Funded by Defra's Aggregates Levy Sustainability Fund, administered by English Nature.

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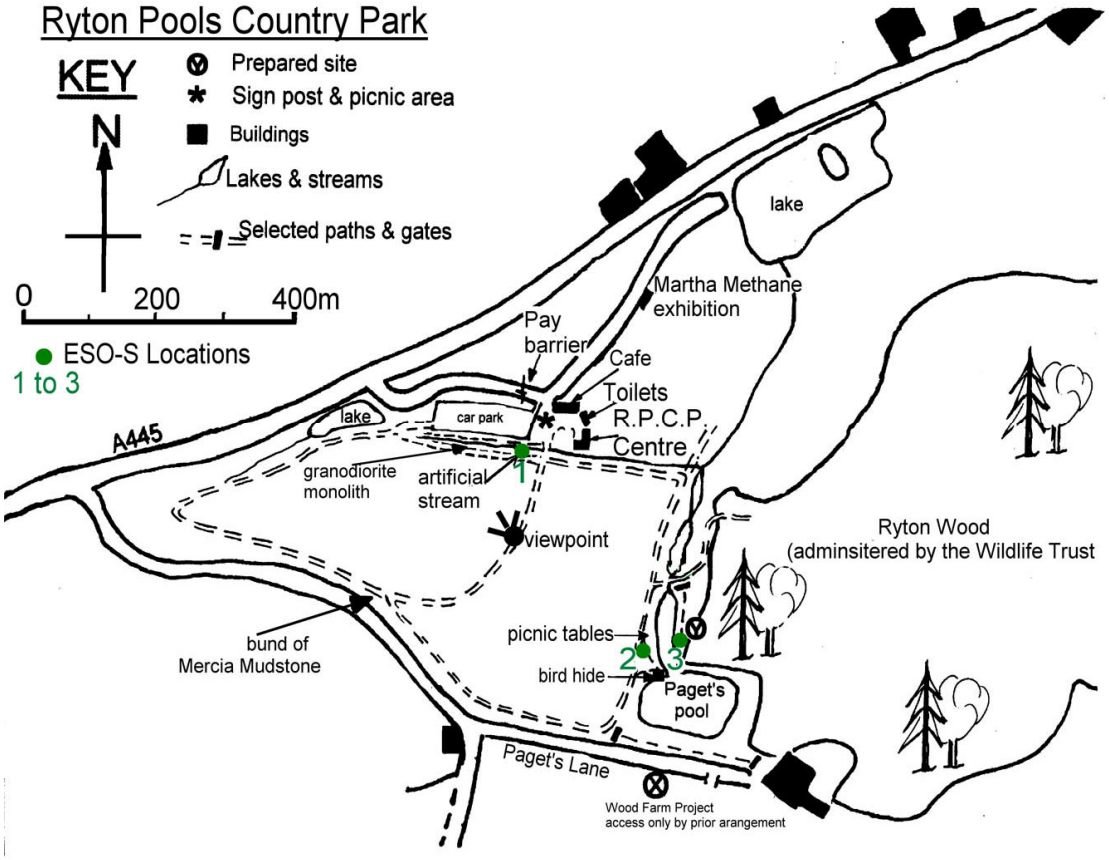
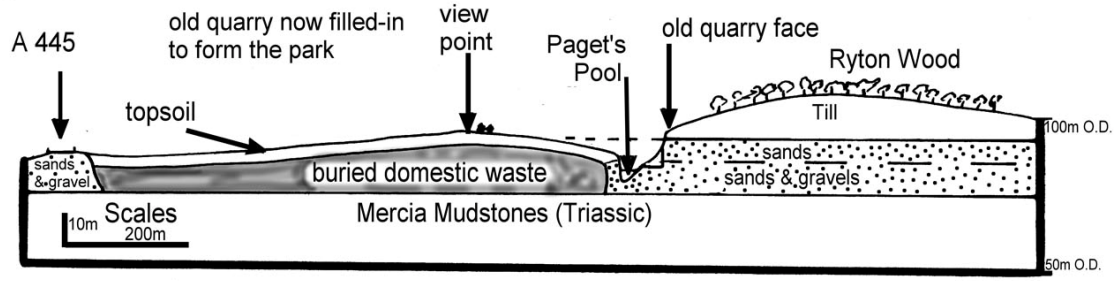
PUPIL ACTIVITY SHEET 1 Pupil Name.....

Your Map Of Ryton Pools Country Park.
Mark the direction north on the compass cross on the map.
Use the map to follow your way through the park.



Below is a cut-through section across the park.



