engineers with the latest technologies and legislation to a national standard. Can there be an Irish involvement in this?

### Promoting Sustainable Practices

Ireland's mining industry has made significant strides in adopting sustainable practices. By sharing these experiences, the Estonian mining industry can move towards more environmentally friendly operations.

This includes strategies for waste management, land reclamation, site

rehabilitation, and minimising the impact on local communities.

### Advocating for Policy Changes

Advocating for policy changes can benefit the mining industry. This could involve lobbying for more favourable regulations, increased funding for research, or initiatives to attract foreign investment. An excellent example is the Minerals Development Act 2017, which is a significant piece of legislation in Ireland that consolidates six earlier pieces of legislation dating from 1940 to 2006. It provides a clear regulatory and fiscal framework for the exploration, mining, and closure of mines in Ireland. The Safety, Health and Welfare at Work (Mines) Regulations 2018 is an additional positive step.

### Another positive example is Ireland's membership of the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF).

By joining the IGF, Ireland committed to responsible governance of its mining sector, aligning with global best practices for sustainability. The IGF supports member countries in leveraging mining for poverty reduction, inclusive growth, social development, and environmental stewardship.

## CONCLUSION

As an Irish professional involved in Estonia's mining industry, I see immense opportunities to integrate Irish expertise and knowledge into the Estonian extractive sector and contribute to the future of Estonia's mining industry.

Together, we can drive innovation, sustainability, and growth in this vital sector, utilizing the wealth of Irish experience and insights accumulated over many decades. Both countries can make major contributions to the EU's Critical Raw Materials Act regardless of size and geographic location.



**BY TONY HAND**  
Sustainable Mining  
Project Manager,  
Division of Mining and  
Mineral Technology,  
Department of Geology,  
Tallinn University of  
Technology - TalTech,  
Estonia.



# Award of IMQS Silver Medals to Geo Drilling Apprentices

## August 2024

IMQS, then led by Brendan Morris, helped set up the Geo Drilling Apprenticeship in 2020.

The Apprenticeship is supported by the drilling industry, Geoscience Ireland and all the main geoscience and geotechnical societies in Ireland, along with state and semi state agencies. Since 2020, 30 Apprentices have completed the course which is delivered by South Eastern Technological University (SETU) at its Carlow campus.

Since its inception in 2020, IMQS has awarded a Silver Medal to the two best Apprentices each year. This year the Silver Medals Awards went to **Jason Reihill of Geological Survey Ireland** and **Conor Horan of Causeway Geotech**.

A Donegal native, Jason has been with GSI for four years, having previously worked for Causeway. GSI is currently drilling a one kilometre deep hole for geothermal energy information for Offaly

Co. Co. Conor hails from Sligo and has been with Causeway for two years. Prior to that he worked in construction in Canada. He has a Marketing Degree from IT Sligo but prefers the hands-on nature of the drilling business. Causeway specialises in geotechnical engineering. Both Jason and Conor are very strong in their support of the course at SETU, finding it to be very well delivered, varied and wide ranging.



Pictured at the Medal Awards in Navan were (from left) Joe Mongan (Geoscience Ireland, Principal Contact for the Apprenticeship), Jason Reihill (GSI), Alan Dolan (President IMQS) and Sean Finlay (Geoscience Ireland and Chair of the GeoDrilling Steering Committee). Missing from the photos is Ger Keohane, Director of the Geo Drilling Course at SETU.

# Copper - The Eternal Metal

**Conductive, malleable,  
ductile and non-corrosive**

**Copper is a chemical element, with a symbol Cu, and an atomic number 29. It is a soft, malleable, and ductile metal with very high thermal and electrical conductivity, and in its pure form has a pinkish-orange colour.**

Copper is used as a conductor of heat and electricity, as a building material, and as a constituent of various metal alloys, such as sterling silver in jewellery, brass (zinc) and bronze (tin). The main areas of use are electrical cabling, roofing, plumbing and other industrial uses. Copper has a melting point of 1084C, a boiling point of 2562C and a density of 8.9g/cm<sup>3</sup>, or nine times heavier than water. In Roman times copper was mainly mined in Cyprus and named aes cyprium (metal of Cyprus) and later corrupted to cuprum and then coper and finally copper.



Copper is essential for human life and is found in the liver, muscle and bone, at a typical rate of 1.4 to 2.1 mg of copper per kilogram of body weight. In 2023, copper was added to the EU list of critical minerals as it is essential in the move to a more sustainable

environment, with use in low emission technologies, such as electric vehicles, batteries, solar panels and wind turbines. Copper is 100% recyclable and is one of the few metals that can occur in nature in a directly usable metallic form (native metals). It does not react with water but does react with atmospheric oxygen, to form a protective layer of brown-black copper oxide. A layer of green copper carbonate can often be seen on old copper structures.

Copper is a major part of the new green economy with uses such as electric wiring for wind power generation, electric vehicles, roofing, plumbing,

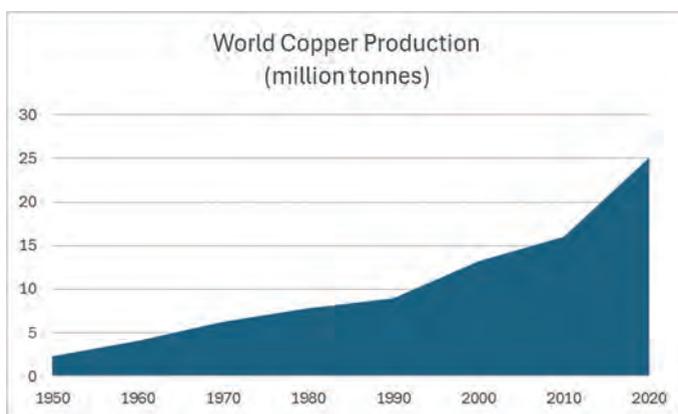


Figure 1. - Production rates for refined copper.

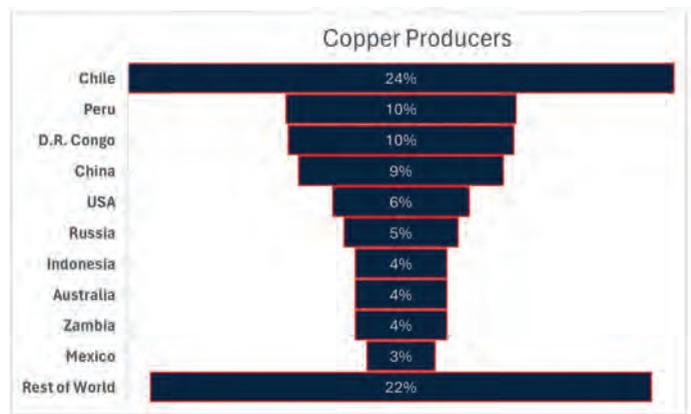


Figure 2. Graph of Copper producing countries.



industrial machinery, pressure vessels and other related uses. In 2022, global refined copper usage was 26.1 million tonnes. In recent times the price of copper has increased significantly due to the rising demand.

### COPPER PRODUCTION

Production of copper has been steadily rising for many decades with an increase observed from 9 million tonnes of refined copper in 1990, to 16 million tonnes in 2010, and then a further ramp up to approximately 25 million tonnes in 2020. This is shown in Figure 1.

Chile is the world leader in copper production with 24% of the market, followed by Peru and Democratic Republic of the Congo (DRC) at 10% each and China with 9%. Most of the copper production is from large open pit mines. Figure 2 shows a graph of copper producers by country.

It is estimated that there are more than 700 copper mines across the globe, with 60-70 of them in Chile. The world's largest copper mine is the Escondida open pit mine located in the Atacama Desert in Chile, which is owned by mining giant BHP Group. The Escondida mine produced an estimated 882 thousand tonnes of refined copper in 2023.

The second largest copper mine is the Collahuasi open pit mine, also in Chile and owned by Glencore plc., with production of an estimated 563 thousand tonnes in 2023. The Cerro Verde open pit mine owned by Freeport-McMoran in Peru is in third place at an estimated 444 thousand tonnes in 2023.

The largest underground copper mine is El Teniente in Chile, which is also the sixth largest copper mine overall. It is located south of Santiago in the Andes Mountain range to Chile. Mining activities at El Teniente started in 1904 and Codelco owns and operates the mine. An expansion project which became operational in 2017 gave access to ore located deeper down at

El Teniente and is expected to extend the mine life by 50 years. The mine has its own smelter near the site, has more than 3,000 kilometres of tunnels and produces more than 400,000 tonnes of refined copper per year.

### GLOBAL COPPER RESOURCES AND RESERVES

Copper occurs in three main mineral groups. In sulphide mineral deposits, the copper is linked with sulphur, while in carbonate deposits the copper occurs with carbon and oxygen, and in silicate mineral deposits, the copper is linked with silicon and oxygen. The latter two groups are also classified as oxide ores. Copper is more easily extracted from the sulphide and carbonate minerals.

Structurally, copper deposits are identified in three main groups. Porphyry deposits are most common and account for approximately 45% of the world's ore reserves. Porphyry deposits generally occur in discontinuous belts and the best-known belt extends from Canada through the United States, Mexico, Central America and into Chile.

Strata bound deposits are less common

and are normally smaller deposits, with Zambia hosting typical strata bound deposits. Massive sulphide deposits are large concentrations of mixed sulphide minerals containing some or all of copper, nickel, lead and zinc. Massive sulphide deposits are important in Canada, United States, Australia and South Africa.

A mineral resource is the best estimate at the amount of a geologic commodity that exists in mineral deposits. An ore reserve is the subgroup of a mineral resource that is defined and evaluated as being capable of being extracted for economic benefit. Typically, the lowest mineable grade of copper is 0.4% in open pit mines and grades of over 1% are considered high grade. For underground mines, grades below 1% are considered low grade and grades above 3% are considered to be high grade.

In line with current production, Chile and Peru are the leaders in copper reserves, followed by Australia and the DRC. Identified global copper resources were estimated by the United States Geological Survey in 2020 at more than 5,000 million tonnes and global reserves are estimated at 870 million tonnes.

Copper Ore Reserves (Million Tonnes)

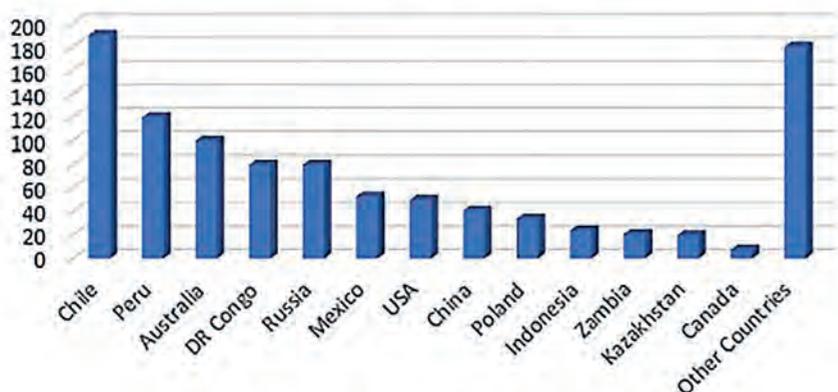


Figure 5. Global Copper Ore Reserves.



Figure 6. Photo of Cornish Engine House in Allihies, Cork.

## MINING & PROCESSING

Mining of copper is carried out in open pit mines and underground mines, normally using drilling and blasting techniques to separate the waste rock from the copper bearing rock (ore), and break the rock into small fragments.

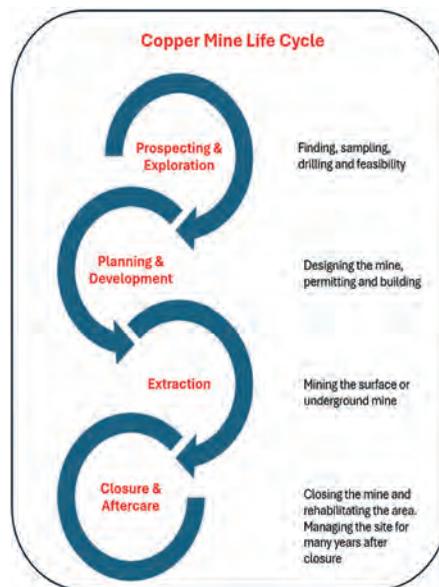
The ore is then transported to a mineral processing plant where it undergoes further crushing and grinding before the mineral processing begins to further separate the copper from the waste material. There are different mineral processing methods depending on the metallurgy of the ore.

Oxide ores are generally processed using hydrometallurgy, which uses aqueous solutions to extract and purify copper from the oxide ores, normally in three stages: heap leaching, solvent extraction and electrowinning.

Sulphide ores are normally processed using pyrometallurgy, which utilises heat, normally in four stages: froth flotation, thickening, smelting and electrolysis.

### THE COPPER MINING LIFE CYCLE

The copper mine life cycle follows any standard hardrock mine cycle, including the four main phases: Prospecting & Exploration, Planning & Development, Extraction and Closure & Aftercare.



Prospecting and exploration for copper is a continuous process carried out by many companies globally.

Most projects do not result in the ultimate development of a mine, due to the size of the discoveries and the economics of mining the metal. If a discovery reaches a key stage, feasibility studies are carried out to assess the size of the mineral resource and then an estimation of the ore reserve.

If the project shows positive results at this stage, a planning application is made and if successful, development of the site and the mine is started.

The extraction stage can be carried out over a defined period or if in many cases further resource is identified, mining can continue for decades. Mine closure normally includes rehabilitation of the mine itself, tailings facilities and surface facilities such as buildings, roads, etc.

### COPPER RECYCLING

Copper is one of the few materials that can be recycled repeatedly without any loss of performance and it is estimated that between 30-40% of copper use is from recycled copper. Recycling copper is a highly eco-efficient way of reintroducing the metal back into industry.

The recycling of copper requires less energy than primary mining production and reduces CO<sub>2</sub> emissions. While the percentage of recycled copper can increase, there will always be a demand for mined copper as much of the copper stays in use for many decades.

### COPPER PRICE

With the upsurge in global copper demand, the price of copper has risen significantly in recent years. At the time of writing this article, copper price is

approximately \$10,600 per tonne, which is slightly down from an all time high of over \$11,100 per tonne on May 20, 2024.

Up to 2004, the copper price maximised at around \$2,000 per tonne and has since continued to rise with fluctuations to the present price.

### COPPER MINING IN IRELAND

Copper mining in Ireland has a long history. Industrial mining in the Allihies area of West Cork dates to 1814 and peaked during the famine years with as many as 1,600 people employed in the mines.

Cornish engine houses were constructed for access, pumping and ventilation. The work was difficult and dangerous and male life expectancy was 32 years. Men worked in the mines while women worked on surface crushing and preparing the rock for processing. Allihies has a very good mining museum in the village.

