

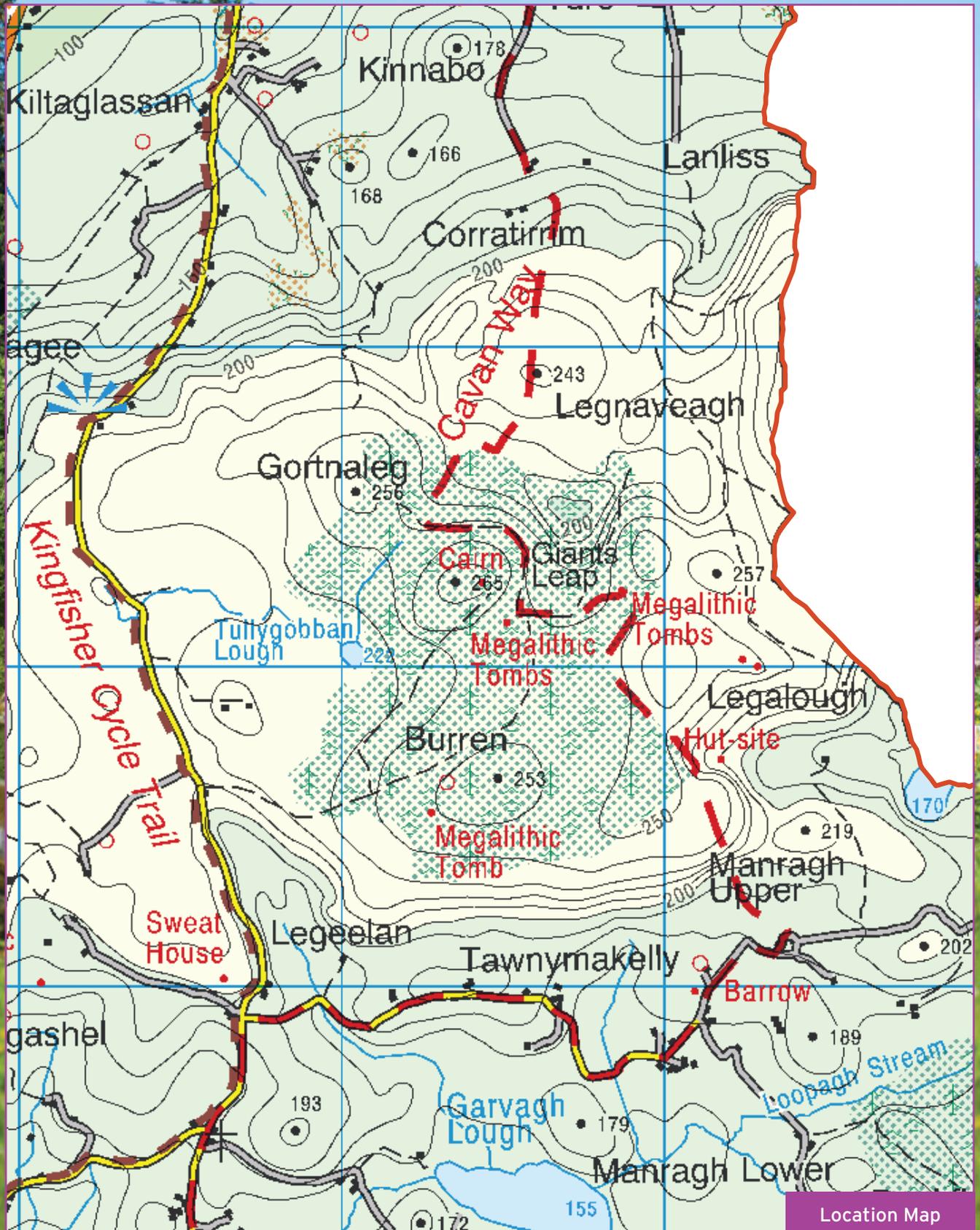
Cavan Burren Park

Teacher's Sheet

Visit Time: 3 – 4 hours

Cavan Burren Park is one of the finest archaeological landscapes in Ireland. This once dense conifer plantation has been opened up to allow good access to a number of key geological sites and provides the ideal place to understand the close links between archaeology and geology.

All sites are easily accessible on foot by gravel path, boardwalk or sleeper paths.