PUPIL ACTIVITY SHEET 2 Pupil Name .....

Site 1: The "Mystery" Stream

Most people have seen streams and paddled in them.
This one is a bit unusual. Let's see how unusual!

Do you think our "Mystery Stream" makes a nice feature in the Park?

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Questions	**Answers**
Describe the shape and size of rocks on the stream bed.	Fairly angular boulders 10 – 15 cm.
Is there any mud or sand or small round pebbles?	No.
From your knowledge of rocks, describe and identify the rock type	Large crystals, different colours, some darker, others pinker, some white. A kind of granite.
These rocks are exactly the same as those found in a quarry in Leicestershire! How do you think they got here?	They came by lorry to make this feature on the landfill site!
Check the bed of the stream. Is the water cutting down and wearing away the bed?	The "bed" is made of black canvass-type sheeting to stop it wearing through!
Look at the water. It is steep and flowing quite fast. Is it moving anything?	No sign of moving any sand or gravel or rolling the rocks. They show little sign of rounding!
Where does the water come from? Where does it go to?	It comes from a pipe, not a spring, at the top, not run-off from the field. Goes to a grid and tank under the decking, not into a proper stream and river. Then pumped back up!
What do we call this process of using things again?	Recycling.

PUPIL ACTIVITY SHEET 3 Pupil Name .....

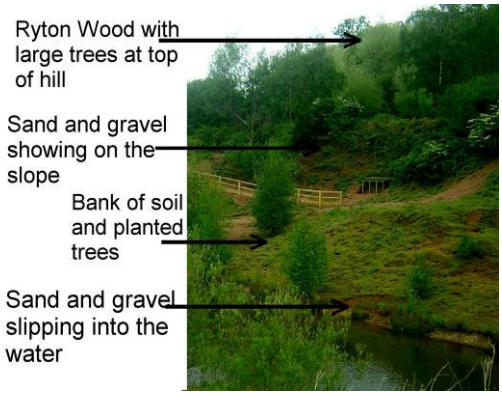
Site 2: "Ryton Pools in the Stone Age"
The display board explains what life was like here 500,000 years ago.
The clues to the story are found in the sands, gravels and clays seen across the pool.

What name has been given to the river which flowed here 500,000 years ago?	Bytham River, (it flowed from south to north).
What materials was it carrying?	Sand, gravel and some mud.
What large animals lived and died in the area, leaving their bones to be buried in the gravel?	Straight-tusked elephants. Horses. Bison.
500,000 years ago was the climate hotter, or colder or about the same as now?	About the same [temperate].
What is the evidence that early humans lived here?	Stone hand axes, made from igneous rocks not found locally.
What did the early humans eat?	Meat from the animals they hunted, Plant fruits, nuts, roots etc.
Why did the animals and early humans move away, to the south?	The climate grew colder, plants had difficulty growing and humans followed the animals to warmer areas to the south. Ice sheets eventually spread from the north and east.

PUPIL ACTIVITY SHEET 4 Pupil Name .....

Site 2: The View From Paget's Pool

Look across the narrow end of Paget's Pool. Match what you see with the photo below.



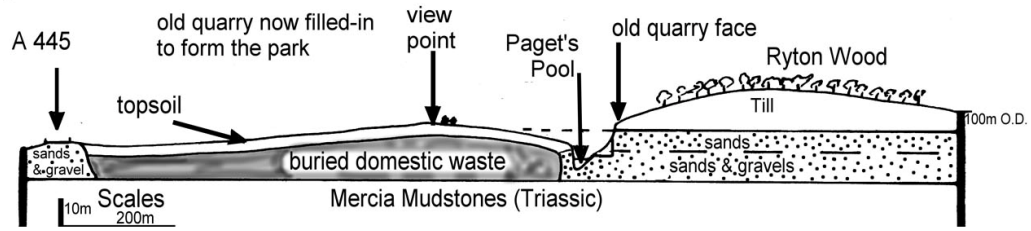
Write these points against the correct arrow on the photo from Site 2.

- Ryton Wood, with large trees growing on hilltop.
- Sand & gravel showing in the side of the hill.
- Sand & gravel slipping down slope into the pool.
- Bank of soil and planted trees.

Now look at the slope across the pool in front of you.

Questions	Answers
How can you tell that this was once the edge of a quarry?	Steep slope, almost a cliff face. Area below has been landscaped.
What has happened to the face in the 20 years since quarrying stopped?	Weathering & erosion, washing sand, pebbles and clay down slope.
What is happening over the ground's surface?	Soil is being formed, & plants colonise. Mini-beasts & rabbits!

