WGCG
Hidden wonders in the landscape of Warwickshire

Solihull Urban Geology Trail

A guided walk through the town centre

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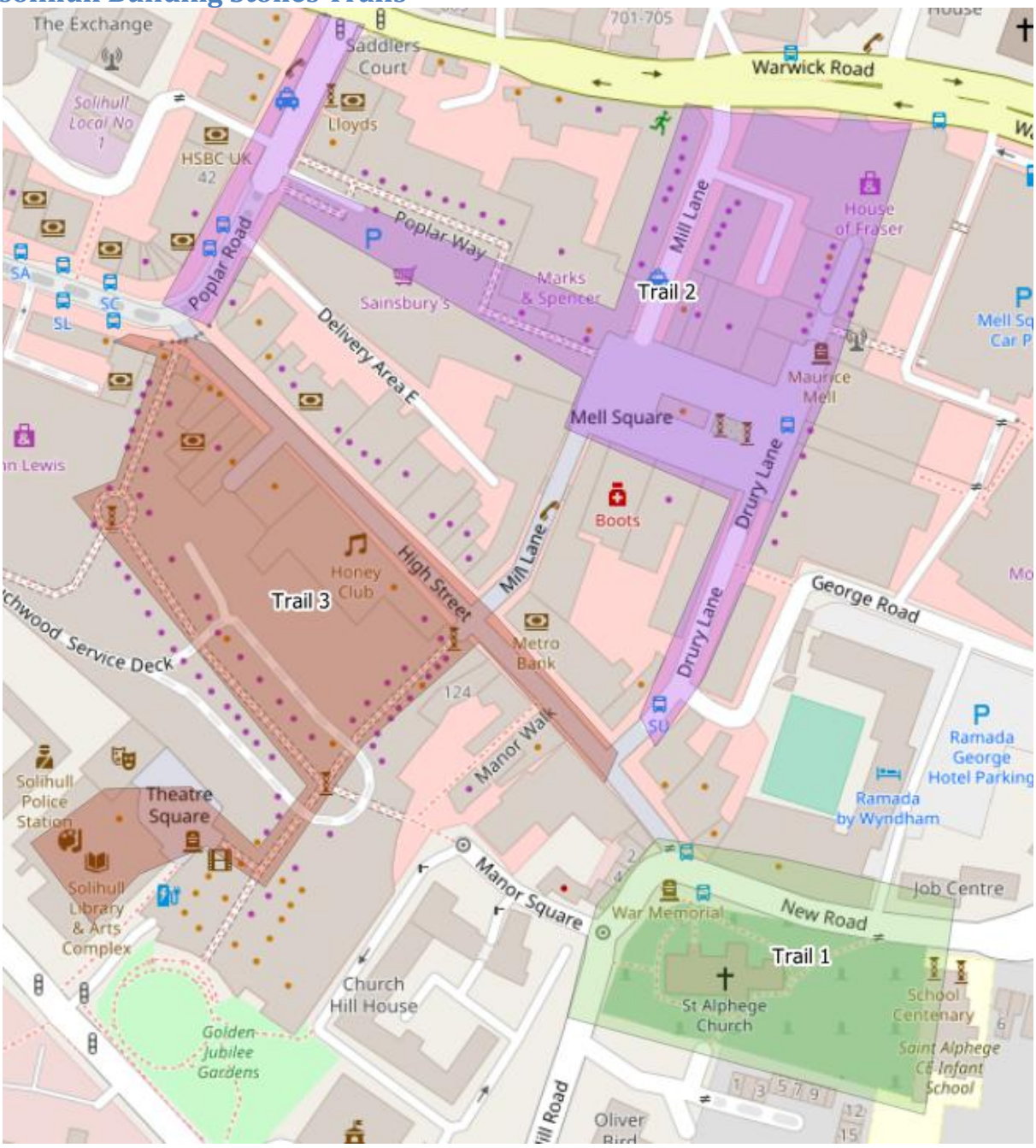
The building stones trails around Solihull.

Acknowledgements
This Urban Geology guide for Solihull has been inspired by the work of Ruth Siddall of the Geologists' Association who documented similar trails around Birmingham and London. The walk built on an existing trail "Solihull: Its geology and building materials" undertaken by Martyn Bradley and Peter Band of the Warwickshire Geological Conservation Group (WGCG). Many thanks go to John Crossling, Colin Frodsham and Julie Schroder who walked the trail making valuable observations and contributions. 'For more geological information regarding the rocks that can be viewed along the trails, have a look at the companion document 'Solihull Urban Geology Trail - A Geological Discussion'.

Solihull Building Stones Trails



Brief history of the buildings of Solihull - following the geo-trails

Solihull was established during the 12th century as a market settlement in the sparsely populated Arden region of Warwickshire. It remained a rural and relatively secluded village until the late 18th century.

Around the square and the nearby High Street are some of the oldest surviving buildings. From early times timber bricks and tiles were the materials of choice for all but the most prestigious buildings. This arose from the scarcity of local good building stone. The underlying bedrock is Mercia Mudstone which is unsuitable for building stone but is ideal for growing trees and providing raw material for the manufacture of bricks and tiles.

The oldest buildings in the town, such as St Alphege Church would have used building stones that were closest at hand as transportation would have been problematical. The opening of the railway station in 1852 led to a rapid growth in the town and enabled transport of high quality building materials at acceptable costs. During the industrial revolution and the first half of the 20th century, building stones from all around Britain became popular with some more exotic building stones being imported.

Until the early 1960s, the main high street remained much as it would have been in the late 19th century with several streets of Victorian terraced houses linking High Street with Warwick Road. The construction of the central shopping area known as Mell Square involved the demolition of properties in Mill Lane and Drury Lane, some of which were several hundred years old, together with that of the large Victorian Congregational Church that had stood on the corner of Union Street and Warwick Road.

The developments of Mell Square in the 1960s and Touchwood in 2001 used variety of natural stone cladding and paving to cover what would otherwise be concrete and steel buildings. The majority of these decorative stones are imported from all over the world. Very little reflects the local geology.

Saint Alphege Church
St Alphege Church is a large and handsome example of English Gothic church architecture, with a traditional spire 168 feet (51 metres) high, making it visible from a great distance. It is a Grade I listed building. It was founded c. 1180 by Hugh de Oddingsell and completed in 1535. It contains a 13th-century chancel, a medieval crypt and fine stained glass windows. The stonework around the West Door shows arrow-sharpening marks from the 14th/15th centuries. Renovation work has been ongoing. During the 18th century the steeple was blown down and rebuilt. In 1879 modifications to the western end of the nave took place. Stained glass replaced plain glass during Victorian times.

The church is built upon claystones of the Sidmouth Fm, Mercia Mudstone Group of the **Triassic** Period. These foundations have been inadequate to support the weight of the church which has subsequently been propped up in 1940 with a row of nave pillars on the south side and iron tie bars. All of the town's buildings have their foundations in this formation.

The Square
The heart of the historic village of Solihull is located at "The Square", a position located today by the war memorial outside St Alphege church. This is positioned where the High Street meets Church Hill Road, the "soily hill" that gave the village its name.

The offices opposite the church are known as the End Houses and date from the 16th Century.

The grade II-listed George Hotel is believed to date from the 16th century and was once a coaching inn.

The war memorial was unveiled in 1921. It was originally on an island in the centre of the road and in 1925 it was moved to its present position

High Street
Although there has been much development at street level many of the High Street buildings retain original features above the shop fronts.