The area near Bunmahon in Waterford was mined for lead, silver and copper in the 18th century, and in the 19th century the industry started to prosper. By 1840, the area was described as the most important mining district in the British Empire. By the mid-1840s the mining

moved to Tankardstown, where it peaked in the 1860s and then fell into decline.

When the mines of Waterford and Cork became unprofitable, many of the miners from there and Allihies emigrated to Butte, Montana, and hence the large Irish diaspora in that area.

This area is also called the Copper Coast and an ideal place to begin your experience in the area is at the Copper Coast Global Geopark Visitor Centre within the coastal village of Bunmahon, where you can visit a unique mining and geoheritage exhibition.

In more recent times, the Avoca mines were used for the extraction of copper and associated products and may have been mined as far back as the Roman times. However, the first records show mining starting in the 1720s and mining continued until 1982, when the mines finally closed. Mining was carried out in open pit and underground mines in the area.

### INTERESTING FACTS ABOUT COPPER

There are some interesting facts about copper:

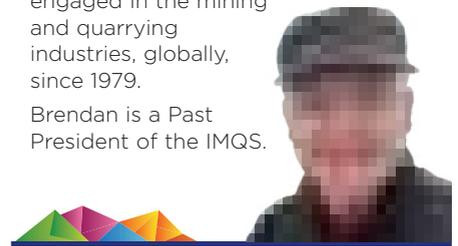
- Humans have used copper for at least 10,000 years

- Copper is naturally antibacterial
- A copper time capsule of our planet was sent into space in 1977
- Oxidised copper turned the Statue of Liberty green
- The term 'Copper' used for British police was the original word used to mean "someone who captures". In British English, the term cop is recorded in the sense of 'to capture' from 1704, derived from the Latin capere.

### BRENDAN MORRIS

is the Managing Director of LTMS Limited and COO of Galantas Gold. Brendan is a Chartered Mining Engineer and has been engaged in the mining and quarrying industries, globally, since 1979.

Brendan is a Past President of the IMQS.



Local sales, spare parts & technical support

T: +44 (0)28 38 840 671  
E: [contact@rapidinternational.com](mailto:contact@rapidinternational.com)  
W: [rapidinternational.com](http://rapidinternational.com)

## MIXING TECHNOLOGY EXPERTS

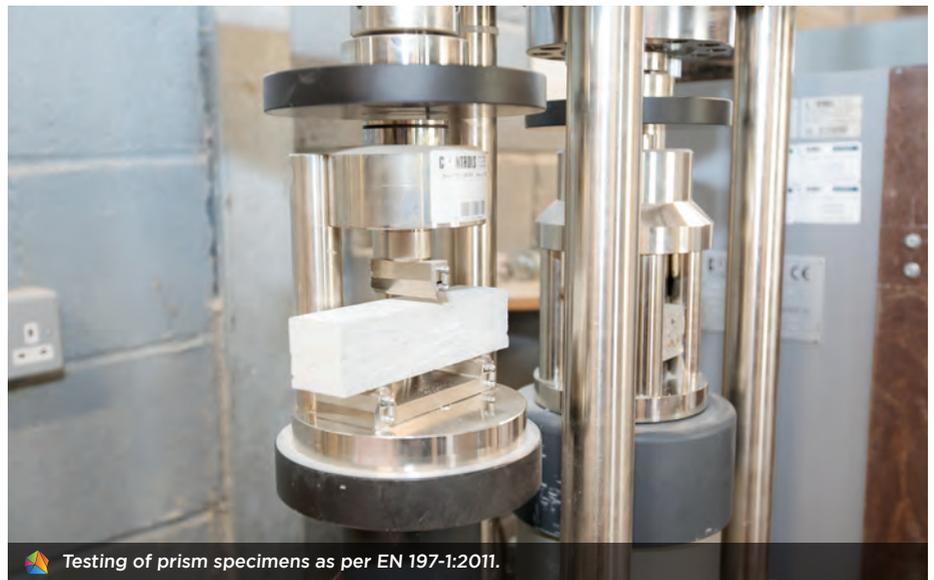
50 Years Experience | High Outputs | Mobile Continuous Mixing | Concrete Mixers  
Mobile Concrete Batching | Spare Parts | Concrete | Paving | Environmental | Recycling

# The Role of Limestone Filler in Ready-Mix Concrete and Cement Based Materials

In the construction industry, the demand for sustainable and cost-effective materials continues to grow. One such material gaining attention is limestone filler, which is increasingly being used as a partial replacement for Portland cement in ready-mix concrete and other cement based materials. The use of limestone filler not only offers potential economic and performance benefits but also contributes to an improved carbon footprint.

Since cement production is the primary contributor to CO<sub>2</sub> emissions in concrete, one of the most effective strategies for concrete manufacturers is to decrease the amount of Ordinary Portland Cement (OPC) in their mixes and incorporate alternative inorganic materials. But what alternatives can be used to replace cement?

Supplementary Cementitious Materials (SCMs) such as fly ash, slag, and pozzolans are ideal candidates, as their pozzolanic properties enhance both the strength and durability of concrete. However, the availability of fly ash and ground granulated blast furnace slag (GGBS) is declining, largely due to the shift of power plants away from coal combustion to renewable energy sources, like wind and solar, and the increased use of recycled materials in steel production. Additionally, natural pozzolans are geographically restricted and not widely accessible. In response, new standards are being developed to accommodate a broader range of SCMs. Given these limitations, there is growing interest in utilizing two of the most abundant natural resources: clay and limestone. Mineral additions, like these, provide a straightforward and cost-effective means to reduce the environmental footprint of cement-based products, including concrete. Recently, the mineral industry, and particularly the calcium carbonate sector, has advanced its technology to produce mineral additives with enhanced properties suitable for technical grouts, mortars, and concrete formulations. Moreover, producing concrete with lower cement content is only feasible with the



Testing of prism specimens as per EN 197-1:2011.

use of advanced chemical admixtures. These admixtures are essential as they significantly reduce the water required for mixing while maintaining the desired workability, helping achieve the necessary compressive strengths.

## UNDERSTANDING LIMESTONE FILLER IN CONCRETE

Limestone filler is finely ground limestone powder that is primarily composed of calcium carbonate (CaCO<sub>3</sub>). Traditionally, it has been used as an additive in concrete to enhance workability, improve rheology and reduce segregation in cement-based materials. However, recent research and industry practices have shifted towards using limestone filler as a partial replacement for Portland cement in concrete mixes.

The particle size of limestone filler is a crucial factor that significantly influences its performance in cement-based materials. The fineness of the limestone particles affects various properties of concrete and mortar, including workability, strength development, durability, and overall microstructure. Finer limestone particles improve the packing density of the mix by filling the voids between larger cement particles. This results in a more cohesive mix with improved flow characteristics. A better-packed matrix requires less water to achieve a given level of workability. When combined with Supplementary Cementitious Materials (SCMs), such as ground granulated blast furnace slag (GGBS) and calcined clays, limestone filler can further optimize



 **Limestone Filler Stocked in Ready-Mix Concrete Plants.**

the mix design, leading to improved mechanical properties, durability, and sustainability of concrete. This synergistic interaction between limestone filler and SCMs is particularly valuable in the context of reducing the carbon footprint of concrete by allowing for reduced Portland cement content without compromising performance.

## USES OF LIMESTONE FILLER IN READY-MIX CONCRETE

Limestone filler serves multiple roles in ready-mix concrete applications, including:

**Improved Workability:** The fine particle size of limestone filler improves the packing density of the cement paste, leading to better workability. This makes the concrete easier to mix, transport, and place, especially in applications requiring high fluidity.

**Enhanced Durability:** Studies have shown that limestone filler can contribute to the overall durability of concrete. The filler particles can fill voids within the cement paste, reducing the permeability of the concrete. Lower permeability enhances resistance to aggressive environmental conditions, such as freeze-thaw cycles and chloride penetration.

**Increased Early Strength:** Limestone filler can accelerate the hydration process of cement due to its nucleation effect, providing additional sites for the formation of hydration products. This can lead to increased early strength development, which is particularly beneficial in precast applications and projects with tight construction schedules.

**Cost Efficiency:** Substituting a portion of Portland cement with limestone filler can significantly reduce the cost of concrete production. Portland cement is one of the most expensive components in a concrete mix, and partial replacement with a less costly material like limestone filler can lead to substantial savings.

**Reduced Carbon Footprint:** The production of Portland cement is a major source of carbon dioxide emissions. By replacing a portion of the cement with limestone filler, the overall carbon footprint of the concrete mix can be reduced. This aligns with the global push towards more sustainable construction practices and can help meet environmental regulations and certifications.

## LIMESTONE FILLER AS A REPLACEMENT FOR FINE AGGREGATE

In addition to replacing a portion of Portland cement, limestone filler can also be utilized as a partial replacement for fine aggregate, such as sand. This is particularly beneficial when the quality of the available sand is poor, which can negatively affect the concrete's workability, strength, and durability. The fine particles of limestone filler can fill the voids between coarse aggregates and poorly graded sands, improving the overall particle packing density.

This enhancement in particle packing leads to a denser and more cohesive concrete mix, which can improve strength and reduce the permeability of the final product. By optimizing the use of limestone filler, ready-

mix concrete producers can mitigate the adverse effects of inferior sand quality, enhancing the performance characteristics of the concrete.

## CONCLUSION

Limestone filler is a valuable component in ready-mix concrete and cement based applications, offering a range of benefits from improved workability and durability to cost savings and reduced environmental impact. As the construction industry continues to seek more sustainable and economical solutions, the use of limestone filler as a partial replacement for Portland cement is likely to become more widespread.

The adoption of limestone filler in concrete mixes represents a significant step towards more sustainable construction practices. By optimizing the mix design and adhering to established standards, the industry can harness the benefits of limestone filler while maintaining the high performance of ready-mix concrete required for modern construction challenges.

**McGRATHS**  
CONG

**Cemfloor**  
liquid concrete solutions

**BY PADRAIC MCGRATH**  
Research and  
Development,  
McGRATHS CONG



# LKAB's transformation and progress in the Sustainable Underground Mining Project



In November 2020, LKAB published its plan for the largest transformation in the company's history. Over the coming decades LKAB will change from supplying iron ore pellets to the steel industry to being a supplier of carbon dioxide-free sponge iron using hydrogen technology.

This will have a major positive effect of reducing global carbon dioxide emissions by 50 million tonnes by 2050, which is equivalent to all of Sweden's current annual emissions. It will also lead and inspire the urgently required transformation of the iron and steel industry, which is currently responsible for 7% of all carbon dioxide emissions globally.

There will be big changes in three major areas:

- We will develop a new world standard for mining at great depths
- Carbon dioxide-free sponge iron will replace iron ore pellets as our main product

- We will extract critical minerals such as Rare Earth Elements and phosphorus from our mine waste

The transformation requires a massive investment, and this in turn will create a great amount of new jobs in Norrbotten, the most northern county in Sweden.

## NEW WORLD STANDARD FOR SUSTAINABLE UNDERGROUND MINING

As part of the huge transformation described above, a major mining development project was initiated in 2018: Sustainable Underground Mining (SUM).

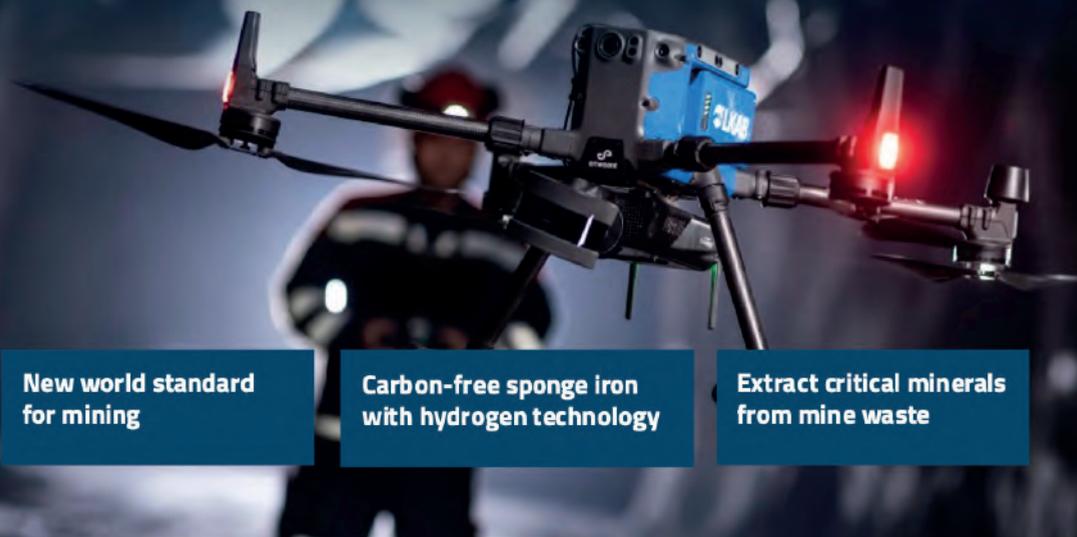
This brings together LKAB, ABB, Epiroc,

Combitech and Sandvik in a unique collaboration that utilises the combined engineering and human resources of five of Sweden's biggest companies. The SUM project receives financial support from the Swedish Energy Agency and the European Union.

The mine of the future will be carbon-dioxide-free, digitalized and autonomous. Reaching that goal will demand a new type of collaboration, a digital ecosystem in which the partners' digital systems and operations are linked.

After 2030, LKAB must be ready to mine at greater depths in the Kiruna and Malmberget mines. For this, decisions have to be taken in the mid-2020s. The sustainable mine of the

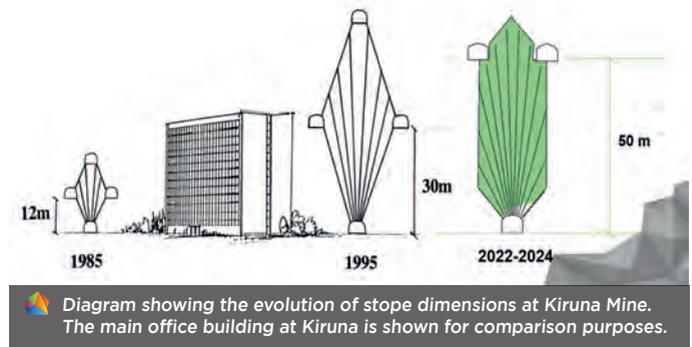
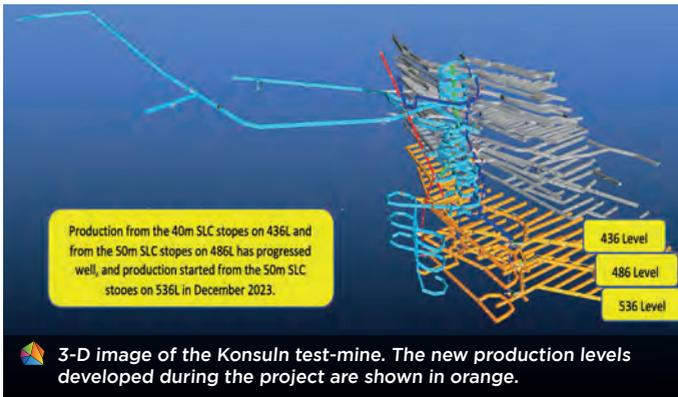
## Three important areas are leading the transformation



New world standard for mining

Carbon-free sponge iron with hydrogen technology

Extract critical minerals from mine waste



future requires new control systems, new and improved mining equipment, as well as complex and efficient management systems that meet future demands for a sustainable industry.

