ROCKIN' AROUND CUILCAGH LAKELANDS GEOPARK

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Global Geopark

Content

Introduction

The Cuilcagh Lakelands UNESCO Global Geopark, located in Co. Fermanagh and Co. Cavan takes in some of the most stunning landscapes on the island of Ireland. Designated as a UNESCO Global Geopark, the entire area has been given this status due to its internationally important geological heritage. But what does this really mean and where can you go to see some of these important rocks and landscapes?

This guide will take you on a journey through time, highlighting the various time periods, environments and earth processes that have helped shape the Cuilcagh Lakelands UNESCO Global Geopark. Come and join us and discover the multitude of chapters that combine to tell us the geological story of the area.

Introduction to Geology

The study of the Earth, or geology as it is more commonly known, tells us about past environments, ancient landscapes, dynamic earth processes and even provides a record of ancient life on our planet. The best geologists are typically the ones who have seen the most rocks, but before you go exploring take the time to either make yourself familiar with the elements of basic geology or use this as an opportunity to refresh your memory.

Basic Rock Types

The Earth can be described as a giant recycling plant in which new rocks are created as others are destroyed. This is known as the Rock Cycle.

The Rock Cycle

There are three main groups of rocks, all of which can be found in the Geopark.

Igneous Rocks:

The word igneous is derived from the Latin word *ignis* meaning fire so it's no surprise that these are rocks that were once molten. They form as molten rock, or magma, cools and solidifies either above or below the surface. Examples include granite and basalt.

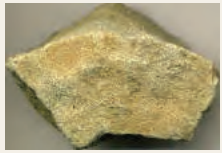

Granite


Basalt

Sedimentary Rocks:

These rocks are formed by the deposition of material on the Earth's surface. This could be as sediments such as sand or mud, or it could be organic material. It can also refer to rocks that were formed as minerals precipitate from solution. Examples include sandstone and limestone.


Limestone


Sandstone


Slate


Marble

Metamorphic Rocks:

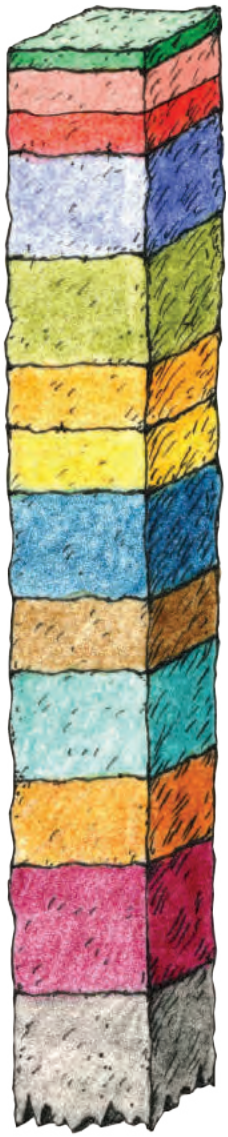
Derived from the Greek words *meta* (meaning change) and *morph* (meaning form) metamorphic rocks form due to the transformation of existing rocks by heat and/or pressure. However, unlike igneous rocks they do not melt. Examples include slate, marble and gneiss.


Gneiss

Geological Time

One of the hardest concepts for most people to understand is that of geological time. We know that the Earth is about 4.5 billion years old but in order to make things a bit easier, geologists have broken this long history into a number of time periods. Major geological events are used to limit these time periods such as a major change in rock type or a mass extinction.