The most prominent building is **the Manor House**, the only remaining domestic Medieval building in the town. It was built by the Greswold family in the late 15th-century. This was purchased by a charitable trust in 1946. It displays two interesting features. The upper story jetties out from the lower wall to counteract sagging of the upper level floor joists; and close studding of vertical timbers as a decorative and expensive status symbol. The original fill between the timbers was probably thin wattle sticks with mud and straw daub, replaced later with locally produced bricks. The variable colour is due to primitive control of temperature in the brick kilns.

In the 1920s about one-third of the buildings were private houses, but almost all had become shops by the 1950s. The centre of the village was almost entirely encircled by green fields as recently as the 1920s. Cobble stones were taken up in the early 1930s and the high street was pedestrianised in 1994.

Drury Lane
This was one of the four main streets of the old Solihull village. It was a narrow road lined with houses and cottages linking the High Street with Warwick Road. These properties from Medieval to Edwardian age were all demolished in the 1960s for the development of Mell Square

Mell Square
Building of this shopping precinct began in 1964 with the first shops opening in the summer of 1966. The new shopping centre was named after W. Maurice Mell, Solihull's Town Clerk from 1946 until his death in 1965. He was credited with encouraging the growth of Solihull and achieving Borough status in 1954 and the elevation to county borough in 1964.

The original centre of the square (now under redevelopment) contained fountains. Many Silhillians recall quantities of washing powder ending up in the fountains at the end of school terms. These were removed in 1987/88 to allow pedestrianisation.

The "Family Outing" statue at the east end of the square was installed in 1988. The sculptor was John Ravera (1941-2006) and the work was commissioned by Norwich Union Insurance Group, owners of the square at that time. The shopping centre was sold to Lord Edmiston's IM Properties for £44 million in 2013. Architects Corstorphine & Wright have since been employed to undertake modifications. Carluccio's on the corner of Drury Lane was the first building to be renovated by the new architects.

Touchwood Shopping Centre
The construction of this shopping centre in 2001 doubled the retail potential of the town. It was designed by R Kuhne & Associates, appointed by the developer Lendlease Solihull Ltd. The eye catching interiors combine decorative brickwork, with timber and stainless steel features. Contrasting decorative imported natural polished stones have been used for the paving.

The Library and Theatre (Core)
Formerly known as Solihull Arts Complex the Core was built by the council in 1976, pre dating the construction of the Touchwood shopping centre which surrounds it. The Core comprises the Central Library, Arts Complex and Solihull Connect building and is the flagship community building for the town. In addition to the library and theatre it houses 2

café bars, Solihull Connect, heritage and courtyard galleries, a Community Advice Hub and a number of voluntary and community sector organisations.
Planning ref: PL/2000/01767/FULL

The Parade
At the junction of Poplar Road with the High Street and Station Road is a row of shops known as the Parade. They were built in the 1920s on the land that previously formed the gardens of the 18th-centuary Silhill House - demolished in 1926.

Poplar Road.
The public house on the corner of Warwick Road and Poplar Road marked the entrance to the village of Solihull and was an important coaching inn.

Lloyds Bank opened in 1877 and was the first bank of Solihull. Next to Lloyds is the building that once was the Public Hall built in 1876 and used for social and charitable events. From 1937-1967 the building was Solihull's Council House.

Catalogue of Building Stones found in Solihull

Sedimentary Rocks

Dolomite: Dolomite is a carbonate containing more than 50% by weight of the mineral dolomite (Magnesium carbonate)

Limestone: Limestone is a very common rock consisting of calcium carbonate (more than 50%)

Marl: or **marlstone** is a calcium carbonate or lime-rich mud or mudstone which contains variable amounts of clays and silt.

Sandstone: Sandstone is composed of sand-sized (0.0625 - 2 mm) mineral grains, rock fragments, or pieces of fossils which are held together by a mineral cement.

Shale: is a fine-grained sedimentary rock that forms from the compaction of silt and clay-size mineral particles that we commonly call "mud." **Shale** is distinguished from other mudstones because it is fissile and laminated. Becomes slate when metamorphosed.

Igneous Rocks

Basalt: is a very common dark-coloured **volcanic** rock composed of calcic plagioclase (usually labradorite), clinopyroxene (augite) and iron.

Dolerite: (Diabase or micro gabbro) is a common dark-coloured igneous rock. It is compositionally equivalent to gabbro and basalt but texturally in-between them. It occurs mostly in shallow intrusions (dykes and sills) of basaltic composition

Diorite: is a plutonic igneous rock with intermediate composition between mafic and felsic rocks. Its volcanic (fine-grained) equivalent is andesite.

Granite: is a crystalline igneous rock that consists largely of feldspar and quartz**.** Granite is one of the main components of the continental crust and occurs in deep seated plutons.

Granodiorite: is a phaneritic-textured intrusive igneous rock similar to granite, but containing more plagioclase feldspar than orthoclase feldspar. It contains greater than 20% quartz**.**

Larvikite: is a deep seated igneous rock, specifically a variety of monzonite, notable for the presence of thumbnail-sized crystals of feldspar. Labradorite feldspar crystals give this rock it labradorescence.

Peridotite / Dunite. A Plutonic igneous ultramafic intrusion, with coarse grained or phaneritic texture. If the mineral assemblage is greater than 90% olivine then called Dunite. Derived from the earth's mantle.

Metamorphic Rocks

Marble: is a metamorphic carbonate rock consisting predominantly of calcite or dolomite.

Phillite: is a slate that is further metamorphosed so that very fine grained white mica achieves a preferred orientation. It is primarily composed of quartz, sericite mica and chlorite

Quartzite: is a silica cemented quartz sandstone. It can also be a hard, non-foliated metamorphic rock which was originally pure quartz sandstone converted into **quartzite** through heating and pressure, e.g. in orogenic belt setting.

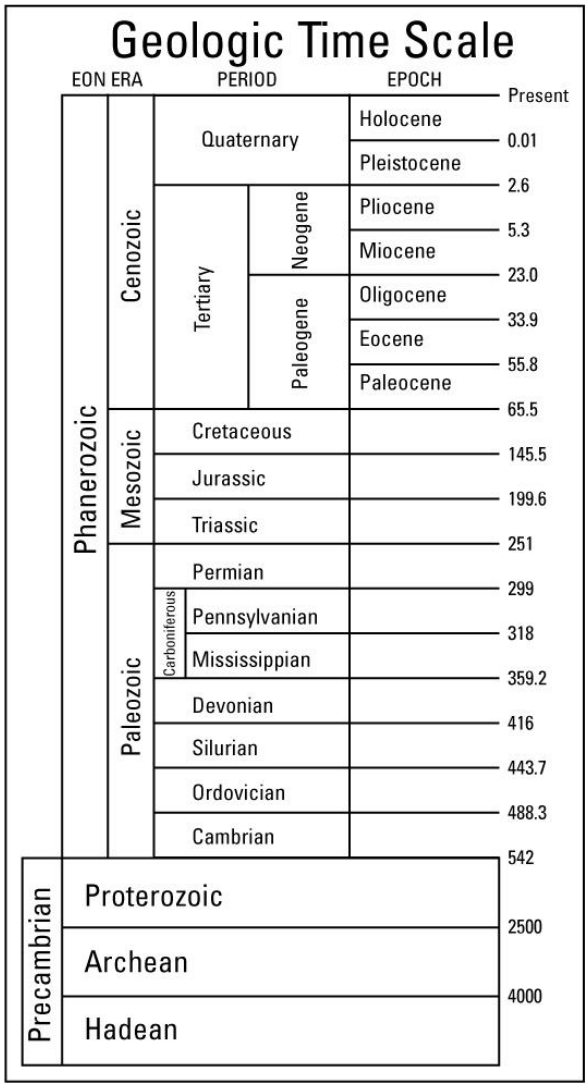
Serpentinite: is a metamorphic rock that is mostly composed of serpentine group minerals, (antigorite, lizardite, and chrysotile). These are produced by the hydrous alteration of ultramafic rocks.

