Rock around campus

6 Metropolitan Cathedral [Campus map locations B5 & B6 and C5 & C6]

This fully accessible trail is one of a planned series of walks around the University of Liverpool. The aim is to introduce the rocks and man-made materials used in the buildings and paving around the campus.

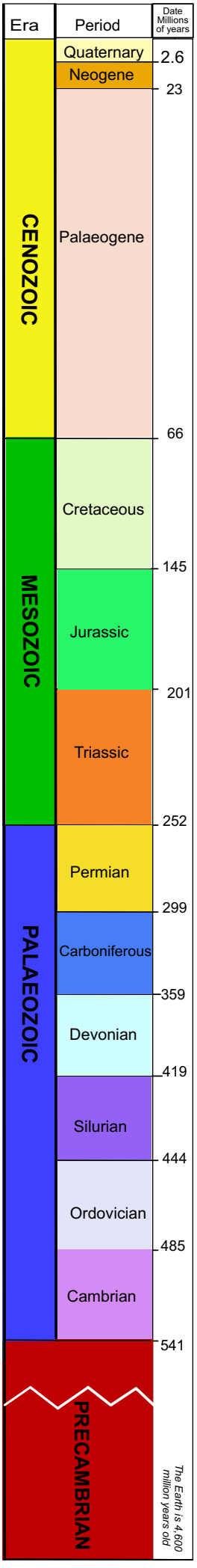
To help you, in this leaflet you will also find:

- a map showing the names of buildings around University Square;
- a glossary of terms;
- a geological timechart.

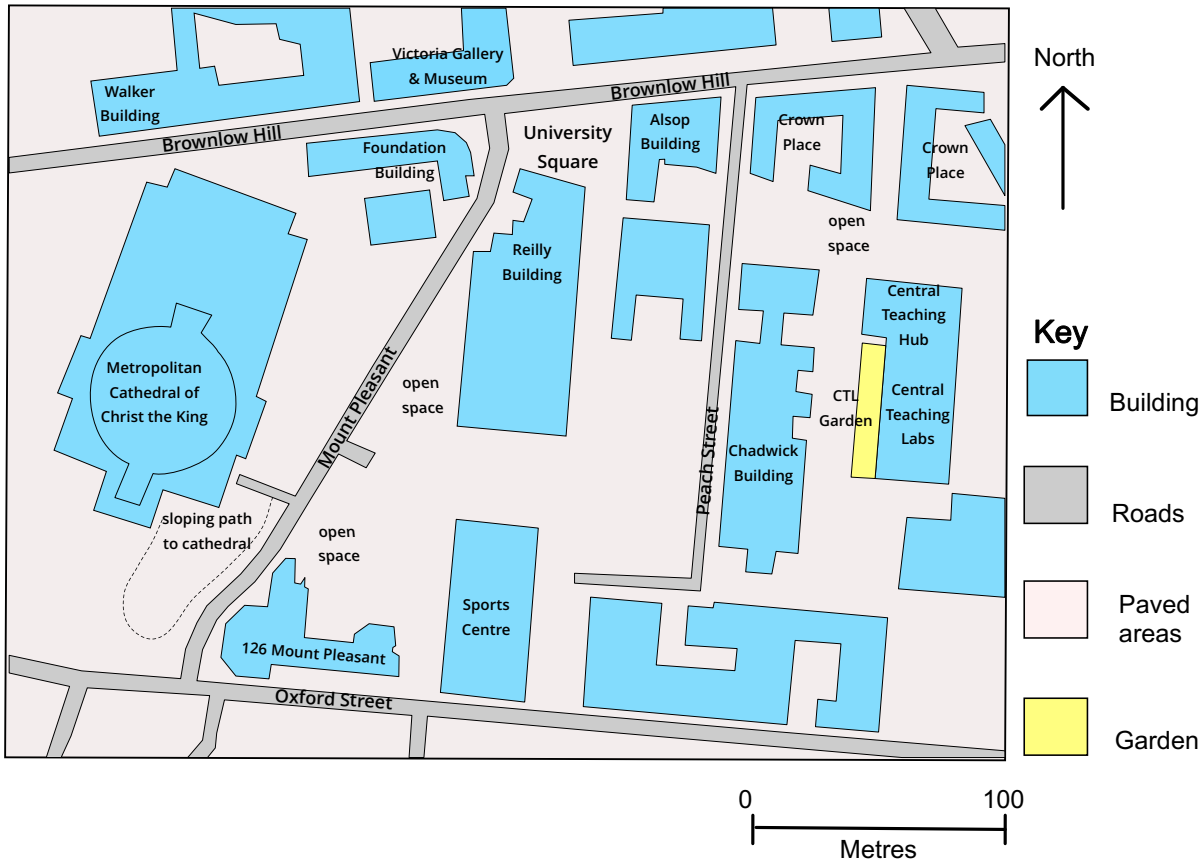
This is a self-led guide and you need to get close to the buildings so that you can see the fine details. Allow an hour to complete the trial.