Teacher's Notes

SUGGESTED STOPS	POINTS TO NOTE
Access	<p>All sites can be accessed from the visitor centre at Cavan Burren Park. This is reached by following the signs from the entrance. There is ample parking for both buses and cars, and picnic tables and toilet facilities are provided.</p>
1	<p>The Burren Forest is an area of approximately 300 acres (1.2km²) and comprises one of the finest archaeological landscapes in the Marble Arch Caves UNESCO Global Geopark.</p> <p>Evidence of settlement ranging from Neolithic farmers right up to 19th Century farmsteads are all found within the forest as well as a host of other evidence from the time periods in between.</p> <p>Cavan Burren Park is owned by Coillte, the Irish semi-state forestry body who manage the site as an active timber plantation together with Cavan County Council who manage the site for recreational purposes. The afforestation of the area in the 1950s has not only helped to preserve this relict landscape but has also helped to protect some fine geological and geomorphological features.</p> <p>The Burren Forest occupies the most north-western part of the limestone escarpment that forms the lower slopes of northern Cuilcagh Mountain. The bedrock geology is almost entirely Lower Carboniferous limestone with the only exception being the dolerite dyke that cuts through the limestone in a southeast-northwest direction. This is the continuation of the Cuilcagh Dyke that is exposed within Cuilcagh Mountain Park.</p> <p>Superficial deposits, primarily glacial till (boulder clay), peats and thin soils, cover much of the area and the limestone only crops out along the eastern and southern margins of the forest.</p> <p>Due to its elevated position at approximately 240m above sea level, the Cavan Burren Park is an area of recharge, meaning that all drainage sinks underground and reappears (or resurges) at risings (or springs) located at the edge of the upland area. The drainage of the Cavan Burren Park is very complex due to the fact that it straddles the watershed between the Erne and Shannon River basins. It has been deduced from water tracing experiments, that the drainage of the Burren Forest is part of five separate drainage systems.</p>
2	<p>From the car park, take the path to the north west (in the direction of Cuilcagh Mountain) which is part of the multi-access trail. This will lead you downhill and before long you will see a sinkhole on the left of the path.</p> <p>Sinkholes (or dolines) are common in the area as it is underlain almost completely by limestone. At this location, the entrance to the sinkhole is very clear and it would have formed as the roof of a cave below collapsed. Even if there is no visible water flowing into it, if you listen carefully you will hear the faint trickle. There is little or no surface water in Cavan Burren Park as it disappears underground very quickly due to the limestone geology.</p> <p>As you continue on the path, you will see a number of small (up to 3m diameter) enclosed depressions alongside the path. These are subsidence dolines that form as the limestone below is slowly dissolved by percolating surface water, leading to the gradual subsidence of material above. These differ from collapse dolines that have steep vertical sides, whereas subsidence dolines have gradual sloping sides.</p>
3	<p>As you continue on the path, you will see an area of exposed limestone pavement. The name 'burren' comes from the Irish word for 'stony ground' and this is how this area would have looked prior to afforestation.</p> <p>Limestone pavement is so called as the exposed limestone displays characteristic vertical jointing giving it the appearance of paving slabs. These joints are known as grykes whereas the 'islands' of limestone in between are known as clints. The exposure of the limestone however is a direct action of glacial activity when ice sheets would have scoured the rock clean of any superficial cover.</p> <p>The limestone exposed is the Dartry Limestone Formation and it is rich in fossils many of which can be seen at this location. There are examples of colonial corals, solitary corals, crinoid fragments and brachiopods all of which are evidence of a tropical, marine environment of deposition.</p>

