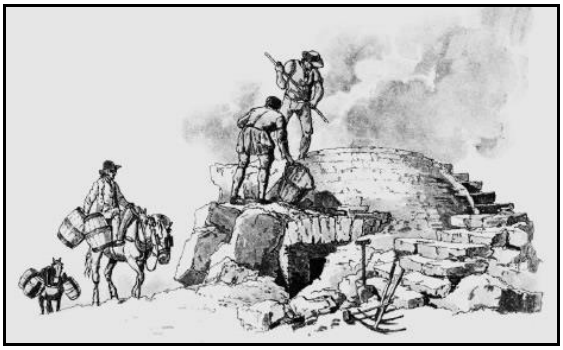
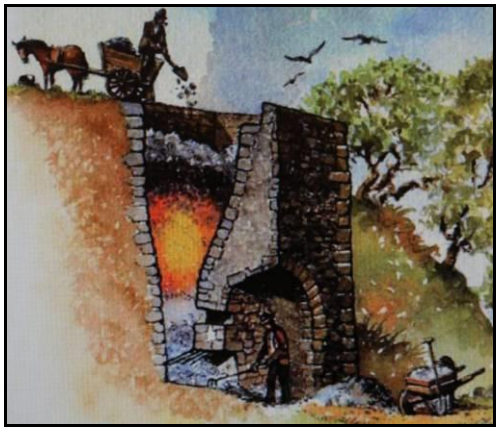
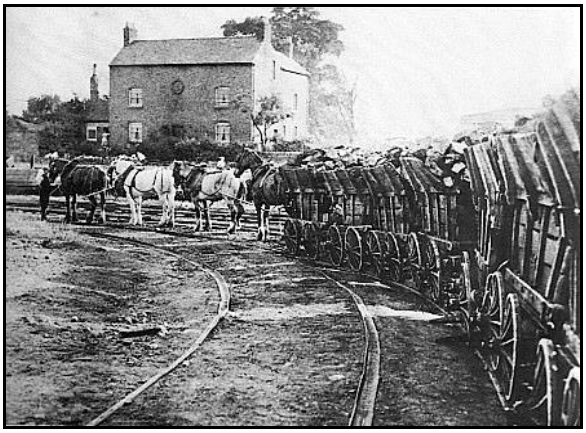
A HISTORY OF LIMESTONE BURNING IN NW LEICESTERSHIRE







By Samuel T Stewart – November 2019

PREFACE

Documentary evidence and publications regarding the quarrying of limestone and the burning of it in kilns to produce quick lime locally have tended to be centred on **Ticknall, Calke and Dimsdale (aka, Dimminsdale) quarries.**

This book specifically relates to the history of limestone burning at **Breedon, Cloud Hill, Barrow Hill, Osgathorpe and Gracedieu quarries with supplementary information on the "Moira Blast Furnace" and lime kilns because of their association with the Cloud Hill and Ticknall quarries**.

The book also covers the various modes of transport which developed in order for their products to find markets further afield, including turnpike roads, horse drawn tramways, canals, a horse drawn railway and steam engine driven railways.

Limestone burning may seem a rather mundane subject to the uninitiated, but for anyone who has an interest in industrial history, the book will hopefully demonstrate just how important this industry became to the local community, and to the wider economy of the country as a whole.

This book is an attempt to bring together fragmented information from numerous sources into one publication, in order to provide the reader with a better understanding of the whole. It is also intended to provide a platform for those wishing to carry out further research into specific areas covered in the book.

I hope that you will enjoy reading the book as much as I enjoyed the researching and writing of it.

Samuel T Stewart

"A PEOPLE WITHOUT THE KNOWLEDGE OF THEIR PAST HISTORY, ORIGIN AND CULTURE, IS LIKE A TREE WITHOUT ROOTS"

- MARCUS GARVEY -

PUBLISHED BY SAMUEL T STEWART

ACKNOWLEDGMENTS

A special thank you to Rev. J. Dawson for giving permission to include certain photographs and text from his book entitled “Hand-me-down Hearsays.”

