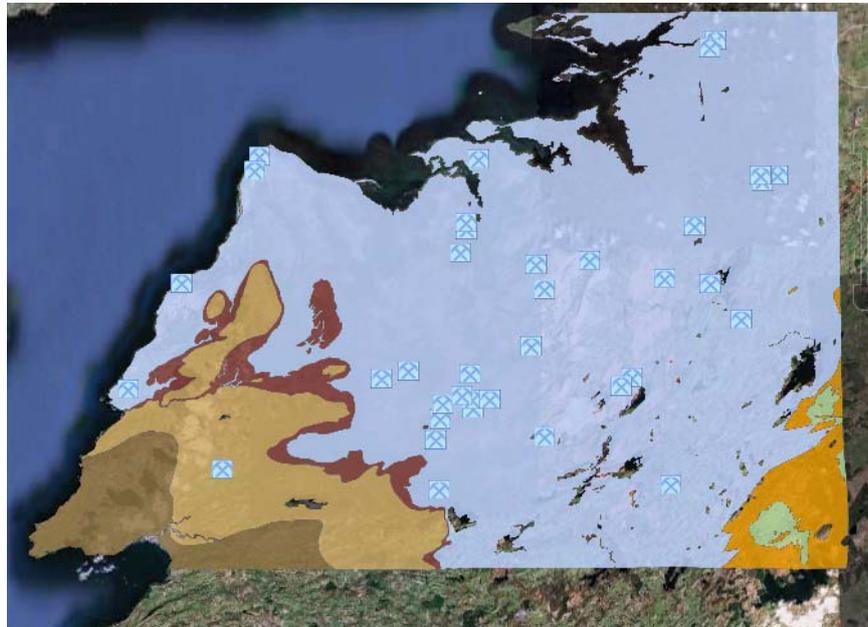


# Google Earth GIS Study Module for the Burren

## Geology Maps and Natural Resources



### INFORMATION for TEACHERS



## **NEED – Northern Environmental Education Development**

The Northern Environmental Education Development (NEED) project is a transnational cooperation project between Ireland, Finland, Norway and Iceland and is a part of the Northern Periphery Programme 2007-2013.

The NEED-project is designed to develop an innovative, operational model to improve the educational use of geo-scientific knowledge in sites of Natural value.

The focus in the project is on:

- environmental education and educational tourism
- environmental awareness amongst local inhabitants
- conserving natural environments and cultural heritage
- networking between the urban and rural educational and tourism resources

### **Project Funding**

The project is funded under the Northern Periphery Programme, which is part of the EU's Interreg IIIB funding program. The Northern Periphery Programme aims to encourage and support transnational co-operation between the regions of Europe. It provides the opportunity for organisations from the programme area to work together on joint projects concerning common issues and problems.

### **Learning environments**

Using the study modules, we will be developing inspiring learning environments in places such as the Burren Centre Kilfenora, the Cliffs of Moher Centre, the Burren College of Art, the Burren Perfumery, the Burren Outdoor Education Centre, and local primary and secondary schools. We consider the whole of the natural environment of the Burren to present learning opportunities and so these study modules will each include outdoor aspects, whereby learners can be immersed in the unique natural learning environment that is the Burren.

### **Project Management**

The National Partner of the NEED Project in Ireland is the **Burren Connect Project** (Clare County Council) ([www.burrenconnect.ie](http://www.burrenconnect.ie)). The Regional Partners include the Geological Survey of Ireland; the Cliffs of Moher Experience Visitor Centre; Shannon Development; National University of Ireland, Galway; The Burren Centre Kilfenora; Burrenbeo Trust; The Burren Outdoor Education Centre.

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## Google Earth GIS Study Module for the Burren

### INFORMATION for TEACHERS

#### Summary:

The GIS based assignments presented here are designed to allow students to use, observe and interact with digital geology maps of the Burren and Ireland. Various questions are posed to encourage students to interact with the software and the GIS content, thus encouraging problem-based learning, which develop can help to develop spatial thinking. The geological and spatial information presented here, and available in Google Earth can be used to support the Information and Communication Technologies (ICT\_ component of the national curriculum.