Work of note from mid-2022 to mid-2024 includes further increased production at the Konsuln test-mine; testing Battery Electric Vehicles from Epiroc, Sandvik and Scania in the Kiruna and Malmberget Mines; progressing with the SUM academic research programme; and continuing with the development of mine rescue techniques and equipment.

### UPDATE ON PROGRESS IN KONSULN TEST-MINE

Production and exploration at the Konsuln test-mine have progressed strongly in the last year.

Testing of the new 40m stopes on 436 Level started in March 2021 and was completed by the end of 2023. Testing of the new 50m stopes on 486L started in May 2022, and so far about 50% of the planned production has been completed. Blasting of the new 50m stopes on 536L started in December 2023. Ore and waste are segregated at the draw-points based on LHD bucket weight and visual inspection. Waste is tipped on surface dumps, while ore is primary-crushed and then concentrated by a magnetic separator. A -30mm fraction with average grade of about 58% Fe is then trammed directly to the main Kiruna mine concentration plant. Results so far are encouraging. Using larger sub-level spacing rather

than the standard 30m will give great cost benefits due to the greater amount of ore that can be extracted per metre of access development.

The new ramp to surface from 436L is complete. This tunnel is 2.5km long, and combined with associated upgrades in the ventilation network has provided a new tramping route to surface that by-passes the old spiral ramp. This has enabled the daily production rate to be increased from 5,000 TPD to 8,000 TPD (ore plus waste).

The total mined tonnage at Konsuln so far, regarding the designed test levels 436, 486 and 536, is 3.9 million tonnes of ore and 1.5 million tonnes of waste, representing about 50% of the total planned tonnage. This has provided valuable information on material flow, fragmentation, recovery and reconciliation, and will assist with planning our future mining at greater depths.

Exploration diamond drilling at Konsuln has been ongoing since 2019. This has led to the discovery of more ore at depth, and the development of a new planned extraction level (565L). Further drilling will explore for more mineralisation below 650L.

In the summer of 2024, production at the Konsuln test-mine was paused, and the operation placed on care-and-maintenance. It is expected that production will recommence again in the future. In the meantime, the break in activity will allow for

the review and analysis of all test-work that has been completed in the mine in the SUM Project.

### BATTERY ELECTRIC VEHICLES

Several models of battery-powered heavy mining vehicles have been tested to assist with the electrification of the mining process and remove diesel engines from underground.

Following underground and surface testing at Konsuln, two **Epiroc MT42B** battery-powered mine trucks were deployed to 1165L in the main Kiruna Mine. The trucks were deployed in hauling ore from a chute to an ore-pass in the southern end of the mine.

Useful information has been gained on tramping speeds, battery capacity, and re-charging options.

An **Epiroc ST14B** battery-powered loader has also been tested underground in Malmberget Mine, with encouraging results.

In early 2023, **Sandvik** delivered a **TH550B** battery-powered truck to Malmberget Mine. This was tested by tramping on flat roadways on the main 1250 production level, and on nearby ramps. In October 2023, **Sandvik** also delivered an **LH518iB** battery-powered loader to Malmberget Mine - evaluation of this LHD in the production cycle continues.

**Scania** developed a prototype P450 battery-powered truck with a 30T payload, which is being used in surface waste rock transport at Malmberget mine.





Mine electrification in action – the Epiroc ST14B battery-powered LHD loading the Scania P450 battery-powered truck at Malmberget Mine. (Photo LKAB).

A Scania P230 battery-powered truck with cargo bed and crane, for the delivery of drilling consumables to production areas, has also been delivered to Malmberget Mine.

### ACADEMIC PROJECTS

LKAB’s academic research programme with Luleå University of Technology, Örebro University, Mälardalens University, and Imperial College London for the period 2021 to 2024 is at full pace. All nine projects are on target to deliver useful results for implementation in operations by the end of 2024.

The full list of research projects is given below.

**SP3** - Evaluation of green mining layouts using a Discrete Event Simulator (DES) support tool. Luleå University of Technology.

**SP4** - Improved productivity and energy efficiency through Dynamic Loading Control. Luleå University of Technology.

**SP5** - Strategies to manage seismic risks at great depths in LKAB’s underground mines with a novel mining layout. Luleå University of Technology.

**SP6** - Underground Loop. Luleå University of Technology.

**SP7.1** - Reconciliation of ore production from the 40m and 50m test-stopes in Konsulin Mine, compared with the resource and reserve estimates. Imperial College London.

**SP7.2** - The use of geological and structural mapping data to inform support design and mine planning. Imperial College London.

**SP12** - Intelligent management of mixed traffic in mines. Örebro University.

**SP13** - Flow and airborne particle monitoring for risk management in mines. Mälardalens University.

**SP14** - Autonomous drones for underground mining operations. Luleå University of Technology.

### MINE RESCUE

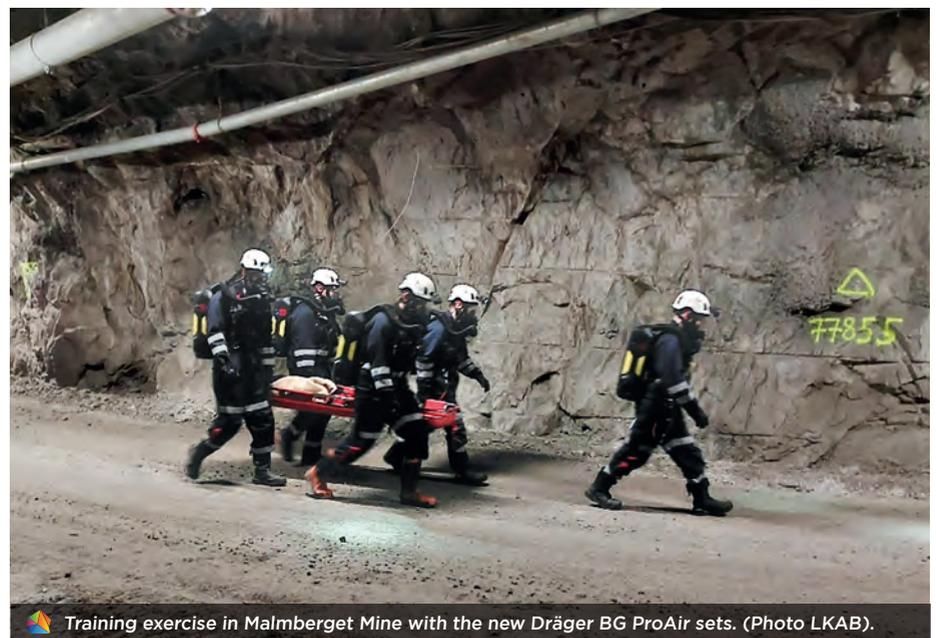
LKAB are continuing to develop their mine rescue capability to ensure preparedness for the mines extending to great depths. LKAB were the first mining company in the world to receive delivery of the latest BG ProAir long-duration closed circuit breathing apparatus from Dräger. Fifteen sets have been deployed to Malmberget Mine and fifteen to Kiruna Mine. Training progressing well.

### COMMENTS BY MAGNUS BREVEMARK, SUM PROJECT MANAGER

“I have had the privilege of being the Project Manager for the SUM Project since 2022, with a clear mission and mandate to complete the work by the end of 2024. It is of the utmost importance that all documentation and completion of tasks are carried out with a very high degree of professionalism and that we ensure that no experience is lost for further development in the future.



Preparing in the Malmberget Mine Rescue Station to go underground. (Photo LKAB).



Training exercise in Malmberget Mine with the new Dräger BG ProAir sets. (Photo LKAB).



The entrance to Konsuln test-mine, mid-winter - 10th January 2023. (Photo LKAB).



Enjoying the summer landscape. (Photo Hans Berggren).



The view over Kiruna and the giant Kiirunavaara Mine, midnight on Wednesday 21st June 2023 - mid-summer. (Photo M. Lowther LKAB).

The breadth of all the work carried out under the SUM umbrella is impressive. There have been many important tests and development initiatives. Now that it is time to conclude the project, LKAB is facing into an exciting journey of change regarding a variety of perspectives.

Almost 600 sub-projects have been activated and implemented, and LKAB is now looking forward to many introductions of new technology and equipment.

Working together with others has also proven to be a crucial success factor for the various development initiatives.

In conclusion, I would like to thank everyone involved in this project period for a job well done, but also to make it clear that our development journey continues with the highest importance."

### RECENT EXPLORATION NEWS

LKAB have recently announced the discovery of a major new mineral

deposit at Per Geijer, north of the existing Kiruna industrial area.

This is not only a large resource of iron, but is also Europe's largest deposit for rare earth elements. <https://lkab.com/en/press/europes-largest-deposit-of-rare-earth-elements-now-25-percent-larger-today-marks-the-first-step-in-critical-review/>.

### CAREER OPPORTUNITIES

LKAB offers some of the most exciting and challenging careers in the mining industry. The climate is wonderful - from the Polar Night to the Midnight Sun - with great opportunities for sport and outdoor activities. Career opportunities are published on our [website](#).

### ABOUT LKAB

LKAB's mines and refining plants are located in Malmfälten in the north of Sweden. Production operations are principally located in Kiruna,

Malmberget and Svappavaara. Luossavaara-Kiirunavaara AB (publ), which is abbreviated to LKAB, is an international mining and minerals group that offers sustainable iron ore, minerals and special products.

We are committed to developing carbon-free processes and products by 2045, leading the transformation of the iron and steel industry. We are one of Sweden's oldest industrial companies and are wholly owned by the Swedish state. Since 1890, we have developed through unique innovations and technological solutions and are driven forward by more than 4,500 employees in 12 countries. In 2023, the LKAB group had sales of nearly SEK 43 billion.

Sustainability is the core of our business, and our ambition is to be one of the most innovative, resource-efficient and responsible mining companies in the sector. We manufacture and supply highly processed iron ore products to the global steel market. The majority of our iron ore products are sold to European steelworks. Other important markets are the Middle East, North Africa, Asia and the USA.

Website: [www.lkab.com](http://www.lkab.com)



BY MIKE LOWTHER  
Specialist - Mine Management

MAGNUS  
BREVEMARK  
SUM Project  
Manager



# FROM CRISP PACKETS TO CLINKER, circular economy in the cement industry

If you have examined your household waste at home before deciding whether it can go in your recycling bin, you will know it can be a complex matter. Granted for the majority of materials, like aluminum cans, paper and card and hard plastics, once clean and dry it is pretty straightforward.

However, quite often you will see packaging materials with messages like “not currently recycled”, or “do not recycle at home”. Check it yourself and you will see what I mean. And you won’t be the only one checking your rubbish! The EPA regularly carries out detailed waste characterisation surveys where household and commercial waste is tipped out and teams of people literally sift through every single item, segregate and characterise the different materials.

The most recent waste characterisation report by the EPA was published in 2023 and interestingly it shows that the composition of materials in our bins in 2023 has changed very little since its previous report in 2018. It is also clear from these EPA reports that approximately one third of the waste materials in recycling bins should not be there. This data underlines the confusion that exists for many of us all as we try to maximize our household recycling rates.

So, what happens to all of this non-recyclable waste? Well, a partnership between the waste industry and the cement industry has developed here in Ireland and those non-recyclable materials are processed by the waste industry and turned into a manufactured fuel which is fed directly into our cement kilns. The fuel is known as **Solid Recovered Fuel, SRF** for short. It is a dry mixture of shredded paper, plastic, card, textile and composite packaging materials -materials that cannot be recycled.

The benefit for the waste industry is that there is a local recovery option for these materials as the primary goal for the cement industry is to use

this locally sourced fuel to replace imported fossil fuel. In doing so, this not only avoids landfill or export of this material but it helps to bring down the carbon intensity of our Platin and Limerick cement factories.

The practice of using alternative fuels is common throughout Europe and indeed globally in the cement industry. Our Platin cement factory began using SRF back in 2011 and Limerick commenced last year in 2023, after a lengthy permitting and licensing process. In 2023, Irish Cement used over 180,000 tonnes of SRF to heat our cement kilns and we were able to significantly reduce our fossil fuel imports. The quantity of SRF we are using is increasing each year.

So, the primary use of SRF in our kilns is as a fuel, replacing fossil fuel, but there’s another aspect to this practice that is not as well known. Inside our cement kilns the temperature is extreme, over 2,000°C, and this heat results in complete combustion of our fuels. Complete combustion means that the structure of the material is completely broken down, releasing the thermal energy and releasing the ‘in-organic’ or ‘non-combustible’ components of the fuels.

This mineral or ‘ash’ content of the fuel, unlocked by the extreme temperatures from their previous structure quickly combines with our super-heated raw materials and becomes integrated into the clinker we make inside the kiln. The clinker, our intermediate product, is cooled quickly, stored onsite in silos and it is from this we make cement.

At an elemental level, four key elements are needed to make clinker; calcium, silicon, aluminum and iron. Our intensive quality control and testing procedures in both Platin and Limerick ensure

we get the correct blend of these ingredients inside the kiln, at the correct temperature to make high quality clinker. The four elements are mainly sourced from our raw materials, the limestone rock from our own quarries topped up with some supplemental shale, bauxite and iron ore. The ‘ash’ derived from the combustion of fuels is becoming an increasingly important source.

Let’s focus on one of those elements, aluminum: it is supplemented through the deliveries of bauxite, a quarried material rich in alumina, to both the Platin and Limerick sites. The SRF also contains aluminium, primarily from foil-lined composite packaging, (examples include crisp packets and packaging for coffee). This aluminium takes on a second life inside our clinker manufacturing process.

So, let’s follow a particle of aluminium, through its lifecycle: It is first extracted from a bauxite mine or quarry and shipped for extraction at an aluminium refinery. Once purified, the aluminium is supplied, in this case, to a packaging manufacturer from where it is delivered to a food producer and used to package its products. The properties of the aluminium make it an ideal and widely used component in food packaging to keep products fresh.

The product is enjoyed by the customer and the packaging discarded, as we have often seen into a recycling bin. For pure aluminium packaging there is an effective recycling process, but in this case, we are looking at a composite pack. It is collected and processed by the waste industry.

