

Public Transport Please phone Traveline North East on 0870 608 2608 for local bus information.

Access to the Reserve

Fulwell Quarry is north of Carley Hill, Sunderland. Access to the reserve is on foot only from several locations, including: the A184 - A1018 Newcastle Road junction (pub and golf driving range) and Fulwell Windmill.

For more information

For further information about the Fulwell Quarry Open Space or to report issues please contact City and Neighbourhood at Sunderland Council on Tel: 0191 520 5550 or Email: CityandNeighbourhood@sunderland.gov.uk



Take Care

Take care when walking through the quarry. Paths are uneven and rough with some steep sections. Please do not dig for fossil fish. Take away only your rubbish, photographs and memories.

Electronic versions of this leaflet

Further copies of this and other leaflets can be downloaded from: www.limestonelandscapes.info/Pages/KingdomofQuarries.aspx



This project has been co-ordinated by Groundwork NE & Cumbria; Changing Places Changing Lives - one green step at a time.

Find out more at www.groundwork.org.uk/northeast or follow us on Facebook and Twitter



"This exposure should be permanently preserved as one of the most outstanding examples of nature's ability to build artistically in stone".

W A Tarr, University of Missouri 1933.





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Limestone Landscapes



Welcome to Fulwell Quarry

This disused quarry site, a Site of Special Scientific Interest, hides a range of secrets: internationally important rocks, a wide range of special plants and a unique history.

Geological Beginnings

Fulwell Quarry lies on a long thin band of Magnesian Limestone that stretches from South Shields to Nottingham. Never more than a few miles wide, this band was laid down 260 million years ago, in the Permian Period. The exposed limestone you see in the quarry today formed as horizontal beds on the floor of a shallow inland sea, known as the Zechstein Sea. Tiny pieces of shell and remains of creatures fell to the sea floor and a limy-mud was created, which eventually became the Magnesian Limestone.

A Feast of Textures

The concretions within the Magnesian Limestone, first noted by the local naturalist Nathaniel Winch in 1817, have been admired and their origin argued about by geologists for many years. These features are found within the Concretionary Limestone, one of the divisions within the Magnesian Limestone. It is currently thought that these have developed from recrystallisation.

Fulwell Quarry displays a spectacular array of concretions, many of which including intricate patterns of bands and calcite crystals.

The main types of concretion to look for here at Fulwell are pictured opposite.



Areas of interest around Fulwell Quarry

to Sunderland

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to Cleadon and

South Shields

AII018

to Boldon and

Newcastl



- 2 A low rock face 2m high, containing the best display of Calcite Spherulitic Concretionary rocks within the quarry.
 - A high face, about 40m long, that was cleared as part of the Limestone Landscapes Project. You can see a variety of Cannonball and other Concretionary Limestones. The quarry face shows both the rolling character of the strata and the great variability in the thicknesses of the grey limestones. These have softer, cream-coloured dolomite rocks between them.
- The WWI Fulwell Acoustic Mirror, was restored by Sunderland Council and the Limestone Landscapes Project in 2015, along with a new interpretation panel.
- **5** The Fulwell Windmill is in the process of being restored as this leaflet is going to print in 2015.
- The Fulwell lime kilns can be seen at the south end of a car showroom's forecourt.

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Carlev Hill

Sworth Roar



A Story of Stone

Fulwell was an agricultural village which became famous for its quarrying. The mounds and rock faces that we see today are the remains of a vast complex of more than three quarries that operated for over 200 years until closure in 1957. Most have been filled in and landscaped. The nature reserve has been created in a small area of the quarry that has been landscaped.

Stone was quarried here for building purposes and lime burning, helped by the abundance of local coal. Some was burnt locally at the Fulwell kilns; much of the output was transported by waggon way to lime kilns and ships on the River Wear at Sunderland. The nearby kilns and Fulwell Mill are built of Magnesian Limestone from the quarry and this stone features strikingly in many local walls and buildings, and in hundreds of private and public gardens within Sunderland and South Shields.

Fulwell Mill

Fulwell Windmill opened in 1808 and was built for Joseph Swan using the magnesian limestone from Fulwell Quarry. It was linked to the Swan family for many years.

1839 saw the only recorded fatality at the mill when a journeyman miller, William Wren, was thrown from the sails during a violent storm.

Regional archives show a succession of millers renting, or leasing, the mill until 1879 when the Moody family took over, operating the mill until 1949. This is one of three surviving windmills in the area between Cleadon and Fulwell.

Fulwell WWI Acoustic Mirror

The acoustic mirror here was built to assist coastal defences detect approaching enemy attacks. On 1st April 1916 a Zeppelin attack killed 22 and injured around 100 other people in Sunderland. To combat this threat a sound mirror was constructed.

It is a concave concrete dish with a microphone located in front of a central point which concentrated the sound waves coming from the Zeppelin engines to the receiver. This could be relayed to the gun batteries and airfields to give them an additional 15 minutes warning of the attack.

A Wealth of Wildlife

The thin soils of the quarry floor within the main quarry support a unique mix of plants known as Magnesian Limestone grassland. These grasslands here are maintained by using cut and rake methods to reduce their fertility and encourage the growth of the special wildflowers.

In April, look out for blue moor grass, and later from June you may see bee orchid, common spotted orchid, fairy flax, yellow-wort and carline thistle.

Butterflies such as the small skipper, large skipper, small copper and the locally rare dingy skipper favour the grasslands. Look closely and you may see the rare woodlouse-hunter spider and Mother Shipton moth.

Scattered hawthorns around the site provide important breeding and feeding habitats for small birds such as wren, yellowhammer and great tits.

Dingy skipper





Fossil Fish from the Quarries

In the lowest part of the quarries the Fulwell Fish-Bed used to be exposed. The Fulwell Fish-Bed was unusual as it was not part of the Marl Slate where Permian fossil fish have been found elsewhere, but was part of the much younger Magnesian Limestone exposures. The Fish-Bed is now buried following the landscaping of the quarries.

There were two types of fish found in the Fish-Bed here:

Acentrophorus – a small sardine-like fish between 4-10cm long that had sharp teeth and is thought to feed on dead creatures. Numerous examples have been found within the fish-bed and several are on display in Sunderland Museum, from both Fulwell and Carley Hill Quarries.

Acrolepis – a larger predatory fish similar to a pike. The largest fossil found in Fulwell was 25 cm long. In Germany examples of a similar fish up to 3m long have been found.



Fulwell Quarry Local Nature Reserve

Fulwell Quarry displays a spectacular array of concretions, many of which including intricate patterns of bands and calcite crystals

- This area had soil stripped and seeds from other Magnesian Limestone grassland areas spread in 2007 to try to establish new grasslands.
- 2 These areas were cut and the grass removed to encourage Magnesian Limestone grasslands in 2013 and 2014. Look here during June and July to see a variety of Magnesian Limestone grassland wildflowers.
- 3 These rocks at the top of the quarry show grey and brown limestone interbedded with cream and buff dolomite that has a sugary appearance (known as 'saccharoidal').
- 4 The rocks on the top face have a variety of Concretionary Limestones including good examples of the Coralline type.
- 5 The quarry face here surrounds what was the deepest excavation in the quarry floor. The 'flexible limestone' and Fulwell Fish Bed used to be exposed here. The 'flexible limestone' was so-called because it can be split into flexible paper-thin sheets.
- 6 Several thick hard Concretionary Limestone beds can be seen here, separated by continuous, but thinner, beds of softer cream dolomite.
 - The Concretionary beds can be seen more closely including those with Cannonball rocks at the northern end of this face.