Thanks to Richard Butler for his assistance with the history of Moira Blast Furnace & Lime Kilns

Thanks to David Perret of the “Newcomen Society” for his input

A SELECTION OF RESEARCH SOURCES

- “Hand-me-down Hearsays” by Rev. J Dawson
- Numerous Historical Trade Directories eg; William White’s 1846 History of Rutland & - Leicestershire
- Coalville Library local studies section.
- Ashby Library local studies section
- Ashby De-La-Zouch Museum
- “The Ashby–De-La-Zouch Canal and Its Railways” by C.R.Clinker & Charles Hadfield
- “The Leicester to Swannington Railway” by C.R.Clinker
- “Benjamin Outram1764-1805” by R.B.Schofield
- Moira Furnace and “A guide to its industrial origin”
- The L&RRO, Wigston
- Leicester Industrial Heritage Society bulletin 13:1990/1
- The Enville Hall Archives
- The Ashby Canal Minute Books
- “The geology of the Leicestershire coal-field and of the country around Ashby-De-La-Zouch” by Edward Hull 1860
- John Prior’s maps of Leicestershire 1777
- Robert Whitworths maps of the Ashby Canal
- The1835 O/S map
- Christopher Stavely’s map of the Charnwood Forest Canal
- John Crocker’s archives held at Ashby Museum
- The Mediaeval Earthworks of North West Leicestershire by Robert. F. Hartley (Leicestershire Museums Publication 56).
- Minerals of the English Midlands by Roy E. Starkey
- The Ticknall Tramway by Geoffrey Holt
- Observation in Husbandry by Thomas Lisle
- Rural economies of the Midland Counties by William Marshall 1790
- House of Lords & House of Commons Journals
- Leicestershire Views by John Throsby
- General View of the Agriculture & Minerals of Derbyshire 1811 by John Farey
- John Nichols – “the History of the Antiquities of Leicestershire” volume 3
- Historic England - Heritage Assets May 2011
- The Leicestershire & South Derbyshire Coalfield 1200-1900 by Colin Owen
- Observations in Husbandry by Edward Lisle (from writings by Thomas Lisle)
- “The Moira Furnace” edited by David Cranstone (NWLDC)
- “Breedon Cloud Wood” by Anthony Squires
- The Monthly Magazine’ No 271 Vol 40 August 1st 1815 by Robert Bakewell
- There’s still more coal in th’ole by Keith Gilliver
- History of the Moira Collieries 1804-1919 by Keith Gilliver
- Mining and Industry in Sth Derbys & NW Leics by Mark Bown
- Donington Hall by Penny Olsen

CONTENTS

FROM THE FORMATION OF LIMESTONE TO THE PROCESS OF BURNING IT IN ORDER TO PRODUCE BURNT LIME (COMMONLY KNOWN AS QUICK LIME) AND ITS USES

THE FORMATION OF LIMESTONE IN THE GEOLOGICAL AREA COVERED

Limestone is a sedimentary rock composed primarily of calcium carbonate ($CaCO_3$).

Breedon, Cloud Hill, Barrow Hill, Osgathorpe and Grace Dieu, have all been quarried in the past, and Breedon & Cloud Hill still continue to be so. They form five inliers of the Peak Limestone Group, (informally known as the Carboniferous Limestone), in north west Leicestershire along the north eastern edge of the Leicestershire coalfield, and can all be regarded as an extension of the Derbyshire mountain limestone. Other limestone inliers occur 3-4 km to the west, around Ticknall, Calke Abbey and Dimminsdale in south Derbyshire.

The story started in the Carboniferous Period which lasted from about 359.2 to 299 million years ago when much of England was enveloped in a warm tropical sea close to the equator, where carbonates formed from the accumulation of shell, coral, algal, and fecal debris were deposited to form the Peak Limestone Group. Hence, many fossils are found in the quarries. The water depth would have varied over the different inliers from around 100m to 250m, with Breedon being in the order of 250m. The water pressure compacted the sediment over millions of years, creating limestone.

A SYNOPSIS OF THE HISTORY OF LIMESTONE BURNING

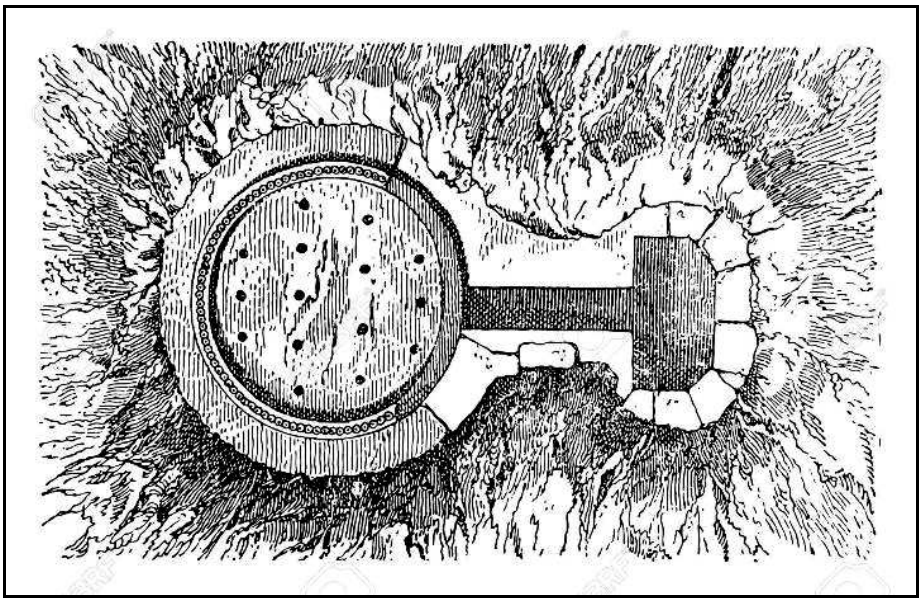
History does not share with us who first burned lime, when, or why. Lime burning certainly dates to antiquity, and it is thought that subsequent to the discovery of brick making, ancient people arrived at the art of lime burning in order to produce “quick lime”. These early civilizations, well before Roman times had utilised lime to make mortar, and scientific analysis has established that lime mortar was used in the building of the pyramids.