On the correct ends of the section below, write in EAST and WEST.



Questions	Answers
What do you think the sand and gravel have been used for?	Mostly aggregates for roads, concrete, mortar etc. [see follow-up topics].
Why doesn't Paget's Pool completely soak away into the ground?	Stopped by non-porous/impermeable Mercia Mudstone which lies under the whole area.
Describe the materials used to make the paths in the Country Park.	Mostly black-ish fine grained igneous rock chippings – basalt/dolerite, with bitumen to stick it together. Other paths are lighter grey, made of limestone of Carboniferous age [react with dilute acid].
What happens to the edges of the paths in wet weather?	Rainwater is running on the surface forming miniature rivers and gullies, carrying the chippings along, wearing away the edges of the path. River erosion!

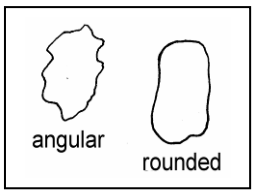
PUPIL ACTIVITY SHEET 5 Pupil Name .....

Site 3a: (or alternative) **The Rocks**

How would you describe these "rocks": Are they: Stuck together and hard or Soft and loose?	Soft and loose. The bits are not cemented / stuck together very well.
Are they all jumbled up or are there signs of layering?	Signs of layering, though the upper layers appear jumbled.
Which is the oldest layer? [You may have done an experiment to demonstrate this].	The one at the bottom, the sandier layer. [These are the Baginton Sands.]
What is this layer made of? Measure the size of the grains – about 1mm, less than 1mm, more than 1mm	Fine grains of quartz sand. 1mm or less.
Are the grains rounded, or angular, or mostly in between?	Mostly in between.
What is the middle layer made of?	Mostly sticky reddish clay, with angular stones [up to several cm] mixed in. [This is the Thrussington Till or boulder clay]
What is special about the top layer? Your teacher may wish to collect a sample for later study.	It is living soil, with plant roots, decaying plant matter and animals, water and air. Lighter colour, merges down through sub-soil to till, from which it was derived!
What is digging the holes in the sand?	Rabbits!

PUPIL ACTIVITY SHEET 6 Pupil Name .....

Site 3b: The Pebble Investigation.
Look at the shape of the pebbles on the ground.
Use the picture at the side to help you



Look at the lower slopes:

What changes to the soil do you notice lower down the slope? Describe the shapes and sizes of the objects you can see.	More pebbles. Mostly rounded & some angular pebbles of various colours, & sizes up to several cm long.
Suggest a reason why the soil here is so pebbly.	There is a pebbly layer under the sandy layer, running under the hill. This is the Baginton Gravels.
What happened to the pebbles when this was a quarry?	Removed, along with sand, as aggregates for roads & concrete in construction industry.
Describe the shape of most of the pebbles.	Rounded.
What does the shape tell us about how the pebbles were transported to here? You may have done an experiment to show this.	Rounded by contact with other pebbles rolling along bed of a river. [Remind the group of the Sugar cubes demonstration]
Most of the pebbles are made of very hard quartz and quartzite. Why does hardness improve a pebble's chances of survival?	Resists attack, with less hard ones breaking up sooner on the journey here.
In which direction did the pebbles come from in order to be deposited here?	Those eroded from from Triassic conglomerates [pebble beds], by the Bytham River, about 500,000 yrs ago came from the south-west. A few [e.g. flint] have weathered out from the overlying till [boulder clay] and originate from the NE, the direction the ice came from.

PUPIL ACTIVITY SHEET 7 Pupil Name .....

Site 3b: Counting The Pebbles

Collect the 25 pebbles nearest to your left foot. Use the identification sheets to name them. Record them in the table. Put the pebbles back when you have finished.

	Look out for:	**Tick here for each one found**	**Totals**
MINERAL	**White, very hard.** [Vein quartz]		
SEDIMENTARY	**Brownish colour & layered, quartz grains, quartz cement.** Quartzite a very hard sandstone		
	Made of sand sized grains. Other sandstones		
	Made of grit sized grains. Gritstone		
	Made of rounded pebbles. (more than 5mm.) Conglomerate		
	Made of angular pebbles (more than 5mm.) Breccia		
	Reacts with acid, may include shells. Limestone		
	Is very hard and glassy. Flint		
	Has grains cemented together. Other sedimentary rock		
IGNEOUS	**Has large crystals of pale colour.** Granite		
	Has small/medium crystals, mostly black. Basalt/dolerite		
	Has interlocking crystals. Other igneous rock		
METAMORPHIC	**Is hard, banded, flat pieces.** Slate		
ANY OTHERS (Unidentified)	Record here any you can't identify.		