This ‘non-recyclable’ composite material enters a secondary life, within the cement industry as a valuable element within the SRF. Inside the kiln as the energy is

 A worker in Platin examines a sample of Solid Recovered Fuel (SRF) which is used as a fuel in the cement kiln instead of fossil fuel.



released from the combustion of the SRF, the non-combustible or mineral fraction, in this case the aluminium combines with other raw materials to form some of the minerals required in clinker.

Without the option of a cement kiln, the aluminium could be lost as a resource either into a landfill or exported for use in a waste to energy plant. But because of the high temperatures inside our kilns and our need for raw materials including aluminium, these discarded resources form part of the clinker.

At an elemental level the aluminium in the SRF is recycled as a component of the clinker. Because we actively monitor all of the inputs to our process, we have

been able to witness a reduced need for bauxite deliveries to the site since 2011.

This reduced need for bauxite has in turn reduced the quarrying and transport impacts associated with sourcing bauxite from external suppliers. In Platin we still need some bauxite, which can be sourced from both domestic and overseas suppliers. But since 2011, when SRF was first introduced, we have reduced our need for bauxite by approximately 140,000 tonnes and avoided close to 5,500 truck movements on local roads.

**This is a real-life example of the circular economy**, where discarded resources are being recycled in a manufacturing

process, helping to reduce the requirement for virgin raw materials. We still have a significant demand for raw material inputs, Irish Cement's Platin plant uses approximately two million tonnes of raw materials each year, but the aluminium sourced from the SRF makes a positive contribution to the sustainable manufacturing of high-quality cement and provides a reliable recycling option for crisp packets and other composite packaging.

As consumers we need effective food packaging to help keep products fresh and reduce food waste. Our cement kilns provide a highly efficient option, because of the extreme temperature, all

the aluminium in the SRF is extracted during combustion and contributes positively to the mineral composition of the clinker. This type of 'hidden recycling' is being increasingly recognised within the European Union with a number of Member States working to assess its contribution to their national circular economy and recycling targets.

There is more and more pressure coming on extractive industries to reduce their impacts and improve their overall sustainability. We all face the same questions, how can we do more with less? How can we become more resource efficient? How can we become more circular? Are there alternative sources of raw materials already in circulation that could be redirected into industrial manufacturing processes? If the raw materials have already been extracted, been used and discarded does it not make more sense to capture those resources and recycle them in some way, rather than extract more?

It is clear that in other European countries, wastes and byproducts from one industry are sent as raw materials or feedstock to another industry.

This concept of 'industrial symbiosis' or 'industrial ecology' will be more challenging here in Ireland because we have very few heavy industries producing suitable materials. However, given the opportunities presented by our cement kilns, because of our high temperatures and raw material requirement, we should be open to examining any source of minerals or decarbonated raw materials that we can secure on the island to use in our production process and ensure we remain competitive and sustainable into the future.

Construction and demolition material is an obvious source given its scale and fundamental nature. There will be plenty of hurdles to overcome, for Irish Cement, the primary focus is quality - do these recovered resources add value and support the manufacturing of high-quality cement? Licensing and permitting could also be a hurdle. How can we foster innovation and encourage new R&D projects, which by their nature may not work first time around?

They will often be small scale at first so could benefit from a flexible 'regulatory sandbox' which enables testing of new

technologies, processes or concepts in a real-world environment. They can have a defined scope and be available for a defined period of time. The purpose of regulatory sandboxes is to explore the opportunities and risks that come with innovation and if it shows promise how to structure a suitable set of rules and guidance for its future regulation.

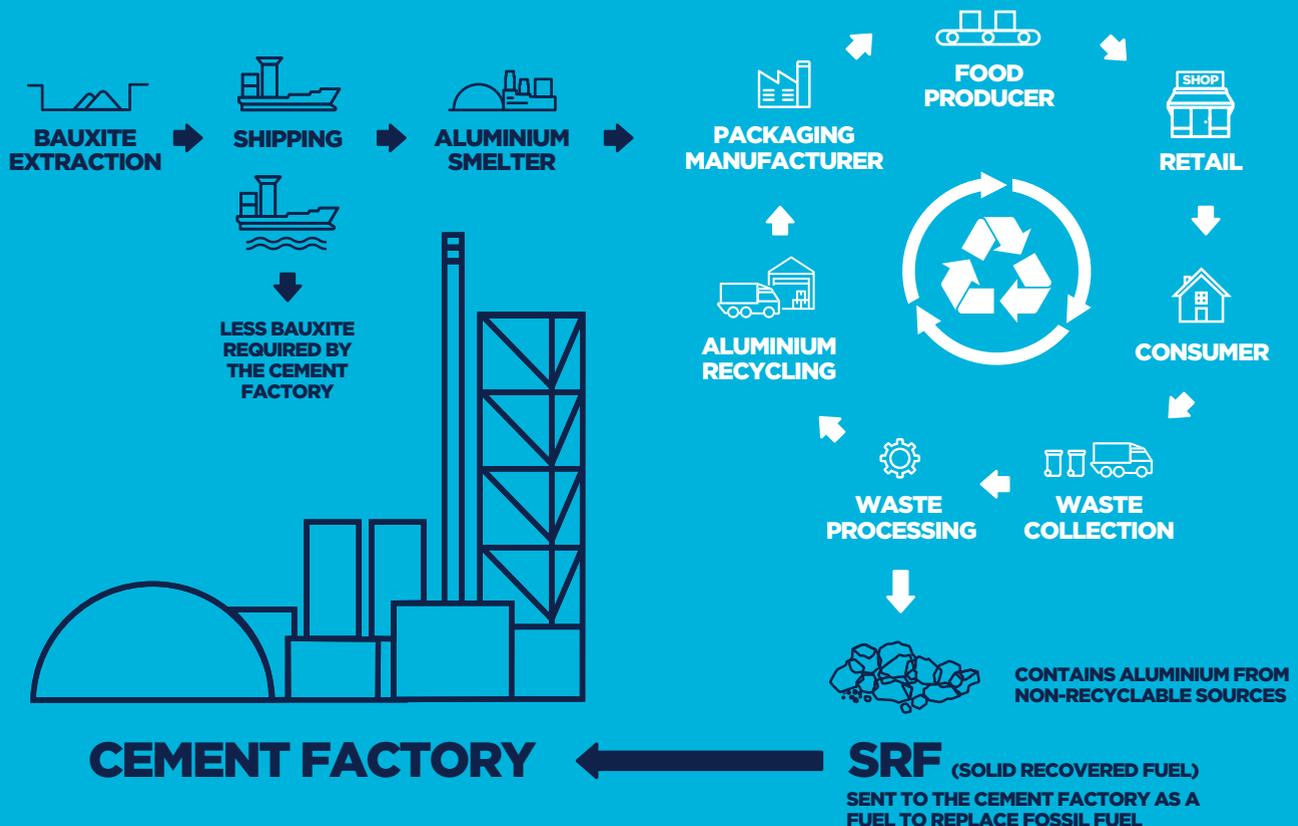
The story of empty crisp packets and the collaboration between the waste and the cement industry points to an approach that must be explored if we truly want to become more circular in Ireland.



**BY BRIAN GILMORE**  
Communications  
Manager



## ALUMINIUM PROCESS FLOW DIAGRAM SHOWING THE TWO PATHWAYS INTO CEMENT PRODUCTION



# Innovative Shaft Sinking Techniques at Woodsmith Mine

Deep mine shaft sinking is a technically demanding area with significant challenges for safety and ground control. Innovations in shaft sinking methods have led to significant improvements in performance promoted by the use of mechanisation. Evolution of key stages of this technology has led to the SBR (Shaft Boring Roadheader) which is a fully mechanised shaft sinking technology used successfully in the Neshinsky Potash project in Belarus.

The same method is now being used at the Woodsmith Polyhalite deep mine project in North Yorkshire, UK to sink the production and service shafts along side a third shaft that is being sunk using more traditional drill and blast methods. Technical innovation is necessary to optimise the performance of the SBR to the ground conditions whilst maintaining the highest safety and productivity standards. Specific areas of focus include, freezing and grouting technologies, rock bolting, shaft linings as well as cutting, mucking and hoisting.

Depending on mining and geological conditions of the deposits, the costs of sinking and lining of shafts can, on average, account for 15-50% of total investments required for the construction of a mining plant. Shaft sinking is a critical issue during the implementation period of such projects. Therefore, it is essential to carry out such works rapidly whilst maintaining high standards of safety. Traditionally, shaft sinking has been carried out by drill and blast methods, used in the UK most recently within the Selby complex in Yorkshire and Asfordby Mine in Leicestershire in the 1970's and 80's. Shaft sinking methods have evolved since this time to incorporate technological advances in

mechanisation and a viable alternative to drill and blast is now available.

## CASE STUDY: MECHANISED SHAFT SINKING AT NEZHINSKY MINE, BELARUS

In 2017, the German company REDPATH DEILMANN (Dortmund) signed a contract for the sinking of two shafts and priority mine drifts in the area near the shafts for Slavkaly, LLC to mine potash deposits in the Republic of Belarus.

The mining and production of potash has been carried out for more than 60 years by Belaruskaly, OJSC, one of the world leaders of potash production. Up to now, Belaruskaly, LLC has been the only potash manufacturer, which has been operating seven potash mines in the Republic of Belarus. At the same time, Slavkaly, LLC started the construction of Nezhinsky mining and processing plant on the territory of the Republic of Belarus near the city of Lyuban on the eastern part of the Nezhinsky site of the Starobinskoye potash salt deposit in 2015. Based on the project execution results, Slavkaly, LLC is planning to produce 2 million tons of potash fertilizers per year. REDPATH DEILMANN GmbH has more than 130 years of experience and has built more than 560 mine shafts around the world, 200 of which have used a special freezing method, including a number of shafts

sunk by using a mechanized method.

According to the decision of Slavkaly, LLC, the shaft sinking should be mechanized using SBR (Shaft Boring Roadheader) manufactured by the company Herrenknecht (Schwanau, Germany). The concept of this decision consisted in the implementation of shaft sinking by a safer method without the use of explosive materials, as well as in the acceleration of sinking, associated with the complete combination of cutting, loading, muck clearance and shaft lining operations. This decision contributed to the high rate of shaft sinking attained on the project. This should allow Slavkaly, LLC to start the extraction of mineral resources with the further production of the final product – potash fertilizers on schedule and in shorter timescales than originally envisioned.

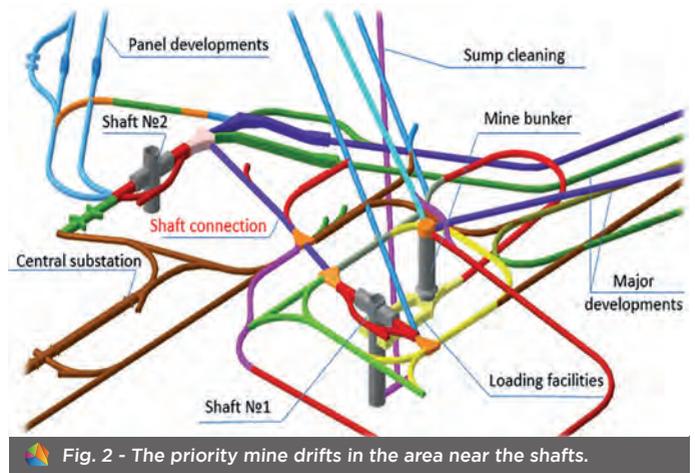
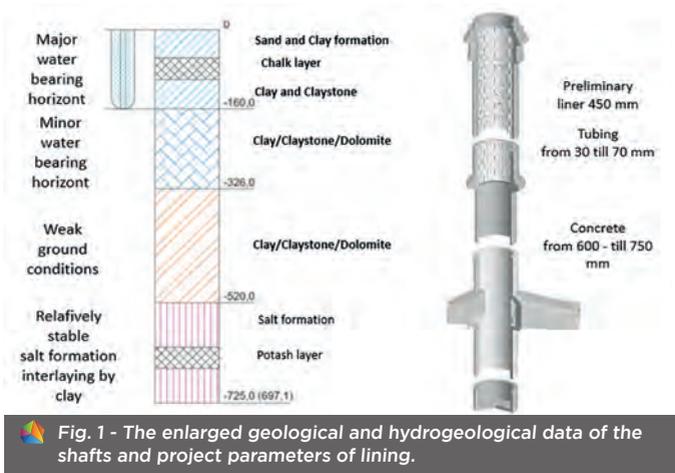
## THE SCOPE OF WORKS AND GEOLOGICAL CONDITIONS

At the initial stage it was decided to open a new potash mine by sinking two shafts 700 and 725 m deep. The skip and the cage shafts with the opening of the second potash horizon are under construction now. The shaft No.1 is provided for the ore lifting and the air supply. The shaft No.2 is provided for the descent and lifting of people and materials, as well as the ventilation. The main parameters of the shafts are given in the Table 1.

The geological conditions of the shafts are influenced by the presence of an abundant water flowing zone at the interval from 0 to 150 m and a zone of insignificant water inflows at the interval from 150 to 305 m. Therefore, it was decided to freeze ground to the depth of about 160 m. The geological formation to salt rock (elevation -520 m) is composed

Table 1. The main parameters of the shafts

The name of a parameter	Skip shaft	Cage shaft
Shaft depth, m	725	700
Shaft diameter (in light), m	8	8
Freezing depth, m	160	160
The depth of waterproof lining, m	325	325



mainly of weakly resistant rocks made of clay, marl and argillite (Figure 1).

The shaft design required the installation of a waterproof lining made of cast iron tubing up to -320 m and the rest of the lining should be made of concrete and reinforced concrete.

The schematic diagram of the shaft with the project parameters of the lining and the enlarged geological data are shown in the Figure 1.

For the further development of the mine, once the shaft sinking is finished, it is planned to carry out the priority mine drifts in the area near the shafts, including a shaft loading complex and a mine bunker with a height of about 40 m and a diameter of 8 m. The total amount of these works is approximately 90,000 m<sup>3</sup> of rock, which will amount to about 10 km of the total development length (the diagram of the priority mine drifts is presented in Figure 2). At the same time, the width of the drifts varies mainly from 3 to 4.5 m with a height between 3 and 4 m, with the exception of special chambers and a mine bunker. The geological conditions are characterized by the presence of stone and potash salt rocks with clay layers of different capacities - from several millimeters to two meters. As for underground drifts near the shaft area,

it is required to ensure their stability for the life of mine operation. Taking these conditions into account, the drifts near the shaft area are mined under a potassium layer in the stone salt rocks.

### EQUIPMENT AND PREPARATION OF THE SURFACE COMPLEX

To start the sinking by the SBR in the conditions of the Nezhinsky project, it was necessary to perform:

- ground freezing;
- foreshaft sinking;
- installation of permanent pile driver;
- supply of the surface with hoisting machines and winches;
- installation of SBR complex;
- main and auxiliary infrastructure supply of sinking.

