

# Geological Survey Ireland – a newcomer’s perspective

Adam Dawson, May 2022

*All photos by the author*



Figure 1 The Geological Survey Ireland “Down to Earth” exhibition, celebrating the Survey’s 175<sup>th</sup> anniversary. The displays are fully bilingual - Irish and English

## Introduction

Relocating to a new country is undoubtedly challenging and at times sheer hard work. But whatever your reasons for moving, you’re presented with the chance to meet new people, visit new places, and learn new things. We’ve certainly been through all these experiences – and more – since coming to Ireland from the UK last year. Right now we’re living just to the north of Dublin and aside from the intrinsic interest of the local geology, being close to the capital means that all the country’s main institutions – geological and otherwise – are right on our doorstep.

Ireland does many things well, and its numerous museums and galleries must surely rank among some of the best in Europe. Dublin is, of course, well provided with these institutions and one in particular should catch the eye of any visiting geologist. Out to the west of the City Centre – right opposite the Guinness brewery in fact – is the Collins Barracks building. This magnificent 18<sup>th</sup> century structure, faced with Wicklow granite and roofed in Welsh slate, was discontinued from military use in 1997 and passed into the keeping of the Office of Public Works. Today it hosts the *National Museum of Ireland – Decorative Arts and History*, which is itself excellent (and free to enter).



Figure 2 The Collins Barracks, Dublin. Home to the *National Museum of Ireland – Decorative Arts and History*, and the Geological Survey Ireland exhibition

But why might a geologist be interested in any of this? The reason is simple. From September last year until around the end of 2022, the Barracks is not only hosting the Decorative Arts museum, but also an exhibition “*Down to Earth - Exploring Ireland's Geology*” laid on by Geological Survey Ireland, which commemorated its 175<sup>th</sup> anniversary in 2020 (albeit the event was delayed slightly by the pandemic), and the National Museum of Ireland.

The exhibition is interesting – not only to geologists but also more widely – because it offers an insight into the extraordinary diversity of the geology in this small island. But perhaps more than that, it is also a useful reminder that Ireland was in fact one of the first countries in the world to be geologically mapped, and to this day remains one of the best studied, with pioneering and world-leading geological survey work going on every day.

### History of Geological Survey Ireland

The modern Geological Survey Ireland is a division of the Department of the Environment, Climate and Communications, and has around a hundred staff. But the exhibition explains how its roots lie in the 1820s when the Ordnance Survey started mapping the landscape of Ireland, and then in 1838 when Sir Richard Griffith, a mining engineer and chairman of the Board of Works, published the first geological map. It came just 20 years after the publication of William Smith's geological map of England, Wales and (parts of) Scotland.



*Figure 3 You're greeted by a huge walk-on geological map of Ireland as soon as you enter the exhibition. There well informed and helpful GSI staff on hand, too, to help guide you through the exhibition and answer questions. It's excellently done.*

Shortly afterwards, in 1845, the Geological Survey of the United Kingdom was established. As this was almost a century before Irish Independence in 1922, it also had responsibility for Ireland alongside England, Wales and Scotland. The first director of the (UK) Geological Survey was Henry Thomas de la Beche and at the same time Henry James was appointed the Local Superintendent of the Geological Survey of Ireland. The Survey's first task in Ireland was to produce a more detailed six-inch (1:10,560) scale geological map of the whole island although the process wasn't aided by the Geological Survey Director's refusal to pay for horses "in case the surveyors lost the use of their legs".



The prime purposes of these early geological surveys of Ireland were to establish land valuations for taxation purposes, and to identify potential coal and mineral reserves. But often fossil data, as well as bedrock and drift mapping, was collected to try and establish relative ages of the geology. At the time, these six-inch maps were amongst the most detailed, accurate, and comprehensive in the world which is one of the reasons why Ireland has been able to develop and retain its position as one of the world's best geologically understood regions.

*Figure 4 One of the first geological maps of Ireland. The early editions were hand-coloured*

The survey work was completed and consolidated into 205 one-inch (1:63,360) maps which were published in 1890. These original maps really were works of art – printed from blocks of finely grained limestone, etched with mapping detail in negative relief.

Moving towards the modern day, the Geological Survey was established in its own right after Independence and was swift to adopt new technologies as they became available. In the 1980s and 90s, Geological Survey Ireland was one of the first geological institutions in the world to adopt digital mapping, publishing its first digitally-produced map (of North County Mayo) in 1992.

### Current priorities

Considering its relatively small size, the Geological Survey Ireland today carries offers a surprisingly wide range of services to the geological and public communities. Aside from describing ongoing activities such as supporting seismic event monitoring (including quarry blasting) and routine mapping, the exhibition focuses on three areas of their work where the Survey has established a unique or world-leading position.