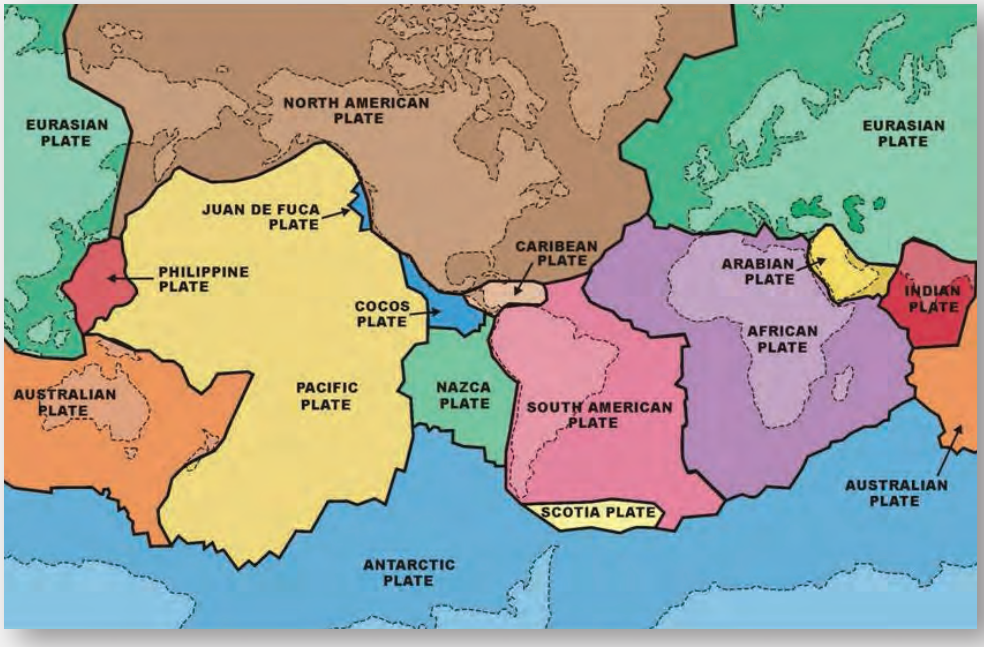
This sequence is known as a stratigraphic column and can be thought of as a giant column of rock that was cored from the Earth, with the oldest rocks being at the bottom and the youngest at the top.



Stratigraphic Column

Plate Tectonics

We know that the Earth's crust is divided into several plates that glide over the mantle below. The plates are not static and they move in a variety of ways including pushing and spreading apart, and pulling and sinking downward. Due to this movement, the location of the island of Ireland has changed a lot in its geological past, beginning its journey in the far south of the southern hemisphere, and slowly moving northwards to its current location.



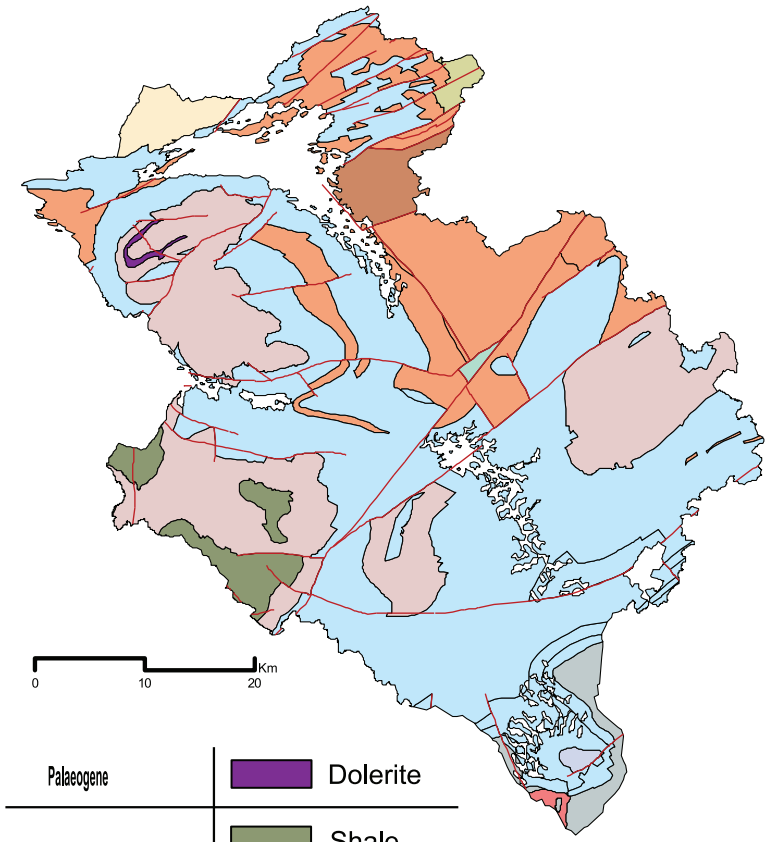
Tectonic Plate Distribution

Rockin' Around Cuilcagh Lakelands Geopark

Your journey begins with the very oldest of the rocks in the Geopark and ends with the youngest. Each chapter of the story tells you a little about the long and fascinating history of the Geopark and will also give you suggestions on where you can go and explore for yourself.