The earliest form of limestone burning in Great Britain would most likely have consisted of alternate layers of fuel (wood) and limestone being stacked on top of each other in a scooped out hollow in the ground or a bank to form a mound, and then covered over with clay and turf, with an opening at the top. A fire would have been lit at the base and the hot gases drawn up through the mound to ignite the alternate layers of fuel and burn the limestone in order to convert it into quick lime. These mounds would have needed to be allowed to cool before the burnt lime could be accessed, thereby destroying the primitive kiln in the process. These early kilns are generally referred to as clamp or sow kilns.

In Great Britain, the burning of lime in “well designed / built kilns” has been attributed to the Romans, and the earliest surviving archaeological evidence of such kilns comes from that period of occupation. No surviving evidence has been found or recorded of any lime kilns in Great Britain prior to the Roman period.

Two examples of excavated “Roman Lime Kilns”, are shown in the following photographs. Work being carried out during the construction of the Porthmadog bypass revealed evidence of a large Roman lime kiln (LH photograph), which, along with other artifacts found, like roof tiles, suggested to archaeologists that a sizeable Roman settlement existed in the vicinity. This substantial kiln was recorded as being 4 metres across and 2 metres deep and had been cut into a bowl shape in the surrounding rock, which would not have been an easy task.

Roman kilns were normally fired from an extended rectangular flue which is more clearly identified in the RH photograph of two similar side by side kilns found during excavations for the Lincoln eastern bypass. A fire would have been lit at the end of the flue farthest away from the kiln, and the controlled hot gases drawn through the limestone in the bowl at a temperature sufficient to convert the limestone into quick lime. The two following illustrations can be related to the photographs. It has been suggested that the Romans learned the art of limestone burning from the Greeks.



There is no evidence to suggest that the Romans used anything but wood as fuel in the lime kilns. However, in certain areas they may have found outcrops of coal which they could have dug out and used. These kilns are often referred to as “Flare” or “Batch Kilns”. They would have been loaded with a single charge of layers of fuel and limestone and after burning was

completed, they would have been allowed to cool down and the burnt lime rake out, before being charged and fired again.

The lime kilns built during the Roman occupation would have been established local to the buildings being erected, and limestone would have been transported to them from suitable locations. In both of the above examples, limestone was readily available locally. Most of the burnt lime produced during the Roman occupation would have been mixed with water, a process known as 'slaking', in order to produce hydrated lime (calcium hydroxide). This product formed the basis of mortar (for brick laying), concrete and plaster, which were all products used extensively by the Romans in the construction of their buildings. Good quality lime was also used in lime-wash, for waterproofing walls and lightening interiors. It was also used for bleaching paper, in tanneries for the removal of the hair from the hides, in medicines, and as a disinfectant.

LIME MORTAR

Lime mortar was used in the laying of bricks and building stone etc, much in the way cement mortar is used in today's building methods. The main constituents of lime mortar were slaked quick lime and sand although numerous other ingredients were shown to have been added in past times to give the mortar different qualities such as increased water resistance; examples of these being eggs, tallow, keratin, beeswax etc. In order to improve setting times, crushed bricks or tiles were commonly mixed in. Much has been written about the preferred and safe methods of making lime mortar and numerous accounts of this are available for those wishing to gain further technical knowledge.

Although Portland cement was invented in 1824, this proved expensive and too strong for building applications in that period. In fact, cement based mortars didn't fully replace lime based mortars until after the Second World War.

AFTER THE ROMANS

Brick making seems to have ceased in Britain around AD 412, just after the Romans departed, and evidently little in the way of brick making was subsequently carried out for a period of some 700 years. It is recorded that the earliest definitive evidence for lime burning in post Roman Britain comes from a kiln sited at Guilford in Surrey, dating from the 12th century. The remains of both Roman and medieval lime kilns are widely distributed throughout Great Britain.

