

# The Rock Quarries of Charnwood Forest

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**Abstract:** The Charnwood Forest area of northwest Leicestershire had a number of small quarries in the late-18th century, supplying broken rock for local road construction. Output increased when transport by horse and cart was superseded by the opening of the Leicester and Swannington Railway Line, one of the world's earliest steam railways, in 1832. Abolition of the turnpikes in 1827, followed by the passing of Local Government Acts in 1888, led to an increased demand for hard rock from the Leicestershire quarries, for bridge building and for new roads. At the same time, construction of the main line railways throughout the country created a constant requirement for railway ballast, and also provided a means to transport aggregate far afield. By 1890, Charnwood 'granite' was the main source of aggregate for Britain, producing over a million tonnes per year by 1900. Leicestershire is the largest producer of igneous rock in the country today, with production of 12.877 million tonnes of rock in 2005. This came from four large quarrying operations at Cliffe Hill, Bardon Hill, Buddon Wood (Mountsorrel) and Croft.

## Geological setting

Charnwood Forest is one of the few places in England to expose the resilient Precambrian basement rocks, much valued as an aggregate for the road-building and construction industry. The landscape consists of a series of craggy inliers of Precambrian basement rocks protruding through a blanket of Triassic Mercia Mudstone deposits and Quaternary drift (Fig. 1; Carney, 1999). All of the quarries, both active and historical, exploit the durable Precambrian and Cambrian basement rocks of the Charnian Supergroup, the exception being the younger Ordovician granodiorite intrusions at Mountsorrel Quarry (the Mountsorrel Complex).

The Charnian Supergroup is subdivided into three Groups (Fig. 1), the oldest of which is the Blackbrook Group, a sequence of metavolcaniclastic breccias and sandstones. They are overlain by the Maplewell Group, a series of interbedded volcanoclastic tuffs, volcanic breccias and debris flow deposits, which in turn are unconformably overlain by the Brand Group, from which the famous Swithland Slates are derived. Until recently the Brand Group was also considered to be Precambrian in age, but the discovery of the trace fossil *Teichichnus* in the Swithland Slate Formation reclassified the group to a younger Cambrian age. It is widely accepted that the volcanoclastic material was erupted from a chain of explosive volcanoes within an intra-oceanic island arc setting, similar to the present day situation on the island of Montserrat (Ambrose et al., 2007). The clouds of ash and dense pyroclastic flows that cascaded down the volcano flanks settled out on the sea floor around the volcanoes, forming the volcanoclastic sediments of the Blackbrook and Maplewell Groups. When subduction ceased, the volcanoes were eroded, and the sea advanced across the landscape in Cambrian times. Sedimentary rocks

with little volcanic material (the Brand Group) were then deposited.

Prior to the end of magmatic activity, when the Charnian arc had attained greater maturity (Carney, 1999), the Charnian Supergroup was intruded by a series of younger Precambrian diorites (the North Charnwood Diorite) and granophyric diorites (the South Charnwood Diorite). However, the granodiorite intrusion at Mountsorrel (the Mountsorrel Complex) is a completely different entity. It formed within a new subduction zone setting during the later Ordovician period, when England was part of a small continent called Avalonia. The basement rocks were subsequently folded in Silurian times into an anticlinal structure, the axis of which plunges towards the south east, forming a U-shaped pattern of rock outcrops (Fig. 1). The anticlinal structure of the basement rocks therefore controls, to some extent, the location of the hard-rock quarries in Charnwood.

The quarries in Charnwood extract a range of rock types, including the volcanoclastic rocks of the Blackbrook Group (at Newhurst and Longcliffe Quarries) and Maplewell Group (Bardon Hill) and the younger Precambrian intrusions of the North Charnwood Diorite (Newhurst and Longcliffe) and the South Charnwood Diorite (Cliffe Hill, Groby and Hill Hole Quarries). They also exploit younger Ordovician granodiorite intrusions at Mountsorrel Quarry (the Mountsorrel Complex). Mention must also be given to the quarrying of the famous Swithland Slate Formation of the Brand Group; although they are not a hard-rock aggregate they were never the less an important (and the only local) source of slate during the 18th century. At that time they were extensively quarried from a number of sites in Charnwood Forest, which are outlined briefly at the end of this paper. Limestone quarries were also active at Grace Dieu, Breedon and Cloud Hill at the end of the 18th century (Smith, 1984), but their history is not considered in this paper.

## Quarrying history in Charnwood

Quarrying can be thought of as Britain's oldest industry, as stone was primarily worked to make weapons for hunting and tools for everyday prehistoric life. Indeed, igneous rocks have been 'quarried' since at least the Neolithic (c4500-2100BC in Britain), a period that also saw the introduction of farming. The Charnwood axe industry provides the earliest clear evidence for quarrying in the region during the Neolithic period (R. Clark, *pers. com.*). Charnwood Forest was the source area for the manufacture of axes (and other stone implements) in Neolithic times, maybe due in part to the 'intractable nature of the Charnwood material' (Bradley, 1989). The axes were sculpted from a variety of Charnian materials and were widely distributed across the country, with concentrations in Charnwood itself, Derbyshire, East Anglia and Fen Edge. Although no factory has been located, several source outcrops have been identified in

Charnwood Forest (Bradley, 1989). A younger axe head sculpted from local igneous rock was also found in the wall of Kellam's Farm (east of Bardon Hill) indicating that Bardon stone was still appreciated as a tool-making material in the Bronze Age (Noble, 1995). Evidence also suggests that granite millstones (or querns) were hewn from the Buddon Wood area of Mountsorrel in the Early Iron Age (Anon, 2003).

The Romans are known to have exploited several small quarries or stone pits in the Charnwood area. They utilised the granite from Mountsorrel, Groby and Hill Hole Quarry, mainly as a rubble stone, in the walls of a number of important buildings in Roman Leicester, of which the Jewry Wall is most notable. It is also believed that they incorporated Enderby stone, a type of medium- to coarse-grained quartz diorite, in to parts of the famous Fosse Way, a Roman road constructed in the mid-1st century AD. The A46 now partly follows the Fosse Way, which runs from Exeter

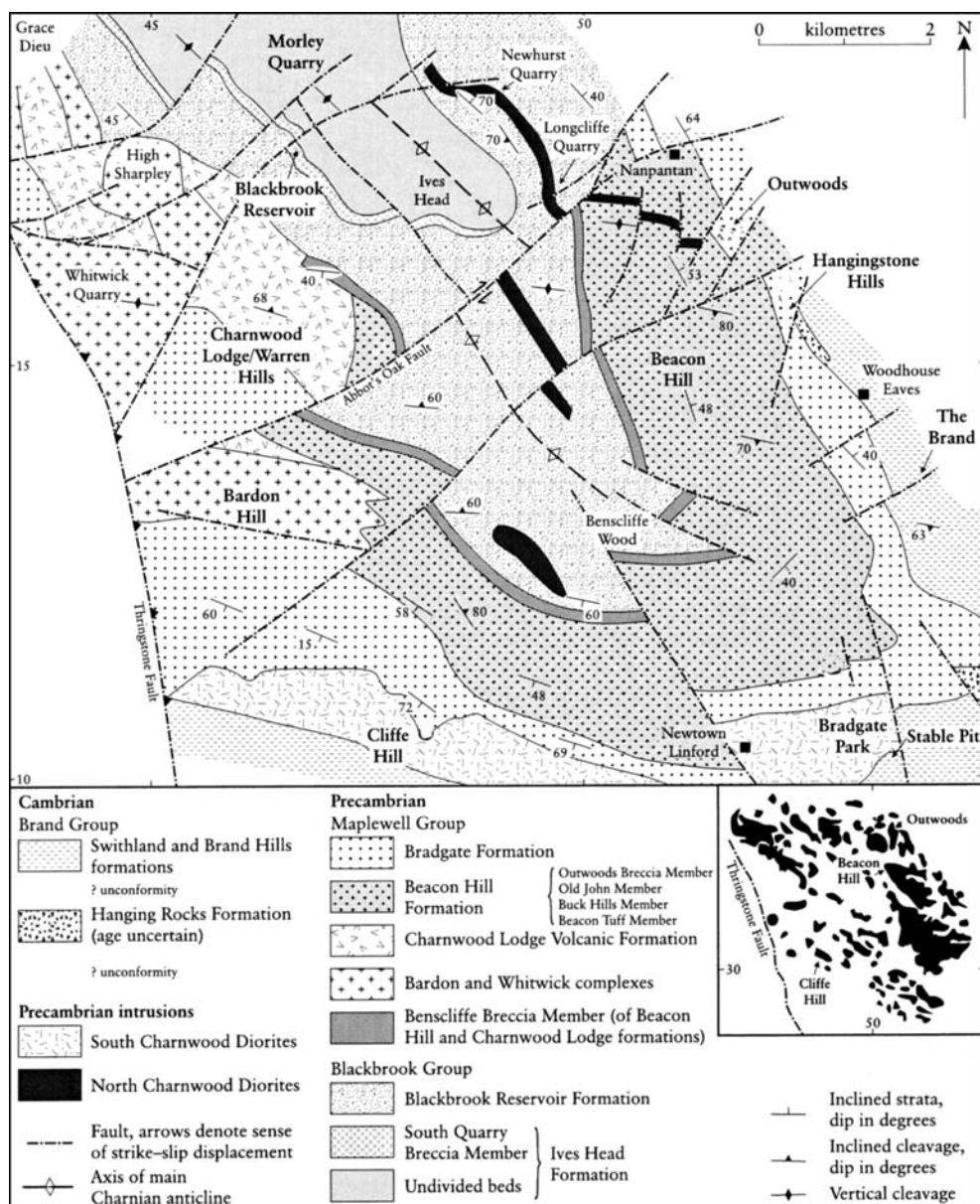


Figure 1. Geological map of Precambrian and Cambrian rocks in Charnwood Forest. The younger Triassic strata, Coal Measures and Quaternary drift are omitted for clarity. The inset shows the outcrop extents of the basement inliers (as dark shading) beneath this younger cover. (After Carney, 1999)

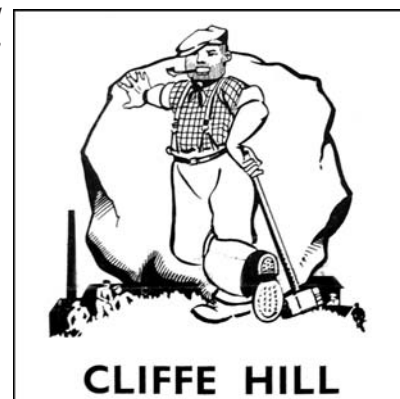
in the southwest, through Leicester to Lincoln in the northeast. One structure that does appear to have been roofed at least partly with Swithland Slate was the Forum (the main administrative centre) in Roman Leicester or *Ratae Corieltavorum*, as it was then known. A recent excavation at a Roman site in Rothley has also yielded a substantial assemblage of characteristically rhomboidal and diamond-shaped tiles of Swithland Slate (R. Clark, *pers. com.*). This could indicate that the slate quarries around Swithland were being worked during the late Roman period (D. Ramsey, *pers. com.*). It is thought that earlier in Roman times the slates were mainly extracted from the Groby area.

Charnwood stone continued to be quarried on a small scale throughout the later centuries, and was mainly used in the construction of religious and defensive structures during the medieval period. In fact, there were 14 known medieval castles in Leicestershire, and each would have used large amounts of local stone in their construction. By the mid-16th century however, the maintenance of roads had become the responsibility of the parish through which the road ran. As a result, each parish generally had their own small quarry (the local 'Parish Pit') to supply chippings and broken stone for road repair. The formation of the Turnpike Trusts from 1726 onwards was a major step forward, representing the first real attempt since Roman times to improve highway conditions, construct new lengths of metalled roads and rebuild bridges. It led to the beginnings of a public transport network, and created a constant demand for broken rock, to both build and repair the road systems. Acts of Parliament carefully defined the limits of responsibility of each turnpike trust, and tollgates or turnpikes were erected to collect charges from road users. The revenues raised met the cost of road repairs and also gave the Trustees a profit on their investment.