**Level:** Secondary Level – Leaving Certificate  
Third Level

**Curriculum Area:** Geography; Geology, Earth Sciences, Chemistry  
  
Leaving Certificate Core Unit 3 (Geographical and Skills Unit)

- Map and aerial photograph interpretation
- Satellite imagery (Google Earth – GIS)

**Objectives:** To gain a wider understanding of the events and processes that have influenced the development of the Burren landscape. Topics include past glaciation events in the Burren region; evidence of ancient karst processes in the Carboniferous; karst landforms and geomorphology; the geology of the Burren; the Burren landscape in Google Earth

Google Earth Files: Available on [www.GeoNeed.org](http://www.GeoNeed.org)  
and  
[www.burrenconnect.ie/geopark/downloads.html](http://www.burrenconnect.ie/geopark/downloads.html)

#### Instructions how to carry out the tasks:

- Students examine the **Bedrock Geology Maps** and **Mineral Maps** and **Soil Maps** in Google Earth.
- By answering questions, students learn how to **identify the geology** of specific locations, and learn to interact with the **tools** in Google Earth e.g. by reading the **map coordinates at the bottom of the map viewer** and by switching on and off a **legend**.

## Activity 1. Introduction to the Bedrock Geology Map of Ireland

**Description:** Students are presented with digital maps of the **Bedrock Geology Map of Ireland in Google Earth**. This map has a **Legend** that can be switched on and off in the left side table. Students learn to view, navigate and read the map using Google Earth.

**Learning objectives:** To learn how to read a geological map using the map and the legend, and how to extract meaningful information from the map. Students can observe how landforms (mountains/bogs/coastlines) can be influenced by the bedrock geology at various locations by clicking on and off the map (or by using the **transparency slider** on the left **sidebar**).

**Time required:** 20 mins

**Materials & Content:** Bedrock Map of Ireland – Google Earth KML file



### Student questions and answers:

- Q1. What is the most common rock type in Ireland and what age is it?  
*Limestone – 330 million years old*
- Q2. Name three counties in Ireland where you find large areas of granite (red colour).  
*Any three of: Galway, Wicklow, Carlow, Donegal, Down.*
- Q2. What are the Latitude/Longitude coordinates of Lisheen Mine in Co. Tipperary (to two decimal places)?  
*52.67N /-7.70W*
- Q3. What rock type lies under the following towns and cities?  
*Belfast – Sandstone; Dublin – limestone; Ennis – limestone; Letterkenny – schist and gneiss, Sligo – limestone, Dundalk – Sandstone/Shale*
- Q4. What age are the oldest rocks in County Clare?  
*420 million years old – Sandstone & Shale*

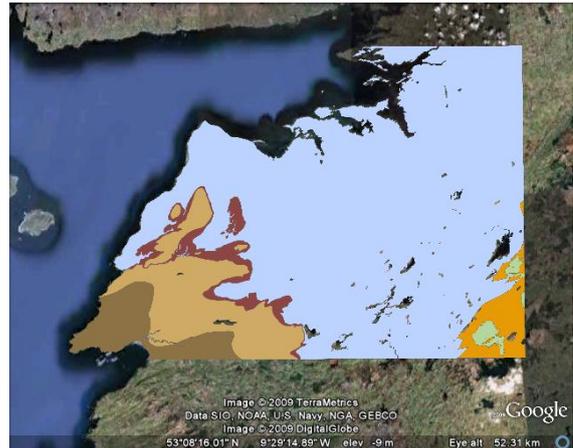
## Activity 2. Introduction to the Bedrock Geology Map of the Burren

**Description:** Students examine the **geological map of the Burren** in Google Earth and familiarise themselves with the geology of the Burren. By answering questions, students learn how to identify the geology of specific locations, and learn to observe how **landscape** topography is often related to **geology**.