A geological map shows the distribution of different rock types either at or just below the land surface, and their relationship to surface features in that landscape. Not all the rocks on the map can be seen everywhere at the surface as a covering of softer materials may cover the underlying geology or bedrock.

On the adjacent page is a simplified geological map of the Geopark which is a key component in understanding the fascinating and complex geological story of the Geopark.



Palaeogene	Dolerite
Carboniferous	Shale
	Mudstone
	Limestone
	Sandstone
Devonian	Sandstone
Silurian	Granite
	Mudstone
Ordovician	Greywacke
Pre-Cambrian	Schist
	Gneiss

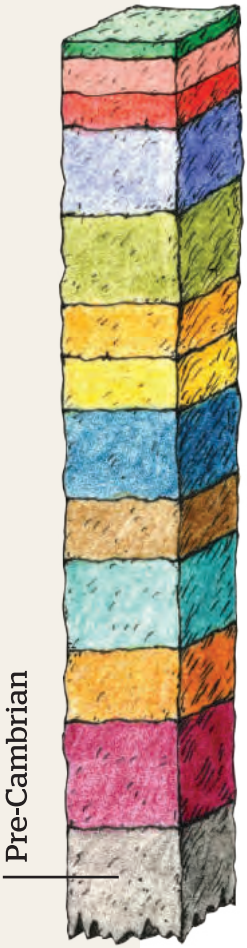
Fault

Fault = Major planes of fracture and movement within the rocks

Geological map of the Cuilcagh Lakelands UNESCO Global Geopark derived from the Geological Survey Ireland 1:500k bedrock geological map of Ireland, 2006. Contains Irish Public Sector Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence.

Ancient Foundations

The oldest rocks of the Geopark are found on the northern shores of Lower Lough Erne. These rocks are thought to be nearly 900 million years old and would have most likely started out as sandstones.



Since they were deposited they have been subjected to intense heat and pressure that has metamorphosed them into a rock called gneiss (pronounced nice). These rocks can be seen clearly on the road between **Pettigo** and **Belleek** and more specifically in the disused quarry in Tullychurry Forest

When these rocks were formed, the island of Ireland would have been in the south of the southern hemisphere and would almost certainly have been covered in ice. In actual fact, the island of Ireland didn't exist at all with one half of the island being attached to one continent, and the other half being attached to another.

Magho Cliffs Viewpoint in Lough Navar Forest provides spectacular panoramic views onto the Pettigo – Belleek Road

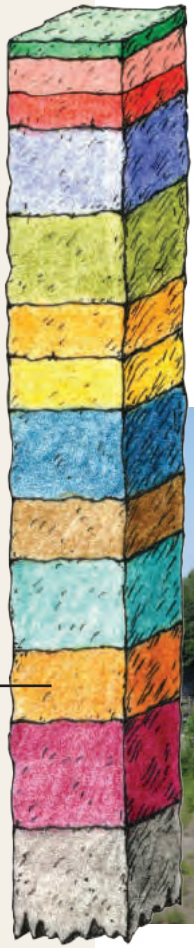
Metamorphic rocks, gneiss, in the disused quarry at Tullychurry

Vanishing Oceans

For the next few hundred million years, Ireland was still split in two, with each half being separated from the other by a vast ocean known as the Iapetus Ocean. However, about 500 million years ago that began to change as plate tectonic activity meant that the Iapetus Ocean began to close as the two continents on either side began to come together.

There are remnants of this vast ocean on the southern shores of Lough Oughter near **Killeshandra** and also at **Bruse Hill** near Arva. These are mudstones and sandstones that would have formed as the result of currents that brought in sediment to the ocean floor around 450 million years ago.

Note this quarry is in private ownership and should not be entered without the landowners permission.



Disused quarry at Bruse Hill

Mountain Building

The closure of the Iapetus Ocean finally ended about 400 million years ago but it didn't happen quietly. The huge amounts of Earth movement that took place created a colossal mountain range to the north of the Geopark that would have been even higher than the Himalayas. This occurred as the two plates collided pushing crust upwards and forming what we now know as the Donegal Highlands and the Sperrin Mountains.