By the end of the 18th century, igneous rock chippings were recognised as an excellent hard-wearing material with which to surface a road, and at this time broken granite aggregate from Mountsorrel Quarry was used in the construction of several roads in Leicestershire. John Loudon McAdam became Surveyor-General of Roads in 1827 and famously promoted the use of 'granite Macadam' when he professed that *Roads should be constructed of broken stone...covered by a series of thin layers of hard stone broken into angular fragments of nearly cubical shape*. Incidentally, McAdam provided guidelines for the correct sizing of a piece of granite to be one that could fit easily into a man's mouth. This back-fired on him when one quarryman had broken granite to too large a size; when he queried the workman, McAdam discovered that the man had no teeth, and therefore a much larger mouth cavity than normal!

The increase in road building and repair was further accelerated following two important turning points in history. First was the abolition of the turnpikes in 1827, which resulted in a far greater freedom of movement

**Figure 2.** An old Cliffe Hill Quarry logo, date unknown. (Photo: MQP)



for all vehicles. This encouraged more people to use the roads, which obviously called for additional maintenance of the road surface. The second turning point relates to a Local Government Act in 1888 that compelled local authorities to be responsible for the maintenance of their own roads. The effect of such new developments resulted in a major increase in quarrying activity in Leicestershire, which led to the opening of new quarries at Groby in 1832, Mountsorrel in 1842, Markfield in 1852, Bardon Hill in 1857 and Croft in 1868 (Fig. 4). A second wave of activity occurred at Enderby and Morley in the 1870's, followed by Cliffe Hill in 1891, Charnwood in 1881/91 and Whitwick in 1893. Demand for hard rock was further boosted during the late-19th century, when main line railways were constructed. This not only created a constant demand for railway ballast, but also provided a means to transport aggregate to customers across the country. By 1890 Charnwood Forest 'granite' had become the main source of aggregates for the whole country, from the Midlands southwards, with Leicestershire producing over a million tonnes per year by 1900. A well-known colloquialism at the time sums up the success of Leicestershire granite - *The streets are not paved with gold in London, they are paved with Leicestershire granite* (J. Shenton, *pers. com.*).



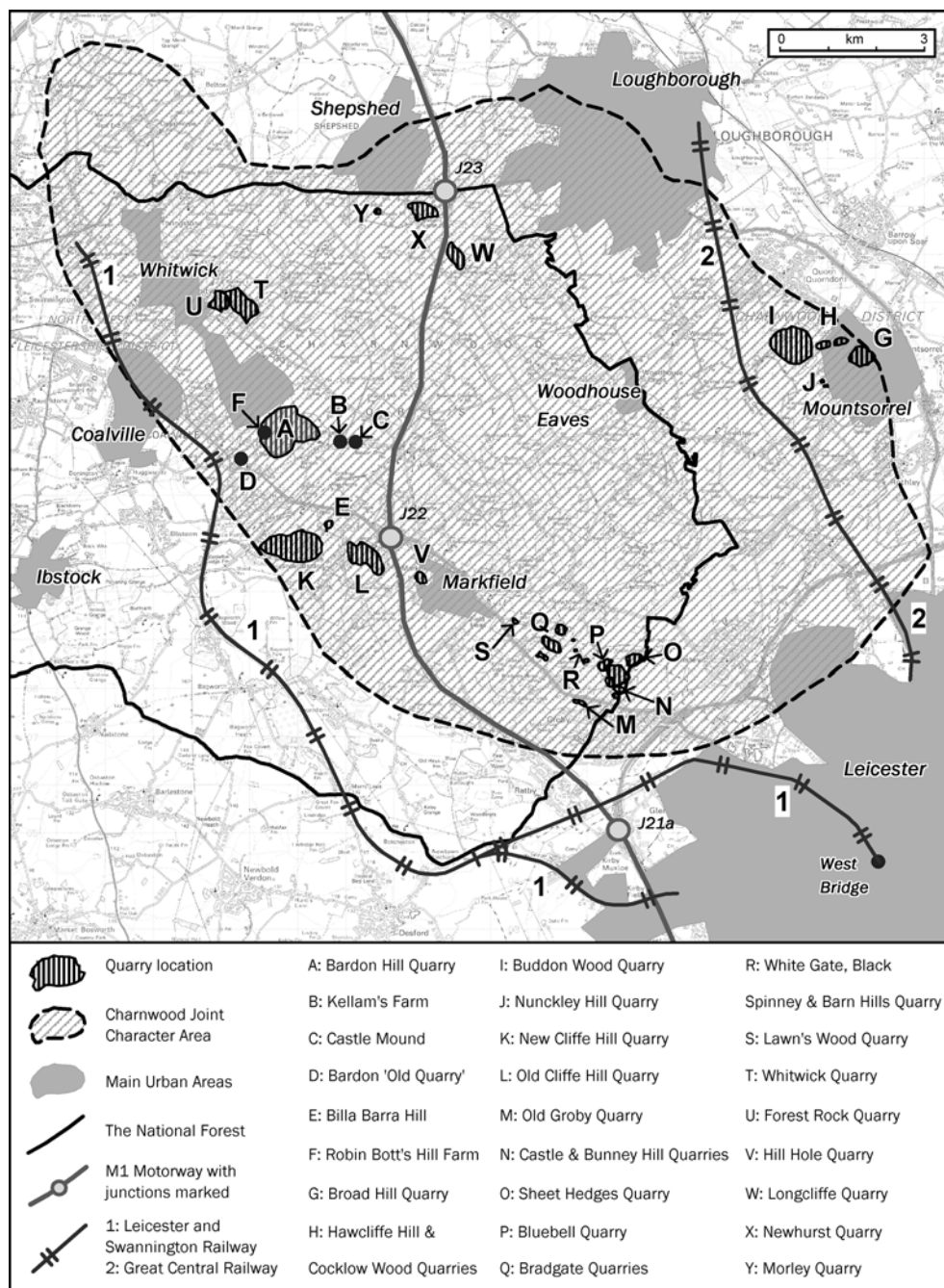
**Figure 3.** Manually laying a road, Mountsorrel. Date unknown. (Photo: Lafarge Aggregates)

But why was Leicestershire ‘granite’ so popular? The reason was, and still is, that there are no reserves of hard rock suitable for roadstone in the South of England; Leicestershire therefore provides the nearest and cheapest rock resources to these ever-expanding markets. Between 1990 and 2000, Leicestershire igneous rock ranged between 45% and 52% of the East Midlands total crushed rock production. It is also worth noting that 1.617 million tonnes of limestone were extracted in Leicestershire and Rutland in 2004, and 1.3595 million tonnes of sand and gravel were produced in 2005 (Leicestershire only). Today, Leicestershire is the largest supplier of igneous rock, supplying over a third of the nation’s requirements, three quarters of which comes from Charnwood Forest

alone. The crushed rock is mainly supplied to the Southeast, the East and West Midlands and East Anglia. Most of the quarries that are open at present are operated by major industrial public companies, a process that began as early as 1876 when the Mountsorrel Granite Company was incorporated as a limited company.

### Bardon Hill Quarry

The slopes of Bardon Hill have been inhabited since at least the Bronze Age as evidenced by the discovery of an axe head made from local Bardon stone in the wall of Kellam’s Farm, to the east of the present day quarry (Noble, 1995; B on Fig. 4). The remains of an ancient



**Figure 4.** Distribution of the hard-rock quarries in Charnwood Forest. (Base map by Ordnance Survey)

**Figure 5.** General view of Mountsorrel Quarry, date unknown. (Photo: Lafarge Aggregates)



farmstead or burial site dating to c 500 BC can also be found to the east of Kellam's Farm at Castle Mound, suggesting that the area was still occupied during the Iron Age. The Romans are known to have used the high point of Bardon Hill as a look-out post, and there is also some speculative evidence to suggest that Bardon Hill was once an ancient religious site, as the eighteenth century writer Throsby refers to druidical ruins on the north side of the Hill. Unfortunately the ruins have never been found. Blandford also recorded the discovery of gold in small quantities at Bardon Hill in 1880, but obviously not enough to start a gold rush! Bardon Hill Quarry is unique, as it is the only locality to expose the Bardon Hill Complex, which is made up of the Peldar Porphyritic Dacite and the Bardon Breccia. The exposures within the quarry provide a rare opportunity to decipher the magmatic processes that operated within one of the Charnian volcanic centres (Carney *et al.*, 2000).

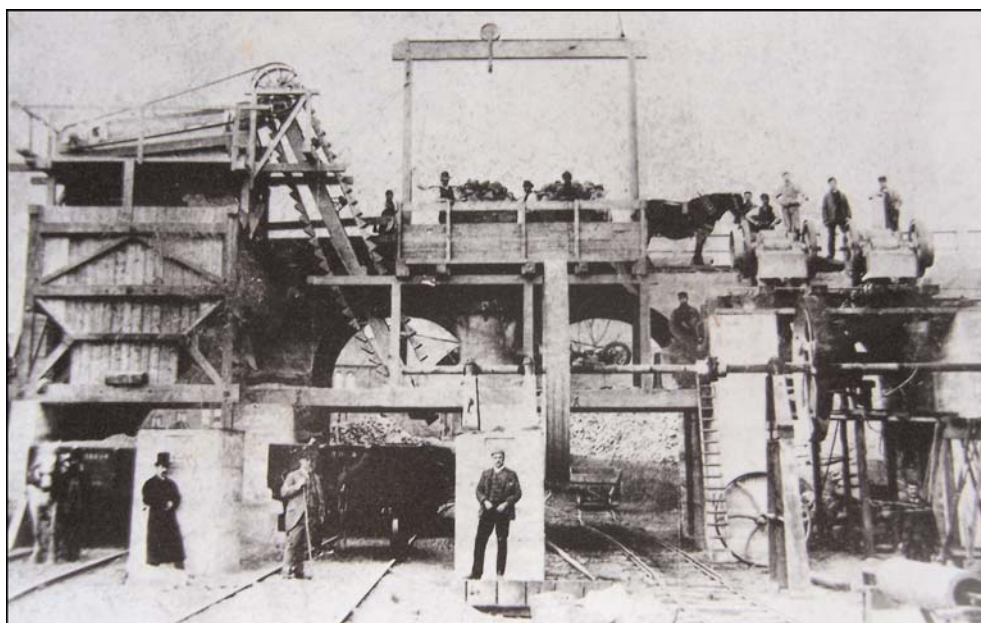
Bardon originally consisted of a deer park, 1500 acres in size, which formed part of the manor of Whitwick within the 'waste' of Charnwood Forest (Noble, 1995). The earliest printed reference to quarrying within the Park was made by the topographer William Burton (1622), when he

incorrectly describes Bardon Hill as having ...*great quarries of hard stone, which some take to be a kind of lime-stone*. Bardon Chapel, built in 1694 by John Hood, was constructed from Bardon stone, as was the Old Hall, a moated manor house (built circa 1300-1500), and the summer-house that in 1743 once stood on the summit of the Hill (Fenn, 2003). All provide evidence of early quarries somewhere on the Bardon Estate, if only on a small scale. However, it is known for certain that several minor quarries existed in the vicinity of the turnpikes at Bardon in the early 1800s (and most probably earlier), to supply crushed stone for local road repairs. One of these quarries (the 'Old Quarry', D on Fig. 4; Fig. 6) still exists today and straddles the grounds of Bardon Hill House, built c 1820-40, and the beer garden of the Birch Tree Inn; it is thought to predate both buildings. A second, possibly more ancient quarry, little more than a stone pit, was sadly obliterated in 1993 when the site was included in the new Birch Tree roundabout.

The Ellis and Everard partnership first realised the value of the mineral wealth at Bardon Hill in the 1850s. In those days the best-quality resource was called the 'Bardon Good Rock', which is a type of grey-green andesitic breccia, of Precambrian age.

**Figure 6.** An old map of the quarries around Bardon Hill, dated 30th June 1906, with the locations of Botts Hill Farm, the Old Quarry (in the SW corner), Scotland and Siberia Quarries (east of centre), the school and the adjacent string of workmen's cottages.





