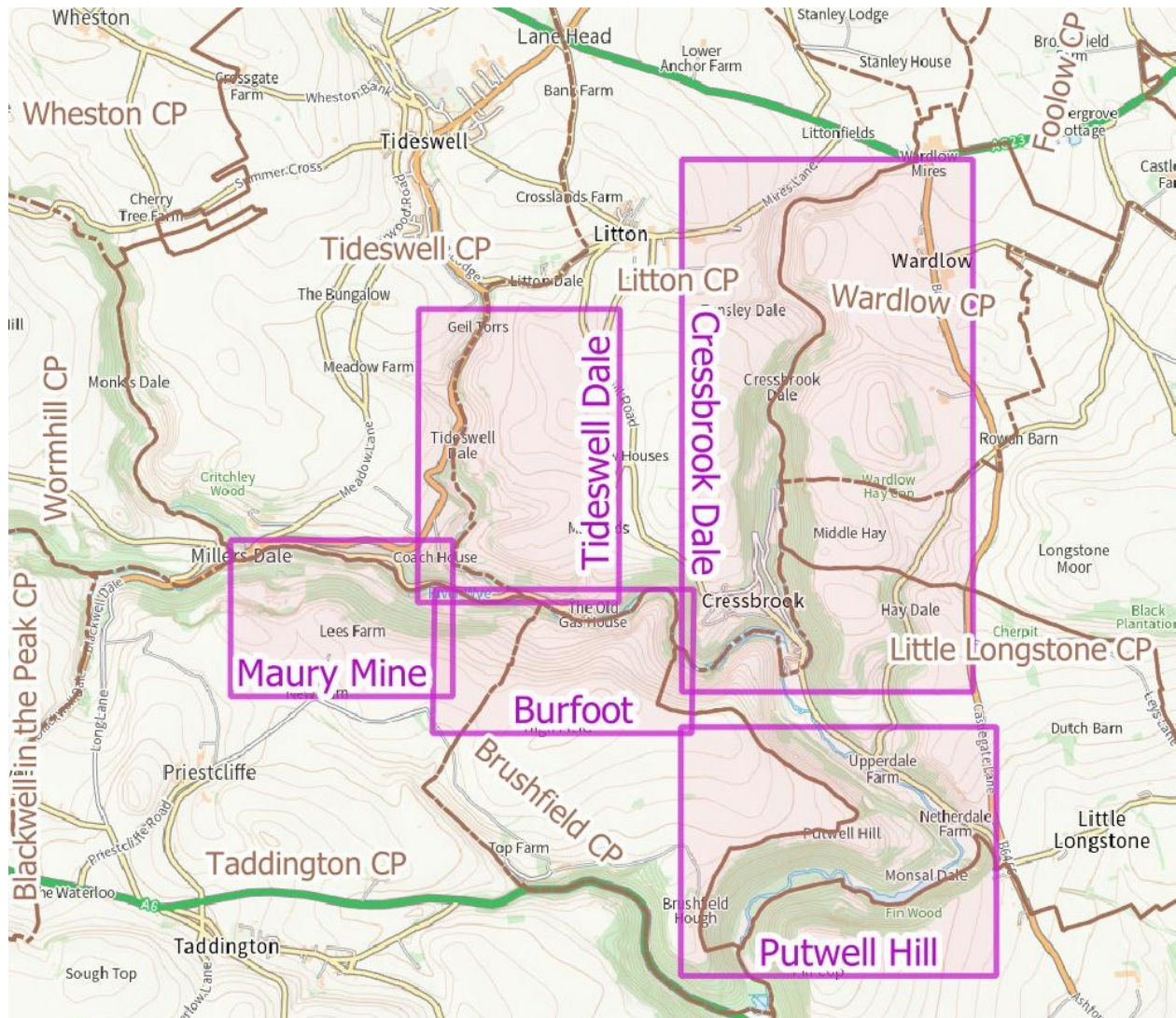


# Mining History Field Guide: Millers Dale to Monsal Dale



*Burfoot, Putwell Hill and Cressbrook Dale guides are in preparation.*

This is a field guide not a walking guide. Users are expected to be competent at planning and executing their own route, taking account of hazards, legal matters, and ethical conduct.

The mention of a site in this guide does not indicate right of access.

The maps provided are not a substitute for use of OS 1:25,000 mapping.

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## Preface

### What Kind of Guide is This?

This is a field guide not a walking guide; it will generally refer only to locations, with a suggested order of visiting, and avoids route-finding information except where additional information to that found on the OS map will be helpful.

It is a guide which focusses on surface features; it avoids referring to locations where nothing can be seen today, even when these are historically significant, and generally restricts comment on underground features to information which helps in understanding the surface.

It is a field guide not a history; the history of the mining industry is brief, with published sources given where historical detail may be found.

It has been written as part of the author's personal exploratory wanderings, which has involved the collation of information from many sources. Many of these contain vague or incorrect location information and the author has attempted, so far as is reasonable, to ensure that all locations given are correct and accurate (subject to the limitations of consumer GPS). It represents the kind of guide which the author would like to have found and unashamedly embeds some of his idiosyncrasies.

It is not an academic source; information drawn from many sources is synthesised with personal observation and inference without formal citation. The principal sources used are, however, given. It has been written by an amateur; if rigour is important to you, refer to these sources! That said, I welcome communication of errors and omissions, and will incorporate those which fit with my view of what these guides should be.

**It is designed to be used "in the field"; it is distributed electronically for home printing, with separate large maps, and easily used in one or more transparent A4 sleeves. Users of GPS devices can download the location data, and digital maps are provided for use on PCs, tablets, and smartphones. See the section "Maps and Digital Location Data" towards the end of this guide.**

### Guides, Itineraries/Trips, Locations

Several guides have been prepared, and others are in preparation. These are published as single documents with supporting geospatial data for GPS enabled devices. They generally contain several individual itineraries (also called "trips" with no distinction of meaning) which are geographically close.

Each itinerary comprises some background information, historical notes, and a set of locations, which are one of features (things to see), viewpoints (places to see features from, and their wider context), and waypoints (significant access/egress places or suggestions of good places to leave a more obvious path). The historical notes are usually separated from the location descriptions, as "boxed-out" text, especially when several locations are part of the same historical entity.

Itineraries usually have a core route suggested, and one or more detours. The route is primarily a suggested sequence of visiting the locations, does not always indicate the path to be taken, and has not been designed to be an attractive walking route. Readers are left to plan where they put their feet, and incorporate whichever locations they see fit within longer walks/hikes...

### Note on Location Identifier Convention

Location identifiers comprise first a single character A-Z which indicates the trip/itinerary. Different guides may use the same letter.

There are three kinds of location given in the guide, which are indicated by the second character with the following meaning: F = a feature, V = a viewpoint, W = a waypoint.

Location identifiers are completed with two digits which follow the order of the suggested route. These increase independently for features, viewpoints, and waypoints.

## Maury Mine

*The majority of sites visited are part of a Scheduled Monument and are protected by law.*

The mine has various recorded names: Maury, Moorhigh, Mawrey, Mawree, Mawley, and Moorleigh Mine (and doubtless others too). Historians believe the name derives from the Maurye family which is known to have lived nearby in the early 17<sup>th</sup> century.

The centre of surface activity to which the name applies actually sits at the intersection of two mineral veins, but the SW-NE trending one, in which Maury Sough was cut and which ranges across Tideswell Dale is known as Maury Vein, although it may well not have been known by this name over its Eastern range. The vein which it intersects is known as Lees Rake, as it heads East, which has some fine surface remains.

This trip visits a good variety of well-preserved surface features at both small and large scales. At large scale are the open-cuts, mounds and hollows which mark out the path of the mineralisation. At small scale are the structures which the miners built, such as a fine Gin Circle, belland yard walls, coes, and buddle dams.