During the Anglo-Saxon period, buildings were usually of timber framed construction and, although lime may have been used for white-washing high status buildings, and in plaster, the demand for it was very low, not in part due to the high relative cost of producing it. Wattle and daub was used to make infill panels between the timber framework. This changed in the medieval period (1066-1485), when large quantities of mortar were needed in the construction of stone castles, city walls and religious buildings.

Stone and brick built "Field Kilns" as shown on the front cover, top left, consisted internally of an inverted cone where the fuel and cobbled limestone were stacked in alternate layers. The fuel was lit and the burnt lime and ashes raked out from the base. These were probably operated on a batch basis where more layers of fuel and limestone were stacked into the kiln from the top as the processed lime was raked out from underneath, in order to maintain a simple form of continuous burning kiln. Evidence exists for many of this type of kiln in remote areas from the mid 1400s to the early 1800s. These kilns would have been built local to limestone outcrops and the lime produced used locally. The design of kilns continued to evolve although the principles remained the same and a detailed explanation of the various developments follows later.

EVIDENCE OF EARLY COAL MINING IN THE AREA

Evidence is available confirming the 'getting' of coal had been taking place in this area at the start of the 13th century. One such example in italics is taken from John Nichols Antiquities of Leicestershire Vol 3:-
During the mid thirteenth century, one of the most important land owners in the Worthington district was Ralph Bozun. Around 1270, he and his wife granted some lands with apputances and coal mines which they contained to Garendon Abbey. These were probably in the area of "The Smoile" and the adjacent "Worthington Rough" near Lount, where the coal seams outcropped. This was not coal mining in the true sense, and coal would have been dug out to a depth below the surface. It was from the 13th century that the mining of coal started to slowly develop for both domestic and industrial use.
Between 1985 and 1993, the "Lounge" open cast coal mining site removed parts of ten seams of coal from an area of over 1.5 square kilometers in the Parish of Coleorton, in the area known as Smoile Wood, near Lount. Over an area of half a square kilometer of the main coal seams, the modern excavators uncovered a continuous series of pillar-and-stall workings as far as 30 metres below the surface, and originally reached by timber lined shafts. It has been possible to date this industry by tree-ring dating of timbers, and a stylistic study of other artifacts found, to the period 1450 – 1600. A future proliferation of coal mines at Coleorton, Lount, Newbold, Staunton Harold, Heath End and Swannington etc**.,** were developed from this period onwards. **Coal mining in the area is covered in detail in two books by Samuel T Stewart entitled "A Social & Industrial History Study based upon Staunton Harold, Lount, Dimminsdale and Heath End" and "A History of Coal Mining in Coleorton and the Local Area".**

A STEP CHANGE IN THE DEMAND FOR BURNT LIME / QUICK LIME

The increase in the use of bricks for buildings in the 17th century led to a significant increase in the demand for burnt / quick lime for use in mortar as did the growth in use of lime for agricultural purposes. Due to the increasing demand, the trade of "Lime Burner" came into being at this time also, and examples of this are cited within the book.

It was in 1793 that the 'Board of Agriculture' was founded, and it commissioned general reports on the state of agriculture in Britain. From the different view points expressed by the Board, there was a consensus of opinion that the increasing use of burnt / quick lime on the land was extremely beneficial in making it more productive for the growing of crops. Prior to land being enclosed by Acts of Parliament, a great deal of "heath land" had been left to waste and the condition of the soil was in desperate need of improvement.

Medieval land husbandry was very inefficient, and it was the fact that such crops as wheat or barley exhausted the soil. This eventually led to the development of the three-field system. In this technique, one third of all the land was allowed to lie fallow or was planted with a regenerative crop such as peas or clover every three years before it could produce another wheat crop. This was obviously wasteful of land and it was soon found that treatment of the land with calcareous clay called marl together with farmyard dung improved the fertility of the soil. It was only another short step to the spreading on the land of burnt / quick lime, which helped to break up clay soils and "manured" (sweetened) the land to give improved crop yields. The dual use of lime for mortar and for fertiliser led to the development of small local industries centred on limestone outcrops which often developed into serious quarrying businesses.

With the building of the canals and subsequent tramways, followed by steam engine railway networks, wider markets for lime opened up as it could then be transported further afield. This of course promoted the need for larger, more efficient continuous burning kilns.

The local lime burning quarries at Ticknall, Calke, Dimminsdale, Breedon Hill, Cloud Hill, Barrow Hill, Osgathorpe and Gracedieu benefited from this increase in demand of course.

The author has attempted to provide an informative overview of five of these lime burning industries at Breedon Hill, Cloud Hill, Barrow Hill, Osgathorpe and Gracedieu quarries, which are depicted geographically on a following map drawn in 1860.