Slate: A fine-grained metamorphic rock that can be split into thin sheets (has slatey cleavage). Slate in the vast majority of cases is a metamorphosed shale/mudstone.

Geological naming versus building trade naming

In the stone trade today, any carbonate rock, whether limestone or marble, is classified as a 'marble' if it takes a good polish. Similarly, various different rocks composed of silicate minerals are classified as 'granites'. Other classes of stone used by the trade include 'limestone' (if a carbonate rock doesn't polish well), 'travertine', 'sandstone' and 'slate'. This guide uses the scientific geological names. Trade names need to be used with some caution.

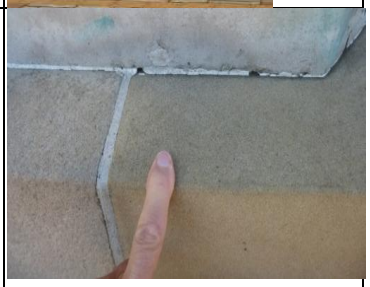
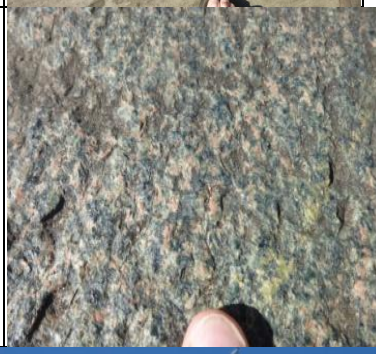
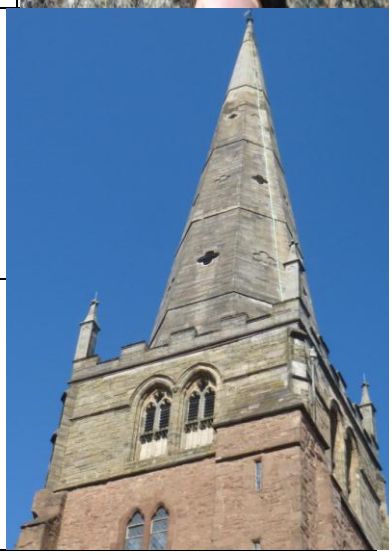
Geological Time Scale - Stratigraphic Column

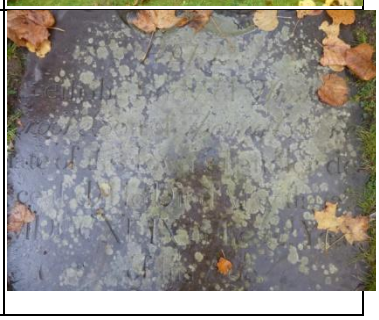


Trail Listing

The source of origin of building stones can sometimes be difficult to determine unless historical records are available. Research of the building stones used in Solihull has been thwarted by very poor documentation. Interpretation of the lithologies has been undertaken with only the use of a hand lens and a grain size chart. Some interpretations may not be wholly accurate and subject to modification upon further investigation. Age of rock is suggested based on the origin, which is often an educated guess.

Trail 1: The Old town of Solihull

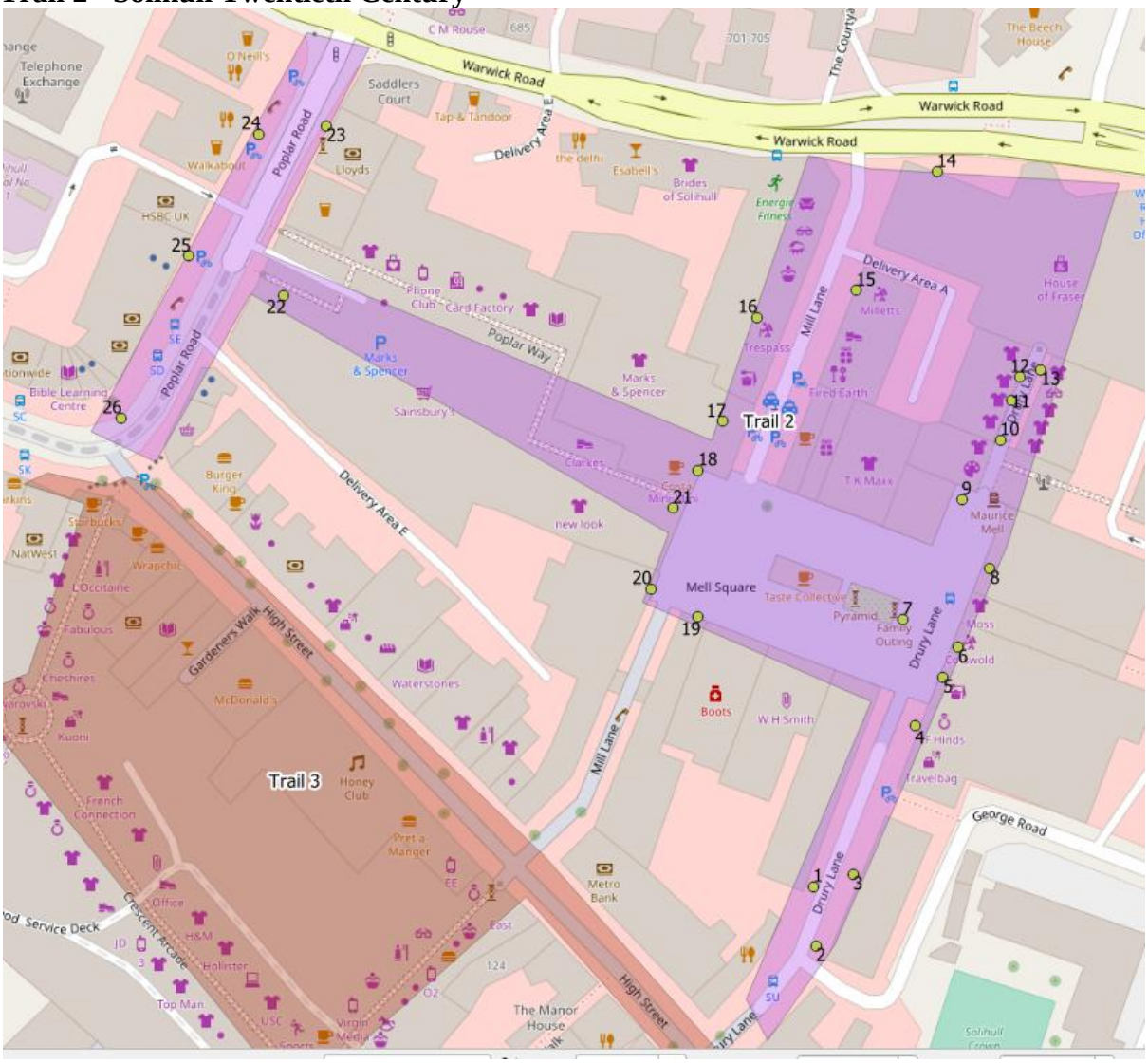
Location 1a **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**War Memorial** Limestone White, common fossils, oolitic, common bryozoa, freestone Shallow Marine Whit Bed Isle of Portland, Dorset Jurassic Portlandian 152 - 145 mmybp	
Location 1b **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Steps around the memorial** Sandstone Buff yellow brown, hard, blocky, dominantly medium subangular grained, trace organic clay, lacks fossils Fluvial. Probably Stanciffe / Stanton Stone or Park Spring Derbyshire or Yorkshire Upper Carboniferous 318-299 mmybp	
Location 1c **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Paving stones around the memorial** Sandstone Buff yellow, arenites, with varying amounts of micro mica silt and carbonaceous material. Rare Leisegang banding Fluvial. York stone South Pennines Lancashire-Yorkshire border Upper Carboniferous 318-299 mmybp	
Location 1d **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Kerbstones** Diorite (Markfieldite) Dark greenish grey, speckled appearance. It is composed of green hornblende and pink orthoclase, with minor epidote appearing as bright green patches. Igneous intrusive. Markfieldite Markfield, Leicestershire Pre Cambrian 600 mmybp	
Location 2a **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Steeple** Sandstone Light greenish grey. Silt to fine grained. Generally well cemented Fluvial distributory channels in deltaic or estuarine conditions Arden Sandstone Arden area Triassic Mercia Mudstone Group 241-235 mmybp	
Location 2b **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Upper Tower** Sandstone Buff coloured, clean sandstone Fluvial (Warwick) Bromsgrove Fm, Sherwood Sandstone Group Warwick Early Triassic 245-241 mmybp	