While none of the sites are in Open Access land, most are in the Priestcliffe Lees Nature Reserve, where access is encouraged. The Millers Dale quarry is also an accessible reserve.

This trip would nicely join on to the Tideswell Dale trip, affording views of one to the other across the Wye Valley, and covering the full extent of the Maury Vein. No direct hill-side access to Booth Lea and Burfoot trip is possible; this would have to be via Bull Tor Lane.

A brief history of the mine follows; refer to the Information Sources and Further Reading section for more detail. The Scheduled Monument listing also gives good historical background to mining in the Peak District.

### Maury Mine Key Dates

The earliest record of the mine dates to **1637**.

Before **1653** a sough had been driven, but the work was found to be hard going, and seems never to have been functional; the mine is known to have become too wet to work by **1674**. This sough, known as Burton's Sough to historians has not been rediscovered.

A second sough at a deeper level was begun from 1694, seemingly to useful effect by **1711**, although ore production was only intermittent over the next half century.

A third sough, which is at river level, was finally completed in **1774**, with work having started in **1760/1**, but the miners were disappointed to find

the vein substantially worked-out after so many years toil and expense.

The final period of working occurred in the middle of the 19<sup>th</sup> century, with Edward Wass laying a new level in **1868**. By this time the railway had been built, so mineral would have to be removed up-hill towards Priestcliffe or possibly parallel to the railway towards Millers Dale Station, through what later became the Millers Dale Lime Works. Wass' workers are likely to have re-worked the spoil heaps around the crest of the hill.

### **MW01 – Parking**

Parking is usually available just beneath the crag, other than in peak climbing season. Alternatively use TW1 or MW9.

### **MF01 – Ravenstor - Lava Bed**

Beneath the face of Ravenstor is an obvious undercut which follows a curved step down (looking left to right) and sits atop a bulbous piece of ground projecting towards the road. This piece of ground is an exposure of the Lower Millers Dale Lava beds. This is basalt rock and its appearance is characteristically greenish-brown with some mottling and sporadic vesicles (gas bubbles trapped when the lava solidified), which are sometimes filled with a white mineral which has migrated through the rock to fill the void (these are known as amygdales).

The curved structure is interpreted as a lava flow, with its far-from-level surface being later covered by successive layers of limestone. The limestone bedding initially follows the curvature/slope, but gradually levels out as the deeper areas filled in faster.

### Maury Sough

The river-side site described below, completed in 1774, is the last of two or three (it may have been the completion of the second abortive attempt) mine drainage levels cut to de-water Maury Mine, although it appears to have also been used to remove minerals from the mine. Its role as a road-way, rather than just for drainage, was ended when weirs were added to improve the water power which Litton Mill could exploit, since this caused the water level to rise into the level.

It extends for around 600m to a point almost directly below the Maury Mine gin shaft MF16, and it is not just a level; the vein above it has been worked, with open stopes and deads precariously held back by rotting timber, and there appears to have been at least one winze (a short shaft from an upper level) dropping down from a level which was closed and

subsequently lost following the building of the railway. The winze would have allowed material to be removed to river level.

A tramway has been found within the sough tunnel – see reports in the PDMHS newsletters listed in the Information Sources and Further Reading section – but it remains unclear when this was last used. The latest date must be before the water level rose, due to the Litton Mill weirs.

### **MV01 – Maury Sough**

Access to the sough (MF02) along the river-side is discouraged by a landowner's sign, but a good view may be had with binoculars from the roadside, at least when the trees are not in leaf. The site is described from this viewpoint.

The sough tail forms an obvious channel cut into the river bank. To the left of this are two partially-restored coes. A bank of possibly-excavated material may be discerned, and close inspection shows this is partially under water, due to the water-level rise (Litton Mill weirs).

High up, in the cliff face, an open-cut is visible, where vein material has been removed.

### **MV02 – From the Bridge**

Looking up and down stream from the bridge is approximately the line of the Maury Vein. There is a non-descript exposure a short way further along the road towards Litton Mill, but it isn't worth a detour.

### **MW02 – Entry to Nature Reserve**

#### Detour – Wass Level and Surface Features

*This is in the Nature Reserve and access is permitted, although it is not designated Open Access land.*

The Wass Level (it is also sometimes called Moorhigh Level) was driven by Edward Wass in 1868. It was one of several ventures intent on re-working abandoned mines using "modern" methods to work ore which had been deemed uneconomical in former times. It was, however, still a low-quality product.

Proceed along down-hill (N side) of the fence at MW02. MW03 is an access stile. MV03 affords a good view of Hammerton Hill (see Tideswell Dale trip).

The area is dominated by substantial mounds of spoil, which are found to contain fragments of basalt – the level was driven in the Upper Millers Dale Lava - as well as calcite and limestone. These appear to have been dumped and then later reworked from the NW side, where there is a large gouge above MF03.

Leadwort (a lead tolerant plant also known as sandwort, *minuartia verna*) may be found

growing here. Late May is a good time to see it flowering.

### **MF03 – Buddle dams**

Two flat areas separated by a clear dam are likely to have been buddle dams. There may be a third further down-slope. These would have been used to process the material from the large gouge. Some fine sandy sediment may be in evidence if the rabbits have been active. Layers of clay-like material and calcite may be found, showing evidence of a separation process.

### **MF04 – Coe**

This modest-sized ruined building may have been used for storage. Nearby, around 5m to the East is a level walled area, which may have been an ore dressing area. Adjacent is a curved hollow which points the way up to where the Wass Level entrance would have been and is likely to have been the line of a tramway for materials being removed.

### **MF05 – Wass Level**

This is now collapsed. Notice that there is no linear groove running up hill; the level was not driven along a pre-existing rake.

Looking down-hill a low wall curves round on the left, arcing towards the W side of the coe. This could be a belland wall, erected to keep animals from ground where finely crushed lead would poison them; it is easy to imagine this as being a small area associated with the coe, with ore being processed here.

### **MF06 – Water storage**

There are several iron/steel tanks here, including one which appears to be a water tank which has been cut in half along its length; it was clearly built to be strong, with slightly domed ends, heavy duty rivets, and thick plate. These tanks may have been installed for grazing animals, but may also be associated with the reworking of the spoil heaps and buddling work.

A pipe may be seen emerging from the hillside nearby; it presumably fed the water tanks and if you follow its line up the hill, an obvious small excavation may be found. At the base of this excavation, a metal plate covers a small water tank. This presumably intercepts spring water which comes to surface due to the Upper Millers Dale Lava (see MF20 for a spring which is controlled by the Lower Millers Dale Lava).

### **MW04 – Gate Egress, Possible Mine Track**

A fairly straight sloping track can be picked out heading back towards the public footpath.

### **MF07 – Possible Track**

Visible from the public footpath or used as the return from the detour, this may be the remnant of a mine track laid out to access the Wass

Level workings; it is known that one was constructed in May 1868, coming from the Brushfield-Priestcliffe lane.

#### **MW05 – Strike out to Maury Rake**

Contour round to pick up Maury Rake again at MF08.

#### **MF08 – Maury Rake and Possible Site of 1653 Sough**

The exact site of the 1653 sough is not known, but it may have been here. Alternatively, some consider a more likely place to be the water tank above MF06.

The level area may be a former dressing and processing area. Nearby is a structure which could have been a sludge dam; the gap in the bank is suggestive of this interpretation.

From somewhere around here, and over to MF16, the mineralisation shown on the maps with this guide are a gross simplification. Whereas a map of 1767 shows the main vein as a single structure on the lower slopes, from around MF08 two minor veins are shown just to its south-east and running parallel: Glutton Rake and Whitecoe Vein. Once the brow of the hill is reached, these become part of a grid of intersecting veins.

#### **MF09 – Dressing/Processing Floors**

A wide level area sitting right in the line of the rake, just below an open-cut is a dressing and processing area. A concrete plinth, of unknown function, with studs is on the NW side and possible buddles, or maybe a storage bin, on the opposite side. On both SE and NW sides a low wall is what remains of the belland yard wall, and this may be followed either way in a continuous path, with the best preserved part to the SE.