Ticknall and Dimminsdale have been well catered for in other publications, and the author of this book has written extensively about Calke and Dimminsdale limestone quarries (including the mining of lead at the latter) in another publication. Research information on the latter three quarries is limited, and the largest of them all in terms of lime burning output were Breedon and Cloud Hill, with the latter becoming the most important in later years. The output at Barrow Hill quarry was not insignificant, but it suffered from the failure of the Charnwood Forest Canal and the fact that an interconnecting tramway with Cloud Hill was never built, which would have enabled transportation of its lime production further afield.

Osgathorpe and Gracedieu limestone quarries were smaller concerns and little information is available on Osgathorpe in particular, however, some interesting information about Gracedieu limestone quarries and the burning of lime there has been found. Both of these benefited to a limited extent from the short lived Charnwood Forest Canal, and Gracedieu did surprisingly ship a limited amount of lime out to Leicester via the Leicester to Swannington steam railway over a short period.

The reader will see later in the book that other lime burning kilns than those situated at the various quarries were built:-

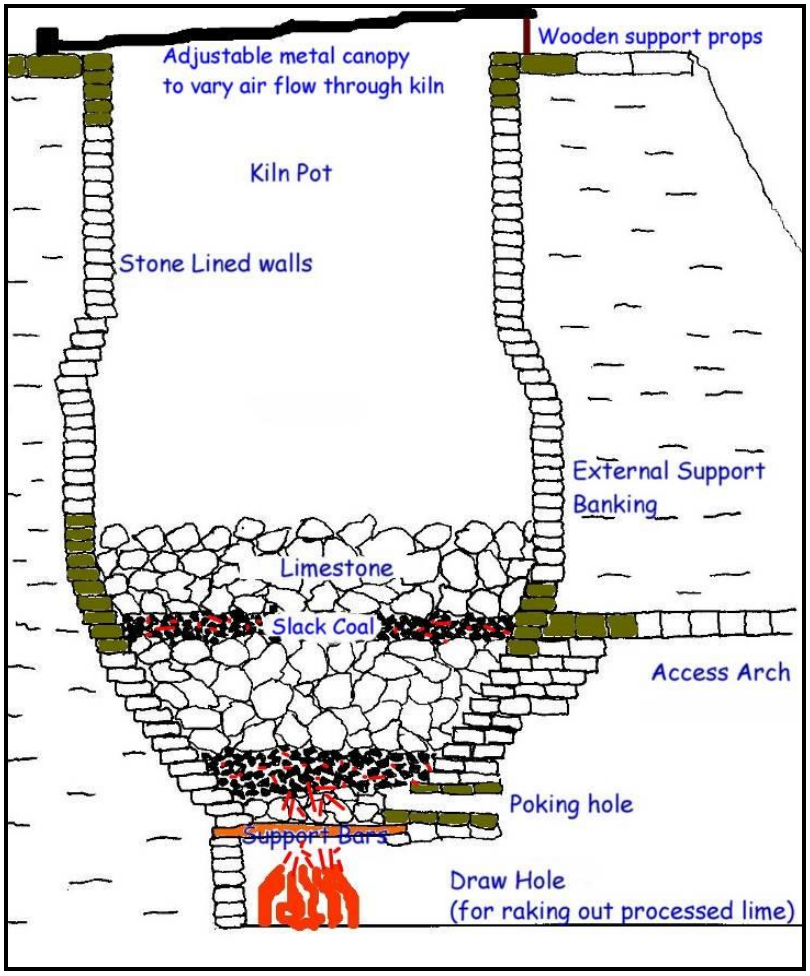
1. Three kilns and a wharf were built adjacent to the Cloud Hill Tramway near Lount on Sir George Beaumont's estate.

2. A Blast Furnace for the smelting of iron ore was built at Moira by Francis Rawdon Hastings, 2nd Earl of Moira and 1st Marquis of Hastings in 1804 to 1806 adjacent to the Ashby Canal, followed by seven lime kilns over a period of time.

Limestone from Cloud Hill and Ticknall to be used as a flux in the smelting of the iron in the Moira Blast Furnace and for burning in the kilns to produce quick lime was supplied from Ticknall and Cloud Hill via the tramway to Willesley basin.

THE PRINCIPLES OF BURNING LIMESTONE IN EARLY INDUSTRIALISED KILNS TO PRODUCE QUICK LIME

The following drawing is intended to be a **basic representation** of a lime kiln which would have been in use in the local quarries earlier years, once the burning of limestone developed into a serious enterprise. The design of kilns evolved over the years to allow for higher temperatures to be achieved together with a continuous burning process, which resulted in a more consistent and better quality product at a lower cost. The lime kilns marked **A** in the later 1936/46 photographs of Breedon and Cloud Hill quarries worked on a similar principle to the design shown below.