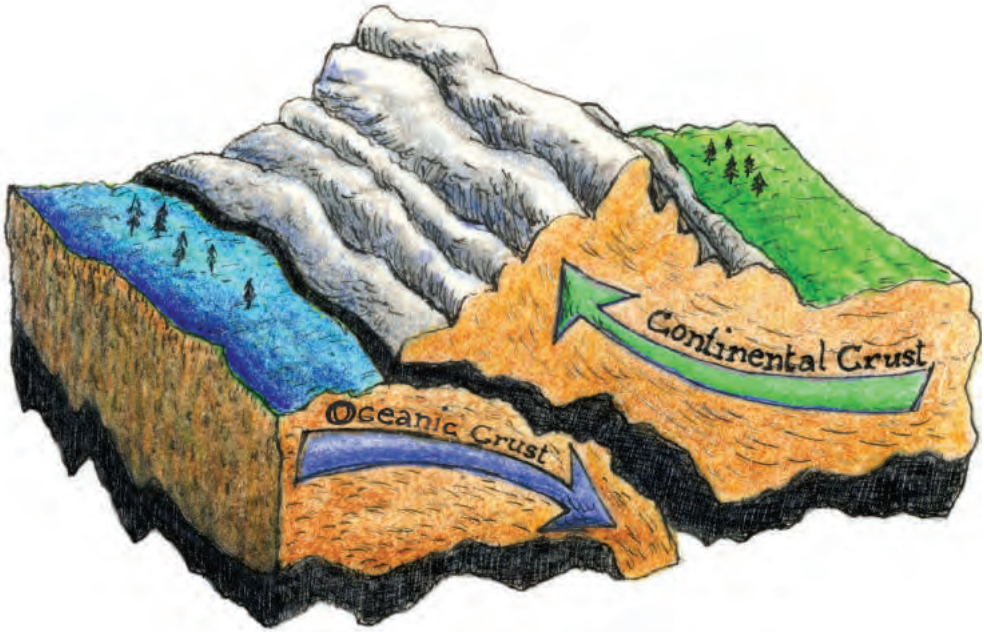
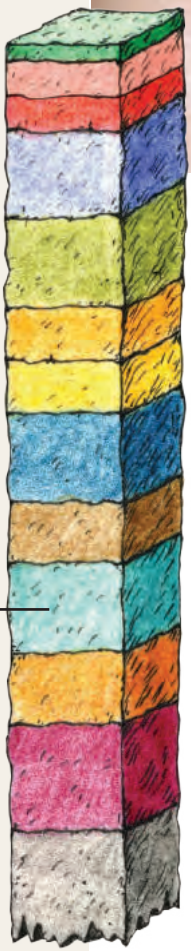


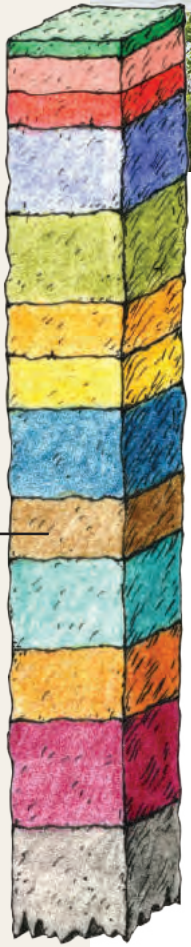
Illustration of how mountain building occurs

Crossdoney granite



This movement also generated huge amounts of heat beneath the surface leading to the production of immense amounts of magma. This is seen in the Geopark at **Crossdoney** where you will find a small quarry of granite that would have formed as a result of this activity. This quarry is in private ownership and should not be entered without the landowners permission.