#### **MF10 – Pond?**

This circular structure, shown on the late 19<sup>th</sup> century maps is rather over-grown, but may have been for water collection/storage, for use in separating crushed ore from gangue.

#### **Detour – Round Cairn and Viewpoint**

This location provides a fine view over the ground covered in the Tideswell Dale trip. It also visits a mound which is not mining-related.

#### **MF11 – Round Cairn**

The cairn is easily missed or dismissed as a minor hummock, when compared with the mining relics nearby. It is a mere 1 foot high and around 4-5m in diameter. It is thought to be a Bronze Age (2000-700BC) monument and, unlike most similar monuments, to have avoided the attention of 18<sup>th</sup> century antiquarians, and to be undisturbed to this day.

#### **MF12/13 – Reprocessing Complex**

Archaeologists have interpreted this area as most likely being associated with 19<sup>th</sup> century reworking of hillocks left from previous eras, as there does not appear to be a shaft here. MF13 is a pair of high-banked buddle dams.

#### **MF14 – Belland Yard Wall**

This point marks the NE corner of the nearly square belland yard, with the W and S sides being maintained field walls, and the N and E being in a ruinous state. The wall was not shown on the 1848 tithe map. Within the yard are a large number of hollows and mounds, and a happy hour can be spent wandering around trying to work out what they are. It is likely, however that original structures have been disturbed by later reworking, so some scepticism is in order. There may be an ore hopper (also known as a "bing stead" or "kiln") in this area, but it is not clear to see.

#### **MF15 – Coe**

The walls are still substantial.

#### **MF16 – Gin Circle and Capped Shafts**

The large cap is the "engine" or "gin" shaft of Maury Mine, which was known as Mr George Barker's Shaft (1767 map), while the smaller one is a climbing shaft. A reconstructed gin may be seen at Magpie Mine; these were horse-powered winding engines. The horse walked around a circle to drive a horizontally-pivoted drum around which the rope was wound, and here the circle is very clear indeed. This is one of the best-preserved gin circles in the Peak District.

The guide map shows a vein cutting across Maury Rake at this point. This appears as Roger's Pipe on the 1767 map. The name part "pipe" suggests the mineralisation was more in the form of a body, rather than a roughly-planar vein. Such structures were often productive and desirable finds.

#### **Millers Dale Quarry and Lime Works**

The Millers Dale Lime Works opened in 1878 and the four kilns are good examples of large commercial kilns of that era, satisfying demands from agriculture and industry. The great quarry behind must largely, except for the remaining spoil, have passed through those kilns.

See the map appendices for contrasting views from 1897 and 1919.

These were continuous, or "draw" kilns, with batches of coal and limestone being fed from the top via a tramway while the kilns were burning.

The quarry was closed in 1930 because the working face became unacceptably dangerous. The quarry floor today indicates the level of the

Upper Millers Dale Lava (basalt), with the limestone which was excavated sitting directly on top of it. The interface between the two is not stable, with natural chemical breakdown of the basalt producing a lubricating clay-like layer, such that the limestone above has a tendency to break away. Weaknesses associated with geological faulting may also be important here (the lead veins developed along such faults). An impressive/frightening land slip may be viewed from MV04.

#### **MV04 – Millers Dale Quarry, Windoway & Gratley Veins**

This viewpoint affords a good view over the quarry, and especially the large land-slip, which seems to have been assisted by the presence of the mineral veins which cut across (including a minor vein from the SW).

#### **MW06 – Egress to Public Footpath**

Derbyshire Wildlife Trust posts mark the way.

#### **MW07 – Detour into Millers Dale Quarry**

An alternative to following the public footpath back to the valley bottom. The quarry is a Derbyshire Nature Reserve and access is permitted along the route indicated.

#### Detour – Quarry and Lime Kilns

##### **MF17 – Tramway Bed**

From around this point, the natural path follows the line of the former tramway. In 1897 the tramway descended to the top of the lime kilns after about 150m from this point.

##### **MW08 – Top of Incline**

This incline appears to have been used once the Western part of the quarry was opened-up, not later than 1919 (refer to maps in the appendix). Walk down the incline.

##### **MF18 – Lime Kilns**

At the bottom of the incline, a level area to the right shows where the top of the lime kilns are; the circular shape of the inside of the kiln “pot” can be easily discerned.

There is an explanatory plaque near the kiln mouths, which also contain some straw stalactites. These form particularly quickly where there are lime residues, much faster than normal cave formations.

##### **MF19 – Tideswell Mill**

The remains of Tideswell Mill comprise little more than an 1860's mill wheel and the vestiges of a leat. This may be the same site as referred to in the Tideswell Parish register in the late 13<sup>th</sup> century, as being granted for the building of a corn mill. The mill was later a monastic holding (the monks of Lenton Abbey, who gave Monks

Dale its name) and passed to the Duke of Devonshire on the dissolution of the monasteries.

It is one of a pair in Millers Dale, formerly known as Milnhouse Dale, with the other being just the other side of the viaducts, in Wormhill Parish. These two water-driven mills survived in use until shortly after WWI but could not compete against modern industrial milling.

#### **MW09 – Alternative Car Parking**

There is space on the verge.

#### **MF20 – Tufa Spring**

The spring here is caused by the limestone resting on the Lower Millers Dale Beds (basalt). Small conduits and caves can form in the former, through corrosive dissolution of the limestone by naturally acidic water, whereas this does not happen with the basalt. Consequently, drainage occurs within the limestone down to the layer of the basalt and where the folding or faulting of the rocks occurs, with the right relationship to the topography, springs form. The controlling effect of the lava beds on drainage, and also of less obvious beds of clay which formed from the weathering of volcanic ash which are sporadically scattered over the layers of calcareous debris and sludge which became the limestone, was of huge practical importance to the miners of old.