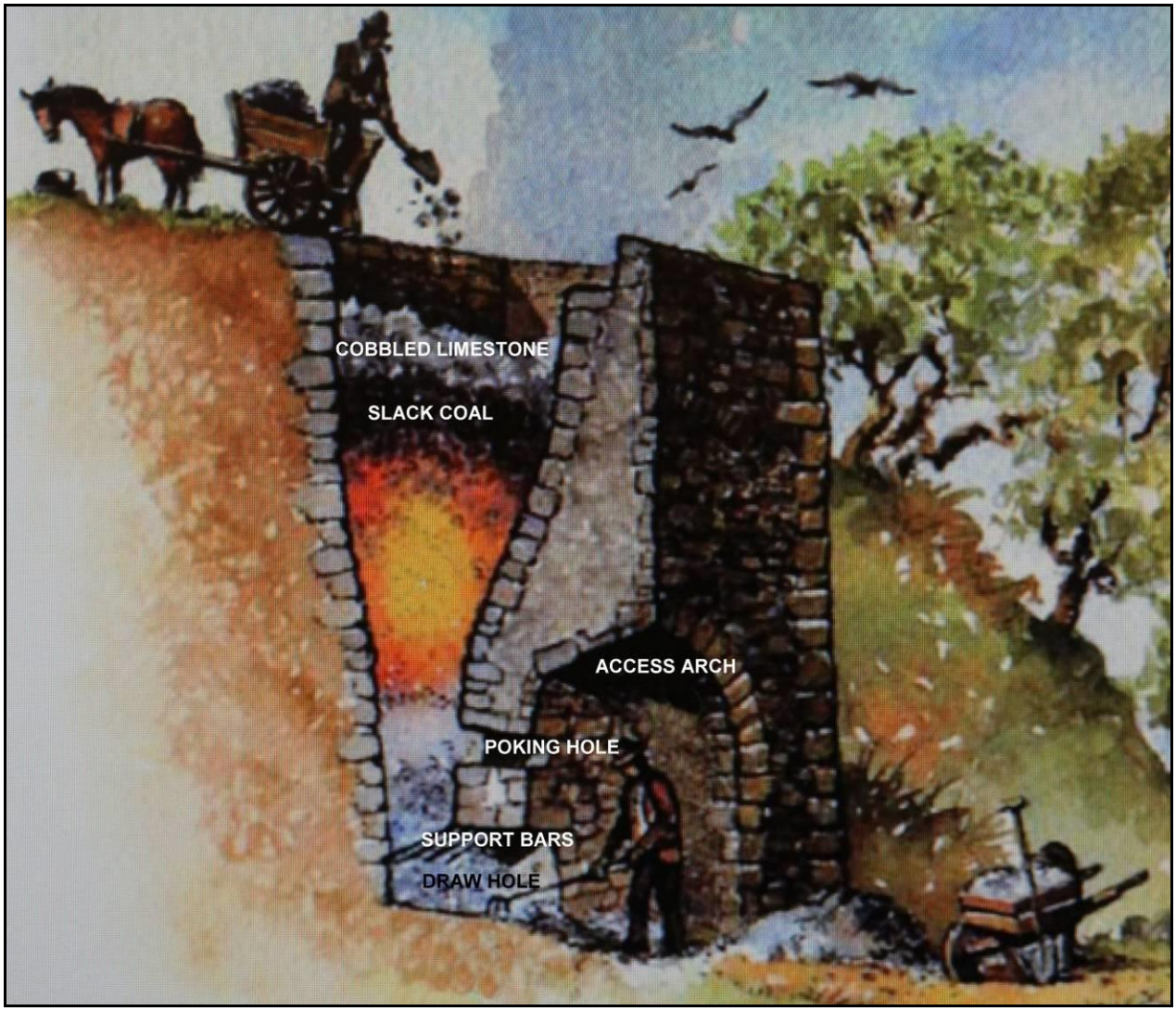


If lumps of limestone are heated to a temperature, preferably in excess of 900 degrees centigrade, carbon dioxide is driven off and what remains is calcium oxide, also known as 'Quick Lime'.

The process is called "calcination". If calcination is carried out correctly, the processed lumps of quicklime are approximately the same size as the original lumps of limestone put in when the kiln was set, but much less dense. Due to the weight loss of 44% arising from the removal of carbon dioxide, this means that for every ton of limestone added to the kiln, only 56% of this is turned into quick lime. The lumps of limestone, normally about fist size when put into the kiln, tend to break up to a large degree, but if necessary, they could be ground down to provide various grades of quick lime in terms of fineness, dependant on the purpose for which it was to

be used. Clearly, for use in the making of mortar, the lime would need to be of a very fine consistency, whereas, for spreading on fields, lumpiness could be tolerated, to a degree.