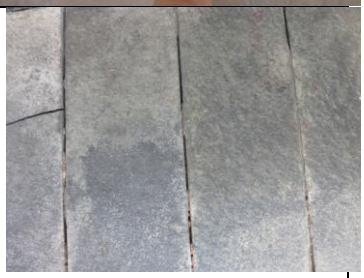
Location 2c **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Nave, Chancel Transepts & Lower Tower** Sandstone Red. Stained from Iron oxides with the sediment. Many blocks crumbling due to clay content. Rare pebbles can be seen. Fluvial. Most beds horizontal, some cross bedding. Suggests a dominantly low energy environment with periodic high flows Coventry Upper Carboniferous 318-299 mmybp	
Location 2d **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Nave Buttresses** Sandstone Grey- reddish grey, red spots of barytes, cross bedding common Fluvial, high energy, good sorting, low clay content Helsby, (Grinshill), *(Hollington Stone, Staffordshire)* Grinshill Quarry, Shrewsbury, Shropshire (Hollington quarry, *Staffs*?. *This stone is more red in colour and siliceous cemented, similar to what we see in the buttresses*). Early Triassic 245-241 mmybp	
Location 3 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Saint Alphege Church - Glacial Erratic** Quartzite Cream, buff, microcrystalline, well rounded Deposited by ice sheet from the north. Possibly formed as a hard pan, known as ganister, a close grained, hard siliceous rock found in the coal measures of northern England, and used for furnace linings) Probably Carboniferous (Deposited by pre-Devensian ice sheet)	
Location 4 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Saint Alphege Church - Grave** Granite Crystalline. Pink feldspar, clear quartz, black biotite Deep igneous intrusive Peterhead Granite Stirlinghill, near Boddam, Aberdeenshire Caledonian 400mmybp	
Location 5 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Saint Alphege Church - Grave (skull & crossbones)** This silty sandstone has a slaty grey - dull brown look, but when dried it is light brown. It is well sorted, fossil free and appears carbon free Fluvial Halesowen Formation North Warwickshire Westphalian D, Carboniferous 313 to 304 MMYBP	

Location 6 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Saint Alphege Church - Grave** Granite Deep igneous intrusive Porphorytic Granite St Levens, Cornwall	
Location 7 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Saint Alphege Church - Grave** Granite Deep igneous intrusive Red Porphry Granite Aberdeenshire	
Location 8 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Saint Alphege Church - Grave** Granite Deep igneous intrusive Ben Cruachan Granite Argyleshire	
Location 9 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Saint Alphege Church - Grave** Granite Crystalline. Pink feldspar, clear quartz, black biotite Deep igneous intrusive Peterhead Granite Stirlinghill, near Boddam, Aberdeenshire Caledonian 400mmya	
Location 10 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**The George Hotel** Sandstone Red, Cross bedding Fluvial Kenilworth ? Permian 290-245 mmybp	

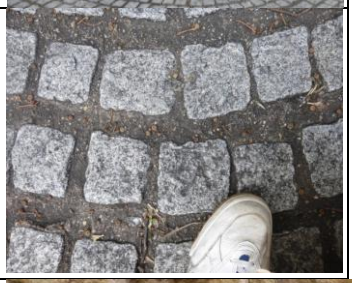
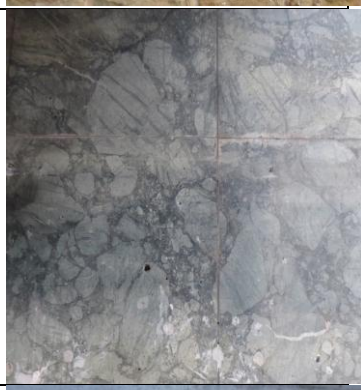
There are lots of other wonderful memorial stones to be viewed in the graveyard and the reader is invited to take a walk around and identify them. It will soon become apparent that different stones and styles were fashionable during different times.

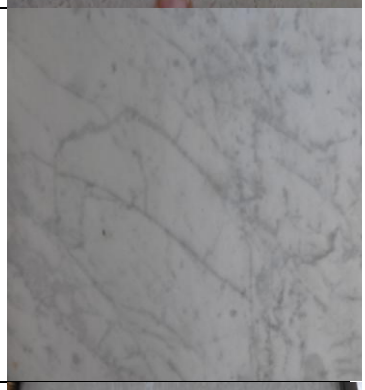
Trail 2 - Solihull Twentieth Century



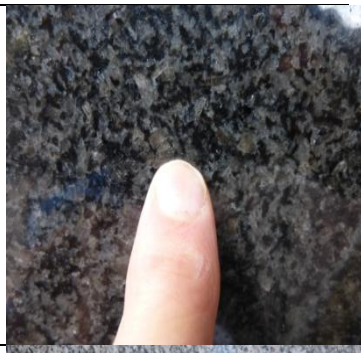
Location 1 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Gentlemen Barbers - Drury Lane** Marble Brecciated, grey, numerous off-white calcite veins, thin dark grey & black lined fractures, grey matrix rich in iron pyrite Tectonic breccia formed along a thrust plane then metamorphosed at greenschist facies Arabescato - Carrara Marble ? Tuscany in Italy ? Mesozoic limestone, Oligocene and Miocene tectonic event ?	
Location 2a **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Bridge Boutique Drury Lane - Columns** Marble Small brick blocks of unpolished white crystalline limestone. These have a naturally broken surface which does catch the light well and makes for an interesting texture. This variety is white with faint, grey streaks, it is known as **Carrara** 'Sicilian' Marble Shallow Marine, later metamorphosed Carrara Marble Tuscany Tertiary	
Location 2b **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**The Columns base** Phillite Greenish black. Phyllitic lustre. It is primarily composed of quartz, sericite mica, and chlorite Low grade metamorphic Possibly Tredorn Phillites / Woolgarden Phillites. Cornwall Variscan	
Location 2c **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**The Wall Cladding (as 15)** Limestone Cream buff grey, abundant shells & bioturbation, wavy laminations caused by impurities and recrystallised sub bed parallel associated in part with stylolites - a diagenetic solution process. Fossil shells indicate way up. Possible small stromatolites. Low energy warm shallow marine environment	
Location 3a **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Entertainment Exchange Drury Lane - flooring** Phillite Light to dark grey, hard, evenly cleaved, Phyllitic lustre. It is primarily composed of quartz, sericite mica, and chlorite Low grade metamorphic Possibly Tredorn Phillites / Woolgarden Phillites. Cornwall Variscan	

