# Cow Green, Teesdale

# Geo-activity trail

## ORGANISATIONAL DETAILS

### Aim

To explore the factors influencing the landscape of Moor House - Upper Teesdale National Nature Reserve.

### Target Group

Key Stages 2 & 3

### Location

Cow Green, Upper Teesdale.

### Practical Details

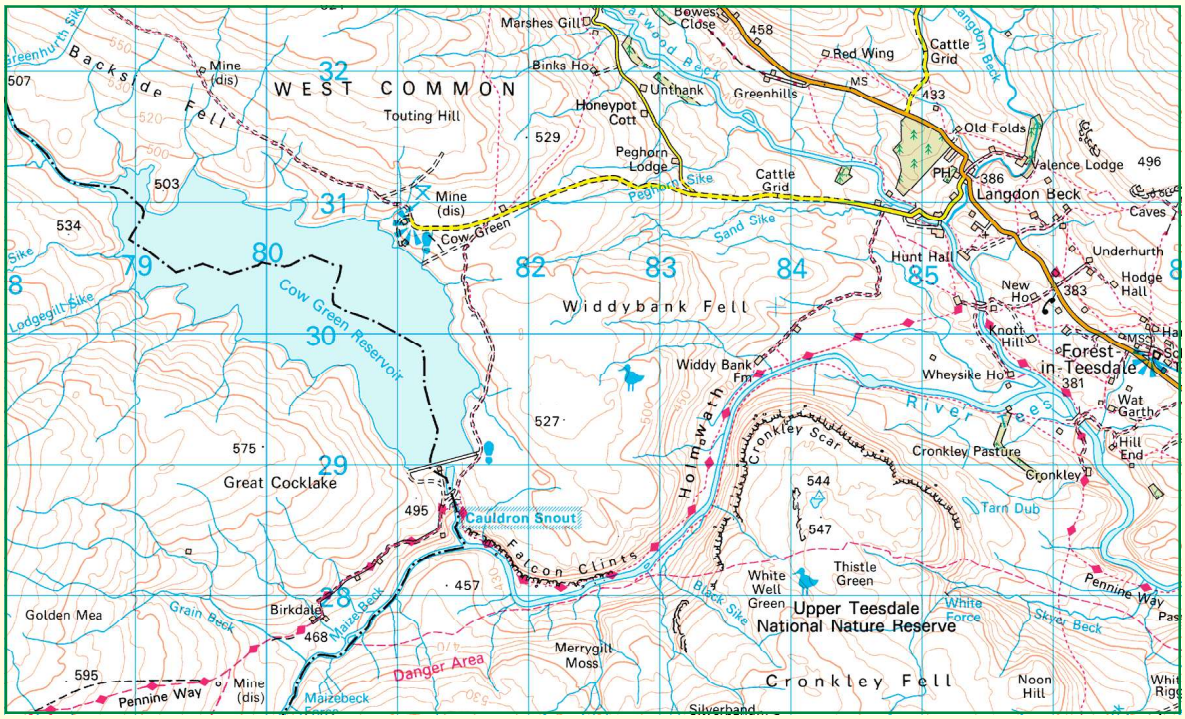
- Parking is free at the car park at Wheelhead Sike.
- Coaches are required to ask permission in advance from Raby Estates. Contact Jeremy Greensides – 01833 640209
- Useful map – O.S. 1:25000 Explorer OL31, North Pennines Teesdale and Weardale.
- Additional leaflets include Moor House – Upper Teesdale National Nature Reserve and Nature Trail produced by English Nature and Cow Green Geological Trail produced by the North Pennines AONB Partnership.
- Follow the route map stopping at the points indicated. The stopping points are shown by a rock with a red flag.

### Safety Issues:

- Sensible footwear, warm clothing and waterproofs are advised, as even in summer the weather in Upper Teesdale can be harsh.
- Extra care needs to be taken at Cauldron Snout as the waterfall is not fenced and the rocks are slippery.
- Refer to Hazard Identification Sheet.
- Duration 2 .5 – 3 hours with a stop for lunch. A further 30 minutres should be included if the volcano exercise is done in the car park at the end.