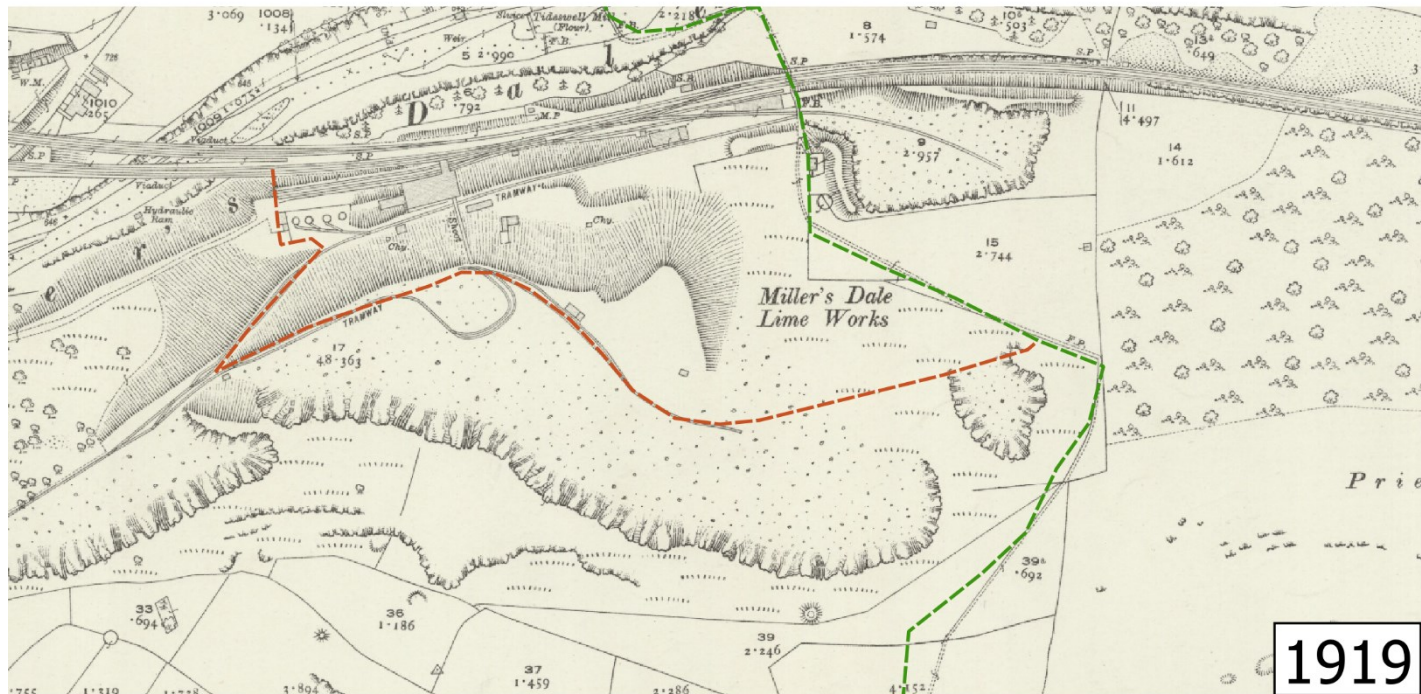
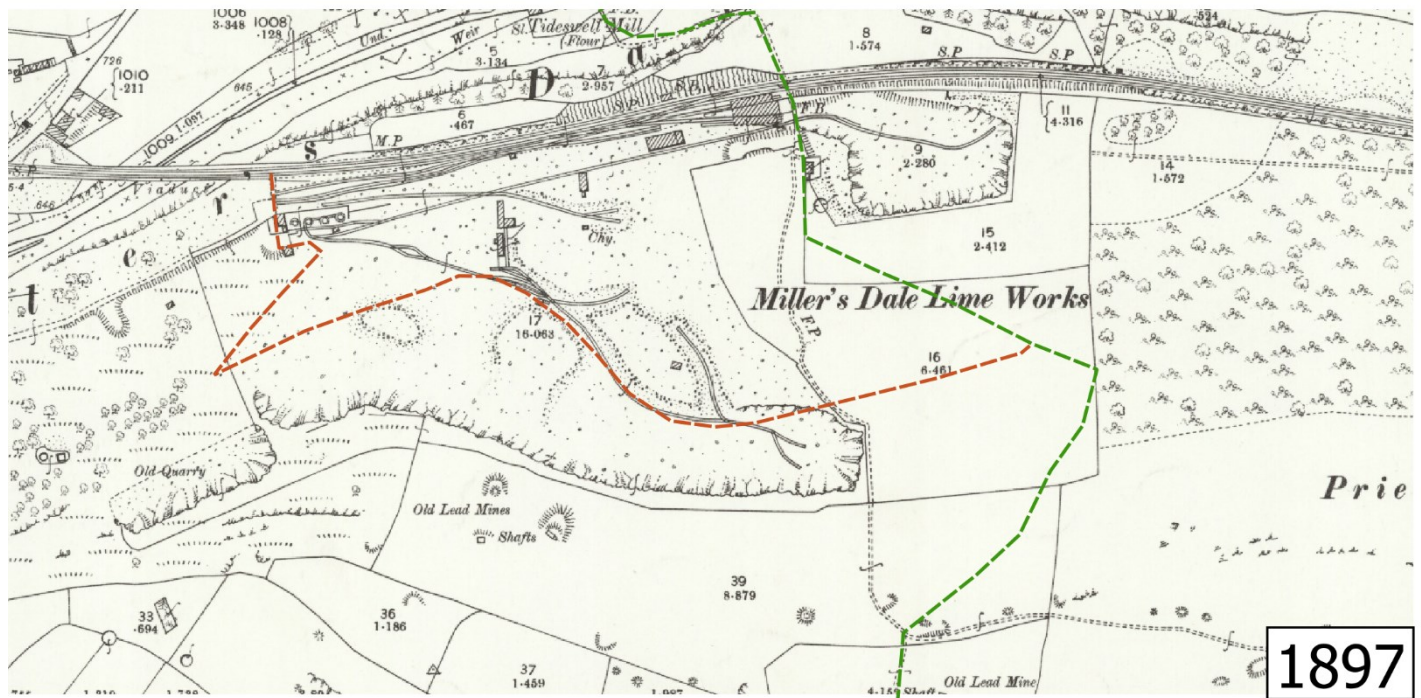
The water which emerges has become quite saturated with dissolved limestone, due to a long residence time, and has a tendency to form tufa, a porous form of calcium carbonate which precipitates once the mineral-rich water enters the atmosphere, similar to the way stalactites and stalagmites form. Biological processes are often involved, for example moss providing an open precipitation framework, or bacterial chemistry may be involved. Some tufa is exposed at the bottom (don't pull the moss off!).

Tufa formation is often observed where there are basalt beds; another fine example may be found in Matlock Bath, near to the Peak District Mining Museum. Tufa may also be found in Monsal Dale and in Lathkildale.

# Millers Dale Quarry and Lime Works Complex

--- Public Right of Way

--- Permissive Path through Nature Reserve



## Tideswell Dale

Tideswell Dale is an attractive and popular walking area and would make a logical extension to the Maury Mine trip as this trip contains the Eastern extension of the Maury Vein as far as Hammerton Hill, so the suggested route begins at the foot of Tideswell Dale (car parking at TW1), although there is a good car park and public toilets at the Northern end of the dale. Thornhill Slack mines are the Northern-most point of interest and there is good opportunity to visit exposures of local lavas and dolerite, and to observe the effects of faulting.

The original road to Litton Mill came down Tideswell Dale; the current road past the Anglers' Rest is a later addition (after 1840, as it is not shown on the OS 1<sup>st</sup> Series map).

### TW1 – Car Park and Liberties Junction

There is usually parking available here.

This marks the approximate place where the boundaries of three mining liberties join. Mining liberties are the administrative units for lead mining in the Peak District and each had its own lord and laws and customs which dictated the rights and responsibilities of miners, although these are similar across the Peak District. This is a gross simplification of what is quite a complex historical story!

South of the Wye is Taddington Liberty and West of Tideswell Dale is Tideswell Liberty, while East of the dale is the Liberty of Litton. These correspond with modern Parish boundaries here.

The Maury Vein is largely in Taddington Liberty but its extension Eastwards cuts through the small spur of Tongue End, which is in Tideswell Liberty before proceeding into Litton Liberty, where it runs out. Anyone wishing to exploit its full extent would have to comply with the requirements of all three.

### TF1 – Tideswell Dale Cave

This obvious entrance adjacent to the path has the appearance of a natural feature that has been enlarged to allow human access.

The arched top part is natural and has developed above a narrow clay bed in the limestone. This would have been initially deposited as volcanic ash and "weathered" to become clay. Clay layers such as this (which the miners would call a "wayboard") resist the flow of water and so influence underground drainage, a matter of interest to all miners.

The scalloped appearance of the roof indicates a slow rate of flow in a completely filled tube, i.e. under the water table. This would, therefore, have developed before the dale bottom was

deepened to its current profile, which is likely to have occurred as the last ice age ended.

The passage beneath is, in contrast to the roof, rough and angular and has clearly been excavated. European Cave Spiders (*Meta Menardi*) have been seen and a 30mm across shot-hole from blasting can be inspected (around 5m from the end). This has a triangular section, which is common and is believed to help concentrate the explosive force, and a series of radiating fracture marks are visible.

This point is in line with a short section of mining remains high up on Hammerton Hill, which will be visited later, but Tideswell Dale Cave did not form along an extension of that vein and was not used to access it. In fact, the enlarged cave intersects another vein, although a narrow and seemingly-unprofitable one, almost perpendicular to it after around 30m. This vein appears to be heading in the direction of TF18.