Various methods were used in the design of the kilns, but they all worked on the same basic principal. The kilns were lined internally with stones (often sandstone where available), or fire bricks and subsequently covered with fire clay when available. The kilns were surrounded with banked up earth to act as insulation. It was preferable to actually build them into the quarry face or an embankment at the side of a canal for example as in the kilns at Moira.



ORIGINAL PAINTED BY NORTHERN IRELAND ARTIST PHILIP ARMSTRONG

The kilns would have typically been around 3.5m diameter at the top and tapering to about 1.5m dia at the base, in the form of an inverted cone, although designs did vary somewhat. At the base of the kiln, an arched entrance was constructed which gave access to the fire box and the draw hole for raking out the lime together with any ash residue after processing, which could subsequently be separated out from the lime by the use of a “riddle”. A “poking” hole was often included to work the burnt lime down through the grating bars.

Alternate layers of cobbled limestone (half a yard thick) and slack coal (5 to 6 inches thick) was shoveled into the kiln pot and stacked loosely by setters so that air could flow freely to draw the

fire up through the layers in order that the slack coal ignited and burnt well. Slack coal was used, as lumps of coal were in demand for domestic use, and slack coal normally proved satisfactory. The layers were typically prevented from reaching the floor of the kiln by grate bars as shown in the illustration, at a sufficient height to enable the raking out of the burnt lime and ash residue. In the early days, the fire would have been started with a layer of brushwood and coal at the base, and the hot gases drawn up through the kiln ignited the layers of fuel between the limestone layers.

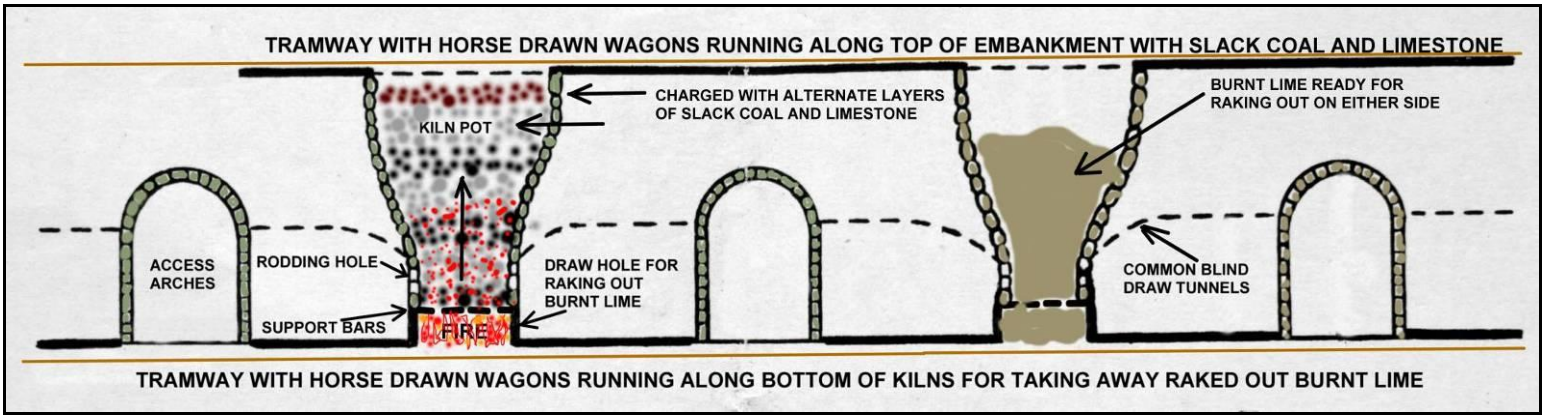
As time progressed, and tramways were introduced, horse drawn wagon brought the limestone and slack coal up to the top of the kilns, and another track ran along the bottom so that horse drawn wagons could take it away as shown in the diagram below

The rate of burning was usually controlled by an angled adjustable large iron sheet placed over the top of the kiln as indicated in the preceding diagram. The firing had the effect of expelling not only the carbon dioxide in the limestone, but also sulphur and other contaminants. This metal canopy over the top of the kiln, as well as controlling the air flow through the kiln, also protected the process in the kilns from the elements. If the kiln was being used on the batch principle, it would be left to burn for about five days and then required a further five days to cool. However, the continuous burning process was normally used where continuous layers of limestone and slack coal were added as the processed lime was raked out from the bottom.