It was decided to carry out the shaft sinking in the conditions of the Nezhinsky section by freezing to a depth of 160m with a temperature of -35 ° C, which allows for freezing of the main water bearing horizon. Thus, 40 freezing and four control and thermal holes were drilled on each shaft. After that, the freezing station was set into operation with a total capacity of about 4 MW. The main technical characteristics and freezing parameters are given in Figure 3.

The foreshaft sinking began after the complete closure of the ice fence. The depth of each foreshaft was 52 m. The sinking was carried out with the use of excavators and rock lifting with a crane and frame guiding buckets. The foreshaft lining was carried out with a reinforced concrete with the depth of 1.5 m of sinking per step. The lining was carried out with a frost-resistant concrete with grade C25/30 550 mm thick. After that, a concrete pad was erected at the bottom of the foreshaft for the further installation of the SBR. Then, a permanent pile driver was installed to carry out the further installation of the sinking complex into the foreshaft.

At the time of the foreshaft sinking, the construction of surface buildings infrastructure was also started which included the hoisting machines and winches building (Figure 5).

The main characteristics of these mechanisms are given in Table 2.

In addition, the site was fully equipped with all necessary main and auxiliary infrastructure, including shaft ventilators, electric power supply of SBR, CSU, storage and administration buildings. The general view of the site is shown in Figure 5.

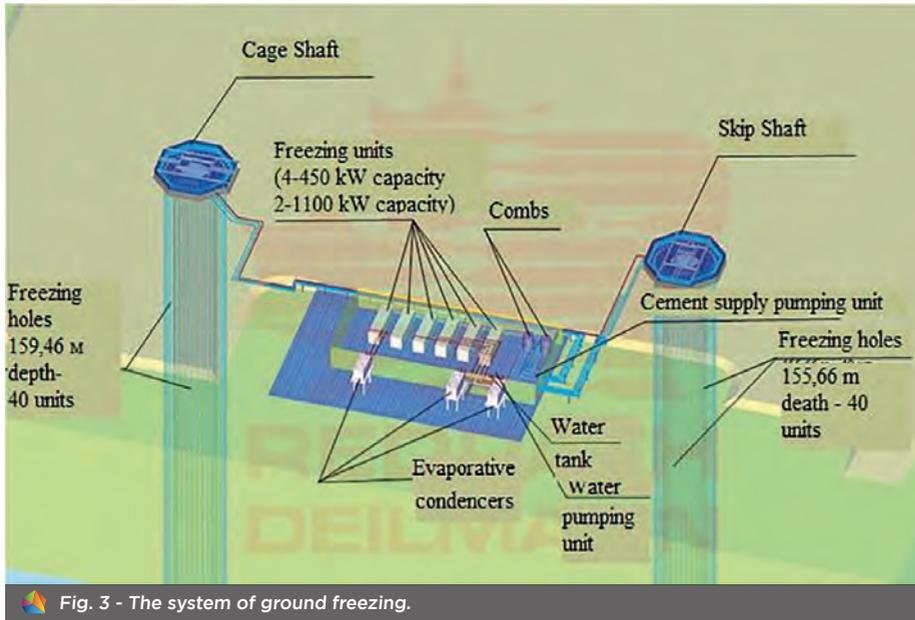
The final stage of the preparatory period was the assembling of the two SBR complexes and their hanging on the ropes of shaft winches (Figure 6). After that, SBR complex was put into operation and shaft sinking began at an elevation of -50 m, the concrete pad created earlier was mined by SBR.

### THE TECHNOLOGY OF WORKS AND SBR DESIGN

The shaft sinking was carried out to a depth of -326 m with the use of SBR and an advanced temporary concrete lining. The thickness of the advanced concrete lining with grade C25/30 was 450 mm. The next step was mounting of the curb ring at the elevation -326 m, which was followed by the assembly of tubing column from the bottom to the top of the shaft and concrete backfilling

**Table 2. The main characteristics of hoisting machines**

	Engine capacity	Diameter of the rope	Maximum speed	Rated load	
HOISTING MACHINE, 215 kN	2x710 kW AC asynchronous engines	Ø 40 mm	6 m/s	215 kN	
HOISTING MACHINE, 252 kN	2x1350 kW AC asynchronous engines	Ø 40 mm	9,5 m/s	252 kN	
SBR WINCH	4x132 kW three-phase asynchronous engines	Ø 54 mm	0,2 m/s	455 kN	
EMERGENCY LIFTING WINCH	4x55 kW three-phase asynchronous engines	Ø 19 mm	0,35 m/s	50 kN	
BEARING CABLE ROPE WINCH	4x55 kW three-phase asynchronous engines	Ø 30 mm	0,16 m/s	313 kN	



with 350 mm of impact thickness. A total quantity of assembled tubing rings on each shaft was 215. After the assembling of tubings, the shaft sinking by SBR was continued until shaft stations level. The thickness of the concrete lining in this area was from 600 to 750 mm with the grade of concrete C40/50. Shaft lining stages and technology are shown in Figure 7. The technology of a mechanized method using the SBR complex includes the mechanization of the rock destruction and parallel concrete lining of the shaft walls. As for the SBR complex, rock destruction was carried out using a cutter located on the handle at the bottom of the machine. This cutter is made in the form of a telescopic boom with a horizontal drum and with the capacity its vertical axis by 360°. The power capacity of the hydraulic drive of the cutter is 600 kW. The cutting drum with a diameter of 1.2 m and a width of 1.5 m is equipped with round shank cutters (Figure 8). Rock cutting always begins in the

center and continues from the center to the contours of the shaft section. In this case, a spherical shape of the face with walls formed in the profile which can be adjusted by the machine settings has been used. The cutting depth in one step is 0.2 m. For the excavation with a depth of 1.2 m, this operation is usually repeated six times. The cutting diameter (in depth) can vary within the working radius of the combine, which allows for excavating of rock in the areas of larger diameter, for example, in the areas of lining foundation, curb rings or in areas of shaft stations. For example, Figure 9 shows the main sinking operations performed during the shaft sinking, which consist of the following:

- sinking to a depth of 1.2 m in layers of 0.2 m and lowering the machine by 1.2 m;
- performing four cycles of 1.2 m to a height of 4.8 m with parallel extension of the curb ring lining and lowering of the shuttering;

- continued sinking of the shaft with concrete backfilling.

During the rock cutting, a pneumatic muck system is provided, which lifts the rock along the central pipeline to a height of about 30 m, followed by conveying the rock through a cyclone into a bucket. The sucked air is drawn off from the top of the cyclone to the dust collector. Three rotary piston compressors with a drive power of 315 kW each are installed on the side of the clean air discharge to create a vacuum. At the same time, the outgoing air is cooled by additional installations in order to exclude the influence of high temperatures on the ice fence. Suction of pneumatic loading system is made over a full width of cutting drum in the form of a suction rock box installed behind it. An enlarged version of the SRB complex is shown in Figure 10. As a result of the sinking complex design, in accordance with the necessary boundary conditions, the following technical characteristics were achieved:

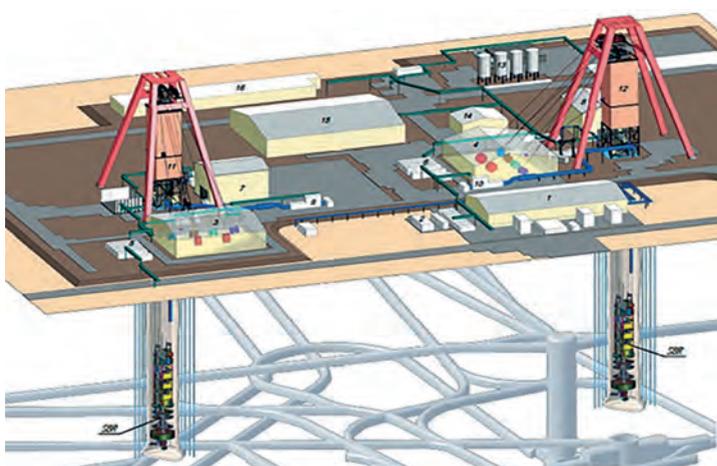


Fig. 5 - The preparation of surface infrastructure for shaft sinking:

- Freezing station;
- Compressor station;
- Hoisting machines and winches building No.2;
- Hoisting machines and winches building No.1;
- Electric power containers of shaft No.2;
- Electric power containers of shaft No.1;
- Shaft collar building No.2;
- Shaft collar building No.1;
- Ventilation system; No.2.
- Ventilation system No.1;
- Cage shaft pile driver (sinking);
- Skip shaft pile driver (sinking);
- Cement supply unit (CSU);
- Administration and service building 1;
- Storage building and workshop;
- Administration and service building 2.

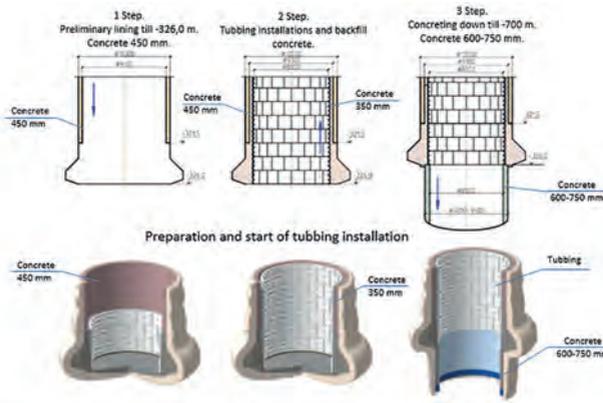


Fig. 7 - Shaft lining stages.

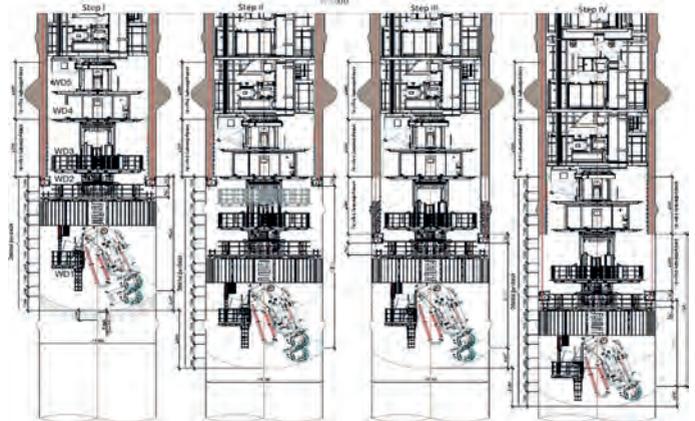


Fig. 9 - Stages of shaft sinking by the SBR.

- excavation depth - up to 1000 m;
- excavation diameter - up to 12 m;
- average sinking speed - 3 m/day;
- total weight - ~ 400 t;
- cutter diameter - 1.2 m;
- cutter width - 1.5 m;
- hydraulic engine - 600 kW;
- muck transport: pneumatic system;
- maximum rock strength - 100 MPa.

It should be noted that during the works, there were also certain difficulties associated with the special features of the geological structure and the SBR complex. Nevertheless, all the difficulties were quickly resolved, which in general did not affect the progress of work and worker safety.

**SHAFT SEALING**

According to the project documentation, a typical technology of the mine shaft sealing, tested at the Starobinskoye potassium salt deposit, was adopted. The primary waterproofing of the shafts is achieved due to bracing of the lead plates on the tubing flanges and tamping of the fixed space, including the erection of two grouting curtains that prevent the transfer of water along the backlining space.

At the same time, it is a well-known fact that the tube lining is not an effective waterproof lining, especially in the conditions of seasonal temperature changes during the operation of shafts. In Germany, for example, this type of lining was replaced by waterproof composite steel and concrete lining in the 1970s (Figure 11).

For the purpose of extra insulation, in addition to lead plates, a special sealant was used, its application made it possible to perform reliable waterproofing of the most difficult-to-isolate T-joints of tubings, as well as significantly improve waterproofing throughout the surface of the tube flanges.

Figure 12 is a detailed diagram of



Fig. 8 - SBR cutting head.

the works on the shaft sealing.

**SINKING AND LINING OF SHAFT STATIONS AND LOADING CHAMBERS**

Sinking and lining of shaft stations and loading chambers were also carried out

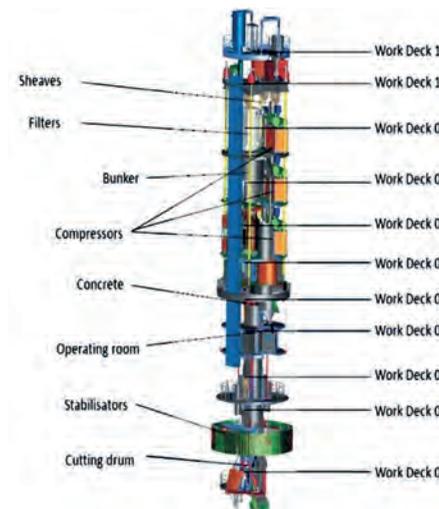


Fig. 10 - SBR design.

without drilling and blasting operations (Figure 13). A selective roadheader was used for division of shaft stations, which made it possible to divide the production circuit and ensure its long-term stability due to exclusion of additional rock fracturing, which potentially occurs during drilling and blasting. Shaft stations and loading chambers lining have been made of reinforced concrete with thickness from 500 to 750 mm. An individually made arched lining was used as timbering for lining of shaft stations, and sectional-panel timbering was used for simultaneous concreting of the shafts and the chambers from the bottom to the top.

**SHAFT FURNITURE**

Skip and cage shafts have been equipped with a traditional system of mine lifts using skips and cages with the use of a furniture system of rigid conductors. The cage shaft is equipped with a cantilever system, skip shaft - with divider system (Figures 14 and 15).

The assembling of steel structures has been carried out according to the downgrading scheme with the use of special galloways 40 m height. It helps to avoid additional re-equipment of the pile driver and accelerates the process of shaft furniture (the diagram of the galloway is shown in Figure 16).

**WORK PROGRESS AND SCHEDULES**

The installation of the freezing station began in October 2017 and active freezing began in February 2018. In April 2018, in parallel with the work on equipping the surface complex, the foreshaft sinking started. At that time, work on the production of SBR complexes ended in Germany.

Once the works of foreshaft sinking, assembling of pile drivers and SBR were finished, the sinking of cage shaft commenced in December 2018 and skip shaft sinking was started the following month.