### TF2 – Trial on Eastern Part of Maury Vein

It is not known what the miners called the vein here; it is structurally an extension of Maury Vein but may have been called something else.

This short stream-side trial shows a small amount of calcite in an area of weak fracturing. The sides of the trial are not quite vertical, which probably reflects a small amount of hade on the vein, i.e. that the vein itself is not vertical. Calcite debris is visible in the stream bed.

Up above the steep bank (NE), at the foot of the cliff, and in line with the apparent line of the trial (taking account of the hade) is a small rectangular alcove, which may have been the start of a similar venture. There is no evidence of a fault or vein material in the cliff at this point, although the limestone above it becomes brecciated (broken-up appearance) towards the top. A triangular shot hole may be seen about 2m up on the right-hand side. This is around 30mm across (see also TF1) but there are no radiating fractures and the hole is around 100mm deep; this hole was never completed.

Looking in the opposite direction (SW) the line of the vein is evident high up in the cliff of Tongue End, at least when the trees are not in leaf. A short trial in a calcite vein has been accessed (roped access) up there.

The date of cutting and of the enlargement of Tideswell Dale Cave is not known, but it seems reasonable to think this could have been done during the period when Edward Wass worked Maury Vein in Taddington liberty, which is well-documented, and took possession of the fragment on Tongue End. This was the late 1860's.

### TF3 – An Adit?

A possible adit may be seen here but it doesn't correspond with any other evidence of mineral working. The 1919 25" OS Map marks the location with a small walled enclosure and "Springs" and it is understood that this was used to access fresh water for some now-demolished houses approximately were the toilets now stand in the car park further up the dale (known as Plantation Houses or New Houses).

*Continue up the dale, passing through the car park. An obvious quarry at the north end of the car park and some smaller scrapes on the hillside near to the sewage works are in dolerite (see later TF10 et seq.).*

#### Thornhill Slack Mines

Thorney or Thornhill Slack Vein

The placename part "slack" is quite frequent in the Peak District (Litton Slack is passed later on). These derive from the Scandinavian slakki, which denotes a shallow valley or hollow.

Not a great deal is known about the history of the mines of Thornhill Slack Vein, and the information which historians have gleaned largely refers to the mining within the Tideswell Liberty, while the greater part of the vein is in the Liberty of Litton, with the boundary following the dale bottom. Refer to MH 19-1 for more information.

Although it seems likely, given its location close to the long-established centre of population that is Tideswell, that the vein was exploited quite early on, maybe as early as the 12<sup>th</sup> or 13<sup>th</sup> centuries, there is no evidence available until 1811, when John Farey mentioned what is probably Thornhill Slack in his "General View of the Agriculture and Minerals of Derbyshire". His description matches the geological situation (map below), referring to limestone to the North, toadstone (here the basalt and dolerite) to the South, and a fault intersecting the main vein. Although the 1:50,000 scale geological mapping shows an intersection fault, the BGS Southern Pennine Orefield database, indicates this is at least a partially-mineralised vein.

Notes of possession occur for 1845 and in 1884 the section of the vein in Tideswell Liberty was sold for £5. A small amount of ore is recorded as having been won in the following year, but in 1909 it was sold again, along with several other local mines, for only 10/-.

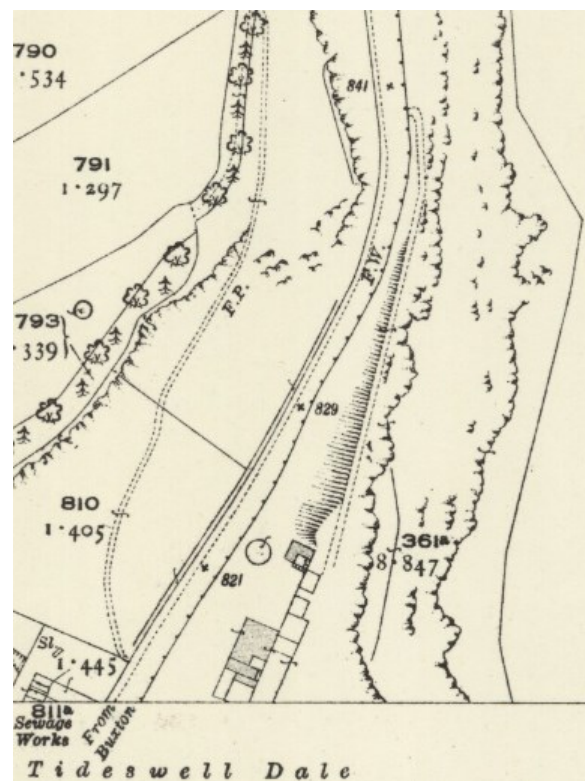
### TF4/5 – Loading Platform & Other Structures

These structures do not appear on the 1897 25" OS Map but are on the 1919 edition. The most obvious aspect on approaching from the South is what appears a substantial loading platform more than 10m long with a flat area beneath it.

On the up-hill side a gently sloping straight track/tram way may be followed, passing a series of structures with the last one looking like a storage hopper. The trackway continues Northwards and suggests that material might have brought to the site from further afield and tipped into the hopper.

No documentary evidence for the purpose of these structures is known but they may have been associated with mining, possibly working spar, and possibly processing materials from the group of mines sold in 1909.

Alternatively, this may be the site where, in the 1920s/30s the remains of roofless buildings and a chimney-flue running up the hillside (for which there is no existing trace) were to be found. These were associated with Tideswell man "Patent Jim" Brightmore and a supposed venture founded on radioactivity in the local rocks. The local igneous rocks do contain radioactive materials but it is not credible that the venture was viable, and it may have been a confidence trick. James Brightmore filed a patent claim (201 034) for fixation of atmospheric nitrogen in 1926, although this too is not entirely believable. Another possible site for Patent Jim's adventure is TF9.



Location of TF4/5 from the 25" OS map Derbyshire XVI.9 (Litton; Tideswell; Wardlow) Revised: 1919

### TF6/7 – Thornhill Slack Mines

A well-preserved line of hollows and hummocks, with the occasional open-cut can be picked out heading up-bank from a mess of workings on the lower slope, where the aftermath of working both veins has probably mingled, although the

surface evidence for the side-vein/fault is unclear.

An appealing walking route starts at the South end of the loading platform, where a mostly-blocked adit is marked by a rather bent grille. The adit drafts quite strongly, suggesting that there is plenty of open passage beyond and appears to be slightly North of the line of the main vein. Head up the slope, following the workings.

### TV1 – Thornhill Slack Vein

This location provides a good view of the range of the vein.

To the West, in Tideswell Liberty across the road, hillocks are visible close to a line of hawthorn bushes, but both documentary and physical evidence for the vein peters out only a few hundred metres further West.

East of the viewpoint substantial mounds mark the line of the vein. While it is clear some of these are of recent agricultural origin, many look like tips from exploiting the vein. It is not known when these were created. Although the features dwindle as the skyline is approached, the continuation of this vein can be picked out on Lidar images and from the Litton to Cressbrook road, near to Litton Cemetery, to where it terminates in Litton Frith, more than 1km away in Cressbrook Dale, where it was worked for calcite as recently as the 1960's. See the Litton to Cressbrook Guide.

### TW2/3 – Access Gates

The best way to access the next set of sites is via TW2 and TW3. It is possible to take a route via TW5, through a pair of gates, but this involves leaving open access land for about 5m.

#### *Igneous rocks and metamorphism*

#### The Upper and Lower Millers Dale Beds and the Tideswell Dale Sill

Two beds of basalt rock are found at several locations around Millers Dale, known as the Upper and Lower Millers Dale Beds (abbreviated UMB and LMB, respectively). These originated as eruptions of lava and are generally fairly smooth, sometimes containing vesicles (created by trapped gas bubbles) or amigdales, typically several mm across. The vesicles formed when the lava solidified quickly, trapping gas bubbles. Amigdales, which are usually pale/white, arise when minerals migrate from the body of the basalt and form in the vesicle. These beds formed around 330 million years ago.