**Learning objectives:** To learn to read, understand and interact with geology maps and layers in Google Earth.

**Time required:** 20 mins

**Materials & Content:** Bedrock Map of the Burren  
Google Earth KML file



### Student questions and answers:

- Q1. What is the most common rock type in north Clare and the Burren, and what age is it?  
*Limestone – 340-318 million years old*
- Q2. What are the youngest rocks on the Burren Bedrock Geology map?  
*Central Clare Group Siltstones and Mudstones – 318 Million years old*
- Q3. The rocks in the northeast and southwest parts of the Burren and North Clare are different. Which part has the younger rock types?  
*Southwest*
- Q4. What rock type lies under the following towns and villages?  
*Ennistymon – Siltstone and Mudstone; Corofin – limestone; Kinvara – limestone; Lisdoonvarna – Shale; Kilfenora – limestone*
- Q5. What do you notice about the bedrock at Lisdoonvarna – is it all shale? Why do you think this is?  
*There are slivers of limestone on the map (these crop out through the overlying shale). This is because the rivers have cut down through the shale exposing the limestone in the river bed*

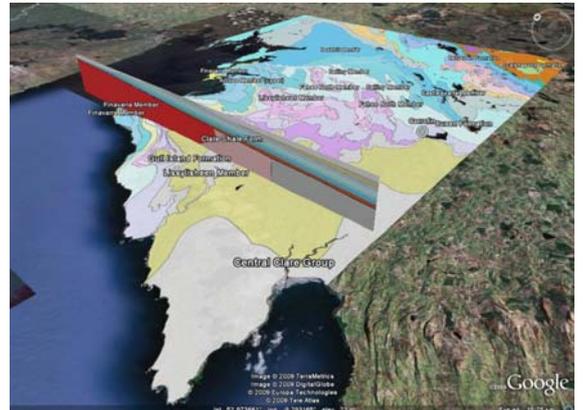
## Activity 3. The Rocks of the Burren and North County Clare

**Description:** Students have familiarized themselves with the bedrock geology map of Ireland and the Burren. Students now proceed to focus on the **detailed geology map of the Burren and north County Clare**.

**Learning objectives:** To learn to read and interpret geology maps and to learn about the different rock types found in their local region.

**Time required:** 15 mins

**Materials & Content:** Detailed Bedrock Map of the Burren - Google Earth KML file



### Instructions how to carry out the tasks:

- Using the cursor on the map viewer, student can click on the different geology formations (colours) on the map to reveal the name of the rock formation at a location and learn some additional information e.g. *the Black Head Member is made of limestone and dolomite with corals*.

### Student questions and answers:

- Q1. Name the limestone rock member that is found at the very northern tip of Black Head?  
*Finavarra Member*
- Q2. Name one other place in the Burren where you find this limestone rock member?  
*Flaggy Shore; Rine; Ballyvelaghan*
- Q3. Most of Lisdoonvarna is built on Shale, but there is limestone to be found there too. What is the name of the Limestone member found at Lisdoonvarna, and what kind of limestone is it?  
*Lissylisheen member. A cyclical crinoidal limestone (Crinoids are fossils)*
- Q4. What rock type lies under the following towns and villages?  
*Kilinboy – Aillwee Member (upper); Lehinch – Central Clare Group; Kinvara – Hawkhill Member;*
- Q5. There is a thin layer of rock that is found at Doolin between the older limestone and the younger siltstone/sandstone. What is it called?  
*Clare Shale Formation – mudstone.*
- Q6. Can you find out what type of rock formation or member is around your school?

## Activity 4. The Mines and Quarries of the Burren and North County Clare

**Description:** Students have familiarized themselves with the bedrock geology map of the Burren. Students now proceed to look at the **different minerals and rocks that** in the region.

**Learning objectives:** To learn to read and interpret geology maps and to learn about the different rock types found in their local region, and how natural resources are obtained from the rocks.

**Time required:** 15 mins

**Materials & Content:** Minerals Map of the Burren - Google Earth KML file



### Instructions how to carry out the tasks:

- Using the cursor on the map viewer, student can click on the different geology formations (colours) on the map to reveal the name of the rock formation at a location and learn some additional information e.g. *the Black Head Member is made of limestone and dolomite with corals.*

### Student questions and answers:

- Q1. In what part of north Clare is sandstone quarried – (A) near Lehinch; (B) near Ballyvaughan (C) Near Corrofin?  
*(A) Near Lehinch*
- Q2. Why is sandstone quarried here and not in other places to the northeast and in the Burren?  
*Sandstone is found here, and not in the northeast*
- Q3. What do you notice about where all the coal quarries are located?  
*They are all in the region where the sandstones/shales are found – not on limestone.*
- Q4. Can you find what minerals and rocks were/are quarried near to you school?