# Cow Green, Teesdale

## Teacher Resource Sheet



## HAZARDS IDENTIFICATION SHEET

The following notes will help teachers conduct their own risk assessments. This is not a risk assessment and teachers should follow guidelines from the Department of Children, Schools and Families.

| Hazard Identified | Risk and to whom | Control measures |
|---|---|---|
| Vehicles in the car park | Caution needed when getting off the coach as the parking area is small and other vehicles may be passing. All students and staff. | Supervise students getting off the coach or minibus and gather in a safe place. |
| Extreme weather conditions | Weather conditions can be very harsh even in the summer. All students and staff. | Ensure students have warm waterproof clothing and suitable footwear. Recommend a sun hat and water for trips in the summer. |
| Unfenced water | The River Tees is not fenced. All students and staff. | Warn students about the water. |
| Uneven paths | Paths are uneven and may be slippery in wet weather. Students may slip and fall. All students and staff. | Warn about conditions. |
| Slippery surfaces | The track and path can be slippery in wet conditions Care is needed. All students and staff. | Warn about conditions. |
| Cauldron Snout waterfall | The waterfall is unfenced and the drop is very sudden. Therocks in the river are very slippery. All students and staff. | Supervise students near the waterfall and warn about the conditions. |

## BACKGROUND INFORMATION

The table below provides background information for the Geo-activity Trail. The first activity provides a brief introduction to the area and the National Nature Reserve. The second activity leads you along the trail to Cauldron Snout. Each stopping point is marked with a rock with a red flag. The information provided links to these points. This information should be used in conjunction with the Student Activity Sheet. After introducing the information at each point the pupils decide which information sticker/s refers to the point and which picture sticker/s. They then need to decide if the information suggests that the geology, the work of ice sheets or people, have influenced the landscape at that point and attach the appropriate stickers under the correct category. The walk can be summarised using the information at the end.

| Route stopping point | Number on nature trail | Number on geological trail | Background information |
|---|---|---|---|
| **Activity 1** Point 1 - Information panels | 1 | 1 | This walk is in the Moor House – Upper Teesdale National Nature Reserve and is around the headwaters of the River Tees. This area is typical of the North Pennines and is a National Nature Reserve for its rare plants, wildlife, geology and landscapes.<br>The hills to the west are the highest in the North Pennines. The sketch map on the Student Activity Sheet names the hills you can see. Use the O.S. map extract to put the heights on.<br>The car park is at 600m a.s.l. Compare this to the height of your school. The hills have a bulky form and are flat topped. This is due to their horizontal layers of sandstone, limestone and shale, from which they are made. The geology map shows the rocks types on this walk from the car park to Cauldron Snout. |
| **Activity 2** Point 1 - Information panels | 1 | 1 | About 20 000 years ago this area was covered in ice when the ice age was at its peak. The ice would have been over 100m thick and would have covered the top of Cross Fell. The hollow that Cow Green reservoir now fills would have been slightly deepened and rounded by the ice. |
| Point 2 - Limestone exposure | 1 | 1 | The flat area of grey rock is limestone. This is a sedimentary rock formed of layers of limey mud deposited on the floor of a tropical sea, during the Carboniferous Period 330 million years ago. The North Pennines was close to the equator during the Carboniferous Period. Look carefully for fossils – pieces of coral and shell in the rock. |
| Point 3 - Glacial deposits at Slapestone Sike | X | X | The ice sheets that covered this area dropped or deposited a mixture of clay, sand, cobbles and boulders of varying sizes. These glacial deposits cover the area and in places stop water draining freely. Where this has happened a peat soil has formed on top since the last ice age. Peat is made of undecayed plant material. Coarse moorland vegetation grows in these wet areas. |
| Point 4 - Rod's Vein | 6 | 3 | Rod's Vein is a mineral vein of barytes – a naturally occurring barium sulphate mineral. A mineral vein is a vertical band of minerals that fills cracks in the surrounding rocks. Barytes was mined here until 1952 and it was used in the paint and chemical industries. The entrance to the mine is now below the water in the reservoir. Shafts were also made to get into the mine and you can see a capped shaft here. Barytes is a white, dense mineral (it feels heavy) and hence its name 'heavy spar'. |
| Point 5 - Arctic vegetation plot | 9 | X | Many different types of arctic and alpine plants grow in this area. These plants are known as the 'Teesdale Assemblage'. They have survived here since the last ice age because of the rock type, which is sugar limestone. The arctic plants include spring gentian, mountain everlasting, alpine bistort and false sedge. Grazing by sheep prevents coarse grasses dominating the vegetation and crowding out the rare arctic and alpine plants. |