*Figure 7. Old crushing machinery, thought to be at Bardon Hill Quarry in the 1800s. (Photo: Aggregate Industries Archive)*

Three generations of Ellis and Everard worked the site until Leonard Tom bought in to the quarry in the 1940s. However, Ellis and Everard did not actually own the land in which the quarry was situated, but leased it from the owner of Bardon Park at the time, Robert Jacomb-Hood. The Hood family must have been greatly interested in the construction of a new railway line, the Leicester and Swannington Railway Line (Fig. 4) so close to Bardon Hill during the early 1830s. In fact, it is known that Jacomb-Hood watched the mightily-named locomotives Comet, Phoenix, Samson, Goliath, Hercules, Liverpool, Atlas Vulcan, Ajax and Hector going about their labours (Fenn, 2003). The Leicester and Swannington Railway Line was actually of paramount importance to the evolution and commercial development of the Charnwood Forest quarries, especially Bardon Hill Quarry, and its construction was a pivotal moment in the transport history of the East Midlands. George and his son Robert Stephenson had visited Leicester in 1828 and had declared the construction of a new railway feasible in terms of its construction and financial viability. John Ellis became involved in the project, was duly elected as Chairman of the scheme and was appointed a Director on the board and the young Robert Stephenson was engaged as the engineer.

The railway opened in July 1832 to passenger traffic, with a train hauled by Comet, driven by George Stephenson himself. Reports say that on its maiden voyage the train was decorated with flags and banners proclaiming ‘Cheap coal and granite’ and ‘Warm hearths and good roads’; it is also said that the train had its 4-metre-high chimney knocked down on entering Glenfield Tunnel. The railway consisted of a single line, 25 km long, with branch lines to the collieries at Bagworth, Ibstock and Whitwick, and the Earl of Stamford’s hard-rock quarry at Groby. This was the first steam worked public railway transporting both

passengers and freight (mainly coal and ‘granite’) in the Midlands, opening six years before the London and Birmingham line. In the first six months of operation the railways’ receipts for the carriage of ‘granite’ amounted to £82 12s 1d, and 4622 tonnes of stone and slate were carried from the Groby quarries (Clinker, 1954); however, by far the greatest profit came from the carriage of coal (£766 3s 8d). In August 1845, George Hudson, Chairman of the Midland Railway Company purchased the line and changed the station’s name from Ashby Road to Bardon Hill.

In the 1840s, Breedon Everard was a tenant farmer on the Earl of Stamford’s Estate at Groby. In 1848 he started a coal merchants’ business in partnership with Joseph Ellis, in the area between Peterborough and Syston, on the newly opened Midland Railway Line extension (Noble, 1995). They first began ‘granite’ quarrying at Billa Barra, (or Billa Barrow as it was then called), a small quarry consisting of volcanoclastic rocks belonging to the Bradgate Formation. At that time the quarry belonged to Breedon Everard’s wife, Elizabeth Ann Cowlishaw. The partnership then purchased the Markfield Granite Quarries in 1852, which motivated the ever-competitive Earl of Stamford to re-open his quarries at Groby.

In 1857, Joseph Ellis died, which prompted Breedon Everard to enter into partnership with his own sons, James and Joseph Henry Ellis. The following year Breedon Everard, who was then the senior partner, negotiated with Robert Jacomb-Hood for the rights to quarry within Bardon Park. They were granted a lease for 40 acres of land and subsequently opened a new quarry, located in the fields to the southeast of what was then known as Robin Bott’s Hill Farm (Noble, 1995). The original site of the farm is now unclear, but it is thought to have been within the current quarry workings, somewhere to the south of Bradgate Drive, Greenhill (F on Fig. 4; Fig. 6). The

quarry also conveniently adjoined the Bardon Hill Station on the Leicester and Swannington branch of the Midland Railway via a siding across the turnpike and into the quarry. The Ellis Brothers were a major asset to the quarry company at this time as they were both directors of the railway line, which enabled them to transport stone to the far reaches of the country. Apparently, the Ellis & Everard partnership paid a rent of £145 per year for the quarry, as well as royalties of 1s 5d (7.5p) per tonne of stone extracted (Noble, 1995). Breedon Everard left Groby and moved to Hill Top House, now known as Bardon House. He abandoned farming in order to devote his full attention to the merchants' business and quarrying.

The demand for stone from Bardon Quarry soon began to outstrip supply, due to the more widespread macadamising of roads and the increased use of ballast on the new railroads. This called for the operation at Bardon to become more mechanised and less labour intensive, to increase output. As a result, in 1859 a powerful crushing machine was commissioned and installed within the mill. It was designed by Charles G Mountain 'of Birmingham' and was the first purpose built steam-driven stone crusher, possibly in the world, to be used commercially (Noble, 1995). Robert Jacomb-Hood died in 1860 and the Bardon Estate was subsequently sold to William Perry Herrick in 1864, the then owner of the Beaumanor Estate at Woodhouse Eaves. The quarry rights at this time extended to nearly 300 acres of Bardon Park, but only a small part of this was quarried, amounting to no more than 4 ha in 1865 (Noble, 1995). It is something of a puzzle as to why the Ellis & Everard partnership did not bid for the estate in 1864, in order to own and expand the quarry workings themselves. The Herrick's improved their property but did not actually move into Bardon Hall; this was originally let for a rental of £150 per year until the Everard family took up the tenancy in the 1870s, apparently for a peppercorn rent.

The demand for aggregate continued to grow, but the workforce required to quarry the stone did not exist, as the thin population of the area was mainly concentrated in the coal mining industry. Houses were therefore built around 1870-3, to attract and accommodate quarrymen in the area, the first of which were built close to the primary crushers, and were known as Spinney Cottages and the Lodgings House. This was followed in 1875-6 by a long string of brick-built terraced cottages, known as The Old Row as well as a Reading Room, school and the remainder of the new village of Bardon (Fig. 6). The architect of the school and houses was John Breedon Everard, Breedon Everard's second son, and all was provided at the joint expense of Ellis & Everard and the Perry Herricks. More cottages were added in the 1890s and were not surprisingly christened The New Row; they were later to be renamed The Crescent.

In 1874, John Breedon Everard, a civil engineer, architect and outstanding man in his profession became a partner in Ellis & Everard and began work on

a new stone-breaking mill at Bardon Hill. The Mill House was constructed close to the quarry workings between 1874-8, and when complete, represented a structure of great architectural interest as well as commercial value (Fig. 8). Breedon Everard died in 1882 and his share of the company was passed to his two elder sons. His eldest son, William Thomas Everard, devoted himself to the quarrying business and became a Managing Partner, retaining his share of the company until his death. He rented Bardon Hall, the Park, the Keeper's Cottage and various other cottages from the Beaumanor Estate for £4-10s a week (Noble, 1995). His brother, John Breedon Everard, built an experimental wire rope tramway between Markfield Quarry and Bardon Hill railway station, but as public opposition to the project was great the tramway was left to fall in to disuse (Fenn, 2003).

By 1890, 'granite' from Charnwood Forest had become the main source of aggregate for the Midlands and the South. Bardon Hill Quarries were then amongst the most modern in the country, producing 175,000 tonnes of stone per year, with a work force of between 600 and 700 men. Shortly after the turn of the century the area quarried at Bardon Hill extended to well over 40 ha; so within 50 years the quarry had increased in size ten-fold. In an understandably optimistic mood, John Breedon Everard doubled the size of the stone-breaking mill in 1902 to 'monumental proportions', creating an industrial building that was deemed to be 'large and spectacular' and providing room for four more crushing units. The beautiful old Mill House has fortunately survived to this day, but in a rather more dilapidated state.

In 1913, the Ellis & Everard partnership decided *not to produce Paving Sets at Bardon Hill, but devote the whole of our production to Macadam, and we believe the enormous demand for Granite from this quarry is partly attributable to the fact of our not manufacturing the best of the material into Setts, and using the residue for Macadam.* This was proclaimed



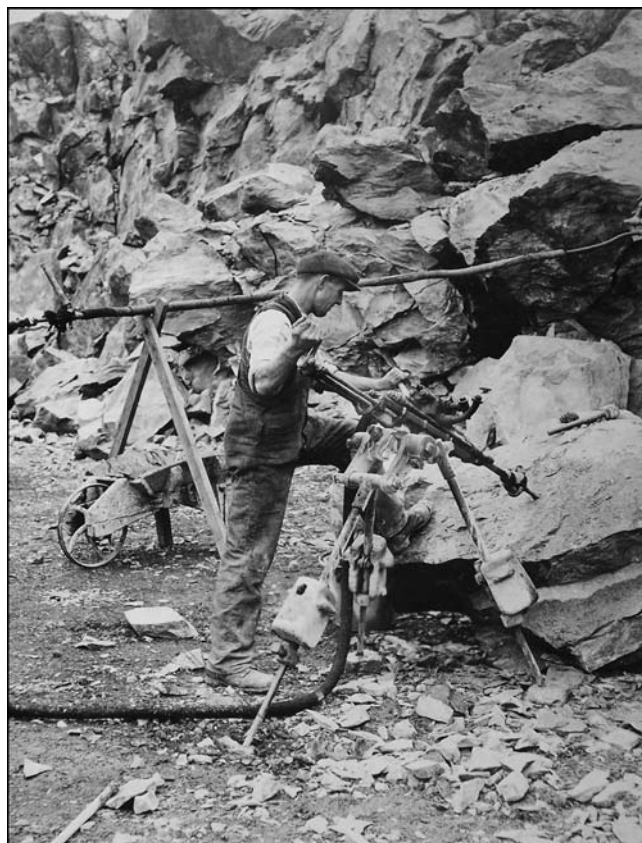
**Figure 8.** *The Mill House, Bardon Hill Quarry, c 1910. (Photo: J. Burton & Sons, Aggregate Industries Archive)*

in a new illustrated company brochure, printed in 1913 in which the company boasted that they *supply most of the well-known contractors in the Midlands, London and elsewhere*. At this time the company employed nearly 350 men at the quarry, but the onset of the First World War reduced this workforce by 60-70% (Noble, 1995). Demand for stone was still great, but output was seriously reduced and this resulted in the closure of large parts of the plant. After the War, the depression years of the 1920s and 30s led to a considerable reduction in the demand for stone. Perhaps as a result of such lean times, the business was converted into a Private Limited Company in 1930 under the title of Bardon Hill Quarries (Ellis & Everard) Ltd. The advent of the Second World War further affected operations at the quarry and after the War, the Herrick family decided to sell the Bardon Estate *with the exception of Bardon Village and the money making quarry* (Noble, 1995). Over 400 acres were offered for sale, of which 350 ha were contained within Bardon Park. However, the sale was not successful and most of the farms were sold to local farmers for a few thousand pounds each.

A turning point in the history of the quarry was in 1948, when Bernard Everard reached an agreement with a Mr Leonard Tom, for control of the company to be shared, and both men became joint managing directors (Noble, 1995). Three generations of the Cornish Tom family then built upon the success of the Ellis & Everard Bardon Hill Quarries. The Tom family had plans to progressively improve the production of stone at the quarry and so quickly implemented a series of changes as demand for aggregate increased. This was not hampered by the fact that Bernard Everard retired in 1956 and Leonard Tom unfortunately died a few years later. Gregory Tom then succeeded his father in the business, became Chairman and Managing Director of the company and moved his family to Bardon Hill House. The company title was changed to Bardon Hill Quarries Limited. Major improvements were made in the operation of the quarry, including the installation of a Babbitless Crusher at a cost of



**Figure 9.** Ellis & Everard's steam lorries at Bardon Hill Quarry, c 1920. (Photo: Aggregate Industries Archive)



**Figure 10.** Steam drilling, Bardon Hill Quarry, c1920. (Photo: Aggregate Industries Archive)

£70,000, which was famous for crushing 400 tonnes of stone per hour and up to 4000 tonnes on a good day (Noble, 1995). This led to further technological improvements in operations at the quarry as well as an increase in staff numbers to cope with the increased output.

In 1975 the Herricks sold the quarry and the village of Bardon to the quarry company, thus ending a Herrick family connection with Bardon Park that had lasted for more than 110 years. However, they apparently left a dubious legacy, as during the Second World War the Herrick family sold a plot of land on the crown of Bardon Hill 'to the country', as a site for a radio pylon, which can still be seen from afar. The reason for this is clear - at 271 m above sea level, the summit of Bardon Hill is the highest point in the county, and is, as Sir Robert Martin alleged, 'only 88 feet short of a mountain.'