There are three types of rock: **igneous** (crystallized from molten rock); **sedimentary** (derived from the breakdown of other rocks) and **metamorphic** (rocks changed by heat and/or pressure). Man-made materials are also derived from Earth materials. Examples include **bricks** (baked clays); **concrete** (a mixture of sand, gravel and limestone); **glass** (a mixture of sand and limestone); m**ortar** (a mixture of sand and limestone); **metals** (lead used in flashings, copper used in wires and lightening conductors, iron used in drain pipes and railings) and **alloys** (mixtures of metals for example bronze used in statues).

Liverpool Metropolitan Cathedral



Map showing the names of the buildings near the Metropolitan Cathedral



Start in University Square near the Reilly Building. Take the crossing towards the Foundation Building and progress along Mount Pleasant.

Before the entrance to the carpark for the Metropolitan Cathedral of Christ the King, look at the low wall on your right-hand side (photo A). The wall is made of blocks of pale yellow to buff coloured Carboniferous sandstone (a sedimentary rock). This rock has a rough, unpolished surface and is called quarry-faced stone. Many of these blocks show layers (sedimentary structures known as bedding). Blocks of sandstone are of different sizes and are cemented into place using mortar (a mixture of sand and limestone).

Cross the road leading to the carpark (beware of traffic). Go through the right-hand entrance gate leading to the sloping path into the cathedral garden.

Look at the wall on the right of the path and on the first building in the garden. The wall cladding is made of stone aggregate concrete blocks (photo B). These concrete blocks made of paste (usually Portland cement and water) and aggregate (rock fragments) have angular rock pebbles stuck onto their outer surfaces. The pebbles are green to grey in colour and are of various types of metamorphic rock.

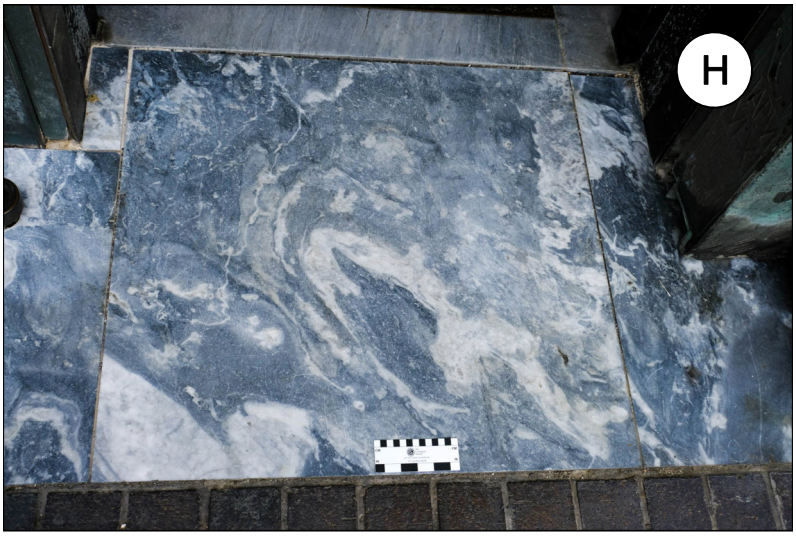
The sloping path is surfaced with permeable resin-bound gravel (photo C). The rounded gravel is yellow-brown in colour and composed of fragments of many types of rock as evidenced by the different colours of the rock fragments.

Follow the path through the garden. As you reach the highest section of the path look down into the grassed area garden on your right-hand side. This gives a view of “Still Point” which is a circular plinth 18 metres in diameter (photo D). This artwork was created by Susanna Heron and is made two types of igneous rock. The light grey coloured rock is granite; the darker grey polished rock is dolerite.

On the highest points on the path notice the balustrade, fences and handrails on either side of the path (photo E) These are made of stainless steel (an alloy of iron with a minimum of 10.5% chromium and which also contains carbon, silicon and manganese).