Castle Archdale Forest on the shores of Lower Lough Erne



Devonian

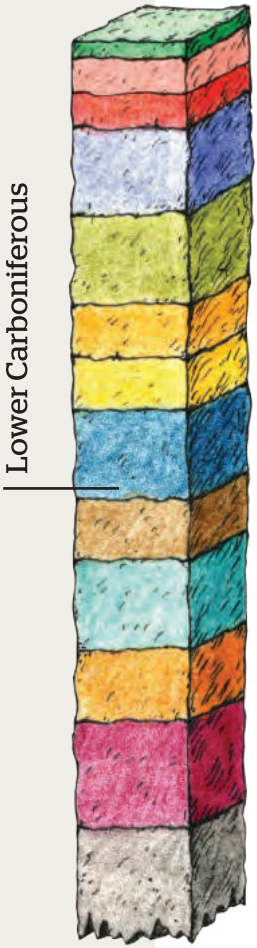
Searing Hot Deserts

The island of Ireland as we know it, although now joined together, was still part of a much larger continent.

By about 400 million years ago it was about 20° south of the equator meaning that it was at desert latitudes, similar to the Sahara Desert. Such climate conditions meant that the entire area was very arid, which led to the deposition of red sandstones some of which are seen on the shores of Lower Lough Erne within **Castle Archdale Forest**.

Tropical Ireland

Ireland continued on its journey northwards, reaching the equator about 340 million years ago. Located on the edge of a much larger continent, much higher sea levels meant that a shallow, tropical sea covered the entire area. The lime-rich mud that gathered on the sea floor has, over millions of years been compacted to form limestone, the rock that makes up the majority of the Geopark. The abundance of sea creatures that thrived in the sea are preserved as fossils within the limestone and can be easily seen at locations such as Legacurragh on the eastern side of **Cuilcagh Mountain**, and in **Cavan Burren Park**.



The limestone that makes up most of the area displays wonderful chemical weathering formed as the acid rainwater attacks the slightly soluble limestone. This has led to the development of a number of classic karst features above ground including, for example limestone pavement which can be seen in **Cuilcagh Mountain Park** and **Cavan Burren Park** and below ground as caves, such as the **Marble Arch Caves**, **White Fathers' Cave** and **Pollnagollum Cave**.

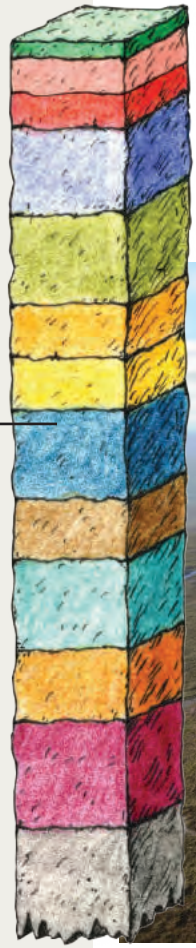
Top: Cavan Burren Park, County Cavan

Bottom: Marble Arch Caves, County Fermanagh

Deltas and Coal Swamps

As sea-level fell, the tropical sea was gradually replaced with sediments from a massive river system about 320 million years ago. Thought to be the same size as the Amazon, this huge river brought with it vast amounts of sediments such as mud, silt and sand. Over millions of years, these have been compacted to form mudstone, siltstone and sandstone that now make up the horizontal layers of Cuilcagh Mountain.

Due to its relative resistance to weathering and erosion, the sandstone forms the summit of the numerous flat-topped mountains in the area including **Belmore**, **Ballintempo** and **Slieve Rushen**.



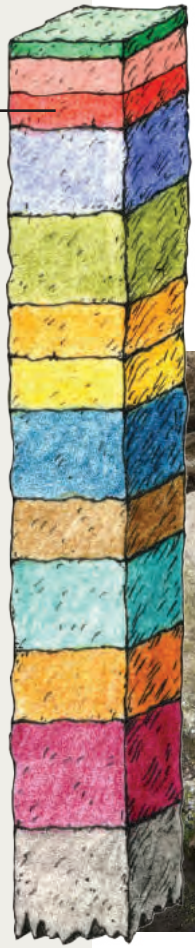
Plateau summit of Cuilcagh Mountain

Slieve Rushen mountain

At that time Ireland was located just a few degrees north of the equator; the climate would have been similar to that of a tropical rainforest, and would probably have had the same amount of vegetation. When the plants died, the swampy conditions meant that they didn't decompose and over millions of years they eventually turned to coal. There are small coal seams in various locations including at **Gubaveeny**, an old coal mine that can be seen from **Cornagee**.