4	<p>As you come to the end of the boardwalk section of the path you will see a huge sandstone boulder perched upon a pedestal of limestone. There is a similar feature on the opposite side of the road slightly further along the trail. These are a type of glacial erratic, whereby the huge transported boulder would have been left behind as the ice melted and retreated at the end of the last glaciation. The fact that the boulder is a different type of rock from the underlying bedrock gives rise to the name 'erratic'.</p> <p>This type of erratic is known as a pedestal rock and these features are relatively rare landforms. However, there is a significantly high concentration of pedestal rocks within Cavan Burren Park where they are considered to be of international significance. In order for a pedestal rock to form, the erratic must be deposited directly on top of the limestone bedrock. Other glacial erratics within the forest have no pedestal suggesting that they were transported within a mass of boulder clay and therefore came to be deposited on top of the boulder clay and not directly on to bedrock. It is thought that the deposition of the huge sandstone boulder directly on top of limestone acted as a barrier to erosion, as limestone erodes readily in weak acidic water such as rainwater. If this is the case, then the amount of erosion that has taken place since the end of the last glaciation is easily estimated as the height of the limestone pedestal is the height that all of the limestone would have been when the erratic was deposited.</p> <p>It was originally suggested that all of the cap rocks (erratics) of the pedestal rocks were composed of pale-grey, medium-grained, quartz-rich sandstone that may or may not contain larger quartz pebbles. If this is the case then the cap rocks would be consistent with the description of the Glenade Sandstone from Cuilcagh Mountain. It has recently been suggested that this is not the case as many of the cap rocks vary greatly and may have their origins in different layers of sandstone from Cuilcagh Mountain including the Lackagh Sandstone that makes up the summit of the mountain. Debate in the past took place as to whether the summit of Cuilcagh Mountain was ever covered by ice to enable the removal of material such as the Lackagh Sandstone. The presence of Lackagh Sandstone glacial erratics means that it is now thought that during the last glacial maximum the ice reached between 700 and 750m thick, meaning that the entire summit of Cuilcagh Mountain (665m) would have been covered.</p>
5	<p>As you travel on the same trail you will see the enclosure that now contains the Calf House. The enclosure is thought to be of 18th century origin and would have been constructed about the same time as the attached byre and farmstead remnants. The Calf House is much older however and is thought to be Neolithic in age. It would have been built as a portal tomb but has been altered at some stage in the past to create a shelter for livestock and hence the name Calf House.</p> <p>If you follow the signposts for the 18th Century limekiln (on the opposite side of the main forest road) you will come across a hole in the ground that is the top of the limekiln. If you move around the structure it will become clear that this is in fact a circular limekiln. It is likely that this kiln was used only for the adjacent farmstead, taking advantage of the abundance of limestone and peat necessary to produce quicklime.</p>
6	<p>Return to the forest road and keep going straight until you see a small marker on the right hand side of the road for the boulder grave.</p> <p>Enter the site and walk towards the huge boulder in the middle. It is best to view this feature from below so walk downhill before stopping. This is another example of a huge glacial erratic. It displays evidence of alteration by man with rock art on the top surface. This is another example of a pedestal rock with the erratic being sandstone and the underlying pedestal being limestone. In this instance the limestone has been carved and has been identified as a prototype tomb. If you look carefully at the sandstone you will see that the layers are contorted in places. This is probably due to some form of disturbance before it became lithified, when the wet layers of sand were disturbed causing the water to be released.</p> <p>If you continue downhill you will see two standing stones and immediately in front there is a small spring. This is highly unusual in Cavan Burren Park due to the underlying limestone. The spring occurs at this location as the Cuilcagh Dyke lies immediately beneath your feet. This vertical sheet of igneous rock acts as a barrier to the through flow of water underground so when water hits the dyke, it emerges at the spring before flowing a few metres and sinking below ground again. Whilst you can't see the dyke, its presence is known due to its influence on the hydrology. The dyke was intruded during the Palaeogene period, at a time when the North Atlantic Ocean was beginning to form, creating huge amounts of molten rock both above and below the surface in Ireland and Scotland and in other areas around the periphery of the newly formed ocean.</p>

Return to the main forest road and head back towards the farm enclosure. Take the left hand path signposted Giant's Grave and continue on until you reach the wedge tomb.

The view from the wedge tomb overlooks a huge karst depression known as the Lost Valley doline. Due to the presence of limestone bedrock in Cavan Burren Park, there are several major karst landforms including limestone pavement, dry valleys and dolines. The Lost Valley doline and Giant's Leap dry valley are undoubtedly the most spectacular of these. With a diameter of over 500m, the Lost Valley doline is by far the largest doline in the immediate area. Even regionally, it is second only in size to the Reymad Pot doline near Derrygonnelly in county Fermanagh which, at over 1km in diameter is one of the largest in Ireland and the UK. The Lost Valley doline is in fact more than likely not a singular doline, but rather an uvala, or a coalescence of a number of smaller dolines.

If you continue on the boardwalk past the wedge tomb you will reach the Giant's Leap dry valley, water from which would have originally fed the Lost Valley doline. Although no longer fed directly by any streams, the size of the Giant's Leap dry valley indicates that in the past a huge stream would have flowed down the valley and into the Lost Valley doline. The sides of the Giant's Leap dry valley have exposed outcrops of Dartry Limestone, with layers of chert clearly visible. If compared to the modern landscape the valley would be similar to the Owenbrean River on the northern slopes of Cuilcagh Mountain, as the width of the dry valley is similar to the width of the limestone gorge that the Owenbrean River currently flows through.

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The Owenbrean River has a large catchment area, greater than 7km², so it is estimated that the catchment of the river that flowed through the Giant's Leap dry valley and into the Lost Valley doline would have been similar in size.

The Giant's Leap dry valley is located at one of the highest points in the forest at a height of 240m, yet the shape of the valley indicates that a large stream or river flowed downslope, from the southeast to the northwest and into the Lost Valley doline. This would imply that the immediate surrounding uplands and the source of the river that once fed the valley is no longer here. It is thought that the Giant's Leap dry valley and doline formed at a time when most of the Dartry Limestone Formation was still covered by the overlying shales and sandstones that make up the rest of the Carboniferous succession. By comparing the incomplete Carboniferous succession found here with similar complete successions it is suggested that some 120m of shales and sandstones have been removed slowly by ice. Given the amount of time it would take to remove such a thickness of strata it is thought that the stream or river that flowed through the Giant's Leap dry valley would have been active prior to glacial times and would make this dry valley one of the oldest karst features in the area.