The increased demand for aggregate in the late 1950s had necessitated a rapid expansion of the original Bardon Hill Quarry and a larger investment of capital; this is reflected in the fact that by 1975 a large area of the northwestern slopes of Bardon Hill had been quarried away. As a result, by 1978 the private company set up by Leonard Tom had gone public (Noble, 1995). However, the initial building boom did not last when the following rapid recession deeply affected primary producers and the company was



slimmed down. The company was eventually put up for sale and merged with the Evered Group in 1991, an organisation with similar quarrying interests to the Bardon Group. The new Evered Bardon plc was formed, headed by Sir Peter Parker and the Chief Executive was Peter W. G. Tom. Bardon Hill Quarries Ltd then became known as Bardon Roadstone Ltd. The old company founded by the Ellis & Everard partnership, built up with so much effort and determination by the Tom family, had now become a component in a much larger organisation operating not only in Britain, but in Europe and the USA as well.

Despite the severe recession, output from the quarry had increased in 1993 by 50%, new sales had been found and the plant was running at capacity. The extraction of rock began in a new area to the north of Bardon Hill, and the Old Rookery Quarry (to the east) was refilled with the overburden stripped off. This went some way towards reinstating and reforming the original shape of Bardon Hill that had been previously quarried away. Test drillings were made and rock was found to extend below the village. By the end of 1993 the new area to be quarried stretched almost to the drive of Bardon Hall. Planning consent was given to extract more rock, which heralded the death knell for the old village of Bardon. The whole of the village, Robin Bott's Hill Farm and the Keeper's Cottage were sadly demolished to make way for the extended quarry. The remaining inhabitants of Bardon village were relocated to newly built bungalows and houses sited between the quarry and Coalville.



**Figure 11.** The primary crusher at Bardon Hill Quarry, date unknown. (Photo: Aggregate Industries Archive)

In May 1997 the Bardon Group merged with CAMAS plc to form Aggregate Industries plc. Peter Tom continued as the Group Chief Executive of the newly created Aggregate Industries plc, continuing the Tom family connection with Bardon quarry to this very day (Noble, 1995). Aggregate Industries UK Ltd now run businesses throughout Britain and Norway and are the fourth largest aggregate and the second largest asphalt producer in the UK. Bardon Aggregates have more than 90 aggregate operations across Britain, comprising crushed rock, sand and gravel and secondary aggregate quarries. Bardon Hill Quarry currently produces three million tonnes of crushed aggregate, half a million tonnes of asphalt and 200,000 tonnes of pre-cast concrete per year, as well as materials created for pitching and rip-rap for coastal and sea defences. The largest output of surface dressing chippings in the country comes from Bardon Hill (J. Campbell, *pers. com.*). The area south of the summit of Bardon Hill is now classified as a Site of Special Scientific Interest, on account of its remnant ancient woodland, heathland and lichen-rich rock outcrops. These important habitats support 247 different species of spider including the famous and rare Charnwood Spider *Mastigusa macrophthalma*.

## Mountsorrel Quarry

Stone has been worked from the Buddon Wood area of Mountsorrel since at least the Early Iron Age, in 800–500BC (Anon, 2003). Activities were evidently concentrated in the Castle Hill area of Mountsorrel, to the east of the present day operations at Buddon Wood; traces of both Roman and Norman excavations were found here, and it was established that a Norman Castle (destroyed in 1217) once crowned the hilltop. Several important Roman discoveries were made during the process of excavating Broad Hill Quarry at Mountsorrel. They included a Late Neolithic or Early Bronze Age (2000-1400BC) incense cup in 1859, a Roman sepulchral chamber discovered at Broad Hill in 1881, and in 1892 a Roman well that had been sunk 18 m into a natural rock fissure (Anon, 2003). Several pottery objects, bones and two remarkably well preserved wooden buckets, one of which had an ornate handle and bronze bindings were found at the bottom of the well. It is thought that the objects came from a Roman villa situated on Broad Hill during the 4th century AD; they represent a rare example of the Iron Age Romano-British artistic style in the Midlands. It is also thought that some of the pinker granites within the Roman Jewry Wall at Leicester may have come from the Mountsorrel area (Anon, 2003).

Mountsorrel granite, strictly speaking an inequigranular granodiorite of Ordovician age, has long been utilised in the Charnwood area as a building stone, in the walls of older buildings and for war memorials. In the 1800s several local churches and houses were built or repaired using large blocks of the characteristic dark red Mountsorrel granodiorite (Lott,

2001). However, its main use was for paving setts and kerbstones for roads and the construction industry. Rumour has it that Mountsorrel granite was used to pave part of the forecourt of Buckingham Palace; however, this claim to fame can no longer be verified as the area was covered with tarmac some time ago.

The quarrying industry had a huge influence on the economy of Mountsorrel and its immediate hinterland, and for a long time was the single largest employer in the area. The quarry represented the life-blood of the village, but it also had devastating effects on the environment of the adjacent village. Apparently Mountsorrel was colloquially known as 'Mount Sterile' due to the large amounts of quarry dust that periodically covered the village. The quarrymen grew large bushy moustaches in order to prevent dust from entering their mouths, and apparently became heavy drinkers, so they could cope with the dry, dusty environment in which they worked. In fact, such concern was felt at the amount of excessive drinking, that in 1852 the Red Lion public house was converted to a more genteel coffee house, much to the chagrin of the local quarrymen!

The origins of systematic quarrying at Mountsorrel can be traced back to the mid-18th Century. In 1758 a local landowner, Sir John Danvers, owned the local mineral rights (Anon, 2003) and was anxious to encourage the use of the famous 'Mountsorrel Stone'. He therefore offered £200 over a few years to the then Turnpikes Trust to lay a 5-m wide granite causeway through Mountsorrel. This proved a success, and resulted in a second causeway being laid in Leicester in 1774, thus providing regular employment for several quarrymen from the village. Broken granite macadam from the quarries at Mountsorrel was used on the turnpike roads between Market Harborough and Loughborough in 1781, and in 1792 a wharf was built on the Leicester Navigation (canal) at Mountsorrel to handle the increased traffic in local granite.

The Earl of Lanesborough succeeded to the Danvers Estate and in 1803 subsequently leased the Main Mountsorrel or Broad Hill Quarry (G on Fig. 4) to a Mr Jackson, who was then a local landowner. Mr Jackson is said to have taken inspiration from watching Scottish quarrymen at work squaring Aberdeen granite at Chatham in 1812. He thus introduced a skilled workman (or workmen) from Scotland to teach the Mountsorrel quarrymen how to more accurately fashion the setts to a good shape and size. Soon he was employing 50 to 100 men and delivering paving stones to many parts of the country at a price of £1-5-0d to £1-7-0d a tonne, including transport. This compared with the price of Mountsorrel chippings, which in 1821 was 2/8d (14p) per tonne, with a delivered price by canal, at Paddington wharf, of 15/8d. In 1826, Mr Jackson also introduced skilled masons from Scotland to produce granite dressed to a suitable standard for use in churches and other buildings; however, this venture does not appear to have been successful.

In 1821 the Earl of Lanesborough, besides leasing quarries on his estate, also opened his own quarry on the eastern fringe of Buddon Wood (the quarry later became known as the Ashpit Quarry). It is said that in 1844 Mr. W. John Martin, a member of the local landed gentry, was riding past this quarry when he noticed a group of despondent quarrymen at the side of the road. They told him that they had not been paid for several weeks, as no work was available to them. Mr Martin sought out the Earl, and requested that he and his father William be allowed to take over the operation of the quarry. This was arranged, and thus began the Martin family association with quarrying in the Mountsorrel area, that lasted until they sold out to the Redland Group in 1960.

The business thrived, and in 1848, John Martin took over the whole mineral lease including operations at the Main Mountsorrel/Broad Hill Quarry, Hawcliffe Hill and Cocklow Wood (H on Fig. 4); by 1849 the labour force had expanded to 200 men and boys. In 1850, John Martin's father William died, leaving his shares in the business to his eldest son Rev. Robert Martin and, maybe as a result of this, in 1854 the Mountsorrel Granite Company was formed. The newly formed company adopted as its trademark the windmill that stood on Broad Hill, where the main quarry had begun. During the same year the Mountsorrel Railway Act gave consent for a branch line to link the quarry to the existing Midland Railway at Barrow-upon-Soar. The line was completed by 1860, and in that same year a spectacular bridge was constructed to carry rail traffic from the quarry over the canal and River Soar direct to the main line (Fig. 13). It was said to be the finest and largest single span brick-built bridge in



**Figure 12.** The crushing mills, known as the High Level at Mountsorrel Quarry, with curious workforce looking on, c1880. The barrels are filled with crushed granite, ready for distribution. (Photo: Lafarge Aggregates)

### The quarrying process at Mountsorrel in 1870

Topsoil and overburden were removed first, and then steel drills were driven into the rock face using heavy hammers. The men carrying out this work were often only suspended in front of the rock face by ropes. A gunpowder charge was then inserted into the drill hole and ignited with a slow fuse, as dynamite was not thought suitable at the time. Blasting was usually timed to coincide with meal breaks, to minimise casualties and prevent injuries to the workforce. After blasting, large masses of stone were broken down on the quarry floor, where they had fallen.

Next came the 'Blockers', a group of skilled men who further split the stone into smaller blocks or strips. The stone was then carried in tubs to the sheds or shelters, located within the quarry, where the sett-makers and kerb-dressers worked. The sett-makers or 'squarers' then worked the stone into cubes of the correct size, and their 'boys' (usually members of their own family) smoothed the surfaces of the setts with small hammers. The kerb-dressers or masons were fewer in number, and required great skill to create the longer, and often curved, kerbstones. Waste left over from making setts and kerbs were arduously broken down by hand into stone chippings. The workmen were expected to contribute towards the cost of repair or replacement of their tools, an allowance being made for their contributions when each stage of the quarrying process was worked out.

*Berger, Mountsorrel Quarry Archive*

England at the time, and it is still in use today. The Mountsorrel Railway has long since been discontinued, its trackway now utilised by conveyor belts that carry the crushed aggregate to the rail-head.

The Company acquired their own rolling stock and throughout the railway era the engines were named after members of the Martin family – mainly the children and female members of the family ('Elizabeth' still survives today in the Rutland Railway Museum at Cottesmore). In 1870 the Main Quarry expanded further into Broad Hill; at this time around 500-600 men and boys were employed by the quarry (Anon, 2003). It is ironic that the famous windmill, the trademark of the company, finally succumbed to the quarrying process in 1874, having stood on that site for more than 100 years.

In 1876 the Mountsorrel Granite Company was incorporated as a limited company, the first quarrying organisation in Leicestershire to take this step (Berger, Mountsorrel Quarry Archive). William John Martin was the proprietor of the company, with £20,000 shares, and Robert Frewen Martin had shares worth £12,000; the rest of the shareholders were members of the Martin family, usually with one share each. In 1877 the Company built cottages, a hospital, and a new school for the workmen and their families. In 1894 another branch line was constructed, linking the quarry to the Great Central Railway at Swithland. Nunckley Hill Quarry (J on Fig. 4) was on the proposed route, so it was subsequently leased from Lord Lanesborough for £86 (plus £29 legal fees).

A major innovation occurred in 1897-8, when electricity was installed in the quarry at a cost of £800. Although costly, this enabled longer hours to be worked in the winter months. In 1899 the quarry employed 600 men and about 30 boys, the men earning, on average, around 30 shillings a week. The boys served a three-year apprenticeship making granite setts, with pay rising from 1s (5p) to 3s per week over three years. Day men worked 10 hours for 4d (2p) per hour, and received no pay for 'wet time'. Archive records show that by the turn of the century, 200,000 tonnes of stone were extracted from the quarry, of which 20,000 tonnes were made into setts, 10,000 tonnes into kerbs and channels, and the remainder was broken into chippings for road construction. At this time the quarry had installed a crushing mill and used steam-generated drilling rigs.