The Tideswell Dale Sill is a body of dolerite, an intrusive igneous rock. This was injected as a molten material and solidified in-situ, within rocks which had already formed. Hence, the sill

formed after the limestone and basalt beds. In this case, the sill was injected approximately along the plane between the Lower Millers Dale Bed and the limestone beneath it, but it does not perfectly follow this boundary. Because the injected material had longer to solidify than the basalt, it is usually possible to detect a grainy/crystalline structure in dolerite, especially further away from the contact with the pre-existing bedrock, where cooling took longest and larger crystals could form. It may also contain vesicles, and these can be a few cm across. The sill is believed to have formed around 290 million years ago.

Dolerite and basalt are chemically similar and weather to form a similar orange-brown soil, which can be quickly recognised with experience.

Dolerite is exposed in numerous small quarries between Thornhill Slack and TW2.

### TF8 – Marmorised Limestone

*This may best be considered as a detour for the geologically-inclined and has the disadvantage of requiring a walk along a section of road without a foot-way. This side is on the W side of the road.*

The Geological Conservation Review describes a small exposure of "marmorised limestone" here, which has a crystalline sugar-like appearance. This arose due to metamorphosis of limestone by heat from the Tideswell Dale Sill.

Recent visits have not revealed this, although there is evidence of thermal alternation: at the exact location of TF08 the limestone appears altered to a crumbly white material (at high temperatures, calcium carbonate decomposes to calcium oxide = "lime") while a short way towards Millers Dale, where the road straightens out, there is an exposure of limestone which appears to be more crystalline than normal (sustained heat allows the ions in calcium carbonate to re-arrange themselves into interlocking crystals from the rather amorphous sedimentary form) and has a pink hue.

### TW3 – Access Gate

Looking up the hillside, the characteristic orange-brown soils of weathered dolerite/basalt should be visible.

### TF9 – Unusual Building

Close to the gate is a rather unusual building, looking like two pairs of back-to-back "cells" with low walls made in brick and stone. It does not look like a typical agricultural building (e.g. a pig sty). The building is not shown on the 1919 map, whereas the houses formerly near the current toilets are shown, suggesting this structure is not associated with those dwellings.

Was this the site of Patent Jim's adventure (see TF4/5)?

Near-by there is what looks like a "dew pond" (or "mere"), which is on the 1919 map, but has some steps, which are not expected for an agricultural feature. Maybe the steps are a later addition.

#### Detour - Traversing the Sill and Basalt

In visiting this set of sites, you will travel from close to the base of the Tideswell Dale Sill, past its top into a thin sliver of limestone, up to an exposure of the Lower Millers Dale Basalt, and further to the limestone which lies above it.

It is also possible to pick out the topographic influence of the different types of rock; the limestone is more resistant to weathering than the basalt.

**TF10** is close to the base of the sill. Most of the exposed rock is brownish due to weathering but there are a few patches of fresher rock which can be seen to have a fairly fine grainy appearance.

At **TF11**, a small exposure of dolerite appears to show evidence for slower cooling within the body of the sill; there are some pockets (a few mm across). Circular or elliptical pockets were probably gas bubbles, while those with approximately straight edges probably contained a mineral crystal which has weathered away.

On the way to **TF12**, limestone is visible. Smaller blocks might simply be boulders which have slid down the slope, while larger pieces may be bedrock. This small sliver of limestone shows that the sill doesn't quite follow the boundary between basalt and limestone just here. (NB the low resolution geological map reproduced with this guide does not show the limestone sliver but it is shown on the published British Geological Survey maps, but only on this side of the dale).

At **TF12**, there are various exposures of the Lower Millers Dale Bed of basalt (LMB). A small chunk of jasper may be seen, indicating that this was probably a submarine eruption. The basalt is typically weathered, with brown and crumbly material most common.

Limestone is again seen as bedrock at **TF13**, showing that we are now above the LMB.

Proceeding along the top of the valley side, you move off the topmost limestone and return to the basalt (**TF14**).

#### **TW4 – Stile**

The best point of egress is via this stile, from which the Northern end of the dolerite quarry may easily be reached.

#### **TF15 – Marble Quarry**

This area was once a source of "corraline marble" which had been created by thermal metamorphism of limestone, due to the emplacement of the Tideswell Dale Sill above it. This was worked around 1850 but the effort to remove the over-burden eventually made it uneconomical.

The remaining quarry face exposes around 25m of the Tideswell Dale Sill dolerite, which is seen to have been subject to "spheroidal weathering", and some basalt (LMB) towards the top.

Spheroidal weathering is common in this type of rock and is best seen on the right hand end. The rock originally has a number of cracks around rectilinear blocks; these are weak points for weathering (chemical attack by weakly acidic rain, freezing, and expansion/contraction due to daily temperature changes) to begin with. Subsequently exposed block corners are more quickly weathered to leave progressively more rounded cores. There is a "beach ball" sized example in the rock face, and a "space hopper" sized one on the ground.

The top part of the face appears as bands of more massive/solid material (dolerite), with fairly wide joints, and some less so (basalt). This reflects the fact that the dolerite was intruded some 40 million years after the basalt was erupted, and forced its way along whatever cracks developed. These are not "beds" as would be inferred from a similar layered appearance in a sedimentary rock.

#### **TF16 – Dolerite Gully (and Clay)**

A gully affords a view of dolerite which is not so weathered and at the Western end fragments of baked clay (rusty, kidney-coloured, and yellow) may be seen, subject to ground disturbance by cow hooves). The geological literature suggests that the clay was baked by heat when the sill was intruded. Columnar structures have been reported but only fragments of clay have been seen.

The gully was excavated by geologists (ca early 1990s) in order to demonstrate the depth of the dolerite sill and what lay beneath it.

#### **TV2 – Hammerton Hill and**

#### **TF17 – Line of Hummocks – Major Fault**

The limestone cap of Hammerton Hill is clearly visible with the Upper Millers Dale Bed (UMB, basalt) only a few metres lower; patches of distinctive basalt-derived soils visible on the hillside and the break in slope which arises from the different geology is evident. A band of hawthorn trees and (depending on season/weather) a band of greener grass betrays the presence of the better-quality soils &/or some rainfall capture by the UMB. Basalt

soils are favoured for local arable farming as they tend to be deeper and moister than the norm. Potatoes are grown nearby at Wormhill on basalt-derived soils.

Observe the line of gentle hummocks and hollows of TF17 on the hillside to your left. These fall on the line of a geological fault which cuts an ENE-WSW line across the dale. The Hammerton Hill side of the fault is on the down side of the fault, which means that the basalt beds not far beneath the summit of are the Upper lavas, whereas those at TF14 and the top of TF15 quarry face, at about the same altitude are the Lower lavas, which form the floor of Tideswell Dale below (S of the fault).

The presence of the LMB in the valley floor explains why there is a stream here; limestone terrain valleys like this would normally be dry but the basalt layer prevents seepage of water and the development of underground conduits.

*Proceed down the path into the dale and return to the car park.*

#### Hammerton Hill

Hammerton Hill is believed to be named from its shape; the place-name part “hamol” being evident in early recorded names, meaning crooked or scarred (and “hamor” is Old English for a hammer). The “ton” ending of its modern name arises from mutation of the Old English “dune”, pronounced “doo-ne” meaning a rounded hill, to which we have added the technically-redundant “Hill”. When viewed from the Monsal Trail, the shape of the hill is more obviously dented, consistent with the differential geomorphological effect of the limestone which forms its cap and foot and the Upper Millers Dale Lava sandwiched between. A line of hawthorn bushes appears to coincide well with the top boundary of the lava.

#### **TW5 & 6 – Route to Access Land**

A gate just before the building affords access.