A New Ocean

There is no evidence of any rocks from 320 million years ago right up to 65 million years ago when volcanic activity began to wreak havoc on Ireland. As plate tectonic activity caused North America to pull apart from Europe, the crust stretched and thinned generating huge amounts of molten rock beneath the surface.



Whilst there is no evidence of volcanoes in the Geopark, there is evidence of the molten rock that never reached the surface. This is seen as dykes, vertical sheets of igneous rock that formed as magma was squeezed into cracks in the pre-existing rocks. Dykes can be seen in numerous locations including at **Gortmaconnell** in Cuilcagh Mountain Park, in **Cavan Burren Park** and also at **Aghameelan** in Lough Navar Forest.

Dolerite dyke, Gortmaconnell, Cuilcagh Mountain Park

Calf house dolomen, Cavan Burren Park, Co.Cavan

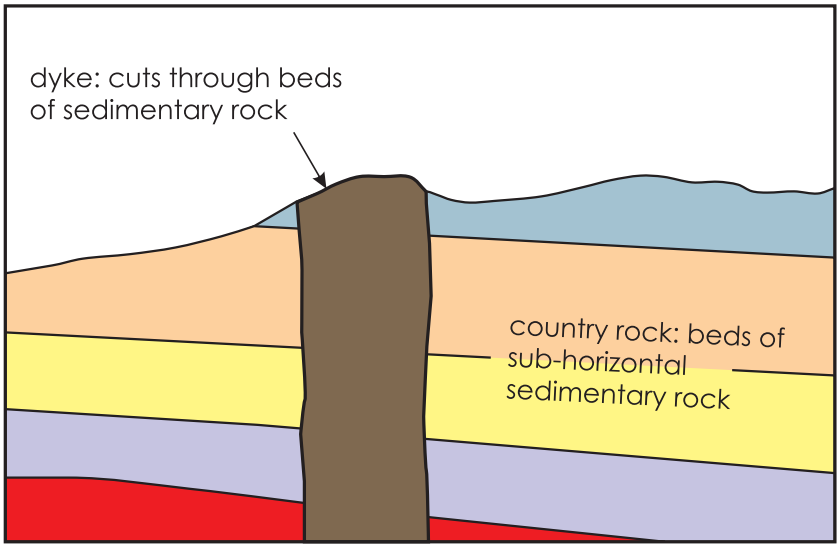
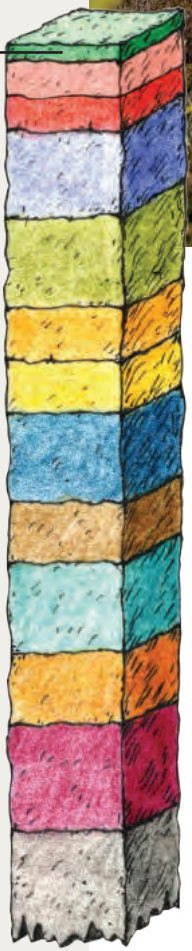


Illustration of dyke formation

Magho Cliffs Viewpoint looking onto the Lower Lough Erne glacial valley



The Big Freeze

The single biggest impact on the landscape of the Geopark comes from the last glaciation. As huge ice sheets slowly crept across the entire area, they acted like giant sheets of sandpaper and removed everything in their path. Some of the ice moved westwards from Enniskillen to the Atlantic Ocean scouring out the huge glacial valley of **Lower Lough Erne** and other smaller ones such as **Lough MacNean**.

In other cases the ice moved south-west towards Cavan and as it did so, it sculpted the loose sediment below into huge sinuous ripples, known as ribbed moraines that now form the landscape of **Lough Oughter**.

Lough MacNean Recreation Area, Co.Cavan

Cavan Burren Park

Clough Oughter Castle on Lough Ougher © Paddy Ronaghan

The ice finally melted about 15,000 years ago and as it did so it left behind a diverse range of material including huge boulders often carried far from their source (seen in Cavan Burren Park), moraines or ridges of sand and gravel (seen at Slieve Rushen), and glacial till (seen in Lough Navar Forest).