First is the surveying and monitoring of groundwater. Ireland gets an unusually large proportion – about a third – of its drinking water from groundwater. This water is generally very clean, having been purified through layers of rock. However because a sizeable proportion of Ireland is covered in karstified limestone, in these areas surface contamination can travel quickly into the groundwater, unfiltered, through this highly permeable rock. Pollution from farms in one county can end up contaminating drinking water two or more counties away – a problem which creates the necessity for careful tracing to understand the systems and enhance groundwater protection.



The second priority is “Tellus” – a massive, detailed project to gather geochemical and geophysical data for the rocks, soils and water of the whole of the island of Ireland (it was in fact started with the Geological Survey of Northern Ireland). A combination of aerial geophysical surveying and ground-based geochemical sampling is being used to compile a database, which is already finding application in mineral exploration, in enhancing agricultural productivity and in environmental management. It’s about three-quarters finished and those exploration geologists who have used it attest to the excellence of the data. The Geological Survey Ireland’s priority is to secure the resources that will be needed to complete it.



Figure 5 Tellus - a huge project to map the geochemistry of the whole of Ireland down to an extremely detailed level



Figure 6 Guests of all ages enjoy the visit to the virtual cabin of one of the INFOMAR marine survey vessels, impressively mocked-up as part of the exhibition

And the final big priority is the INFOMAR programme to map the whole of Ireland’s seabed as far as the edge of the continental shelf – an area ten times as big as the land of the country of Ireland itself. The programme is jointly managed and run by Geological Survey Ireland and the Marine Institute. The data are some of the most detailed in the world, and are already proving useful in, among other things, the siting of offshore wind farms, and for monitoring the effects of climate change on coasts.

Less technically-minded visitors to the exhibition will enjoy the displays of some of Ireland’s economically important rocks and minerals, and the explanation of how geologically-derived materials make their way into almost every aspect of our day to day lives – from washing powder to mobile phones, from jewellery to foodstuffs. It seems to be a great way to encourage budding Irish geologists to take an interest in their country – and maybe even to consider a geological career one day.

In this context, it seems to come as a bit of a revelation to some visitors to learn that one of Europe's biggest zinc mines is situated just up the road from Dublin – in Navan. In fact the Boliden Tara mine is so well landscaped that large numbers of the people who live in the nearby town don't even know how big it is – most of the workings, which extend a kilometre underground – are completely invisible from the surface. More recently, a further deposit ("Tara Deep") has been identified at a depth of up to 1900m, and is slated for future development. An excellent example of mining bringing economic benefit to the country while minimising the environmental impact.



*Figure 7 Daily freight train, passing through Donabate station with zinc ore from the Tara mine at Navan, heading for export via the Alexandra Dock in Dublin*

### Exploring Ireland's geology

If you live in Ireland, and even if you haven't been to the exhibition, it's actually quite hard not to be impressed by the rich diversity of this country's geological heritage. Taking the east coast near Dublin as an example – to the north, the Fingal group of lower carboniferous limestones are well exposed, with fine examples of fossilised coral (*Lithostrotion*) and brachiopods easily visible at low tide in the beds near Malahide. To the south of the capital lie the Wicklow Mountains, shaped by northwest Europe's largest granitic batholith. This has long been a source of building materials – the outcrop at Dalkey being extensively quarried in the past to provide rock for coastal defences and harbour walls around Dublin port, for paving stones, and for the construction of the Basilica in St John's, Newfoundland.



*Figure 8 Precariously-perched glacial erratic balanced on the Karst of the Burren limestone*

Heading further west, the Karstic limestone outcrop in County Clare is world renowned and simply astonishing, as are the carboniferous sandstones and shales that make up the impressive Cliffs of Moher, a little further south.

But what might actually matter more to Ireland in the longer term could be the mineral assets that lie hidden from sight below ground. Gold, lead, nickel and copper deposits have been identified and further exploration may reveal commercially viable prospects. Industrial materials including gypsum and fireclays, as well as granites and limestones, are also of interest.

So it seems likely that there is a great potential wealth under Ireland's feet. Perhaps today's visitors to the Down to Earth exhibition may become the geologists of the future who will unlock it, using the world leading tools that the Survey itself has developed over the last one and three-quarter centuries.

Find out more

Down to Earth – Exploring Ireland’s Geology:

<https://www.museum.ie/en-IE/Museums/Decorative-Arts-History/Exhibitions/Down-to-Earth>

Geological Survey Ireland:

<https://www.gsi.ie/en-ie/Pages/default.aspx>

Irish Geological Association:

<https://geology.ie/>