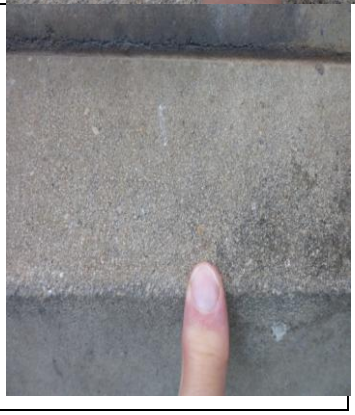
Location 3b **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Entertainment Exchange & Regis Drury Lane - Wall cladding -** Diorite Dark, greenish & blue hue (amphiboles & pyroxenes), speckled white (plagioclase), Deep seated intrusive Black Granite Malvern / Charnwood ? 570 mmybp ?	
Location 4a **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**F Hinds Drury Lane - Wall Cladding** Marble Breccia Creamy white angular blocks of various sizes surrounded by very fine darker grained impurities such as clay, silt, sand, iron oxides,. Note that the blocks are all aligned with the stress direction Metamorphic Marble	
Location 4b **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**F Hinds - Footings** Diorite Peppered black and white appearance. This is a very commonly used stone for many of the lower parts of the buildings in the town. Deep igneous intrusive Black Granite Malvern / Charnwood ? 570 mmybp	
Location 5 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Dunelm Drury Lane - Footings** Marble White, crystalline with red Almandine garnets. High grade metamorphic formed at >10km depth	
Location 6 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Cotswold Outdoors - Footings and floor tiles** Shale Varicoloured, black, yellowish brown, bluish grey, uneven cleavage Sedimentary. Deeply buried and dewatered creating shaly laminations making cleaving easy.	

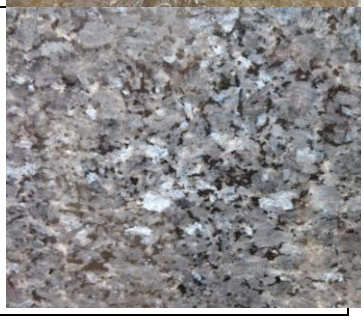
Location 7a **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Sculpture in Mell Square - The Plinth** Dolerite Dark grey - black Igneous intrusive Whinstone (a generic name) Probably from Rowley Regis Quarry Late Carboniferous Ca 290 mmybp	
Location 7b **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**The Setts** Granite Light grey, speckled black, crystalline Deep intrusive Granite Possibly from St Austell or Aberdeen Either Variscan Ca 290 mmybp or Caledonian 470 mmybp	
Location 8 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Old Post Office in Mell Square** Oolitic Iron Rich Limestone Blue Grey - weathers light brown, rusty brown, iron veins, common brachiopod fossils. Greenish blocks due to presence of chamosite which has remained un-oxidised. Red oxidised veins are limonite. Warm shallow marine Hornton Stone Edge Hill Quarry, Northamptonshire/ Warwickshire Mid Jurassic 178-157 mmybp	
Location 9 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Drury Arcade in Mell Square - Cladding** Serpentinite Breccia It is named for its snake-like patterns Greenish grey. Massive rounded fractured boulders with a variable grain size matrix . Metamorphic. Subduction zone product - hydrated peridotite. Results from a transformation of ancient ocean crust thrust onto continental rocks. White veins of calcite Verde Alpi Probably Piedmont Zone of the French and Italian Alps Cretaceous	
Location 10a **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Zebra Kids - Cladding under window** Limestone Cream, Brownish, fractured, brecciated, shelly, many stylolites, some shells Warm shallow marine, tectonically fractured	
Location 10b **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Zebra Kids Cladding on wall** Limestone Cream, buff, very fossiliferous, sponges, Warm shallow marine.	

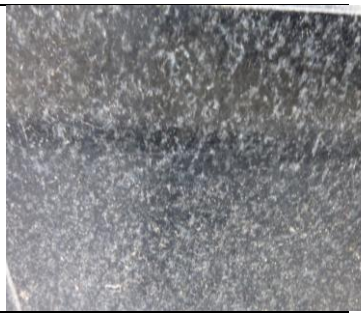
Location 11 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Onu (As location 3b)** Diorite Coarse, crystalline, dark, greenish & blue hue (amphiboles & pyroxenes), speckled white (plagioclase), Deep seated intrusive Black Granite Malvern / Charnwood ? 570 mmybp ?	
Location 12 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Madelaine Ann (As location 4b)** Diorite Coarse, crystalline, black & white speckled rock. Dark amphiboles & pyroxenes, white plagioclase and some clear quartz Deep igneous intrusive Black Granite Malvern / Charnwood ? 570 mmybp ?	
Location 13 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Katherine Draisey Boutique (As location 2c)** Limestone Cream buff grey, abundant shells & bioturbation, wavy laminations caused by impurities and recrystallised sub bed parallel associated in part with stylolites - a diagenetic solution process. Note stylolites and lineaments prevalent in area with less shall material Fossil shells indicate way up. Possible small stromatolites. Low energy warm shallow marine environment	
Location 14a **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**House of Fraser, Warwick Road** Marble White to very light grey, crystalline. Veins in marbles are usually due to various mineral impurities such as clay, silt, sand, iron oxides, or chert which were originally present as grains or layers in the limestone. Low - moderate grade metamorphism. Bianco Carrara - Pencil Vein Marble. Carrara, Tuscany Italy Alpine orogeny - c. 23mmybp	
Location 14b **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**House of Fraser, Warwick Road** Limestone, Travertine Very fine grained, lots of stylolites. Porosity filled with secondary calcite. Stylolites following the banding Terrestrial percolation and precipitation of CaC03 saturated fluids Alabaster Travertine	

Location 14c **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**House of Fraser, Warwick Road (As location 3b)** Diorite. Dark, speckled, greenish hue (olivine), blue black amphiboles & pyroxenes, clear -white plagioclase with characteristic twinning. Deep seated intrusive Black Granite Malvern / Charnwood ? 570 mmybp ?	
Location 14d **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**House of Fraser, Mill Lane** Brecciated Limestone Pinky mauve grey, severely brecciated, large lumps of travertine limestone surrounded by very small pieces of limestone in a calcite cement. Lots of small pea sized curved inclusions, possibly shells Warm coastal environment. High energy/ storms to break up beds with subsequent infilling in calmer conditions.	
Location 14e **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**House of Fraser, Mill Lane** Limestone - Travertine Very light and medium wavy grey bands, non fossiliferous, small amount of small vuggy porosity, stylolites along banding Terrestrial.	
Location 15 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Mill lane Millets. Shop cladding** Serpentinite It is named for its snake-like patterns and colouring. Greenish grey, numerous off white veins, thin dark grey & black lined fractures Metamorphic. Subduction zone product - hydrated Peridotite. Results from a transformation of ancient ocean crust thrust upwards under intense pressure by tectonic plate movements Verde Alpi. Probably Piedmont Zone of the French and Italian Alps Cretaceous	
Location 16 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Edinburgh Woollen Mill, Mill lane** Peridotite / Dunite ? Crystalline. Green. Packed with olivine. Lots of lenticular shards, probably chromite, showing a diagonal alignment. Plutonic igneous ultramafic intrusion, with coarse grained (phaneritic) texture. Derived from the earth's mantle. (Dunite if the mineral assemblage is greater than 90% olivine).	