By November 2020, the sinking and

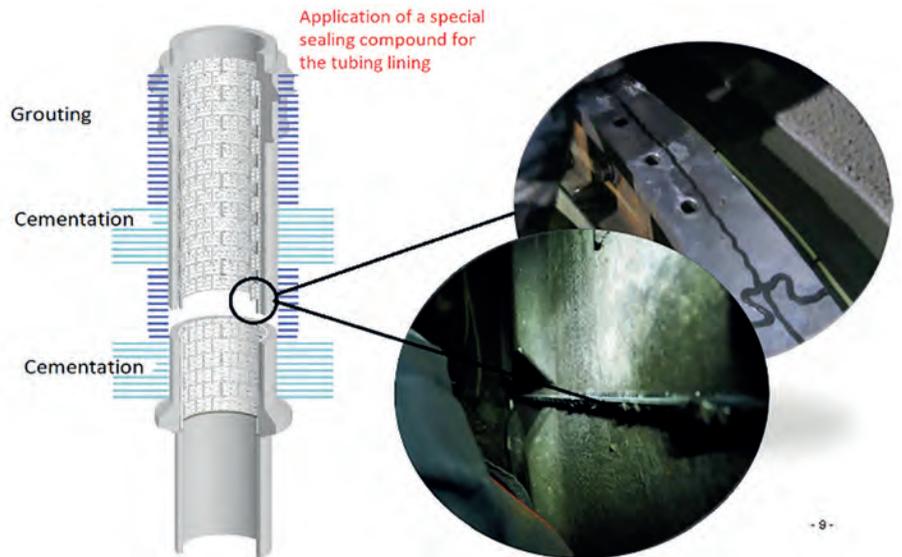


Fig. 12 - Shaft sealing.

lining of the cage shaft were completely finished, including the reinforced concrete lining at a distance of 8 and 13 m from the edge of the shaft. At the same time, the works of the sinking and lining of the main part of the skip shaft were finished, including the shaft stations and loading chambers. The final stage of sinking and lining of shaft sump is carrying out at the moment. Progress and enlarged schedule are shown in Figures 17 and 18.

Once all sinking works are finished, shafts' furnishing and their equipment with lifting machines of constant period will be performed. After that, it is necessary to descent the sinking equipment for underground mining operations and perform the mine drifts near the area of the shafts and the common-shaft bunker. Completion of the entire scope of work is planned in the third quarter of 2022.

It should be noted that the average sinking speed was about 3 m/day, while the maximum rate was set to 7.5 m/

day. In April 2020, a record was set for sinking and lining of the shafts at a rate of 144 m/month. More detailed information on the rate of sinking in April 2020 and the daily capacity of the complexes are given in Figure 19.

**MECHANISED SHAFT SINKING AT THE WOODSMITH MINE PROJECT, NORTH YORKSHIRE, UK, CONCLUSION AND ECONOMIC EFFECT OF RAPID SHAFT SINKING**

Safety of work performance is a priority when making any engineering decisions in organization of mining. Mechanized sinking technology allows to operate a sinking mechanism without people in the working face - the machine is controlled remotely from the operator's room. Accordingly, the risk of collapse to employees and other similar situations occurring during work is reduced to a minimum. The absence of explosive operations, which always involve a certain degree of risk, also improves

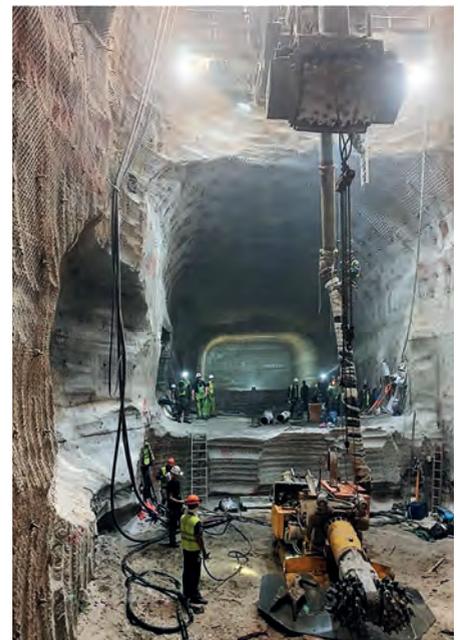


Fig. 13 - Sinking and loading chambers.

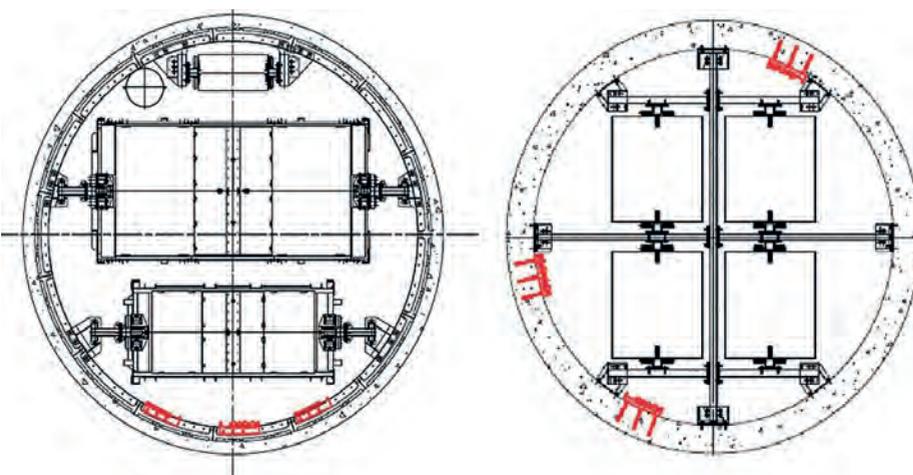


Fig. 14 - Layout of vessels and shaft furniture.

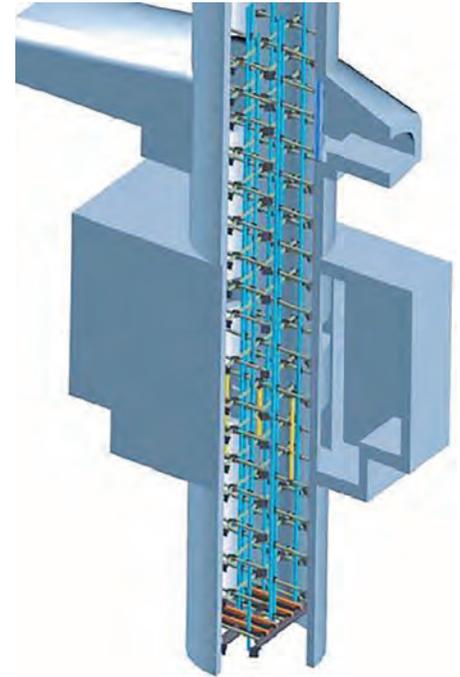
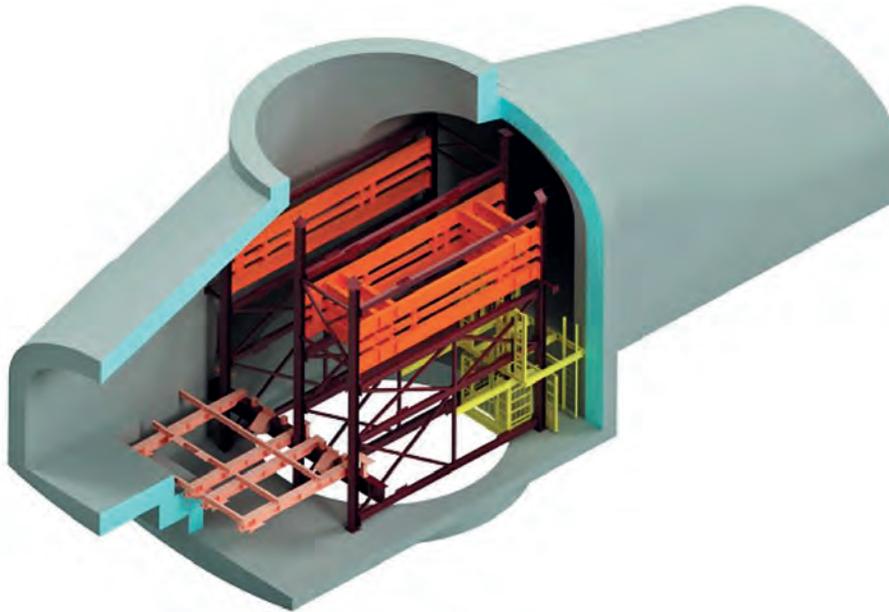


Fig. 15 - Shaft furniture models, on the left – skip shaft in the area of loading chambers and shaft station; on the right – mining machine of the station in the cage shaft.

the work safety as a whole. In the Republic of Belarus, when using SBR sinking systems, certain production capacity has been achieved, which is a significant technological progress. Most of the solutions are innovative, as the sinking of shafts using this equipment is a high-tech process. At the same time, further improvement of the methods of

work with the use of new technologies and structures of materials for shaft lining and mine drifts is developing. In particular, for salt and potash mines, it is necessary to use the technology of erecting an absolutely waterproof lining, which will also reduce the construction time and operating costs. The technology of sinking, as well as shaft lining and underground mine drifts, requires constant improvement and the search for new effective solutions. After all, the reserves that lay down, as they say, in comfortable conditions, are becoming less and less, and in many cases it is also necessary to switch from an open method of

development to an underground one.

As subsoil users have more complex tasks, there is a need to mine at great depths, in difficult geological conditions. Even more difficult is the fact that, given market conditions, this needs to be done at an accelerated pace.

In accepting these challenges, engineers and scientists are engaged in new developments to solve the problems of underdevelopment as efficiently as possible. Therefore, now, for example, a fundamentally new technology for mechanized shaft sinking is being developed, which will be called a machine of a new generation of mechanized passage for the full section

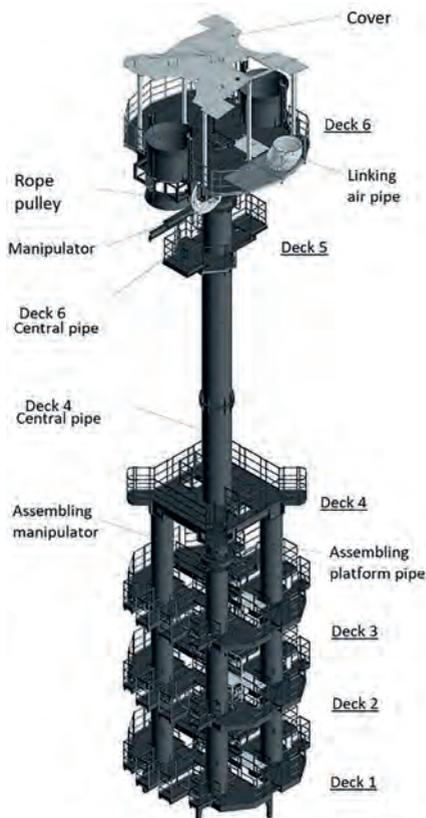


Fig. 16 - The diagram of the Galloway.



Fig. 17 - Site progress.

of the shaft. With it will be possible to realize mechanized sinking at a high rate, including on rocks of high strength.

Shaft sinking is one of the most long-term and high-cost construction stages, which lie on the critical path when commissioning a particular plant. Accordingly, the rapid rate of shaft sinking with the necessary surface preparation - the construction of a surface enrichment or infrastructure complex makes it possible to enter the final products market much faster. And the earlier commissioning of the enterprise, accordingly, allows to save enormous amounts of money by reducing the cost of borrowed funds and reducing the cost of general construction work, accelerating the return on investment and earlier entering the finished product market.

Types of work	Year	1	2	3	4	5
1. Preliminary works/ground freezing/surface equipment		█	█	█		
2. Foreshaft sinking/cage shaft sinking till 697,100 m and shaft stations sinking			█	█	█	
3. Foreshaft sinking/skip shaft sinking till 725,000 m, shaft stations sinking			█	█	█	
4. Shaft furniture					█	█
5. Drifts in the area near the shaft/loading facilities					█	█

Fig. 18 - Schedule of shaft sinking operations.

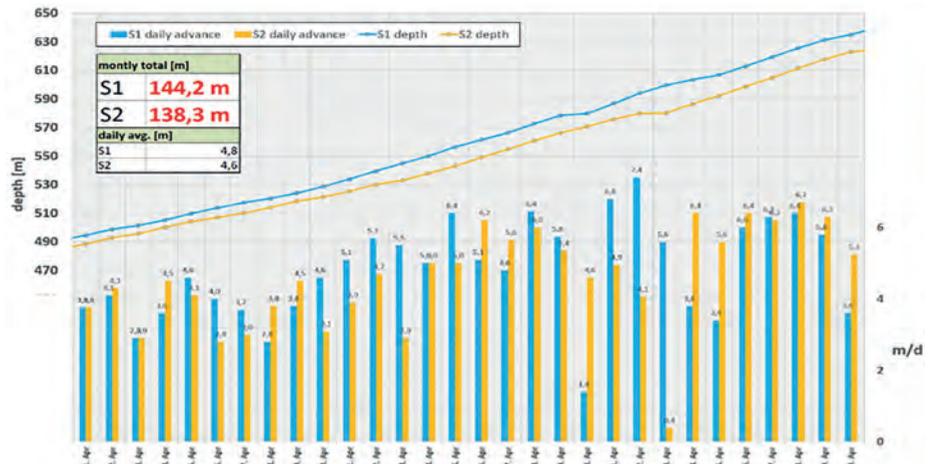


Fig. 19 - SBR shaft sinking advance in April 2020. Nezhinskij Mine, Belarus. (144 m/month - shaft No.1, 138 m/month - shaft No.2)



BY STUART WALKER

Deputy Engineering Manager, Woodsmith New Mine, North Yorkshire



## TYRES & WHEELS

options for quarry, mine & site work

## CUSTOMISED WHEEL RIM MANUFACTURING & MODIFICATION

## WHEEL RIM RECONDITIONING



Kells Road, Bailieborough,  
Co. Cavan, IRELAND  
Phone +353 42 9666444  
sales@agrigeare.ie  
www.agrigeare.ie

# Construct Innovate



**Construct Innovate is Ireland’s national research centre for construction technology and innovation and is a part of Enterprise Ireland’s industry-led Technology Centre programme which aims to provide independent and evidence-based research through collaboration between industry members and research performing organisations (RPOs).**

The Centre has over 80 industry (associate) member organisations, including Geoscience Ireland and Irish Mining and Quarrying Society Corporate Members: BAM Ireland, Ecochem, Roadstone, and in March 2024, Construct Innovate welcomed The Land Development Agency to be the first Patron Member.

Bringing together multidisciplinary research groups from across our partner institutions, the Centre is building a research programme aimed at supporting innovation across key focus areas in construction, such as digital adoption, modern methods of construction, and sustainability.

## WHAT DO WE DO?

Construct Innovate strives to support and run research initiatives to meet the demands of the country’s major

building and investment programmes, Project Ireland 2040, the National Development Plan 2021-2030, Housing for All, and the Climate Action Plan 2023.

## SERVICES: ACCESS TO WORLD-CLASS RESEARCH AND TESTING FACILITIES, REGIONAL, NATIONAL AND INTERNATIONAL FUNDING SUPPORT

We offer our members access to some of Ireland’s most advanced research and innovation infrastructure. In addition, we enable access to the METABUILDING Open Innovation Platform, providing innovators with technical support of experts and/or access to adequate services, test-beds and demo buildings across Europe to advance their technologies.