#### **TF18 – Large Diameter Shaft on Continuation of Maury Vein**

This site is easily reached by following along the field edge adjacent to the woods which descend into the dale. This will bring you to a concreted area a little to one side of some mining disturbance. This may be a cap, although it looks rather unsubstantial, or a working area.

The adjacent line of hollows and hummocks heading up slope and close to a decrepit wall *almost* lines up the trial which was visited earlier, which is a mere 125m distant. That the line of

hollows does not quite line up illustrates that we cannot assume faults or veins are neat perfectly straight and vertical planes. Recall the hade on the trial (TF02).

The TF18 grid reference is on this line of hummocks. It is a large-ish heap of spoil and a very obvious hollow with a dry stone retaining wall on the up-hill side. A likely conclusion is that this was a relatively large diameter shaft. The wall may have been built to prevent an unexpected depth of basalt-weathered soil from slumping into the shaft; this point is very close to the boundary between limestone and basalt (BGS survey).

This location is very close to being in alignment with vein at the end of Tideswell Dale Cave.

Follow the vein up-bank all the way to the top, noting that the areas of working are further apart over the Upper Lava and that the hummocks/hollows continue beyond the wall on the ridge.

#### **TV3 – Summit of Hammerton Hill**

This is an excellent location to review the sites visited so far, as well of those in other trips in this guide which are located South of the Wye.

#### **TF19 – Un-named Minor Vein**

This point marks the place where a minor vein was worked. It appears to dissipate in the Upper Millers Dale Lava.

Looking straight down the slope from this point the lava beds terminate, although there are no exposures to demonstrate this. This corresponds with an exposure in the railway cutting on the opposite side of the Wye valley (at SK158729) and marks the “front” of the lava flow.

It is not known what the miners called this vein.

#### **TF20 – Romano-British Settlement**

This is the site of a probable Romano-British settlement, although it may be of medieval date. Some earthworks are clearly visible, described as an embanked sub-circular enclosure, and these are also quite prominent when viewed from the opposite side of the Wye valley, especially in dry spring/summer weather, when a bounded area appears substantially more lush.

#### **TV4 – View to Burfoot Old Vein**

This location gives good views over to Burfoot Old Vein (see another guide), ranging Westwards towards Lees and Dove Rakes.

The nearby chimney was part of the gas works associated with Litton Mill, which is well described on the web.

#### Detour – Tongue End

*This is recommended if a visit to Hammerton Hill is not made; TF18 & TV3 afford the same overview of Maury Rake.*

This aptly-named feature is accessible via stone steps with a metal hand-rail. The area is also informally known as Bellamy's Bank, and there is a small plaque to this effect.

Proceed to around 100m before the stone wall of the Youth Hostel. From around there, you should be able to make out the run of Maury Rake from the horizon (about "3 fingers" right of the building), across not far from where you stand, and up to the shallow nick to ridge of Hammerton Hill. The line of the vein passes close by the footbridge over the Wye. The substantial spoil heaps and run-in Wass Level (see the Maury Mine guide) can be made out at about the same altitude as the top of Tongue End.

Documentary evidence suggests rights to exploit the short section of Maury Vein on Tongue End was awarded to Edward Wass in 1868.

*It is possible to use a steep path down to TF02, leaving TF01 for the return leg to the car park.*

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## Maps and Digital Location Data

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Several different maps and location data are provided with this guide, within the “zip” file which contains this document:

- There are three PDF files for printing, viewing on-screen, or using in some mobile device apps.
  - One contains the route and points of interest.
  - One contains geological information, including the lead veins (black lines with circular dots overlain) and geological faults (plain black lines).
  - One is based on Lidar data and shows the ground surface (without trees, buildings, walls etc).
- The GPX file can be used in many GPS devices as well as mobile device mapping apps.
- The Microsoft Excel file contains grid references for all the features, viewpoints, and waypoints. The same information is included below, in the Supplement.

### Caveat concerning the bedrock geology and faults/veins shown on the maps

As is often the case, the BGS mapping of mineral veins does not precisely match what is inferred from observed workings. This is thought to arise from the unavailability of GPS locations when the BGS surveys were recorded.

The principal upshot in this area is that, where faults affect the surface bedrock distribution, there are jarring anomalies in the maps shown below because the vein locations have been altered but the bedrock left as the BGS indicates.

### Using Maps and Data on Mobile Devices

*There are too many options to give a comprehensive picture, so this section is meant only to give some hints and a basis for some “desk research”.*

The GPX file is probably the best starting point if you already have a digital mapping app installed, especially if you have OS maps in that app as this file only contains the location data.

An alternative which includes a map is to use one the “mbtiles” files. These are not included in the zip file as they are rather large but can be downloaded separately. My preferred app for using these is SWMaps but a better app people with less digital mapping experience is MapTiler Mobile. It allows for relatively easy loading of MBTiles maps but it will be necessary to register and get the Free (rather than Anonymous) plan. MBTiles can be put on Google Drive and then accessed on Android phones as “local” storage. MBTiles maps can also be used on a desktop/laptop PC using the Maptiler Desktop software.

*The MBTiles maps have a slightly different coverage and map content than the PDF maps, which are really designed for printing to-scale.*

Finally: the PDF files are “georeferenced” so can be used with suitable software on a mobile phone or tablet, combined with its GPS, to show your location in relation to the itinerary or geology. Software which can work with these “geopdf” maps includes Avenza and GeoPDF.

## Supplements

### Summary of Grid References

feature	MF01	SK15027328	Ravenstor
feature	MF02	SK15097310	Maury Sough
feature	MF03	SK14977308	Buddle Dams
feature	MF04	SK14977305	Ruined Coe
feature	MF05	SK14957303	Wass Level
feature	MF06	SK14897303	Water storage
feature	MF07	SK14917299	Possible Mine Track
feature	MF08	SK14787298	Maury Rake. Possible Site of 1653 Sough
feature	MF09	SK14757297	Dressing/Processing Floors
feature	MF10	SK14727294	Pond?
feature	MF11	SK14647298	Round Cairn
feature	MF12	SK14647291	Processing Area
feature	MF13	SK14627289	Buddle Dams
feature	MF14	SK14587286	Belland Yard Wall
feature	MF15	SK14547286	Coe
feature	MF16	SK14517286	Gin Circle and Capped Shafts
feature	MF17	SK14307307	Quarry Tramway Bed
feature	MF18	SK14047319	Millers Dale Limekilns
feature	MF19	SK14177331	Tideswell Mill (Wheel)
feature	MF20	SK14477337	Tufa Spring
viewpoint	MV01	SK15097313	Maury Sough
viewpoint	MV02	SK15167312	From the Bridge
viewpoint	MV03	SK15077299	Hammerton Hill
viewpoint	MV04	SK14527296	Quarry Landslip, Windoway & Gratley Veins
waypoint	MW01	SK14997329	Car Parking
waypoint	MW02	SK15117298	Entrance to Nature Reserve
waypoint	MW03	SK15007302	Stile
waypoint	MW04	SK14887304	Gate (egress)
waypoint	MW05	SK14857294	Strike Out
waypoint	MW06	SK14477296	Egress from Nature Reserve
waypoint	MW07	SK14457310	Quarry Detour
waypoint	MW08	SK13987310	Top of Incline
waypoint	MW09	SK14357338	Alternative Parking
feature	TF01	SK15557319	Tideswell Dale Cave
feature	TF02	SK15417322	Trial on Eastern Part of Maury Vein
feature	TF03	SK15347385	An Adit?
feature	TF04	SK15507453	Loading Platform
feature	TF05	SK15517457	Storage Hopper
feature	TF06	SK15497452	Drafting Adit
feature	TF07	SK15527449	Thornhill Slack Vein
feature	TF08	SK15387410	Marmorised Limestone
feature	TF09	SK15447408	Unusual Building
feature	TF10	SK15447413	Approx Base of Dolerite
feature	TF11	SK15477421	Coarser Dolerite
feature	TF12	SK15547421	Lower Millers Dale Lava (basalt)
feature	TF13	SK15557420	Limestone above LMB
feature	TF14	SK15587402	LMB
feature	TF15	SK15487385	Marble Quarry
feature	TF16	SK15467378	Dolerite Gully (and Clay)
feature	TF17	SK15597364	Line of Fault

feature	TF18	SK15527328	Large Diameter Shaft on Continuation of Maury Vein
feature	TF19	SK15777329	Un-named Minor Vein
feature	TF20	SK15987323	Probable Romano-British Settlement
viewpoint	TV01	SK15527442	Thornhill Slack Vein
viewpoint	TV02	SK15547365	Hammerton Hill
viewpoint	TV03	SK15607340	Summit of Hammerton Hill
viewpoint	TV05	SK16147315	View to Burfoot
waypoint	TW01	SK15667311	Parking
waypoint	TW02	SK15417421	Access Gate
waypoint	TW03	SK15437407	Access Gate
waypoint	TW04	SK15437394	Stile
waypoint	TW05	SK15717310	Footpath
waypoint	TW06	SK15767312	Access Gate