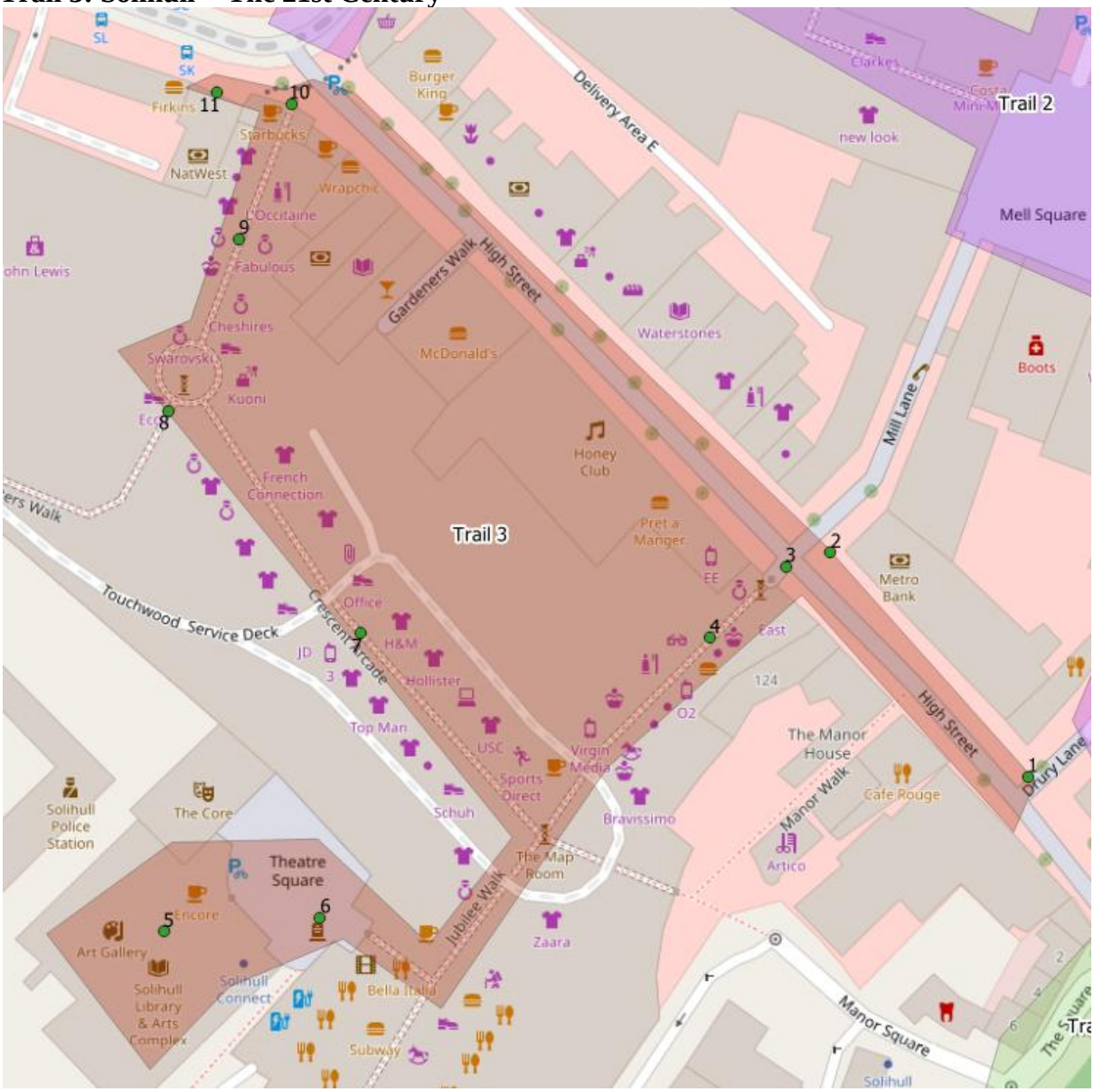
Location 17a **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Marks and Spencer - below windows (as 4b)** Diorite Coarse crystalline, speckled rock. Dark amphiboles & pyroxenes, greenish hue from olivine, white plagioclase, black biotite and some clear quartz Deep igneous intrusive Black Granite Malvern / Charnwood ? 570 mmybp ?	
Location 17b **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Marks and Spencer - pillars** Granite Coarse, crystalline, speckled, grey granite. Because it cooled slowly it grew large crystals and, in this example, we can identify the white crystals of quartz, white & pink feldspar and black hornblende, plus a sparkle from particles of mica. Relic banding seen in one section suggesting it could be derived from the melting of a gneiss. Some xenoliths visible. Lot of variation. Deep igneous intrusive Swan Grey Granite ?	
Location 18 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Costa and M&S** Granite Darkish grey from ferro magnesium minerals, clear quartz, pink feldspars small amount of black biotite, red hornfells ?, crystalline. Deep igneous intrusive, Violetta Granite ? Italy ?	
Location 19 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Boots Exterior, Mill Lane** Slate Green Grey, speckled, chlorite rich, cleaves readily Originally laid down as a volcanic tuff in Caradoc times and subsequently metamorphosed during the Caledonian orogeny Westmorland Slate or Honister Slate Honister pass, Cumbria Deposited 458-448 mmybp, metamorphosed 448-400mya	
Location 20 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Roman, Mill Lane (as location 1)** Marble, brecciated Brecciated, intensely veined. grey, numerous off white calcite veins, thin dark grey& black lined fractures, grey matrix rich in iron pyrite, stylolites, offset veining Tectonic breccia formed along a thrust plane then metamorphosed at greenschist facies Arabescato - Carrara Marble ? Tuscany in Italy ? Mesozoic limestone, Oligocene and Miocene tectonic event?	

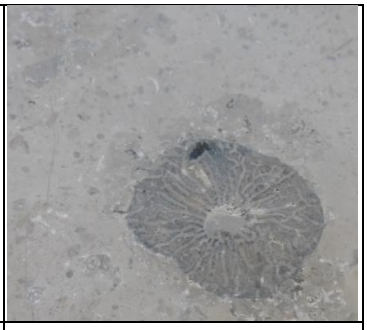
Location 21 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Inside Poplar Way - Mell Square (as 14a)** Marble White to very light grey, light yellowish stained, crystalline. Veins in marbles are usually due to various mineral impurities such as clay, silt, sand, iron oxides, or chert which were originally present as grains or layers in the limestone. Low - moderate grade metamorphism Bianco Carrara - Pencil Vein Marble. Carrara, Tuscany Italy	
Location 22 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Poplar Way (Poplar Road) - Tiling** Limestone - Travertine Pinky mauve, speckled with wavy features. The angle of cut gives its unusual features. Trails of round grains. All the porosity has been filled with white and clear calcite during post depositional mineralisation Terrestrial. Precipitation of CaC03 at hot springs. Alabaster Marble	
Location 23a **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Lloyds Bank Poplar Rd - Windows** Limestone (Oolite) Buff brown, cream, honey colour, oolite granular particles of calcium carbonate. Strong secondary calcite cement. Freestone. Warm shallow marine (beach) environment Bathstone Coombe Down, Somerset Jurassic	
Location 23b **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Lower beading** Limestone (Oolite, bioclastic) Coarse oolite with lots of bioclastic material, small amount of quartz. Poor to moderate secondary calcite cement. Freestone. Probably high energy shallow marine (beach) environment, tiny amount of quartz Bathstone ? Coombe Down, Somerset ? Jurassic	
Location 24 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Zizzi Poplar Rd** Sandstone . Light grey brownish grey, dominantly of fine subrounded grains, occasional medium, coarse grained with occasional pebbles. Moderately well sorted, mostly quartz, rare trace of calcareous cement, trace of argillaceous matrix. Lack of fossils and sedimentary features. Freestone Probably fluvial channel. Derbyshire / Yorkshire ? Carboniferous 330-298 mmybp	