PUPIL ACTIVITY SHEET 8 Pupil Name .....

Site 3c: (or alternative) **Investigating Soil**
Look at the top of the face.

Observations/Questions/Teaching points	**Answers/Interpretation/Comments**
Watch whilst your teacher pours some water gently onto the soil surface. Is it permeable (it lets water through) or not?	At the soil pit, on top of the slope it is slightly permeable. In the sandier soils at the bottom it is quite permeable. [see Working with Rocks & Working with Soil]
What is the soil made from?	At the top of the slope it is mainly clay with some pebbles from the till (boulder clay). At the foot of the slope it is mainly sand (quartz) grains and pebbles, with some clay. In both cases there are also roots and mini-beasts , water and air.
How do you think soil is formed?	Rocks are being broken down all the time by weathering processes. These include acid rain and freeze-thaw. These rocks are mostly "soft" sands and clays and easily form soil. [see WW Rocks p 14]. [Note leaching downwards of nutrients from upper layers by rainwater.]
Describe where the roots are growing.	Roots grow down and along, just below the surface. Some are long, even growing down into the sub-soil to anchor the trees, Some are short and absorb mineral nutrients.
Try to identify some plants growing in the new soil on the scree slopes.	At the top of the slope: Mixed woodland, with silver birch, oak and conifers, brambles. On the slope itself: Silver birch and other tree saplings. Grass, plus others – identification depends on season! Moss & lichen in dark, damper areas.
Try to explain why the trees in Ryton Wood at the top are larger than those on this slope.	Ryton Wood on top is older. It was woodland even before the sand and gravel was quarried. The trees on the later slopes have only grown after the quarrying finished and are therefore smaller and younger.
What clues have you found to show that animals live in the soil in this area?	Worm casts. Mole hills. Rabbit burrows and droppings.

PUPIL ACTIVITY SHEET 9 Pupil Name .....

Ryton Pools Summary pupil worksheet (i)
On our visit to Ryton Pools Country Park we have found out a lot about the rocks beneath our feet.

At the Mystery Stream 1. Describe the size and shape of the most common rock here.	Large angular boulders, 10-15cm.
2. You should find that the rocks are made of crystals, describe what they look like.	Large pink and white crystals with darker ones [granite].
3. What rock is it?	Granite.
4. How did these rocks get here?	They were brought - from Leicestershire.
5. Is this a natural stream or Man-made?	Man-made.
View from Paget's Pool 1. What has happened to the old quarry face in front of you?	Rock material, sand & gravel slipped down, trees & grass growing.
2. What is it turning into?	Soil.
3. Name two plants you can see growing in it.	Grass, silver birch, oak, brambles.
4. Why doesn't the water in Paget's Pool completely soak away into the ground?	Stopped by clay layer underneath.
The Display board: Ryton Pools in the Stone Age 1. What was the river which flowed here 500,000 years ago?	Bytham River.
2. What animals lived in the area at that time?	Straight-tusked elephants, horses, bison.
3. How do we know that early Man lived here?	Stone hand axes found.
4. What happened to the climate in the next 50,000 years?	Colder, becoming an Ice Age.

PUPIL ACTIVITY SHEET 10 Pupil Name .....

Ryton Pools Summary pupil worksheet (ii)

The Faces and Pebbles 1. How would you describe these "rocks"/ Are they: Stuck together and hard or: Soft and loose?	Soft and loose.
2. Which is the oldest layer? What is it made of?	The one at the bottom. Made of red sand.
3. What is the middle layer made of?	Sticky reddish clay with angular stones.
4. What is special about the top layer? What is it made of?	Not rock, but soil. Made of living and dead plants and animals, plus sand and clay, air and water.
5. What is the name of the wooded area growing on top of these rocks?	Ryton Wood.
6.. Describe the shape of most of the pebbles:	Rounded.
7. What does the shape tell us about how they were transported here?	They were rounded by contact with other pebbles rolling along in a river. [in Triassic times and also by the Bytham River.]
8. Describe the two most common types of pebble. Use the table to help you.	White, very hard [vein quartz] Brownish, layered, quartz grains, quartz cement, very hard sandstone [quartzite]
9. Name these two pebbles. (Use the table to identify them.)	Quartz… and … Quartzite.
10. What has happened to the old quarry after quarrying stopped?	Filled with domestic rubbish, covered & used for recreation & methane.

Finally: In the space below draw one pebble you have found.
Show as much detail as you can. Give a centimetre scale bar. Try to identify the pebble from the table.

Well done