On the outbreak of World War I in 1914, all the directors of the quarry as well as many of the quarrymen joined the army. William Martin was killed in action at Ypres in 1915, but the other directors fortunately survived the conflict. With so many men absent and so little road-building taking place, production in the quarries fell from 14,000 tonnes in 1914, to 7600 tonnes in 1915. Before the onset of war, Northern Quarries Limited had leased a site at Mountsorrel near to the Hawcliffe Hill Quarry, and had set up a tar coating plant. This unfortunately closed in 1917, as production fell due to the effects of war;

*Figure 13. The bridge at Mountsorrel, c 1870, with a locomotive on it. Right of the bridge are the loading chutes, with side-tip wagons on top feeding aggregate to barges on the canal. (Photo: Lafarge Aggregates)*



however the production of coated granite began again in 1919 under the name of the Mountsorrel Tarred Macadam Company.

During 1918, the company was approached by the Ellis Company of Barrow ‘regarding a possible transfusion of the two companies’ and the amalgamation took place on January 1st 1920. The workforce then grew from 600 to 900, producing 1500 tonnes per day in 1920. In comparison, workers numbered only 100 in 1984, but due to massive technical improvements, they were able to produce 9000 tonnes per day (Anon, 2003). Mountsorrel Quarry closed for the first time for a whole week at the beginning of August 1931, as 70 men had applied for a week’s holiday. Perhaps as a result of this, in August 1939 all quarry employees were granted a one-week holiday with pay.

In 1936 the production of granite setts for paving was phased out in favour of crushed stone, and in 1940 kerb dressing was also abandoned due to a shortage of craftsmen. Thereafter, the only materials produced were crushed stone of various sizes for road materials, concrete aggregate, filter media and railway ballast. Operations simultaneously became more mechanised, as in 1938 the company installed a Ransome Rapier shovel and primary jaw crusher as well as a new conveyor belt system. As a result, the Second World War affected quarry operations less dramatically than WW1, as the modernisations meant that a much smaller workforce could now produce the same amount of broken stone. This was fortuitous, as the building of new aerodromes and runways led to an increased demand for stone and gravel. Hawcliffe Hill Quarry was closed early in the war, and in 1944 was utilised as a reservoir for the new washing plant. The military used Cocklow Wood Quarry for target practice during the war.



**Figure 14.** *The Baron and wagons loaded with granite, Mill Yard, Mountsorrel Quarry, c1900. Note the engine shed in the background(Photo: Lafarge Aggregates)*

In 1966 the quarry was taken over by Redland Perle (later known as Redland Roadstone, then Redland Aggregates plc) and in 1967 extraction ceased at the Broad Hill Quarry, which eventually became a landfill site. The plant was then fed by rock from the Cocklow Wood Quarry, adjacent to the Buddon Wood site (I on Fig. 4). Redland Roadstone then decided in 1971 to concentrate their Leicestershire production in the Mountsorrel area, while simultaneously running down production at the Enderby and Bradgate Quarries. A new reserve was located in the western section of the Mountsorrel Quarry complex, around the Buddon Wood area, where earlier test borings had shown ‘good stone of a true Mountsorrel colour’. The Buddon Wood site formed part of a lease from the Lanesborough Estates, which expires in 2034. Site clearance work began in late 1971, and the primary crusher was installed by 1973. The official opening ceremony of Buddon Wood Quarry was performed on 24th September 1974.



**Figure 15.** *Aerial view looking southwest over the active Buddon Wood Quarry, Mountsorrel, in May 2005. Swithland Reservoir can just be seen at the top of the picture. (Photo: Lafarge Aggregates)*

The quarry today is operated by Lafarge UK plc, part of Lafarge Aggregates, the world leader in construction materials, who acquired the quarry from Redland plc in 1997 (Wix & Keil, 2002). The planning consent passed in 1992 allows for a larger area of operation and the area currently in use now approaches one kilometre across, with a total area of 55 ha and a quarry floor that is currently 94 m below sea level. Mountsorrel is now the largest granite quarry in Europe and is capable of producing 10 million tonnes of rock per annum from reserves of 180 million tonnes. The environmental impacts of the site are carefully managed, and the operations are hardly visible to the local communities. The effects of Mountsorrel's most famous and important industry are no longer as devastating as they once were - Mountsorrel can no longer be called 'Mount Sterile.'

### Cliffe Hill Quarry

Jones and Fitzmaurice, two businessmen from Birmingham, formed a partnership in the late 1870s to work the stone at Cliffe Hill for the small-scale production of setts and kerbs. However, the quarry closed after a few years and remained so for a decade, until Mr J. Rupert Fitzmaurice acquired the quarry from his father on 9th May 1891 (Billington, 1974). He needed a manager, so he wrote to Mr Peter Preston, who then worked at the quarry in Enderby, to offer him the position. Mr Fitzmaurice apparently interviewed Mr Preston at the quarry site, whilst both men sat on small heaps of stone. Mr Preston accepted the position and a wage of £3 per week – good going by standards of the day! Mr Preston began work straight away, bringing a millwright and a blacksmith with him from Enderby and installing a crusher. A second crusher was soon added and a licence to store and use explosives was obtained on 15th July 1891. The first load of stone produced was sold to a local farmer at a price of 2/6d per tonne (Billington, 1974).

Rock drilling in those days was carried out by steam driven drills with secondary drilling completed by hand. Steam was provided to the drills from the old traction engine that was engaged to transport the drilling equipment from one face to another. Hand drilling was a dangerous and laborious job – a boy would hold a short drill with both hands while a quarryman would hit the drill with a sledgehammer. The boy would turn the drill slightly, and the man would hit it again. This procedure would be repeated until the stone could be split with plugs of steel. The working day at that time was 10 hours and on a Saturday 5 hours. Most jobs were put on a piecework basis, but where this could not be done rates of pay varied between 4d (2p) per hour for Labourers, to 5d per hour for skilled men (Billington, 1974).

In 1894 the company secured its first big railway contract, for 5000 tonnes of stone, and on 1st November 1894 the Cliffe Hill Granite Company Ltd was formed. The aptly named Sir J. Benjamin Stone was elected the first director of the Company. As the demand for products increased, the decision was made in 1896 to install a narrow gauge light railway, connecting the quarry to the London Midland and Scottish Railway line between Leicester and Coalville. The railway was named the Cliffe Hill Mineral Railway, and in 1896 the first locomotive to be bought from W.G. Bagnall of Stafford was imaginatively christened Cliffe (Billington, 1974). Isabel and Rocket joined Cliffe over the next few years, and served to haul stone to the crushers and to the sidings at Beveridge Lane, near Bardon Hill station. Isabel is now preserved at the Amerton Railway in Staffordshire, and Cliffe was apparently sold to Bardon Hill Quarry in 1946, but was scrapped in 1953. The light railway continued to be used until 1947-8, when five Mack lorries were purchased and adapted for use in the quarry. Traces of the railway embankment can still be identified at Stanton under Bardon and on Billa Barra Lane close to Billa Barra Local Nature Reserve.



**Figure 16.** Mr Preston and family, 1899, manager of Old Cliffe Hill Quarry.



**Figure 17.** Drilling competition at Old Cliffe Hill Quarry. (Photos: MQP)

In the early days of quarrying at Cliffe Hill, the Company only crushed the good quality grey stone, preferring to discard the poorer quality brown stone to keep up the high standards and preserve quality. This obviously produced much waste material, so in 1912, the Company decided to set up a secondary business, the Rockside Company to crush and sell the waste brown stone. The dust and rotten stone generated from the plant, known as gingerbread, apparently became popular for covering tennis courts and drives. The 'granite' resource at Cliffe Hill, known locally as Markfieldite, is a distinctive variety of granophyric diorite intrusion, Precambrian in age, which is now termed the South Charnwood Diorite. The quarry serves as a type locality for the diorites, which are the youngest Precambrian intrusive rocks in Charnwood Forest (Carney *et al.*, 2000). It had a good reputation as a hard-wearing stone, and Cliffe Hill Quarry provided cities in the Midlands and London with kerbs well into the 1950s.

The Fitzmaurice and Preston families jointly managed the Cliffe Hill Granite Company for 72 years, until Tarmac Quarry Products Ltd acquired the company in 1965. Midland Quarry Products (MQP) was formed in December 1996, as a joint venture between the parent companies Hanson and Tarmac. The company now operates three quarries, one rail ballast depot and seven asphalt plants in the East and West Midlands, including the award winning Cliffe Hill Quarry, the largest quarrying and asphalt operation within Midland Quarry Products.

Cliffe Hill actually consists of two quarries – New Cliffe Hill (K on Fig. 4) opened in the late 1980s and the original Old Cliffe Hill Quarry (L on Fig. 4)

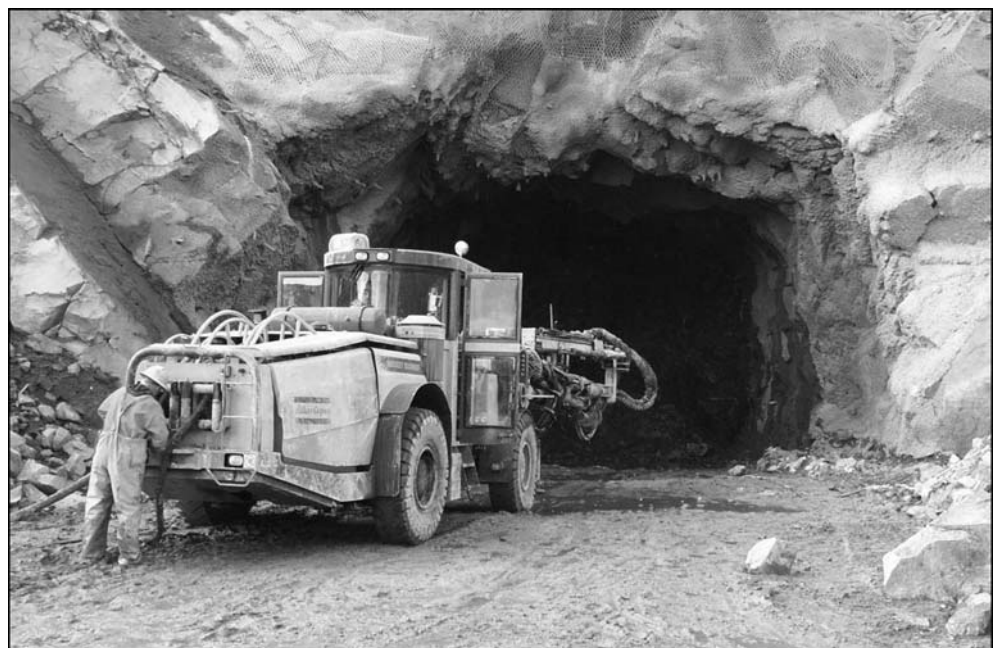
(McGrath, 2004b). New Cliffe Hill currently houses a railway line and two plants with a production level of 600,000 tonnes of asphalt materials per annum. The quarry produced 4.5 million tonnes of crushed 'granite' aggregate per year, up until 2006. This was mainly for the rail, construction and road building industry in the Midlands, Southeast England and East Anglia. The Old Cliffe Hill Quarry was brought back into production following the construction of a tunnel connecting it with the processing plant at New Cliffe Hill Quarry; the new tunnel; 9 m wide, 6 m high and 725 m long, was opened in September 2003 (Fig. 19). It was aptly christened the Joskin Tunnel as a result of a naming competition held in the nearby village of Stanton under Bardon. This local name is taken from the Joskins Cottages that were once located on the original quarry site, at the northern end of the village.

