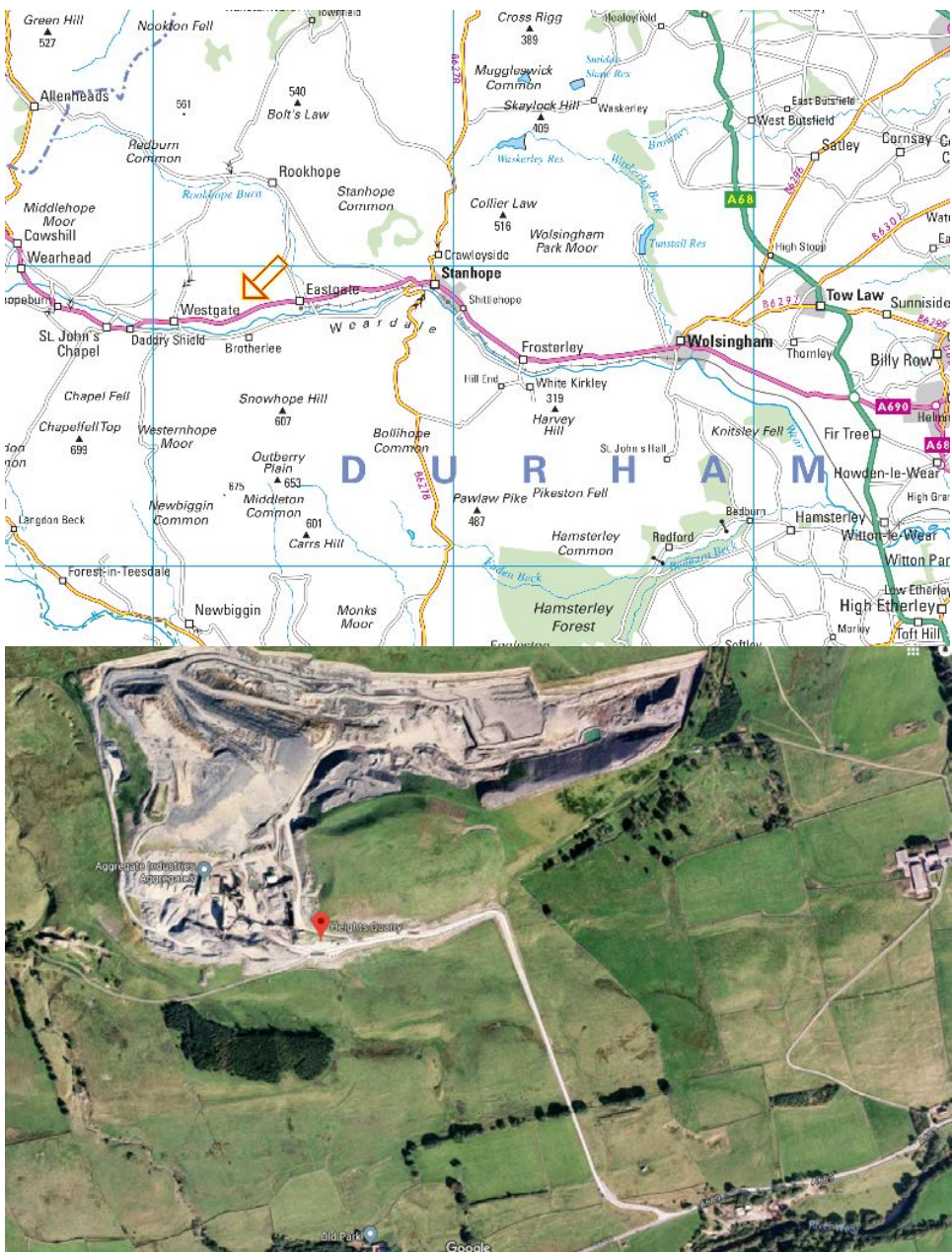


**EIG FIELD TRIP 2018**Saturday 15<sup>th</sup> SEPTEMBER 2018**Heights Quarry & Mineralisation in Weardale**

Co. Durham



<b>Location</b>	<p>Aggregate Industries Heights Quarry Westgate in Weardale Co. Durham DL13 1PF</p> <p>It is assumed that everyone will have their own transport, but if not then a lift can probably be arranged.</p> <p>Take the A690 westwards to Crook from Durham, then A689 through Stanhope and Eastgate. The quarry is on the right. If you reach Westgate, you have gone too far.</p>
<b>Field Trip Leader</b>	Peter W. Scott. Camborne School of Mines, University of Exeter and Peter W. Scott Ltd
<b>Contact &amp; Meeting Point</b>	Main Quarry Office, Heights Quarry
<b>Useful Websites</b>	<p><a href="https://www.mindat.org/loc-4761.html">https://www.mindat.org/loc-4761.html</a></p> <p><a href="https://www.aditnow.co.uk/documents/Cambokeels-Lead-Mine/Cambokeels-mine-article.pdf">https://www.aditnow.co.uk/documents/Cambokeels-Lead-Mine/Cambokeels-mine-article.pdf</a></p> <p><a href="http://mineexplorer.org.uk/cambokeels.htm">http://mineexplorer.org.uk/cambokeels.htm</a></p> <p><a href="http://www.rock-site.co.uk/cms.php?id cms=11">http://www.rock-site.co.uk/cms.php?id cms=11</a></p> <p><a href="https://explorenorthpennines.org.uk/enp022">https://explorenorthpennines.org.uk/enp022</a></p>
<b>Objective</b>	Visit to Heights Quarry and mineralisation / mining sites in Weardale
<b>Time of arrival</b>	15 <sup>th</sup> September 2018 / 10am
<b>Length of Visit</b>	(allow 1 hour from Durham)
	5-6 hours
<b>Max No</b>	n/a
<b>PPE required</b>	The PPE requirements for the quarry visit are: Hard Hat, Steel Toe cap lace up safety boots, Hi visibility trousers and jacket, Gloves, Safety glasses