We also offer services in funding support both through our Construct Innovate funding calls, but also by our membership in securing funding through various national and international research and innovation funding bodies, creating networking opportunities, and addressing Irish construction industry research and development challenges.

As an example, one hugely successful way in which Construct Innovate has been supporting innovation and collaboration in the construction industry is by funding industry-led projects through Seed Fund Calls. These calls are open to all Construct Innovate members. Following the success of its first Seed Fund Call in 2023, Construct Innovate’s second Seed Fund Call attracted many collaborative and impactful project proposals in 2024.



 Figure 1 Construct Innovate’s AIMday hosted by UCD, School of Civil Engineering on 30th of April 2024 attracted over 100 members from academia and industry. Scan code to see full list of Construct Innovate’s members.



**Figure 2** Testing innovative screed properties for Construct Innovate’s associate member by team from School of Engineering, University of Galway (from left: Ciaran Kennedy and Luke Corbett). Scan code to visit Construct Innovate’s Knowledge Hub.

There was a significant increase in applications received compared to 2023, which shows the increased engagement the industry is having with Construct Innovate and the value it can bring to construction sector organisations.

A total of 18 project proposals have been approved for funding in the latest Seed Fund Call, totalling over €1.1m in funding committed by the Centre through this Call alone.

We are also working closely with Enterprise Ireland’s Built to Innovate initiative, which provides a suite of lean, digitalisation and research and innovation grant aid packages.

**KNOWLEDGE HUB**

Part of Construct Innovate’s value to the construction industry is through the provision of open source, freely available resources and information that can assist in upskilling the industry through innovative research-focused developments. Through the Construct Innovate Knowledge Hub, anyone can access published research reports, guides, webinars, training material and tools, and useful information on educational courses that complement the work happening in the Centre and across the industry. The Centre’s Knowledge Hub includes free access to 2023/2024 webinar recordings (subjects correspond to our five pillars), as well as ready-for-download reports and guidelines documents. Examples include our recent publications on “Viable Homes. Practical guidance for planners and developers on carbon optimisation of housing developments” and “Design for Manufacture and Assembly

with Design for Reuse” with more explainers, reports, guidelines and tools coming later this year to Construct Innovate Knowledge Hub.

**CULTURE**

Membership of Construct Innovate is open to all construction and built environment stakeholders. Members are supported and empowered to take ownership of the research, development and innovation activities needed for their organisation’s continued progression, excellence and impact. Through the initiatives undertaken by the Centre, members will get opportunities to discuss challenges facing the industry, get involved in funded research projects to understand and address these challenges, network with their industry peers and access useful information and training that will help organisations to upskill in innovative, modern construction techniques and technologies.

Our research programme is driven by our members. One way in which they can drive the research agenda is through thematic working groups including: Modern Methods of Construction, Sustainable Concrete and Cements, Mass Timber Construction, Materials and Technology Testing, Innovative material and Technology Adoption, Whole Lifecycle Carbon (WLC) Accounting, Lean Construction and Digital Tools, Sustainable Planning and Construction and Overheating in Irish Dwellings. Construct Innovate’s working groups are an essential part in understanding and discussing particular challenges faced by stakeholders in the Irish construction industry and translating them into research-based activities. The working groups enhance collaboration, information sharing and networking between members of Construct Innovate.



**Figure 3** Examples of Construct Innovate open access resources: “Viable Homes. Practical guidance for planners and developers on carbon optimisation of housing developments” report (Irish Green Building Council and UCD) and “Design for Manufacture and Assembly with Design for Reuse” (Trinity College Dublin).

Contact us to become a member: [info@constructinnovate.ie](mailto:info@constructinnovate.ie)

For more information visit: [www.constructinnovate.ie](http://www.constructinnovate.ie)



**BY COLM MCHUGH**  
Centre Manager



## Introduction

The circular economy aims to tackle climate change and other global challenges such as waste, pollution and biodiversity loss. Transition to a circular economy aims to reduce resource consumption, keeping assets' components and materials at their highest value and promoting regenerative and restorative design. This must be achieved while maintaining safety and technical function. Transport Infrastructure Ireland (TII) is the Irish government organisation responsible for delivery and operation of the national road, light rail and Metro networks in Ireland. In addition, TII publishes design standards which are used along the lifecycle of the TII transport network. As a result, TII influences the consumption of significant quantities of resources in the Irish economy, in particular asphalt, concrete and steel.

In 2020, in light of its role and influence on resource consumption, TII commissioned Arup to undertake a review of international best practice in relation to circular economy. TII's approach to transition to a circular economy will support implementation of the Department of Transport's National Investment Framework for Transport in Ireland (NIFTI) Intervention Hierarchy depicted in Figure 1 below.

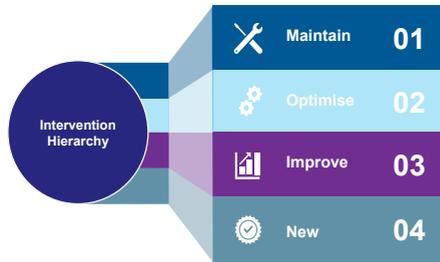


Figure 1: NIFTI Transport Intervention Hierarchy

## Method

A "state of the art" literature review of selected transport agencies' approaches to circular economy and resource consumption was undertaken in 2020. Barriers and Opportunities workshops on approaches to circular economy were undertaken with senior management and key experts in TII based on the findings of the literature review. From these workshops, six key focus areas were established. These areas are shown in Figure 2.



Figure 2: TII Circular Economy Focus Areas

## Systems Mapping Workshops

A series of systems mapping workshops were then undertaken with selected TII staff responsible for the delivery and operation of national road and light rail assets. External workshops were also undertaken with an industry group and similar organisations to TII representing the transport infrastructure sector. The workshops used systems mapping techniques to review and verify a systems map of stakeholder roles and develop circular economy transition actions. The resulting systems diagram is presented in Figure 3 below.

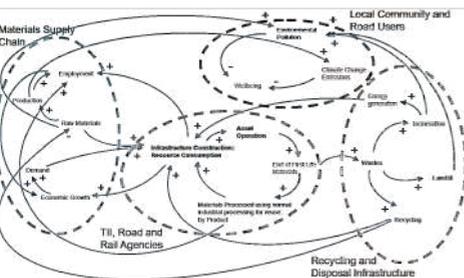
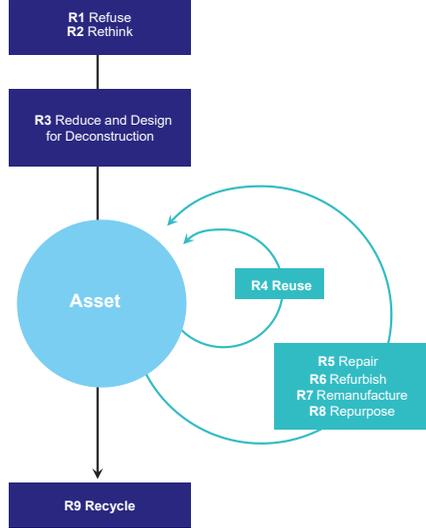


Figure 3: Transport Infrastructure Circularity and Materials Systems Map

## 9R Approach to Circular Economy

The 9R approach to Circular Economy has been adopted by the European Commission and the European Investment Bank. It has been adapted for use by TII, as shown in Figure 4 below.

Figure 4: 9R Categorisation of Circular Economy Strategies (adapted from the European Commission and Rijkswaterstaat)



The TII Circular Economy Policy and Strategy were published in September 2023. These included the focus areas identified in workshops. The Policy sets out the purpose of circular economy at TII, and TII's circular economy objectives and focus areas. The Strategy sets out how the Circular Economy delivers on TII's Strategic and Sustainability aims. It sets out steps TII will take to transition from a linear to a circular approach including circular economy pilot projects, creation of new standards, updates to existing standards, publication of design guidelines for projects and programmes, and education and training initiatives.

## Pilot Projects and Results

During preparation of the TII Circular Economy Policy and Strategy, pilot projects were undertaken on pavement design and light rail. In order to allow for the opportunity to reduce, reuse or repurpose materials within pavement construction, performance related aspects were introduced to pavement design and material specification. This is encapsulated within the Irish Analytic Pavement Design Method (IAPDM), the updated standard DN-PAV-03021 Analytic Pavement & Foundation Design and the accompanying IAPDM web-based software. The benefits of application of the IAPDM approach were demonstrated through a circular pilot project, the N4 Collooney to Castlebaldwin Road Development (N4 CCRD) (14km of Type 2 Dual Carriageway, and just under 1km of Single Carriageway). Table 1 shows estimated savings which were calculated during the pilot.

Table 1: Estimated savings due to applying the IAPDM approach to pavement design in comparison with business-as-usual case

Savings	Bituminous Materials
<b>8,715</b> tonnes	8% saving in bituminous materials for a typical 150mm layer thickness. <i>Note: Road Type 2 Dual Carriageway (16.5m pavement width), New pavement length 14km.</i>
<b>€647.4k</b>	<b>Project Cost Saving</b> Equivalent 8% saving on a typical 150mm bituminous layer. <i>Note: Dense bitumen macadam with G40/60 penetration binder with 23m aggregate roadbase, TII Schedule of Rates 2019 (CC-GMP-00054 Oct 2019).</i>
<b>454,923</b> kgCO <sub>2</sub> e	<b>Embodied Carbon emissions</b> Equivalent 8% reduction for a typical 150mm bituminous layer. <i>Note: TII Carbon Tool, Asphalt 4% binder content</i>

A circular economy pilot project was also undertaken on the Preliminary design phase of the Luas Finglas Project in May 2022. The Preferred Route for Luas Finglas is approximately 4km long with four stops and comprises approx. 70% grass track. A review of the proposed scheme was undertaken, and key resource flows identified. Some of the opportunities identified for circularity on the project include:



**Earthworks optimisation:** As a result of enhanced review of GI data approximately 20,900 m<sup>3</sup> of excess material (38-40,000 tonnes) potentially available for reuse on the project were identified. The majority of this is expected to comprise made ground – generally firm to stiff gravelly clay containing inert construction and demolition waste.



**Design for disassembly of track:** The project team is adopting a design for disassembly and future reuse approach to track design. It will prevent concrete breaking out, reduce carbon emissions and costs. The resulting carbon saving is estimated at 1,056 tCO<sub>2</sub>e for embodied and use-phase carbon over the length of the scheme.

Additional measures include material data integration into BIM (Building Information Modelling), active travel promotion and adoption of nature-based solutions in conjunction with Dublin City Council.

## cPCRs and Standards Updates

A number of updates to TII Standards also commenced, which will contribute to TII's transition to a circular approach which are of note in the context of TII's transition as they contribute to transition of TII to a circular approach. These were supported by industry or stakeholder consultation as appropriate.

TII published DN-PAV-03077 Complementary Product Category Rules for Bituminous Mixtures (c-PCR Bituminous Mixtures) in January 2024. This enables evidence-based use of EPDs (Environmental Product Declarations) for a range of applications, including procurement. The greenhouse gas emissions EPD data contained within EPDs is of particular interest in the context of emissions reduction and transition to a circular economy. In the future TII will create and publish cPCRs for further road construction materials which will support circular economy transition.

The TII standard CC-SPW-00600 - Specification for Road Works Series 600 – Earthworks is currently being updated and this update will ensure alignment with the Irish Environmental Protection Agencies Article 27 regulatory process for reuse of by products and the Article 28 regulatory process to achieve end of waste and use recycled materials.

The TII standard CC-SPW-00900 - Specification for Road Works Series 900 – Road Pavements – Bituminous Materials is currently being updated including an increase in the permissible recycled content to 70% of the lower road pavement layers.

## Conclusion

- While the circular economy is a means of achieving TII's strategic and sustainability aims, the circular economy approach required tailoring to fit the transport infrastructure context. This involved a particular focus on safety and delivery of technical functional asset objectives. Bespoke circular economy objectives and focus areas were created specifically for TII.
- The tangible benefits of a circular approach were demonstrated by pilot projects.
- Standards' updates will be delivered in 2024 to support transport infrastructure designers who wish to incorporate circularity, by products and recycled materials in their design
- With publication of its Circular Economy Policy and Circular Economy Strategy in September 2023, TII has set out its circular economy objectives, and the actions to deliver these under 6 focus area headings.
- The approach taken was collaborative, including a cross-divisional consultation approach and creation of an external industry consultation committee. This collaborative approach will continue during circular economy implementation through the period 2024-2025.

## Contact Information

**Esther Madden, Transport Infrastructure Ireland**

Tel: +353 (0)1 6463600

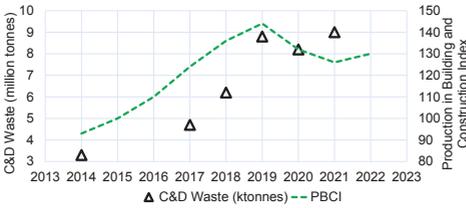
Email: Esther.Madden@tii.ie

Web: www.tii.ie

## Introduction

The earthworks associated with road projects can be significant in terms of the environmental impacts, energy usage, and sustainability of a scheme. For example:

- Construction industry responsible for 37% of global carbon emissions (UN, 2022).
- Earthworks activities can account for up to 90% of GHG emissions on construction of road infrastructure projects (Kim et al. 2011).
- In Ireland, between 2017-21, waste from C&D projects increased from 4.8 to 9 million tonnes. 85% of this waste consists of 'soil and stone' (EPA, 2023).
- Earthworks can represent between 15% to 20% of the capital cost of an infrastructure project (Castro, 2005; Monahan (2012).
- Integration of planning methods with allocation of earthmoving based on mass haul can reduce environmental impacts and cost (Jassim, 2019).



EPA (2023) Construction & Demolition Waste Statistics



## National Sustainability Policy

European Waste Framework Directive requires consideration of prevention and reuse ahead of disposal. Ireland's National Waste Prevention Programme aims to move away from a linear take-make-waste model to a circular approach to materials and resources



European Commission – Waste Framework Directive



National Waste Prevention Programme – Circular Economy

## TII Objectives

TII's strategic objectives include the promotion of low-carbon approaches and products in infrastructure construction. TII aims to provide sustainable transport solutions, delivering a better quality of life, supporting economic growth, and respecting the environment. This is reflected in TII's Sustainability Implementation Plan and Circular Economy Strategy. This led to a focus on optimising all aspects of road construction including earthworks, in terms of sustainability.