## Information Sources and Further Reading

Historical information and geological details have been obtained from the following sources. My thanks go to the authors of these articles.

Mining History back issues and PDMHS Newsletters are available from the PDMHS website (see below).

The trip(s) which each relates to are indicated by the content of brackets following a source, using the same letter as begins each location code. e.g. [T]

### Mining History:

**The Black Marble Mines of Ashford-in-the-Water, T D Ford,**  
volume: 2, number: 4, pp: 179-188

**Field Meeting to Millers Dale: 21st May 1967, J A Robey**  
volume: 3, number: 4, pp: 247-248 [M]

**The Recovery of a Steam Engine from Putwell Hill Mine, Monsal Dale, S Thompson,**  
volume: 4, number: 6, pp: 413-416

**Putwell Hill Lead Mine, Monsal Dale, R Bird,**  
volume: 5, number: 1, pp: 54-60

**Recovery of the Second Steam Pumping Engine from Putwell Hill Mine, Monsal Dale, R Amner,**  
volume: 5, number: 6, pp: 335-340

**A Survey of the Geology of Putwell Hill Mine, Monsal Dale, R P Shaw,**  
volume: 7, number: 6, pp: 342-344

**The Maury and Burfoot Mines, Taddington and Brushfield, Derbyshire, J Barnatt & C Heathcote,**  
volume: 15, number: 3, pp: 45-50 [M]

**The Geological Setting of the Lead Mines in the Lathkil Dale and Wye Valley Area, T D Ford,**  
volume: 17, number: 2, pp: 1-36

**The Lead Legacy: An Updated Inventory of the Important Metal and Gangue Mining Sites in the Peak District. J Barnatt, K Huston, D Mallon, R Newman, R Penny, & R Shaw.**  
volume 18, number 3, pp: 1-112 [M]

**A Gazetteer & History of the Lead Mines within the Liberty of Tideswell 1189-1945, C Heathcote,**  
volume: 19, number: 1, pp: 27-75 [T]

## PDMHS Newsletter Observations and Discoveries

N/L No.		
102	Workings: Tideswell Dale Adit: Tideswell Dale	T
104	Workings in Upper Tideswell Dale Postulated Adit, Tideswell Dale	T
111	Eastern Range of Maury Vein	T
133	Maury Sough	M
135	Maury Sough	M
136	Maury Sough	M
137	Lead Veins on Hammerton Hill	T, M
138	Lead Veins on Hammerton Hill (Revisited) High-level Sough, Maury Vein	T M
140	Vein Trial, Tongue End	T

### Other Sources:

**Geological Conservation Review, Tideswell Dale (GCR ID: 2764), C. N Waters.**

[http://www.thegcr.org.uk/Sites/GCR\\_v27\\_C07\\_Site2764.htm](http://www.thegcr.org.uk/Sites/GCR_v27_C07_Site2764.htm) [T]

**Peaks Romana: The Peak District Roman-British Rural Upland Settlement Survey 1998-2000, Bill Bevan**

Derbyshire Archaeological Journal Volume 125, 2005.

<https://archaeologydataservice.ac.uk/archives/view/daj/volumes.cfm> [T]

**Lead Legacy** (updated inventory in Mining History 18-6) inventory numbers: 97 and 98 [M], 99 [B]

**Lead Mining in Derbyshire: volume 2, Millers Dale to Alport and Dovedale, J H Rieuwerts**

**Scheduled Monument Listings, Historic England** (some of these contain comprehensive detail and good background information, accessible from <https://historicengland.org.uk/listing/the-list/>):

- 1020086 – Round cairn in Priestcliffe Lees SSSI
- 1412310 – Maury Mine and Sough
- 1412889 – Lees and Dove Rakes – Booth Lee Pipes and Sterndale Sough
- 1412909 – Putwell Hill Mine

### PDMHS Archive

CD 119, and its copy in the PDMHS Accessible Digital Archive, has a scan of the 1767 map showing various named veins and shafts and the route of the sough from river level.

### Other Acknowledgements

Maps were created using QGIS open source GIS software. Field observations were recorded using the SWMaps Android app.

## Edition, Copyright, and Licence

### Mapping Source and Copyright

The maps with this guide have been created with the aid of data and images from a variety of sources.

#### Base Mapping

Most of the base maps have been created using vector data from Open Street Map. Overview maps have been produced from the OSM raster map tile service. This is © OpenStreetMap contributors and used under the terms of the Open Database Licence.

The data was acquired using the “QuickOSM” QGIS plugin.

Source: <https://www.openstreetmap.org/export>

Licence: <https://opendatacommons.org/licenses/odbl/>

The overview map on the title page is created using the OS Open Data Road layer from the OS Maps API, “© Crown copyright and database right 2023” and used under the Open Government Licence.

#### Place Names, Boundaries, and Contour Lines

Most of the place names are drawn from OS Open Names, contour lines use the OS Terrain 50 dataset, and parish boundaries are drawn from OS Boundary-Line which are “© Crown copyright and database right 2023”. They are licenced under the Open Government Licence.

Source: <https://www.ordnancesurvey.co.uk/opendatadownload/products.html>

Licence: <http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

#### Geological Information

Maps with bedrock colouring contains British Geological Survey materials © UKRI 2020. Bedrock data was obtained from the British Geological Survey 1:50,000 scale WMS service. This data is licenced under the Open Government Licence.

Source: <https://www.bgs.ac.uk/data/services/digmap50wms.html>

Licence: <http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Mineral vein locations have been informed by reference to the British Geological Survey Southern Pennine Orefield dataset, which was kindly made available to the author. In many cases, the locations shown in this guide have been adjusted by the author to better correspond with field observation, lidar, and satellite images.

[ ADD MORE INFO ]

#### LIDAR DTM and Composite Data from the Department for Environment Food & Rural Affairs

Digital terrain models used for creating profiles and composite map visualisations are from Defra, used under the Open Government Licence v3.0.

Source: <https://environment.data.gov.uk/DefraDataDownload/>

Licence: <http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

#### Old OS Maps

Old OS maps are generally six-inch maps from the later part of the 19<sup>th</sup> century and are reproduced with the permission of the National Library of Scotland. These maps are licenced under the terms of the Creative Commons Attribution (CC-BY) licence.

Source: <https://maps.nls.uk/os/6inch-england-and-wales/>

Licence: <https://maps.nls.uk/copyright.html>

## This Work

This is version 1.0, 27 December, 2023.

An electronic copy and all map and data downloads may be obtained from:  
<https://adam.hilltop-cottage.info/field-guides>.

New guides and new versions will be published there. Errors and omissions may be sent to [arc@hilltop-cottage.info](mailto:arc@hilltop-cottage.info) (please indicate “Field Guide” and the name of the excursion) or via the website.

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