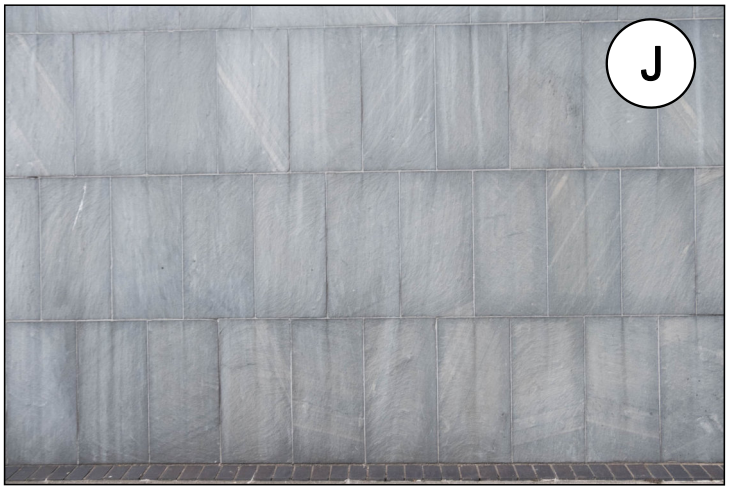
On the flat area at the end of the garden path proceed to the left to reach the entrance to the cathedral. Sculptures on either side of the entrance (photos F & G) are sliding doors and were designed by William Mitchell and made of bronzed fiberglass. These sculptures depict symbols of the evangelists: Matthew, Mark, Luke and John. The bells, also called after the evangelists are made from bell metal, a mixture of copper and tin (with a higher percentage of tin than bronze.

Look at the rock slabs used to pave the first part of the cathedral entrance (photo H). These rock slabs are made of marble (a metamorphic rock).



From the entrance return towards the garden path, then follow the flagged area along the side of the cathedral building. Look at the rock cladding that covers the side of the building (photos I & J) .

The darker rock slabs are slate (a metamorphic rock). Slate was formed when shale (a sedimentary rock) was affected by heat and pressure during a process called metamorphism. The word metamorphism means “change in form”. Look at the slate slabs and you will see pale grey bands and lines in the rock which show the bedding in the original sedimentary rock.



Continue along the side of the cathedral. The pale coloured rock cladding the next sections of the building (photo K) is a sedimentary rock known as Portland Limestone (Jurassic). This limestone contains fossils. Most are fragments, but you may spot some whole oyster shells (photo K).

On the right-hand side there is a huge stained-glass artwork mounted on a plinth of granite (photo L). This piece of artwork made of hand-cut, mouth-blown glass, is one of several stained-glass columns created by the German artist Raphael Seitz. Glass is made from sand, limestone and sodium carbonate (soda ash).

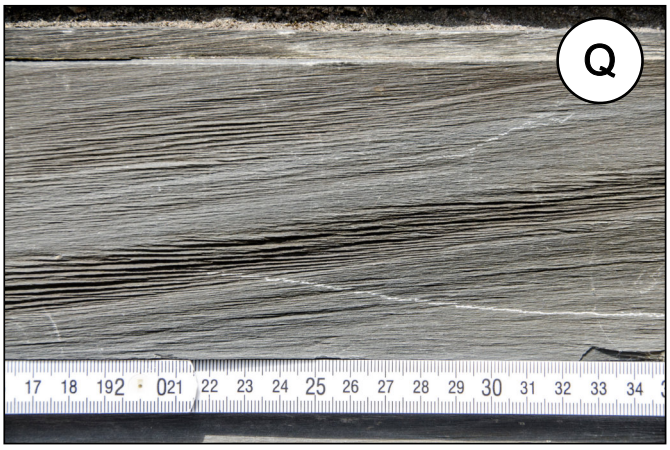
Proceed to the plateau behind the Liverpool Metropolitan Cathedral. Look at the view of the cathedral from the plateau. The cathedral, designed by Sir Frederick Gibberd, is built in concrete with a Portland Limestone cladding and has an aluminium covering on its roof. You will notice the building has a circular shape and its tower has the shape of a truncated cone. The building is supported by 16 concrete trusses and flying buttresses attached to these trusses give the cathedral a tent-like appearance (photo M).

Proceed towards the pyramidal shaped building on the right-hand side of the plateau (photo N). The base of this building is made of granite, but limestone cladding is used on the upper parts of the building. If you look carefully you may be able to see shelly fossils in the limestone.