### Groby and Bradgate Quarries

It is thought that quarrying has taken place at Groby since Roman times, as Groby 'granite' can be found incorporated into the remains of some Roman buildings in Leicester, Ratae Corieltavorum. Apparently the Romans found the Groby stone difficult to work, but due to its impermeable qualities they found a use for it as rubble masonry. However, the location of the Roman quarries in Groby still remains a cause of much speculation. The 'granite' at Groby is actually a continuation of the Precambrian granophyric diorite intrusion quarried at Cliffe Hill and Markfield (Hill Hole Quarry), although the granite at Groby has a more purple and green mottled texture (Lott, 2001). Due to its distinctive colouration and appearance, the



**Figure 18.** Sales by Miss Cliffe, date unknown. (Photo: MQP)



**Figure 19.** Entrance to the Joskin Tunnel connecting the Old and New Cliffe Hill Quarries, that enables the company to work the remaining reserves at Old Cliffe Hill, and return them for processing at the New Cliffe Hill plant. (Photo: MQP)



**Figure 20.** Driller at Old Cliffe Hill Quarry. Date unknown. (Photo: MQP)

rock has been used locally as a building stone in the walls of the parish church and older cottages in and around Groby (Lott, 2001; Ramsey, 1982).

Local records indicate that the Fifth Earl of Stamford and Warrington initiated quarrying at Groby in the early 1800s. In 1807, the Earl received from a Mr Wyatt of Barton-under-Needwood a valuation of the Swithland and 'Grooby' slate quarries, which at that time were leased to a Mr Hind (Ramsey, 1982). In 1832, the Earl engaged Robert Stephenson to engineer a railway from the Old Groby Quarry (now an industrial unit, located between the present day Newtown Linford Road and the village; M on Fig. 4), to the Leicester and Swannington Railway. On the opening day, 24 wagons of Groby 'granite' were collected by Robert Stephenson's famous steam locomotive Comet, and transported to the West Bridge in Leicester, for further distribution (Ramsey, 1982). At least ten other locomotives are known to have worked on the line over the years, including a Robert Stephenson 0-4-0 tender locomotive dating from 1833 and a 0-4-0 vertical boiler tank locomotive jokingly known as the Groby Coffee Pot (Farmer, 1968).

The Earl continued to produce stone from the Old Quarry through his manager, John Martin, until 1843 when the quarry was leased. The lessee apparently preferred to take the stone to Glenfield by road rather than use the Groby railway line, which subsequently fell into disuse (Ramsey, 1982). The Groby Granite Company then acquired a lease to work the quarry from the Earl in August 1865, and royalties were duly

paid on the stone extracted. The Company re-opened the Groby railway in 1870 and added a further section to link the Old Quarry with the newly opened Castle Hill Quarry (located north of the Newtown Linford Road); the Bunney Hill Quarry (N on Fig. 4) was also connected shortly afterwards (Ramsey, 1982). The existing quarry at Groby, known as the Sheet Hedges Wood Quarry (O on Fig. 4), was linked to the railway shortly after it opened in the 1890s. As early as the 1880s, Groby Granite was sent as far afield as London, and granite from the Sheet Hedges Wood Quarry was reputedly used in the original paving stones of Trafalgar Square. At this time the Groby Granite Company was by far the largest employer in the village, having 546 workers on their payroll in 1902, 16 of which came from Markfield (Lockley, 2001)

The Dowry Quarry, which subsequently became a rifle range, was also linked by rail between 1907 and 1916. White Gate, Black Spinney and Barn Hills Quarry (R on Fig. 4) on the northwestern edge of the Company's extractive operations were never connected or extensively quarried, due to the poor quality of stone produced. The Bluebell Quarry (named after the carpet of bluebells that surrounded it in spring; P on Fig. 4) commenced operations shortly after the end of World War I; this quarry lies to the west of the main site today. However, the quarry closed shortly afterwards as the stone quality was deemed to be too low; it was imaginatively named the Chocolate Factory after the brown colour of the stone extracted (Ramsey, 1982).

Years ago, Groby was known as Granite Village, and the Groby quarrymen were said to have been physically as hard as stone. A reporter from the old Leicester Advertiser had conversations with several old quarrymen in 1963, who talked of the days when 500 men from nearby villages were employed in the Groby quarries, starting work at 6.00am and finishing at 5.30pm. Many worked to the ripe old age of 70 and above – remarkable considering that in those days the men had to use a 12-kg hammer to break the rock. For their services the men were typically paid 1/3d (6.25p) per tonne of rock produced, and 12 tonnes a day was considered a good day's work. If the weather was bad, and the men could not work, they received no pay (Anon., 1990).

The Old Groby Quarry has now been partially restored as a recreation ground to the south of Markfield Road, but parts of the original quarry site, engine shed and wharf can still be distinguished in the industrial unit area on Fir Tree Lane. The Castle Hill Quarry has since been infilled so that it currently functions as an extensive allotment area, and the Bunney Hill Quarry site was filled with overburden. The Sheet Hedges Wood site at Groby is the newest acquisition by Midland Quarry Products Ltd, but quarrying at this site is currently suspended (2007) as Groby now obtains its aggregates from the nearby Cliffe Hill Quarry. Groby Asphalt Plant was built on the site in February 2002, and replaces an older plant



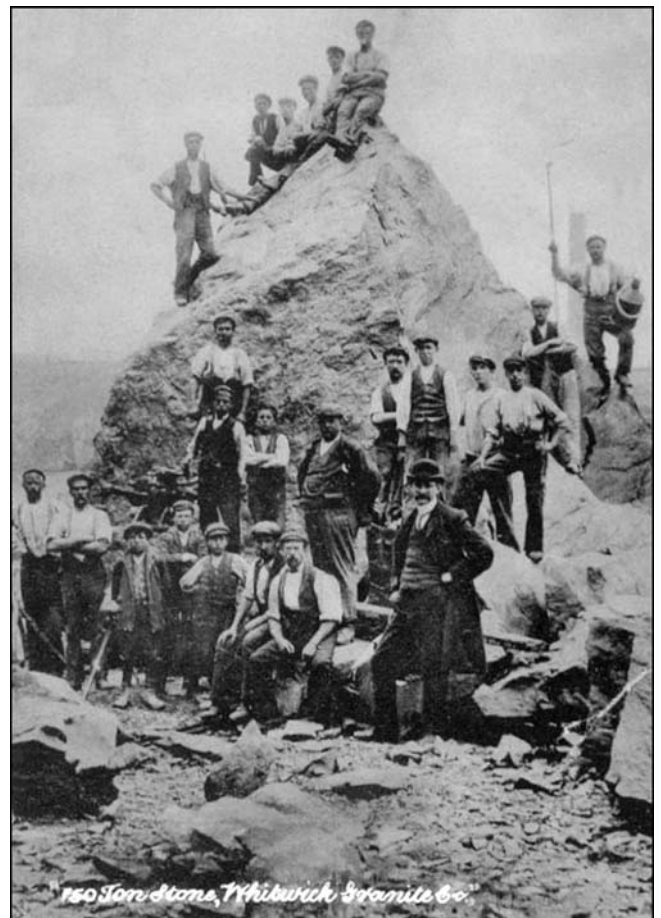
**Figure 21.** Aerial view looking northwest over the current Groby Quarry (foreground) and the old Bluebell Quarry (top of the photo), towards Sheet Hedges Wood, an ancient woodland. (Photo: MQP)

that operated there for over thirty years. The Groby Slate Works (opened in 1833) at Alder Spinney, and the Groby Old Slate Quarry close to Bradgate Home Farm once worked the Swithland Formation for roofing slates and headstones. The quarries closed in 1887 when Welsh slates took over the industry.

The Bradgate Quarries (Q on Fig. 4), opened in 1919, consist of three separate quarries located northwest of the Groby Quarries. In 1971 Redland Roadstone decided to concentrate their Leicestershire production at Mountsorrel, whilst running down activities at Bradgate and Enderby Quarries. It was thought that Bradgate Quarry was difficult to expand, as the rock occurred only within three ridges, and large quantities of overburden had to be removed to maintain the workings. The quarries are therefore currently closed: Redland Aggregates did apply to re-open the quarries, but the planning consent was refused. The central quarry went to landfill some time ago; it will be landscaped back to grassland and woodland on completion.

### Whitwick and Forest Rock Quarry

The Whitwick Granite Company bought the site of Whitwick Quarry (T on Fig. 4) from a Mr E. Cooper in 1893, for the princely sum of £3500 for 42 ha (K. Bird, *pers. com.*) – which was rather cheap, even for the time, at £33.65 per acre! The original quarry was called Peldar Tor Quarry; which then consisted of two much smaller sites, the first of which was located in the southwestern corner of the current Whitwick Quarry. The second site was located about 500 m west of the



**Figure 22.** The famous '150 ton Stone', the largest single block excavated in any known quarry at that time, in 1911. (From a postcard held by Whitwick Historical Group)



first quarry, at Houghton Hill, close to Vicarage Forest Farm; this quarry latterly became known as the Forest Rock Quarry (U on Fig. 4). In 1899 the Company bought land to develop a mineral railway, which ran from Coalville East Station (just north of the Coalville junction) to the south side of the quarry; before this, stone was transported by horse and cart. The Whitwick Granite Company operated the quarries until 1938, when they were taken over by Messrs. Thomas Roberts (Westminster) Ltd., later to be known as Roads Reconstruction Ltd. After several more takeovers and mergers, the quarry was owned by the Amey Roadstone Corporation Ltd (Smith, 1984).

In the early 1960s, the M1 motorway was being developed, and Forest Rock Quarry still had substantial reserves left. The quarry companies that operated in the area at the time were apparently extremely worried that the Forest Rock Quarry would be developed to provide the aggregate for the new motorway. As a result, they decided to club together to form a new company, the inevitably named Forest Rock Granite Company, in order to buy the quarry and keep it off the market, so that they could jointly supply the aggregate (K. Bird, *pers. com.*).

The line of quarrying moved progressively northwards and eastwards, towards Ratchet Hill, such that by the 1980s, Whitwick Quarry was almost two-thirds of its present size. The overburden was very deep in the far northwestern section of the quarry, and this needed to be stripped off and removed. Disposal of such large amounts of waste posed a problem for the company, until they remembered the conveniently located Forest Rock Quarry nearby. ARC subsequently bought out the interests of Forest Rock, to dispose of the overburden removed from Whitwick Quarry. In 1984 the first phase of overburden removal at Whitwick partially filled the Old Forest Rock Quarry, and in 1991/2 the second phase completely filled the quarry and land to the west of it.



**Figure 23.** Stone is transported by horse and cart from the Bottom Quarry Whitwick, c1920. (Photo: Whitwick Historical Group).



**Figure 24.** Mr J.H. Robinson and family, Manager at Whitwick Quarry from 1897 to the 1950, pictured c1935. Mr Robinson was an important figure in the area, and was colloquially known as 'Mr Whitwick'. (Photo: Whitwick Historical Group)

There is a happy ending to the sad demise of Forest Rock Quarry. Originally, the infilled quarry was restored to hillside pastureland, but in 1995, the creation of the National Forest Company enabled Hanson Aggregates to further improve and restore the old quarry site. Hanson submitted a successful bid to the National Forest Company in 1995, and the land was planted with more than 20,000 native trees and shrubs over the following two years. The newly planted woodland has now transformed this site, blending sympathetically with nearby mature woodland and creating valuable new wildlife habitats in the area, including meadow grasslands and a spring fed pond. Public access to the site is actively encouraged, with the construction of more than a kilometre of new footpaths that link into the wider local network. The footpaths converge on a high



**Figure 25.** New Years Day 1915, at Whitwick Quarry, with seasonal greeting written on the front of the steam engine. Origins of this photograph are unknown, but it is thought that it could be either soldiers requisitioning a steam lorry from Whitwick Quarry, or former quarrymen visiting the quarry on leave. (Photo: Whitwick Historical Group)

plateau 200 m above sea level, on the summit of which is built a stone circle with an enormous 10-tonne rock as a central feature. Excellent panoramic views to the south and west can be enjoyed from the summit. The aptly named Forest Rock Quarry has now been transformed into a new National Forest site.