## Earthworks Aspects of Sustainability

To achieve the above objectives in road projects, it is necessary to consider the following earthworks-related sustainability objectives during design:

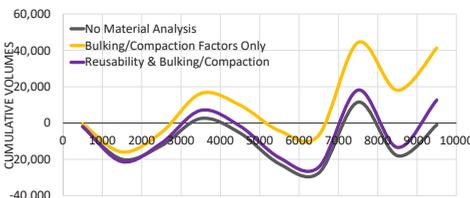
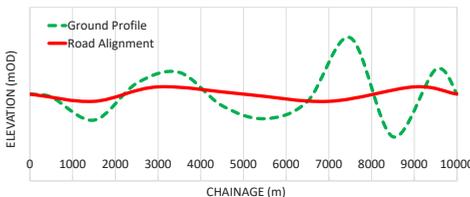
- Optimisation of material extraction
- Maximisation of material re-use
- Allocation of materials at their highest value
- Optimisation of haulage
- Minimisation of waste
- Minimisation of reliance on external natural resources

Inadequate consideration of earthworks in terms of reusability, allocation and movement/haulage can have a significantly negative contribution to the environmental impacts for a road project. The consideration of measures at planning phases is particularly important because early interventions have the potential to be significantly less costly than remedial measures implemented during detailed design and construction post-statutory approval.

The basic definition of Mass Haul is Volume x Distance Travelled. But to be effective, Mass Haul and Earthworks Analysis should consider a number of important aspects, including:

- Material acceptability
- Material bulking and compaction factors
- Material classification and value
- Sources and destinations, including alternative sites
- Haulage distance, gradient, and constraints
- Haulage equipment

Failure to adequately consider these can give significantly misleading results, which will result in inefficient and unsustainable solutions. For example, in the Mass Haul analysis below, if no material analysis is undertaken, the scheme appears to have an earthworks balance (i.e. volume of cut equals volume of fill). However, if material bulking and compaction is taken into account, there is a significant surplus of material. If reusability is considered, the surplus reduces. Similar variances can be expected once other aspects are considered. This demonstrates the importance of undertaking a robust earthworks analysis taking account of all relevant aspects.



## Mass Haul & Earthworks Analysis Tool

In order to facilitate robust earthworks analysis in a practical manner at the early stages of design, semi-automated Excel-based tools have been developed. These not only allow for a mass haul analysis which takes account of all relevant aspects, thereby developing an optimised design, but also assist designers to explore and meet sustainability objectives, by identifying opportunities to modify design when it is at its most flexible.



The tools are tailored for the level of geotechnical information that is usually available at the early stages of design, and also for the frequent modifications to alignment geometry that typically occurs as the design evolves.

The tools produce mass haul diagrams for the overall earthworks quantities, and for each material type, with the designer free to define material classifications, either in terms of generalized geological classifications, or using classifications from the TII Specification for Road Works. They also undertake a haulage assessment for each material type and each earthworks area, including:

- Haulage distance and volume in terms of freehaul and overhaul
- Volumes and total distance for uphill movements
- Constraints to earthworks movements
- Distances in excess of freehaul
- Backwards and forwards earthworks movements up to two earthworks areas beyond the source.
- Imports, exports, borrow pits, and material deposition areas.

The tools provide visual prompts to the designer where the earthworks design is sub-optimal in terms of sustainability, allowing the designer to take measures to address these.

From	To	Chainage	To the 1st Next Fill Section	FORWARD MOVEMENT			
				To the 2nd Next	Constraints		
-150	50	CUT	0.27%	YES	154	0.55%	YES
50	450	FILL					
450	700	CUT	0.63%	NO	23	1175	
700	2800	FILL					
2800	3200	CUT	-0.72%	NO	462	315	
3200	3850	FILL					
3850	4200	CUT	0.06%	YES	541	300	
4200	4850	FILL					
4850	5100	CUT	0.26%	NO	172	450	
5100	5750	FILL					
5750	6650	CUT	0.46%	YES	5269	875	
6650	7700	FILL					
7700	7800	CUT	1.84%	NO	36	200	
7800	8100	FILL					
8100	8400	CUT	0.18%	NO	1626	450	
8400	9000	FILL					
9000	9200	CUT	0.25%	NO	695	600	

Pilot trials of the tools were undertaken on two National Road projects in Ireland, which demonstrated their effectiveness as practical aids to the design teams and assisting in the enhancement of the sustainability outcomes on both projects. Subsequently, the tools, along with a User Guide, have been made available for use on all National Road projects.

## Contact Information

### John O'Connor

Arup  
One Albert Quay  
Cork, T12 X8N6  
Ireland

Tel: +353 21 422 3200  
Email: [john.oconnor@arup.com](mailto:john.oconnor@arup.com)  
Web: [www.arup.com](http://www.arup.com)

# Saint-Gobain Mining (Ireland) Ltd 2024 Update

## Drummond Mine/ Knocknacran Open Cast Mine



Progress continues to be made on the application to expand our open cast mining activities. The area Knocknacran West is just one kilometre from the current mine. It is Saint-Gobain's intent that this mine will employ the latest industry 4.0 technologies.

An Board Pleanála is now handling the planning application for which an update is anticipated later this year. In preparation for this we have also submitted an application for an EPA license.

The existing Drummond Mine and Knocknacran Open Cast Mine continue to supply the growing Irish construction market with the material for plasterboard and plaster.

Following the successful completion of phase one of the new Magheraclone Mitchell's GAA playing ground, the planning application includes a second phase which will see Saint-Gobain deliver two further pitches, a running track and a club house.



 Drumgoosat Community Centre: July 24.

Terrific progress has been made on the development of a Community Centre complex in Drumgoosat. The final touches are being completed to this world class community asset. Saint-Gobain broke ground at the site in 2023 and very soon will be delighted to hand it over to the local community.

Once completed this centre will include a sports arena for basketball, volleyball or badminton enthusiasts. The multiple studios as well as modern changing and catering facilities means the opportunities for use are endless.

  
**SAINT-GOBAIN**  
**BY BENSON PLUNKETT**  
Mine Manager,  
Drummond Mine,  
Knocknacran Open  
Cast Mine



 The proposed new Knocknacran West Open Cast Mine site.

# IMQS Golf & Dinner Dance 2023

IMQS Dinner Dance, Knightsbrook Hotel, Trim Co.Meath, Saturday 11th November 2023.

The full selection of photos from the IMQS 2023 Dinner Dance are available for viewing on our website.



Eddie Nethery (Chairman of the Institute of Quarrying (IOQ) - Northern Ireland), Nicola Nixon (IMQS Past President and Executive Secretary) and Alan Dolan (IMQS President).



IMQS Council members (L-R) Sean Finlay, Liam O'Shea (Treasurer) Ruairi O'Connor (Vice President), Aoife Brady, Alan Dolan (President), Nicola Nixon (Past President and Executive Secretary), John Francis, Siobhan Tinnelly, Keith Mc Grath and Ronan Griffin.

**OBITUARY**

# Seán Gilmore

**(1951 – 2023)**


**Seán Gilmore was born on 9th September 1951 in Milltown, Co. Galway. He lived on the family farm with his parents, John and Mary, and his younger siblings Mary and Michael.**

Seán attended Milltown National school until the age of 11 when he sadly lost his father in a tragic farming accident, and as the eldest son, he stepped up to take over the family farm. He farmed the land in Milltown until he had seen his younger siblings through their secondary and third level education, and then moved to Dublin with his wife Marian to forge his own path.

He worked with the building construction company Dwyer & Nolan from 1979 until 1981, when he returned to Galway to begin his career in manufacturing. He co-founded the plastics manufacturing company JSL with his brother-in-law Richard Browne.

They enjoyed success with this company and in 1986 they were bought out by Westport Plastics Ltd., with Seán taking up a role within the mother company as part of the merger.

In 1990, Seán moved to Thurles, Co. Tipperary with his wife and young family to take up the role of Production Manager at GMX, the Irish branch of the French company, Moulinex, who specialised in the moulding and manufacturing of kitchen appliances.

During his 11 year tenure with GMX, Seán completed several courses in Management with the Open University and also became fluent in French. This proved to be a vital tool in communicating with his French colleagues in Moulinex, and also ensured his presence whenever an Irish contingent were 'forced' to travel to France for meetings.

GMX closed in 2001 and Seán took on a lead role within the 'Thurles inter-agency Task Force', whose main focus was to ensure fair redundancy and future employment opportunities for the Company's 200 strong work-force, which at the time accounted for 20% of the entire employment of Thurles.

A comment made at the time suggested that in the Task Force's meetings with Government Ministers and officials, Seán was never on the back foot and he did not rest until a



 **Seán Gilmore.**

fair package was secured for his staff.

In 2002, Seán took up the position of Assistant Safety Officer in Galmoy Mine, County Kilkenny. He was subsequently promoted to Safety Officer. Seán was instrumental in developing the Safety Management System at the mine.

He also spent many hours helping to develop the Mine Rescue team. This included helping to organise and

take part in training sessions, setting up and running competitions, and constant administrative back-up.

In 2010, Seán was contracted by the School of the Holy Spirit in Kilkenny. This special needs school had just moved into new state-of-the-art premises, and needed professional advice to set up their safety management system.

Seán worked with the school for



Seán with his family at his daughter's wedding.



Seán with his training colleagues from Tara, Brian McKenna and Paul Fitzgerald.

about a six-month period, helping to get the safety system and statutory documentation in place. Seán's attention to detail meant that the system was robust and easy to use, and is still the foundation for safety management at the school today.

In late 2010 Seán moved to New Boliden's Tara Mine in County Meath, as Mine Training Coordinator, and stayed in that post until his passing.

As Mine Training Coordinator, Seán's office was in the 'wicket' area where all mining crews assembled. This enabled Seán to establish a great rapport with the whole mining workforce.

Seán established a highly organised system that covered statutory and Boliden Tara training requirements for the whole Mine Division. His training colleagues commented that he had everything so stream-lined that the programme was enjoyable and straight-forward to work with. Seán was also consulted by many other departments in Tara, from complicated technical and procedural issues to

general support and practical advice.

Seán was also key in the evolution and implementation of the Personal Safety Management System (PSMS), part of Tara's high focus on safety.

Seán had a keen interest in sports, especially GAA and rugby, while he also enjoyed gardening, classical music, and meditation and spirituality in recent years.

Seán was often described as a quiet man, but to those who knew him best, he was regarded to be a thoughtful man, who carefully considered what to say before he offered advice or opinion.

Seán was a font of knowledge and encouragement for his colleagues and friends, professional in everything that he did, and he had a very positive influence on the improvement of safety in the Irish mining industry.

Seán died on 1st November 2023. He is survived by his wife Marian, son David, daughter Rachael, daughter in-law Sheila, son in-law Dave and his grandchildren, Robyn, Joe, Ella, Dj, Grace and Rosie.



Seán as a young boy in Milltown, Co. Galway.

**OBITUARY WRITTEN BY  
DAVID GILMORE, MIKE LOWTHER  
AND PAUL FITZGERALD**



Seán with his mine rescue colleagues at Galmoy Mine in 2002.



Seán adjudicating at a mine rescue competition in Boliden Tara Mine in 2014.

# HAPPY COLOURING

Colouring pages for children of all ages - great fun and creative.



## HOW TO ENTER

Name: .....

Address: .....

Email: .....

Please send your entry to  
**IRISH MINING & QUARRYING SOCIETY,**  
 27 UPPER PEMBROKE ST, DUBLIN 2, IRELAND, D02 X361

\*Terms and conditions apply.

**Competition Closing Date: 19th January 2025**

## THE WINNERS OF THE 2023 ANNUAL REVIEW COLOURING COMPETITION

**1ST PRIZE: KATE FORDE**  
 (ST. ANNE'S LORETO N.S., NAVAN)

**2ND PRIZE: AMY DAWNAY**  
 (KILCOCK, CO. MEATH)

**3RD PRIZE: NIAMH & EOIN BURNS**  
 (BALLINASLOE, CO. GALWAY)

**UNDER 5: GEORGE LYNCH (DUBLIN 15)**



**Twitter: @IMQS\_IE    LinkedIn: Irish Mining and Quarrying Society (IMQS)**

# CONGRATULATIONS TO OUR WINNERS OF THE 2023 COLOURING COMPETITION!



## TDS 815 SLOW SPEED SHREDDER



📍 10 Coolmaghry Road, Donaghmore, Dungannon BT70 3 HJ  
✉ info@qrs.ie  
☎ +442887767120  
**SALES/SERVICE/HIRE**



# MEMBERSHIP APPLICATION FORM

Irish Mining & Quarrying Society, 27 Upper Pembroke Street, Dublin 2, Ireland, D02 X361

Web: [www.imqs.ie](http://www.imqs.ie) Email: [info@imqs.ie](mailto:info@imqs.ie) Tel: 089 49 27942

## PERSONAL Details (PLEASE USE BLOCK CAPITALS THROUGHOUT)

Surname: ..... Forename(s): .....

Home Address: .....

.....

Telephone Number: .....

Mobile: .....

Home E-Mail Address: .....

## EMPLOYER Details (PLEASE USE BLOCK CAPITALS THROUGHOUT)

Employer: .....

Address: .....

.....

Telephone Number: ..... Mobile: .....

Work E-Mail Address: .....

Correspondence Address (please tick both location to be sent to & by what means Home  Work  E-Mail (preferred by IMQS)  Post

Please state association with the Mining or Quarrying Industry: .....

Proposed by: ..... (Existing IMQS Member)

**Note:** Should the candidate be unable to obtain a proposer who is a member of the IMQS, the application will be assessed by the Council of the IMQS and membership is subject to the approval of the Council. Please send to address above enclosing payment of €50 (ordinary membership). (Membership fees are payable in January each year and are valid for that calendar year).

## ADVERTISERS INDEX

- |                        |                        |                         |
|------------------------|------------------------|-------------------------|
| 2. Kemek               | 39. McHale Plant Sales | 63. SLR Consulting      |
| 7. Epiroc              | 43. McCabe Contracts   | 65. Sandvik             |
| 9. Pat O'Donnell       | 45. Ashbourne Trucks   | 69. Cemcor              |
| 11. QME Mining         | 49. C&K Fitzpatrick    | 83. QRS Cedarapids      |
| 13. Irish Drilling     | 50. Liebherr           | 87. Kalsaran            |
| 17. Irish Salt Mine    | 51. Liebherr           | 95. Rapid International |
| 21. Dalradian          | 53. Tobin              | 121. QRS                |
| 25. Creagh Concrete    | 54. Pat O'Connor       | 123. Irish Cement       |
| 29. Quarryplan         | 55. Pat O'Connor       | 124. Close Brothers     |
| 33. McGraths Limestone | 57. Roadstone          |                         |
| 35. GSNI               | 61. Epiroc             |                         |

# THE CEMENT YOU TRUST



Same great cement now available in both the reliable paper bag and new plastic bag.

[www.irishcement.ie](http://www.irishcement.ie)



# ACTIVELY, PRACTICALLY, WE'LL HELP YOU THRIVE

Close Brothers Commercial Finance provide asset based lending, invoice finance and asset finance solutions to businesses across Ireland.

We can help you access the working capital you need.

Contact us today on (0)28 9099 5701 / +353(1) 901 5224  
or visit [closecommercialfinance.ie](http://closecommercialfinance.ie)



**Close Brothers**  
Commercial Finance