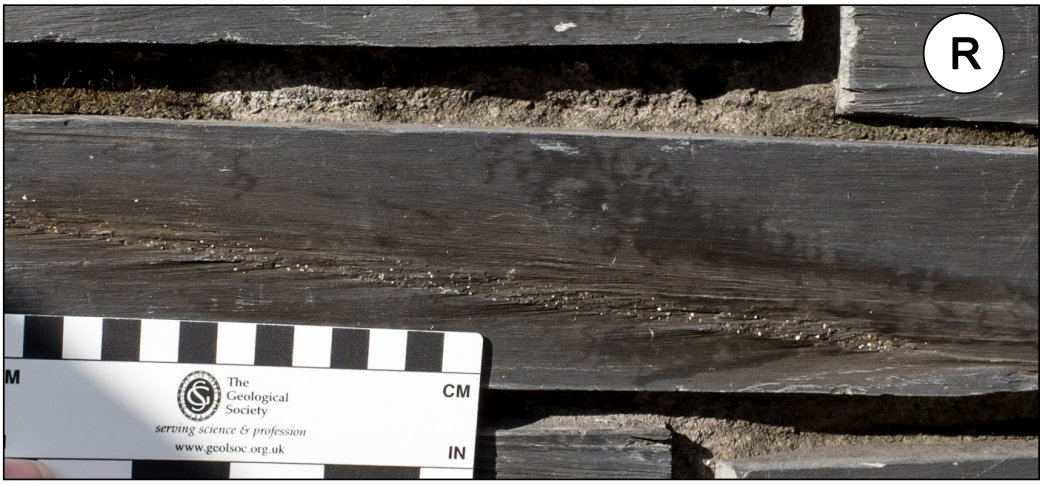
Return towards the entrance of the cathedral. As you proceed look on your left-hand side at the wall forming the perimeter of the plateau. This wall is made of granite and the different crystals making up the rock are easy to see. You will notice that some crystals are larger than others. Many of the larger crystals have clear shapes, consisting flat faces with sharp angles (photo O).

Near the entrance to the cathedral take the path on your left into the cathedral garden and return to Mount Pleasant. Turn right on Mount Pleasant.

Look at the high wall on your right. (photo P) The wall is made of blocks of dark-coloured slate (a metamorphic rock). You will notice the structure called slaty cleavage in the slate blocks. This is a repetitive layering in the slate. The rock seems to be splitting along these layers, each of which can be as thin as a sheet of paper (photo Q). Slate is usually used as a roofing material because it is easily split into thin sheets.



You may also be able to see bands where there are slight changes in colour in the slate. These bands mark the bedding of the original shale. If you look very closely you may also see thin bands of shiny yellow crystals in the slate (photo R). These are crystals of the mineral pyrite, also known as ‘fool's gold’.



Proceed along Mount Pleasant to return to University Square.

Glossary of terms

Cladding: material that is attached onto another on a building to provide a skin or outer layer.

Concrete trusses: an assembly of concrete beams that create a rigid structure in a building.

Crystal: a mineral solid with a regular atomic structure, often having a regular shape.

Dolerite: dark coloured, crystalline igneous rock made of medium-sized crystals of plagioclase and pyroxene.

Feldspars: rock forming silicate minerals that are common in igneous rocks; includes plagioclase and orthoclase.

Flying buttresses: structures used to support the upper part of a building and which form arches leading away from the building.

Fossil: any preserved remains, impression, or trace of any once-living thing from a past geological age. Examples include bones, shells, exoskeletons, leaf impressions, tracks and trails.

Granite: light coloured, crystalline igneous rock with large crystals of quartz, plagioclase, orthoclase and mica.

Limestone: a sedimentary rock composed primarily of calcium carbonate ($CaCO_3$) in the form of the mineral calcite.

Marble: a metamorphosed limestone.

Mica: a shiny silicate mineral with a layered structure.

Mineral: a natural solid material of fixed chemical composition with an orderly internal atomic structure.

Orthoclase: a type of feldspar mineral rich in potassium.

Paving slabs (or stones): naturally-occurring igneous, sedimentary, or metamorphic rocks which can be cut, shaped, or split into blocks or slabs for use as paving materials.

Permeable: allowing liquids or gases to pass through it**.**

Plagioclase: type of feldspar mineral.

Pyroxene: dark coloured silicate mineral generally containing calcium, magnesium and iron and found in many igneous and metamorphic rocks.

Pyrite: a shiny yellow mineral which is an iron sulphide.

Quartz: a mineral composed of silicon and oxygen atoms.

Slate: a metamorphic rock formed from mudstone and which has small crystals and splits (or cleaves) into thin sheets.