<p><b>Location Map</b></p>	
<p><b>Outline of Trip</b></p>	<p><b>Locality 1. Heights Quarry, Westgate (Aggregate Industries) (Grid Ref: NY926391)</b>  <b>Quarry Manager: Hazen Bowskill</b></p> <p>Heights Quarry extracts limestone from the Great Limestone Member of Carboniferous age for aggregates. The quarry is developed on the former site of the underground Heights Mine. The old underground workings have long been inaccessible for the most part, but occasionally parts of mineral veins are encountered. The mine was in the fluorite zone of the Northern Pennine Orefield. The limestone is a bedded medium dark grey fine to medium grained biomicrite. Total thickness is 17-18m.</p>

	<p><b>Locality 2.</b>  <b>Cambokeels Mine adit.</b>  Cambokeels Mine is an abandoned lead and fluorspar mine situated on the north bank of the River Wear between the villages of Eastgate and Westgate. The adit is visible just below the road level. Minerals from the mine can be found in and around the site.</p> <p><b>Locality 3.</b>  <b>West Rigg Mine, Westgate</b>  This mine worked the Slitt Vein for galena and later fluorite. It is the longest known single vein in the Northern Pennines. Here the vein (now visible as a cavity through stoping) cuts the Great Limestone. Adjacent to the vein the limestone is silicified. The quarries adjacent to the vein on both sides were worked for ironstone, as replacement deposits within the Great Limestone. The ore was oxidised to goethite at the surface.</p> <p>The extent of the Slitt Vein can be traced over the adjacent countryside by observing the linear feature created by the disturbed ground.</p> <p><b>Locality 4. (If time permits). Fossil tree and old limestone quarries at Stanhope</b></p> <p><b>Geology of the Northern Pennine Orefield</b>  The Northern Pennines have a basement of Lower Palaeozoic sediments and volcanics intruded by Caledonian granites. These are overlain by cyclothem sequences of Carboniferous limestones, sandstones, mudstones and minor thin coals.</p> <p>Approximately 4 million tonnes (Mt) lead, 0.3 Mt zinc, 2.1 Mt fluorite, 1.5Mt barite, 1 Mt witherite plus a substantial amount of iron ore and a few hundred tonnes of copper ore have been produced from the Northern Pennine Orefield. The mining took place over many centuries although the major activity was in the 19th and early 20th Centuries for lead and zinc, followed by an upsurge in the mid to late 20th Century for fluorite and barite. There are no current operating mines, although in recent years there has been some preliminary interest in exploration for new resources of zinc.</p> <p>The orefield is a fluorite sub-type of Mississippi Valley-type deposits. The main resources have been in veins although there are significant replacement (i.e. stratabound) deposits adjacent to the veins. The replacement deposits are hosted principally by limestones, although there is some replacement also in the Whin Sill. The resources show strong concentric zonation with a central fluorite zone and surrounding zone characterised by barium minerals, dominantly barite. Mineralisation in the central fluorite zone is generally regarded as having formed from hot (120-200°C) metal rich saline brines (about 20 wt% NaCl equivalent), with lower temperatures and salinities in the surrounding barium zone (less than 120°C and about 15 wt% NaCl equivalent). Current models for mineralisation relate to sulphide and fluorite precipitation in response to mixing of a metalliferous Cl-dominated brine of various possible sources with a sulphate dominated brine. Replacement deposits with ankerite and dolomite are thought to have formed first followed by the main stage sulphide – fluorite veins, and then later barite mineralisation in the outer zone. Mineralisation</p>
--	---

	<p>probably initiated shortly after intrusion of the Whin Sill and continued through the Permian with the main phase lasting through into the Triassic. The residual heat from the earlier intrusion of the Weardale Granite is thought to be at least partly responsible for driving the circulation of the hydrothermal fluids.</p> <p>There are two dominant directions for the mineral veins, northwest – southeast and southwest – northeast. The veins mostly have small displacement that enabled openings to form for the deposition of the minerals. Major ore shoots are in the limestones and Whin Sill. Mining was principally along driveways at different levels within the vein, along with some stoping where the height of the vein required it.</p>
<b>Driving time from Durham University</b>	1 hour