During the early 1900s the residents of Whitwick enjoyed many days out, walks and picnics at a local beauty spot known as Bilberry Common, a rolling section of heathland between Spring Hill, Ratchet Hill and Mount St. Bernard's Abbey; the day was not complete without a visit to the Spring Hill Farm Tea Room. Sadly, the Bilberry Common and Spring Hill Farm were quarried away as the site was enlarged, but the good times stay alive in the childhood memories of the local people of Whitwick. The original Peldar Tor and Whitwick Quarries are now closed, but substantial reserves still exist in the northwestern part of the site (Carney, 2005). Whitwick Quarry is famously known as one of the Charnian volcanic centres (alongside Bardon Hill) and is the type locality for the Whitwick Volcanic Complex (Carney, 2000), consisting of the highly porphyritic Sharpley Porphyritic Dacite and the Grimley Andesite. It is one of the few places in Charnwood where the Peldar Dacite Breccia or 'peperite' (Carney, 2000; 2005) can be examined in detail. The quarry is now owned by Midland Quarry Products Ltd, which stopped working at Whitwick when the company was formed in December 1996, and operations were subsequently concentrated at Cliffe Hill Quarry. The company head office is now located on the Whitwick site, an Italian Marini asphalt coating plant operates on the opposite side of the road and the weighbridge is still in use today.

## Hill Hole or Markfield Quarry

Hill Hole Quarry (V on Fig. 4) is the type locality for the Precambrian granophyric diorite known locally as Markfieldite, much admired as a building stone for its colour and beauty. A stone implement made from Markfieldite (now known as the South Charnwood Diorite) was discovered at Ulverscroft in Charnwood Forest, indicating that this rock was appreciated as a durable and hard-wearing material several thousand years ago. Markfieldite has also been identified within the Jewry Wall in Leicester, which forms the back wall of a Roman bathhouse complex. Markfield Quarry is now situated on the site of what was previously known as Knoll Hill, one of four granite hills in the area that included Billa Barra Hill, Cliffe Hill and Bardon Hill. A windmill stood on the summit of the hill in 1743, and may have dated from the early 17th century; unfortunately the site of the windmill was quarried away in the 1870s.

Breedon Everard and Josh Ellis purchased the Markfield Granite Quarries in 1852, although the quarry was already active in 1830. Markfield stone was then described as ....*of fine quality and beautiful appearance, but being much harder than the granites*



**Figure 26.** Cliffe Hill Granite Company truck delivers mixed concrete. (Photo: MQP)

*of Scotland and Westmoreland, cannot compete with these stones for architectural purposes.* The stone quarried was therefore mainly used as highly marketable broken aggregate screenings or Macadam for road building; larger blocks were used for paving setts and kerbstones. At first, the stone was broken into pieces by hand, but when crushing machinery was installed at the Bardon Quarry, stone was transported there for processing until a small crusher was installed at Hill Hole in 1892.

Stone was initially transported from the quarry via horse-drawn carts to the new Ashby Road railway station at Bardon (later known as Bardon Station). However, this mode of transport proved to be both slow and expensive, so the son of Breedon Everard, John Breedon Everard, designed and constructed an overhead ropeway system to carry the granite quarried from Hill Hole to the railway sidings at Bardon. This followed what is now the line of the A50 all the way to Bardon, a distance of 5 km. It was built in the 1870s, and the quarrymen called it a *Blondin*, after the French high-wire artist famous for his jaunt across Niagara Falls. However, the *Blondin* was not a success, as public opposition to it was great, and even on a good day it could only manage to carry 50 kg of stone per bucket, so it soon fell into disuse.

In 1863, out of Markfield's 1391 inhabitants, Ellis & Everard employed around 90 at their newly opened granite quarry. The youngest quarry worker was Michael Russell, who was a mere nine years old in 1861. At about this time, the houses in New Row were built to accommodate the workers, located behind the present parish church. Quarrymen were mainly local to the area, but some travelled from much farther afield to work in the quarry; records show that workers came from Scotland, Wales and even America. Quarrying was a dangerous process, and at least six men died at Hill Hole during the latter half of the 19th century alone. Despite this, the quarry was proudly promoted by Ellis & Everard as being the supplier to ....*15 County Councils, 10 Cities, 22 Boroughs and 72 Urban and Rural District Councils.*

Quarrying of stone at Hill Hole had two major drawbacks. The operation depended on a steam crane that not only had to lower all tools and machinery into the quarry void, but also had to raise all the quarried stone to road level. In wet weather the quarry started to fill with water, and as a result the crane was required daily to scoop up the water from the floor of the quarry in a large flat bucket. Production at Hill Hole Quarry was therefore sporadic, until the quarry filled with water and was abandoned by the time of the First World War (Lockley, 2001). After that, the quarrymen found work at Cliffe Hill and Bardon Hill Quarry. Hill Hole Quarry then had a rather novel change of use when it was often used as a communal bath, before the village had a full running water supply. Men would cheerfully bring a towel and a bar of soap to have a quick dip in the flooded quarry. During the Second World War, two 'strategic observation posts' or wooden look-out towers were sited on Markfield Hill, for use by the Home Guard; one of these was set on fire to celebrate the end of the war.

Midland Quarry Products sold the quarry to the Tarmac Company, as an overburden tip for its new quarry at Stud Farm, but fortunately it was never used for that purpose. The Hinckley and Bosworth Borough Council subsequently bought Hill Hole Quarry, with grant aid from the National Forest Company. The site now supports a variety of unusual flora and fauna, including a protected species of rare white-clawed crayfish within the lake, the only species of freshwater crayfish native to Britain (McGrath, 2004b).

## Charnwood Granite Quarries

Charnwood Quarry near Shepshed actually consists of two individual quarries sited on either side of the M1 motorway, near to junction 23. To the east is Longcliffe Quarry (W on Fig. 4), and to the west is Newhurst Quarry (X on Fig. 4), which is more than 100 m deep. Both quarries are largely in the Precambrian North Charnwood Diorites, and older volcanoclastic sediments belonging to the Blackbrook Reservoir Formation of the Charnian Supergroup (Carney, 1994). The quarries date from around 1850, when a horse-worked railway was built to convey rock to the processing plant (Farmer, 1968). The Ellis & Everard partnership purchased the quarries from the Charnwood Granite Company in 1891, when partners in the enterprise were James Ellis, William Thomas Everard, John Breedon Everard and Charles Everard.

John Breedon Everard installed new machinery in the quarries and the stone was initially transported from the sidings by horse and cart. Later on, the stone was carried by rail, via a short branch line to the Charnwood Forest (Keil *et al.*, 1991) and London and North Western Railway at Shepshed Station. In 1913, the quarries produced various sizes of broken macadam, screenings and chippings 'with or without dust', washed chips, unbroken granite for breaking by hand and rubble for road formations. Steam operation

of the 2-foot-gauge railway was introduced at an unknown date into the quarries, and two locomotives were in use, a Brush and a Bagnall saddle tank; the latter was owned earlier by the Ministry of Munitions (Farmer, 1968), and was sent to Bardon Hill Quarry in May 1936, when control for the quarries passed from Ellis & Everard to the Amalgamated Roadstone Corporation (ARC). ARC continued to trade under the name of the Charnwood Granite Quarries, until Hanson Quarry Products Europe Ltd. acquired them in 1999. In 1960, around 65 men worked in the quarries, extracting about 600 tonnes a day (Keil *et al.*, 1991), but by 1992 this number had dropped to 50, who worked the quarries 24 hours a day (Wix & Keil, 2002). More recently only a handful of men were employed in the quarries.

Longcliffe Quarry, originally known as Longcliff Plantation, had major developments in 1984, to expand it to almost 90 ha (K. Bird, *pers. com.*), but by 1995 quarrying had ceased as it was no longer considered to be economical. At that time, Newhurst Quarry was



**Figure 27.** Aerial view of the Charnwood Quarries in 1969. The haul road and conveyor belt pass under the M1 motorway, transporting rock and aggregate between Newhurst (to the northwest) and Longcliffe Quarry (to the southeast). (Photo: Hanson Quarry Products)

dormant, but on the closure of Longcliffe the decision was made to re-open and expand it to almost twice its original width. Stone was then extracted from Newhurst Quarry and taken by 60-tonne dumper truck to Longcliffe Quarry, where the primary crusher reduced it down to 200-mm lumps (Wix & Keil, 2002). Aggregate was then returned to Newhurst via a conveyor belt that ran under the M1 to the secondary and tertiary crushers adjacent to the quarry (Fig. 27).

By 1997 production of crushed diorite and Precambrian volcaniclastic rock was around 1 million tonnes a year, but later a severe decline in the demand for roadstone reduced annual output to 400,000 tonnes (Wix & Keil, 2002). Reserves at Newhurst were recently estimated at around 2 million tonnes, which would take only four years to extract, and it is known that there are still small reserves remaining at Longcliffe Quarry. However, Newhurst Quarry also ceased to operate in April 2000, and is currently allocated in the Leicestershire Waste Local Plan as a potential landfill site.

### The Leicestershire slate industry

The Romans exploited the outcrops of Swithland Slate in Charnwood Forest during the period 100–400 A.D., and fashioned the slates into characteristic diamond shaped tiles for roofing purposes. Swithland Slates were used to roof important buildings in Roman Leicester, but they have also been found at another Roman site at East Bridgford, Nottinghamshire (then known as Margidunum). There is no further evidence for the use of Swithland Slate until the 1300's, when Borough Records show that it was then used to roof major buildings in Leicester. Swithland slates are referred to in the Mayor's accounts for 1305-6, and ten years later the Borough purchased slates at ...2s/2d (11p) per 100, carriage paid (Ramsey, 2000).

The actual locations of the slate quarries are first mentioned in 1343, when the quarries at Swithland and Groby Park are referred to in the Records of the Borough of Leicester 1103-1603. In 1377-8, work on the Leicester Castle included ...2000 slates bought from John Bareman with cartage from Swithland, with 3s 1d a thousand (Fox, 1944). In the same year, builders at Frith Lodge purchased 1500 slates from Swithland at the same price. It is also known that Bradgate House, once the home of the ill-fated Lady Jane Grey, was roofed with Swithland Slate, and reference is made to the use of slate from Groby Park in the building records for the Kirby Muxloe Castle (Ramsey, 2000).

Slate was not commonly used as a roofing material until the late-17th and early-18th centuries, and even then it only tended to be used for the houses of the nobility and gentry (Ramsey, 2000). Most of the quarrying activity took place in the 18th and 19th centuries, when the principal slate quarries were at Swithland Wood, The Brand, Groby and Woodhouse Eaves. The two landowners with slate resources on

their estates were the Herrick family of Beaumanor Hall, Old Woodhouse and the Earl of Stamford at Groby and Swithland (Ramsey, 2000). A series of tenants operated the slate quarries, on lease from the landowners, but paid them a commission on every tonne of slate sold. Swithland Slate was utilised for a multitude of purposes, including the manufacture of roofing slates, headstones, milestones, wall stones, flag floors, sundials, paving, fencing, shelving, gateposts, kerb-edging and some household items. Traditionally the slates were laid on a roof in sizes reducing from eaves to ridge, thus enabling even the smallest pieces of slate to be used (Lott, 2001). Swithland Slates were widely used in country dairies due to their ease of cleaning and resistance to grease.