Find Out More

If you wish to find out more about the Cuilcagh Lakelands Geopark please contact us at:

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For more information on upcoming activities latest news, additional Geopark sites and much more please visit:

www.cuilcaghlakelands.org
www.cavanburrenpark.ie
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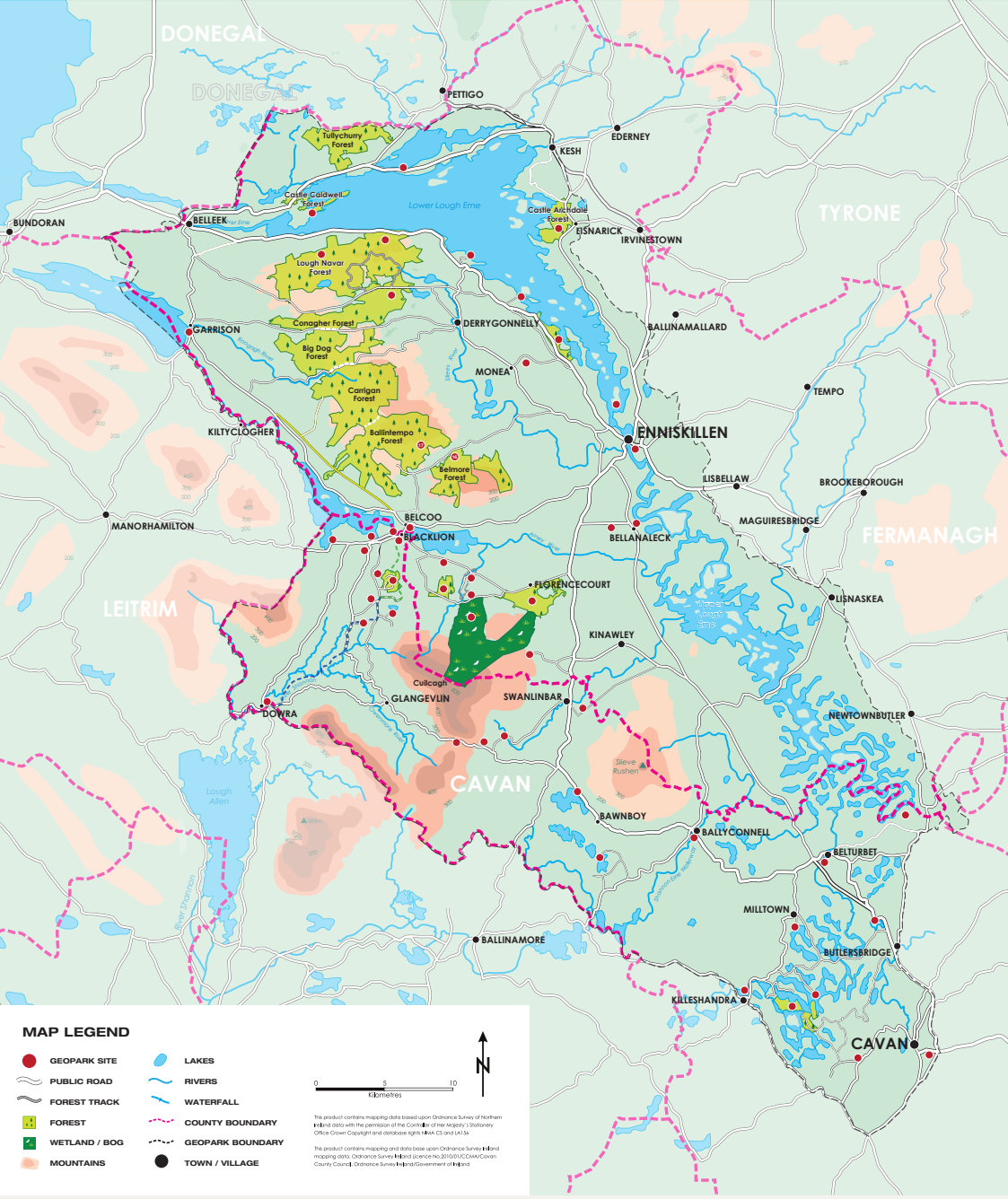

Cuilcagh Lakelands UNESCO Global Geopark is currently in a transition period as we move towards a new application to UNESCO for a reduced Geopark boundary area in Autum 2022. This reduction is as a result of an extensive consultation process with local communities, businesses and relevant stakeholders which was undertaken in 2020/21. Please see our website for further updates.

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