Location 25a **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Danes Poplar Rd - Facing** Marble White, brecciated marble with stylolites. Veining possibly due to impurities and hydrothermal modification during metamorphism. Metamorphic Italy ?	
Location 25b **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Danes Poplar Rd - surround (As location 3b)** Diorite Coarse crystalline igneous rock. Dark, greenish & blue hue (amphiboles & pyroxenes), speckled white (plagioclase), Deep seated igneous intrusive Black Granite Malvern / Charnwood ? 570 mmybp ?	
Location 25c **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Danes Poplar Rd - floor tiles** Phillitic slate Green grey, brown grey, bleached look, uneven cleavage. It is primarily composed of quartz, sericite mica, and chlorite Low grade metamorphic Possibly Tredorn Phillites / Woolgarden Phillites. Cornwall Variscan	
Location 26a **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**No 2 Station Road, Bible Centre & Dixons** Limestone White, fossil rich, oolite Warm shallow marine where calcite, precipitated from the seawater, built up around sand particles and fragments of shell Portland Stone Whit Bed Dorset Late Jurassic 152-146 mmybp	
Location 26b **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**No 2 Station Road, Bible Centre & Dixons** Sandy Iron Rich Limestone Light brown, rusty brown, iron veins, common brachiopod fossils (also seen above in 26a) Warm shallow marine Hornton Stone Edge Hill Quarry, Northamptonshire Warwickshire Mid Jurassic 178-157 mmybp	
Location 26c **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**No 2 Station Road, Bible Centre & Dixons** Larvikite Coarse crystalline rock with labradorescence shimmer of the labradorite feldspars Deep seated igneous intrusive Blue Pearl Granite, Larvik, Norway Permian 292 - 298 mmybp	

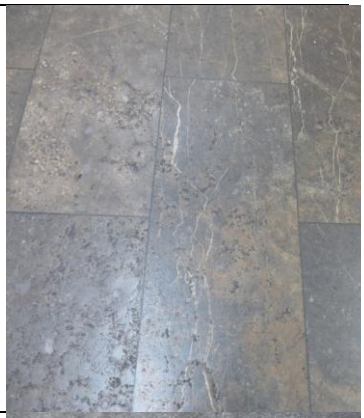
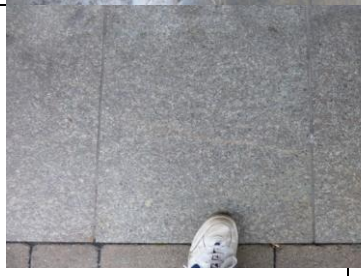
Location 26d	**No 2 Station Road, Bible Centre & Dixons (As 3b)**	
Rock Type:	Diorite	
Description:	Coarse crystalline igneous rock. Dark, greenish & blue hue (amphiboles & pyroxenes), speckled white (plagioclase),	
Environment:	Deep seated igneous intrusive	
Stone name:	Black Granite	
Source:	Malvern / Charnwood ?	
Age:	570 mmybp ?	

Trail 3: Solihull - The 21st Century



Location 1a **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Carluccio's, Drury Lane Lower Wall Cladding** Limestone / Marl Pinky grey, very fossiliferous, common ammonites, shell fragments, sponges, scleractina corals, tubiphyte microfossil "worms" Tropical marine, possibly sheltered back reef or mid shelf setting Jura Limestone ? Germany ? Late Jurassic Treuchtlingen Formation, c. 155-150 mmybp	
Location 1b **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Upper Level Wall Cladding** Limestone Cream to beige coloured stones contain fossils, including ammonites. Same as seen in Mill Lane Arcade Tropical open marine. Shelf between 50-200m water depth Jura Limestone Germany Late Jurassic Treuchtlingen Formation, c. 155-150 mmybp	
Location 2 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Metro Bank Mill Lane** Limestone White, very fine oolite, occasional shells Agitated warm marine beach setting Candeeiros Limestone Porto de Mos.(probably) Middle Jurassic	
Location 3 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Flooring entrance to Touchwood centre** Granite Pink, gray coloured slab with a polished, leathered or honed finish. some late stage veining with some of the rock Deep seated igneous intrusive Rosa Beta Granite? Italy?	
Location 4 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Mill Lane Arcade Flooring (as 1a & 1b)** Limestone Cream to beige coloured stones contain fossils, sponge biostromes, tubiphyte worms, scleractina corals, ammonites and belemnites. Stylolites Tropical open marine. Shelf between 50-200m water depth Jura Limestone Germany Late Jurassic Treuchtlingen Formation, c. 155-150 mmybp	

Location 5a **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Library Stairwell** Limestone (Travertine-*Tufa*) Cream, tan, vuggy porosity. Streaks of iron compounds. *Tufa precipitates out of calcium rich waters over organic matter, e.g. over cave entrances and waterfalls. It is normally so porous as not to be suitable for cutting and polishing. Most ornamental forms are Travertine (see description below)* Italy? Tertiary	
Location 5b **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Library Travertine** Limestone (Travertine) White, Grey white. Terrestrial. Deposited by mineral springs, especially hot springs. Travertine often has a fibrous or concentric appearance and exists in white, tan, cream-colored, and even rusty varieties. It is formed by a process of rapid precipitation of calcium carbonate, often at the mouth of a hot spring or in a limestone cave. Italy ? Tertiary	
Location 6 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Library Courtyard - Commemoration Obelisk** Dolerite Black micro-crystalline Igneous intrusive Imported	
Location 7 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Crescent Arcade Flooring (Age as locations 1 & 4)** Limestone Pale cream, clay linings infilling bands of vuggy porosity. Fossiliferous, lots of burrows, shells, sponge biostromes, tubiphyte worms, belemnites, scleractina corals and rare ammonite. En echelon fractures indicate post depositional stress. Porcellenous Open marine mid self setting in close proximity to a shoal is likely for this Jura limestone. Vugs could be the result of Tuberoids Jura Limestone ? Germany ? Late Jurassic Treuchtlingen Formation, c. 155-150 mmybp	
Location 8 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Cloisters Walk towards toilets (As 1 & 4)** Limestone Pale Cream. Lots of ammonites, sponges & scleractina corals. Sporadic vuggy porosity. Mottled appearance Open marine warm tropical seas probably >50 m depth Jura Germany Late Jurassic Treuchtlingen Formation, c.155-150 mmybp	

Location 9 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Poplar Arcade Flooring** Dolomitic Limestone Grey to brown, some light brown, lots of thin calcite veins filling fractures. Darker colour associated with the beach bio clastic deposits. Less fossils evident in the light brown deposits Initially deposited as a limestone, possibly a beach, bar, . storm deposits. Fractures and vein filling with vein offset suggest multiple tectonic events. Chemically dolomitised ? Germany Jurassic ?	
Location 10 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Poplar Arcade Entrance (as 3)** Granite Pinkish, crystalline Igneous extrusive Rosa Beta ? Italy?	
Location 11 **Rock Type:** **Description:** **Environment:** **Stone name:** **Source:** **Age:**	**Nat West, Station Road** Granite - Pegmatite Pink to reddish feldspar, white quartz with black biotite. Dark red minerals in clumps, Large phenocrysts of feldspar. Xenolith inclusions Deep igneous intrusive Porkkala Granite ? Rapakivi Finland ? Carboniferous Variscan ?	