The Swithland quarries consist of The Great Pit in Swithland Wood, The Brand and Pike or Tower Water near to the 'triangle' at Woodhouse Eaves (Fig. 28). Their slates tend to be pale grey, blue-green-grey or purple in colour; they are from the Cambrian Brand Group of the Charnian Supergroup. The Hind family were frequent tenants of the Swithland quarries, having their first lease granted from the Earl of Stamford in 1688. However, their involvement in the slate quarries may have been as early as 1622, as Robert Hind is mentioned in the Stamford list of lease holders (Ramsey, 2000). The Ellis family took over the

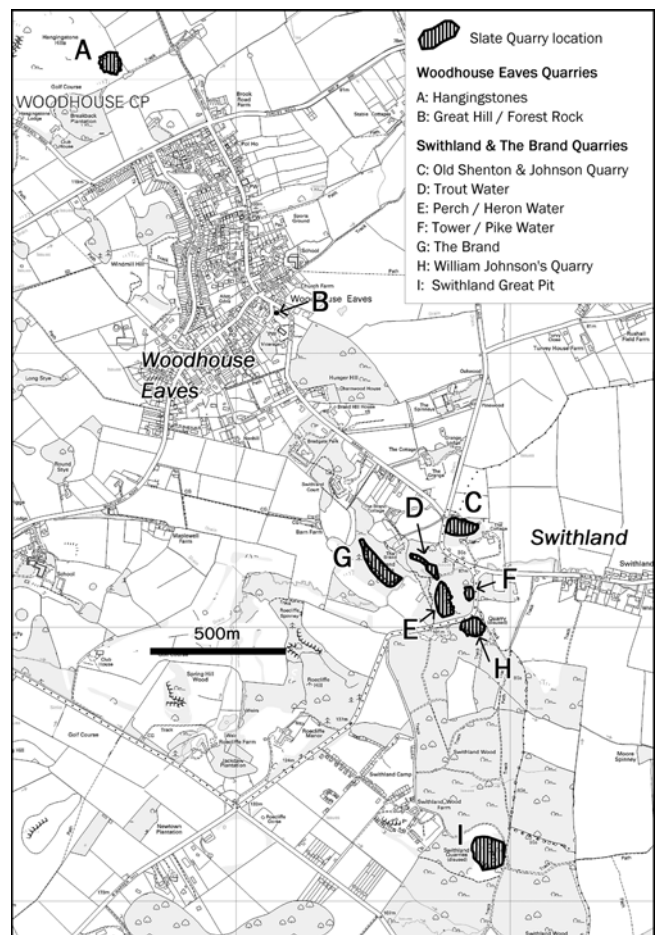


Figure 28. Locations of the Swithland and Woodhouse Eaves Slate Quarries. (Base map by Ordnance Survey)

Swithland quarries sometime during the period 1852-65 and operated them until they closed in 1887. They also reopened The Great Pit when they took on the lease in 1859, apparently using 'modern methods and machinery'. The best bed of slate in the quarry was apparently only 5 m wide and almost vertical. As a result, the quarry was worked to a depth of more than 60 m at its northern end, which presumably earned it the name of Great Pit; poorer quality slates were extracted from the south end. Excavated blocks of slate had to be raised to ground level before being split, sawn and polished (Lott, 2001; McGrath, 2004a).

Slate quarrying was a growth area in The Brand (Fig. 28) during the 17th and 18th centuries. It was also one of the localities in Charnwood Forest where cattle could be annually branded with the mark of their owners, hence the unusual name. The quarries were purchased and operated by the Hind family during the 18th century and then sold in 1851 to John and Joseph Ellis. The Ellis family continued to work The Brand quarries, and built a stone tower in the north end of Tower Water (also known as Pike Water), to house a pumping engine (Ramsey, 2000); the tower still remains today as a prominent feature of the abandoned slate pit. When quarrying ceased, the Ellis family transformed the abandoned slate workings into a nature reserve. They landscaped the original Hind quarry by partly filling the middle section of the site to create two separate lakes, Trout Water (to the north) and Perch (or Heron) Water (Fig. 28) to the south (Ramsey, 2000). The Brand Estate was subsequently sold to Robert Frewen Martin in June 1887 for £9850; the Martin family still own and live on the estate.

The Groby land tax records for 1773-1829 indicate that three quarries existed in the area at that time - the Groby Slate Works north of Grey Lodge at Alder Spinney, and two earlier quarries, located close to Bradgate Hill Farm and the present A50. Waste material from construction of the Groby by-pass has now levelled the site of the Groby Old Slate Quarry close to the A50 (Ramsey, 2000). As early as 1766, Henry Hind and his son were leasing the Groby slate pits from the Earl of Stamford (Ramsey, 2000). In 1866 the Ellis family took on the Groby and Swithland quarries and worked them until their closure in 1887. The slates from the quarries at Groby are geologically the same as those at Swithland, but they are more brittle and cleave more easily; their colours range from dark to pale green-grey, and from pale to dark green.

The quarries at Woodhouse Eaves (Fig. 28) were owned by the Herrick family, and are located at Hangingstones and Great Hill. They are not slates in the true sense of the word, as they actually belong to the older Precambrian Maplewell Group of the Charnian Supergroup. Unsurprisingly, they did not cleave so easily as the true slates from Groby and Swithland, and, as a result, their use was not so widespread (Ramsey, 2000). However, this distinctive deep purple slate was used locally as a building stone, a good example being the Almhouses in Woodhouse

Eaves. The quarry at Great Hill has since been called Church Quarry and Forest Rock Quarry and is now known locally as Stone Hole. The quarry is situated near to the churchyard, next to the Forest Rock pub (now closed), and had been long abandoned in 1877.

The Swithland Slate quarries supplied stone to local markets, but they were also able to make use of the Rivers Soar and Trent to transport slate farther afield. The construction of the Grand Union Canal in the early 19th century opened up even greater markets, so Swithland Slates were sent as far as Lincolnshire, Northamptonshire, Warwickshire and Derbyshire (Lott, 2001). However, the improvements in transportation that allowed the Leicestershire slates to be more widely distributed also enabled the cheaper Welsh slates to flood the market. These had been available in the county via the Midlands Canal System since the late 1700s (Ramsey, 2000), and Francis Shenton was able to offer Welsh slates for sale at both Mountsorrel and Leicester Wharf in May 1795; one of the earliest documented sales of Welsh slate was made in 1806 to William Oldham, a builder at Braunstone Hall. In 1831, a tax imposed on the carriage of slate by sea was lifted, which resulted in a rapid increase in the amount of Welsh slates imported into England. Welsh slates swamped the market even more effectively when national rail links were established in the 1840s; as a result, the local Swithland Slate industry went into rapid decline. Welsh slates were easier to split, and they produced a more precisely cut, thinner slate; they were also larger and more uniform and weighed less than the local material (Ramsey, 2000). The Leicestershire slates had a more poorly developed cleavage, making them more difficult to split and dress; they were thicker, heavier and rougher than Welsh slates, a feature that is greatly appreciated and admired today, but not so in the past!

A certain Frederick Mott summed up the situation in 1868 in no uncertain terms, when he declared that *These old slates of Charnwood are quarried at Groby, Woodhouse Eaves and Swithland.....and every one of which is worth three Welshmen (or Welsh Slates), both in respect of durability and picturesqueness, although an age of cheapness and bad taste prefers, of course, the flimsier article.* By 1887, most of the Leicestershire Slate quarries had closed, signaling the end of an era. Charles Wesley continued to work the Old Groby Slate Quarry until March 1897; it is thought that he was probably the last person to quarry slate in Leicestershire (Ramsey, 2000). Although no quarries produce roofing slate in Charnwood today, recycled Swithland Slate is still very much in demand (Lott, 2001) and can command a high price. It is greatly prized for its character and variety of colours, and it still adds beauty to the Charnwood villages.

### **A final note...**

The quarry industry has been vital to the socio-economic development of Charnwood Forest for well

over a century now, and will continue to be so for at least another 50 years. Abandoned quarries can and often do become a positive feature of the landscape, as with age they produce a wealth of varied habitats for wildlife and plants, as well as providing a multitude of recreational uses. The quarrying industry plays a major role in the conservation of many old quarries, as mineral companies often work together with local authorities and conservation groups to restore and reclaim old quarry workings, to enhance the local biodiversity and geodiversity value of the area. Over 12% of the area of Charnwood Forest is notified as a Site of Special Scientific Interest, including sections of the quarries at Bardon Hill, Old Cliffe Hill, Newhurst, Buddon Wood, the Old Mountsorrel Quarry as well as Swithland Wood and the slate pits. To date, there are seven confirmed and six candidate Regionally Important Geological and Geomorphological Sites (RIGS) within Charnwood Forest. All of the RIGS are within quarries, covering a total (confirmed and candidate) of 502 ha. The scientific usefulness of many quarries will long outlive their commercial life, as some of the most fascinating geology in this part of England is revealed in them (McGrath, 2004b). They should therefore be carefully and sensitively conserved to ensure that they remain a valuable teaching and research asset for future generations of geologists.

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## References

- Ambrose, K., Carney, J.N., Lott, G.K., Weightman, G. & McGrath, A., 2007. *Exploring the landscape of Charnwood Forest and Mountsorrel*. British Geological Survey.
- Anon., 1990. *A Celebration. Groby Church and Village. St Philip and St James' Church, Groby*. The 1990 Committee: Groby.
- Anon., 2003. *Mountsorrel a place of stone*. Friends of Charnwood Museum.
- Billington, M. H., 1974. Cliffe Hill Mineral Railway, Leicestershire. *Minor Railways of Britain Series*. Turntable Enterprises, Leeds.
- Bradley, P., 1989, A Leicestershire Source for Group XX, *Trans. Leicestershire Archaeological & Historical Soc.*, **68**, 1-5.

- Burton, W., 1622. *The Description of Leicester Shire. Containing matters of antiquitye, historye, armorye, and geneology*. London.
- Carney, J.N., 1994. *Geology of the Thringstone, Shepshed and Loughborough districts (SK41NW, SK41NE and SK51NW)*. British Geological Survey Technical Report WA/94/08.
- Carney, J.N., 1999. Revisiting the Charnian Supergroup: new advances in understanding old rocks. *Geology Today*, **15**, 221-229.
- Carney, J.N., 2000. Igneous processes within late Precambrian volcanic centres near Whitwick, north-western Charnwood Forest. *Mercian Geologist*, **15**, 7-28.
- Carney, J.N., Horak, J.M., Pharoah, T.C., Gibbons, W., Wilson, D., Barclay, W.J. & Bevins, R.E., 2000. *Precambrian rocks of England and Wales*. Geological Conservation Review, 20.
- Carney, J.N., 2005. Old Cliffe Hill and Whitwick quarries, Charnwood Forest. *Mercian Geologist*, **16**, 138-141.
- Clinker, C.R., 1954. The Leicester and Swannington Railway. *Transactions Leicestershire Archaeological Society*, **30**, 79.
- Farmer, K., 1968. Amalgamated Roadstone. *The Industrial Railway Record*, **20**, 269-288.
- Fenn, R.W.D., 2003. *The Bardon Hill Quarries 1858-1918*. [www.aggregate.com/history/bardon\\_hill\\_quarries/asp](http://www.aggregate.com/history/bardon_hill_quarries/asp).
- Fox, L., 1944. *Leicester Castle*. City of Leicester Publicity and Development Department.
- Keil, I., Humphrey, W. & Wix, D., 1991. *Charnwood Forest in Old Photographs*. Leicestershire Museums, Art and Records Service. Alan Sutton Publishing Limited.
- Lockley, D., 2001. *Rough with the smooth: life in Markfield at the start of the last century, 1900-1930*. Lockley: Markfield
- Lott, G., 2001. Geology and building stones in the East Midlands. *Mercian Geologist*, **15**, 87-122.
- McGrath, A.G., 2004a. *A Geological Walk around Bradgate Park and Swithland Wood*. British Geological Survey.
- McGrath, A.G., 2004b. *A Geological Walk around Cliffe Hill Quarry*. British Geological Survey.
- Noble, L., 1995. *Bardon Hill: A Source Book: Being a Collection of Papers, Anecdotes & Published Work Concerning the Ancient Enclosure of Bardon Park*. Ellistown: L.Noble.
- Office of National Statistics, 2005. *Mineral Extraction in Great Britain Business Monitor PA1007*. ONS: London.
- Ramsey, D.A., 1982. *Groby and its Railways*. TEE: Hinckley.
- Ramsey, D.A., 2000. *Newtown Linford Notes and the Leicestershire Slate Industry*. Bradgate and its Villages Series, 4. Ramsey: Groby.
- Smith, S., 1984. *A Brief History of Whitwick*. Leicestershire Libraries and Information Service.
- Sutherland, D.S., Boynton, H.E., Ford, T.D., Le Bas, M.J., & Moseley, J., 1994. A guide to the geology of the Precambrian rocks of Bradgate Park, Charnwood Forest, Leicestershire. *Transactions of the Leicester Literary and Philosophical Society*. **81**.
- Wix, D. & Keil I., 2002. *Charnwood's Silver Jubilee 1974 - 1999. How technical, social and environmental changes have influenced the Borough of Charnwood's development from 1974 - 1999*. Borough of Charnwood.
- Further valuable source data in ephemeral literature is traceable in the Leicestershire County libraries (notably at Hinckley), in the archives of the Bardon Hill and Mountsorrel Quarries, and in the files of the Whitwick Historical Group.

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