| Route stopping point | Number on nature trail | Number on geological trail | Background information |
|---|---|---|---|
| Point 6 - Sugar limestone | 10 | 4 | This rock is a limestone but it is very white and crumbly – hence its name. The limestone has been changed by heat and so it is a metamorphic rock. Encourage the children to think about where the heat to change the rock has come from, as you continue on the walk. The explanation for the heat will be explained at Cauldron Snout. |
| Point 7 - Limestone exposure | 13 | 6 | A dam has been built across the valley of the River Tees to hold back the water in the reservoir. The dam on this side of the valley is built of concrete as it could be tied into the hard rock found here, which is dolerite or Whinstone. On the far side of the valley there is no hard rock to build on as this side is covered in glacial deposits and so the dam is an earth bank. The glacial deposits are blocking the river valley that existed before the last ice age and so after the ice sheet melted the river could not use the same channel and instead has cut its way through the dolerite or Whinstone at Cauldron Snout. |
| Point 8 - Cauldron Snout | 14 | 7 | Cauldron Snout is the waterfall. The river here flows over the hard dolerite rock or Whinstone. The Whin Sill was formed by hot molten rock from deep within the earth being injected into the layers of limestone and sandstone. The Whinstone is an igneous rock. It was the heat from the injection of the Whin Sill that changed the limestone we saw earlier to sugar limestone. A simple exercise here to help to explain the intrusion of the Whin Sill is to have a large plastic beaker that is tightly packed with 3 – 4 layers of different coloured plasticene. Make a hole in the bottom of the cup and up through the layers of plasticene about the width of a pencil. Insert a tube of toothpaste in the bottom of the cup and squeeze the toothpaste so that goes between the layers of plasticene and out of the top, if you want to illustrate a volcano.<br><br>Use all the information gathered to summarise the factors that have influenced the landscape of the Moor House – Upper Teesdale National Nature Reserve. |

The return journey to the car park can be made by crossing the River Tees on the bridge below the dam and then walking up the side of the dam and across the dam to rejoin the nature trail. Once at the car park the volcano activity on the Student Information Sheet could be done or this could be used later in school.

# Cow Green, Teesdale

## Pupil Activity Sheet

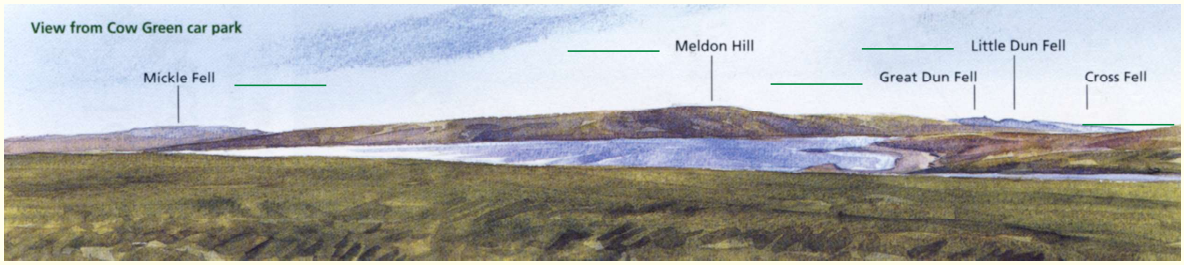
### Activity 1

**Where am I?**

The Moor House – Upper Teesdale National Nature Reserve is around the headwaters of the River Tees and is an area typical of the North Pennines.

**View to the west across Cow Green Reservoir**

Using your O.S. map extract add the heights to the hills marked on the picture.