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Geology of Central Europe, 14 Jurassic, GRZEGORZ PIEN´ KOWSKI & MICHAEL E. SCHUDACK et al

Appendix 1 Glossary of Terms

(Definitions from Wikipedia)

Alabaster Archaeologists and the stone industry use the term to includes varieties of two different minerals: the fine-grained massive type of gypsum and the fine-grained banded type of calcite. Geologists define alabaster only as the gypsum type.

The calcite type is geologically described as either a compact banded travertine[or "a stalagmite limestone marked with patterns of swirling bands of cream and brown"

Breccia is a rock composed of broken fragments of rock cemented together by a fine-grained matrix that can be similar to or different from the composition of the fragments.

A breccia may have a variety of different origins, as indicated by the named types including sedimentary breccia, tectonic breccia, igneous breccia, impact breccia, and hydrothermal breccia.

Crystal twinning occurs when two separate crystals share some of the same crystal lattice points in a symmetrical manner. The result is an intergrowth of two separate crystals in a variety of specific configurations. The surface along which the lattice points are shared in twinned crystals is called a composition surface or twin plane.

Dolomitisation. This is a geological process by which the carbonate mineral dolomite is formed when magnesium ions replace calcium ions in a carbonate. It is common for this mineral alteration into dolomite to take place due to evaporation of water in the sabka area. Dolomitization involves a substantial amount of recrystallization. This process is described by the stoichiometric equation:

$$2\ CaCO_{3(calcite)} + Mg^{2+} \leftrightarrow CaMg(CO_3)_{2(dolomite)} + Ca^{2+}$$

Dolomitization depends on specific conditions which include low Ca:Mg ratio in solution, reactant surface area, the mineralogy of the reactant, high temperatures which represents the thermodynamic stability of the system, and the presence of kinetic inhibitors such as sulphate.

Erratic. This is a piece of rock that differs from the size and type of rock native to the area in which it rests. Erratics are carried by glacial ice often over distances of hundreds of kilometres. Erratics can range in size from pebbles to large boulders.

Ganister. A hard, fine-grained quartzose sandstone, or orthoquartzite, used in the manufacture of silica brick typically used to line furnaces. Ganisters are cemented with secondary silica and typically have a characteristic splintery fracture.

Miners originally coined this term for hard, chemically and physically inert silica-cemented quartzose sandstones, commonly, but not always found as seatearths within English Carboniferous coal measures. This term is now used for similar quartzose sandstones found typically as seatearths in the Carboniferous coal measures of Nova Scotia, the United States, and the Triassic coal-bearing strata of the Sydney Basin in Australia.

Greenschists are metamorphic rocks that formed under the lowest temperatures and pressures usually produced by regional metamorphism, typically 300–450 °C (570–840 °F) and 2–10 kilobars (14,500–58,000 psi). Greenschists commonly have an abundance of green minerals such as chlorite, serpentine, and epidote, and platy minerals such as muscovite and platy serpentine

Pegmatite is an igneous rock, formed underground, with interlocking crystals usually larger than 2.5 cm in size (1 in). Most pegmatites are found in sheets of rock (dikes and veins) near large masses of igneous rocks called batholiths.

Most pegmatites are composed of quartz, feldspar and mica, having a similar silicic composition as granite. Crystal size is the most striking feature of pegmatites, with crystals usually over 5 cm in size. Individual crystals over 10 metres.

Phaneritic textured rocks are comprised of large crystals that are clearly visible to the eye with or without a hand lens or binocular microscope.

Phenocryst. This is an early forming, relatively large and usually conspicuous crystal distinctly larger than the grains of the rock groundmass of an igneous rock. Phenocrysts often have euhedral forms, either due to early growth within a magma, or by post-emplacement recrystallisation. Normally the term *phenocryst* is not used unless the crystals are directly observable, which is sometimes stated as greater than 5 millimetre in diameter.

Porphyritic texture is an igneous rock **texture** in which large crystals are set in a finer-grained or glassy groundmass. Porphyritic textures occur in coarse, medium and fine-grained igneous rocks. Usually the larger crystals, known as phenocrysts, formed earlier in the crystallisation sequence of the magma.

Stromatolites and biostromes are layered mounds, columns, and sheet-like sedimentary rocks that were originally formed by the growth of layer upon layer of cyanobacteria, a single-celled photosynthesizing microbe. Fossilized stromatolites provide records of ancient life on Earth. Lichen stromatolites are a proposed mechanism of formation of some kinds of layered rock structure that are formed above water, where rock meets air, by repeated colonization of the rock by endolithic lichens

Stylolites are serrated surfaces within a rock mass at which mineral material has been removed by pressure dissolution, in a process that decreases the total volume of rock. Insoluble minerals, such as clays, pyrite and oxides, as well as insoluble organic matter remain within the stylolites and make them visible.

A **subduction zone** is a region of the Earth's crust where tectonic plates meet. Tectonic plates are massive pieces of the Earth's crust that interact with each other. **Subduction** is a geological process that takes place at convergent boundaries of tectonic plates where one plate moves under another and is forced to sink due to high gravitational potential energy into the mantle.

Travertine is a form of limestone deposited by mineral springs, especially hot springs. Travertine often has a fibrous or concentric appearance and exists in white, tan, cream-colored, and even rusty varieties. It is formed by a process of rapid precipitation of calcium carbonate, often at the mouth of a hot spring or in a limestone cave. In the latter, it can form stalactites, stalagmites, and other speleothems. It is frequently used in Italy and elsewhere as a building material. It is a terrestrial sedimentary rock sometimes called "flowstone"

Twinning

Tufa is a variety of limestone formed when carbonate minerals precipitate out of ambient temperature water. Geothermally heated hot springs sometimes produce similar (but less

porous) carbonate deposits, which are known as travertine. Tufa is sometimes referred to as (meteogene) travertine. It should not be confused with hot spring (thermogene) travertine.

A **xenolith** is used to describe inclusions in igneous rock during magma emplacement and eruption. Xenoliths may be engulfed along the margins of a magma chamber, torn loose from the walls of an erupting lava conduit or explosive diatreme or picked up along the base of a flowing body of lava on the Earth's surface. A xenocryst is an individual foreign crystal included within an igneous body.

St Alphege . Church building terminology.

Nave, central and principal part of a Christian **church**, extending from the entrance (the narthex) to the **transepts** (transverse aisle crossing the **nave** in front of the sanctuary in a cruciform **church**) or, in the absence of transepts, to the chancel (area around the altar).

The **chancel** is the space around the altar, including the choir and the sanctuary, at the liturgical east end of a traditional Christian church building. It may terminate in an apse. It is generally the area used by the clergy and choir during worship, while the congregation is in the nave.