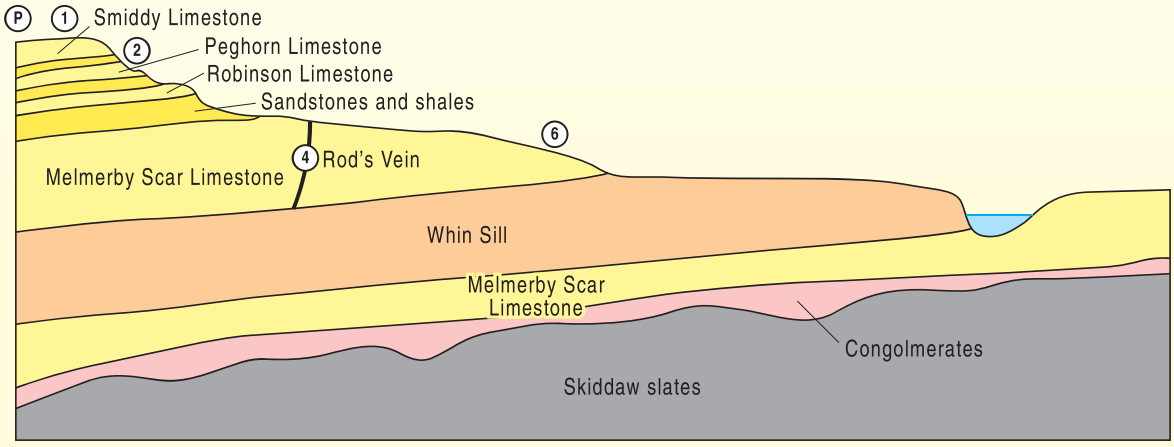

What height above sea level (a.s.l.) is your school at? _____ m a.s.l.

The car park at Cow Green is 600m a.s.l. How much higher are you than at school? _____m.

How much higher again is the highest hill on your sketch map (Cross Fell)? _____ m.

### *The rocks on the walk*

The hills that you can see to the west are flat-topped. This is due to the horizontal layers of limestone, shale and sandstone of which they are made. The geology cross-section below shows the rock types you will walk over on this trail.



## *Activity 2*

Look for the red flags on the marker stones as they are stopping points for information.

The landscape around you has been influenced by its geology (the rocks), the work of ice sheets that once covered the area and by people. At each stopping point you will be given information. You have to decide which pieces of information and picture stickers the information refers to. Then place your stickers in the correct box below to show if the information suggests that the landscape has been influenced by geology, the work of ice sheets or by people.

The landscape of Moor House - Upper Teesdale National Nature Reserve has been influenced by:

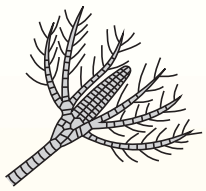
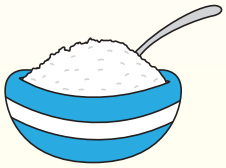
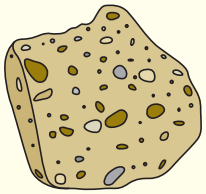
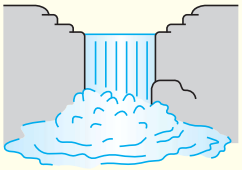
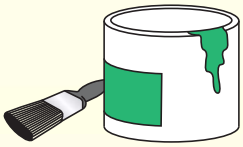
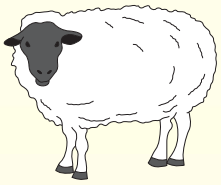
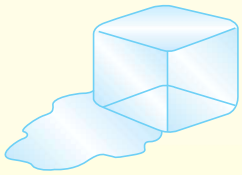
**Geology**

**The work of ice sheets**

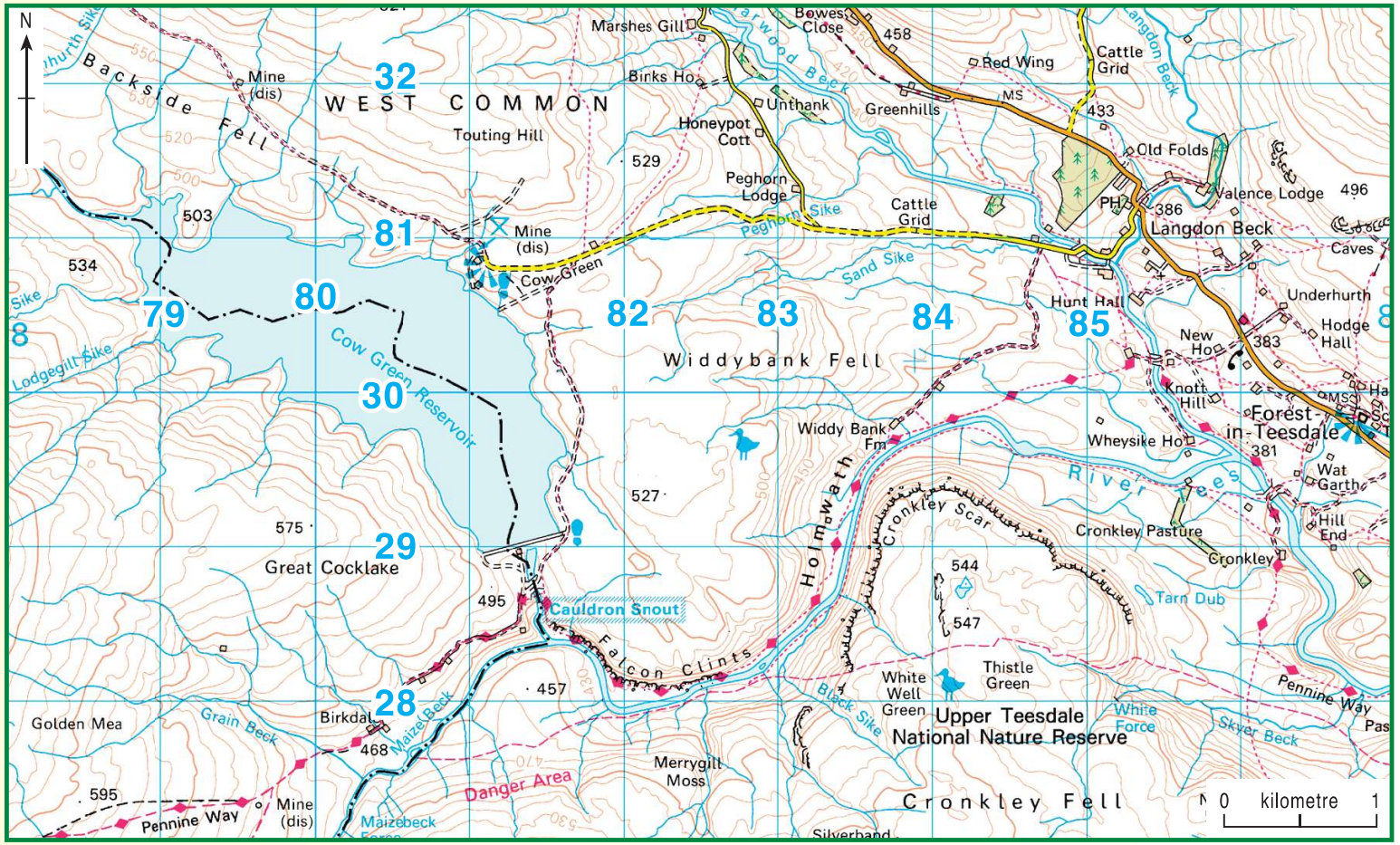
**People**





| | | | |
|---|---|---|---|
| Rod's Vein - A barytes mine until the 1950's. Barytes is used in paint and in the chemical industry. | The hollow that the reservoir fills has been enlarged and rounded by an ice sheet that covered this area 20,000 years ago. |  |  |
| Sugar limestone - This is a limestone that has been changed by heat. It is a **metamorphic rock**. It looks like sugar. | Rare arctic and alpine plants are found here. They are called the 'Teesdale Assemblage' and have survived on the sugar limestone. |  |  |
| Limestone with fossils - This is a **sedimentary rock**. | Glacial material left by the ice sheet can be seen under the peat. It is a mixture of clay, pebbles and boulders. |  |  |
| The waterfall at Cauldron Snout falls over dolerite rock or Whinstone. This is an **igneous rock**. | Sheep graze this area and stop coarse grasses crowding out the rare plants. |  |  |
| The dam on the far side is made of earth as it is built on material deposited by the ice sheet. This glacial material blocks the old channel of the Tees. | |  | |

*This sheet needs to be printed onto sticky-backed paper (Avery Labels No. L7651)*




*O.S. Map of Cow Green*

# Cow Green, Teesdale

*Pupil Information Sheet*

## MAKE YOUR OWN VOLCANO

***You will need:***

| | |
|---|---|
| A jug | Vinegar |
| Baking soda | Red food colouring |
| Flour | Tray |
| Stirring rod | Sand |
| Funnel | Plastic bottle |

***Instructions***

1. Empty the baking soda and 3-4 spoons of flour into the jug. Mix with the stirrer.
2. Place the funnel into the neck of the plastic bottle. Pour the mixture of baking soda and flour into the bottle.
3. Put wet sand on the tray.
4. Stand the bottle with the baking soda and flour mix in the centre of the tray and pack the wet sand around it. Make the sand into a cone shape.
5. Pour the vinegar into the jug and add red food colouring to make it a rich red colour.
6. Place the funnel into the mouth of the plastic bottle and pour the vinegar into the bottle. Quickly remove the funnel from the bottle.
7. The sandy volcano you have made will begin to erupt. The vinegar and soda mix to give off carbon dioxide. This makes the flour turn frothy and forces it out of the bottle as red lava!