Prior to the tramway links being built, lime was actually put into storage sheds and could be collected by customers on site in horse drawn wagons. It was vital that the raked out lime was protected from the rain as this would have ruined it. A kiln might yield some 10 tons of burnt lime, and a tramway wagon carried about two tons. The working conditions would have been extremely unpleasant and poisonous, as the process would have caused serious polluting of the local land and streams which was often used as drinking water, thereby causing serious illnesses to develop. Many remedies were advertised to cure the stomach problems caused by the polluted streams.

An advertisment in the Leicester Chronicle on April 11th 1834 referring to Staunton Harold Lime Works (Dimsdale / Dimminsdale) stated that……. *lime could be obtained from the quarry at 7s. 4d. per ton cash and 8s 4d. per ton credit. Orders to be received at the Nag's Head Inn, Derby and the Plough Inn, Loughborough on the respective market days.*

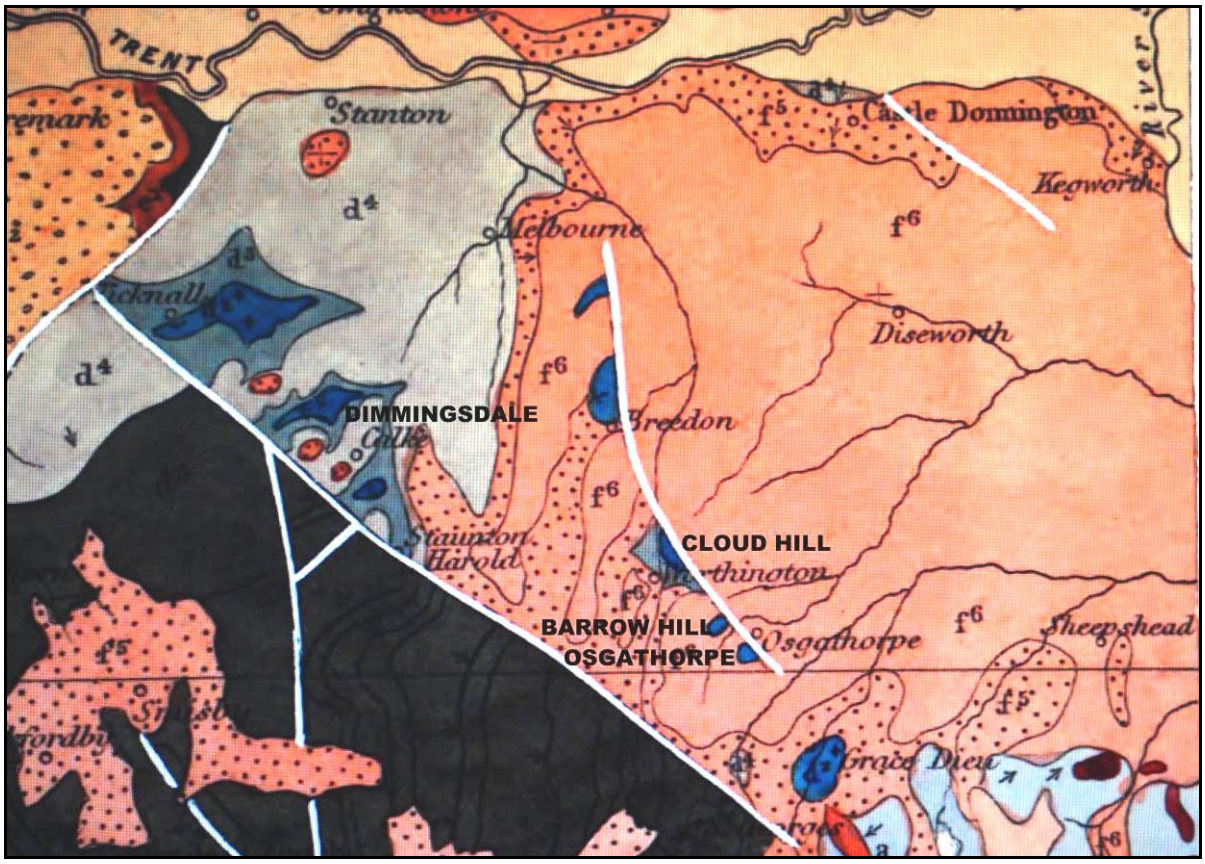
As demand for burnt lime increased, several kilns were often joined together by common draw tunnels, often in pairs, into which the lime and ash residue was raked and then taken out through common entrance arches to storage sheds for collection by horse drawn wagons. Canopies would have been constructed over the arches to prevent the lime being ruined by the elements.



THE GEOLOGY OF BREEDON AND CLOUD HILL QUARRIES

EDWARD HULL'S 1860 REPORT ON THE GEOLOGY OF BREEDON HILL & BREEDON CLOUD (CLOUD HILL)

THE CARBONIFEROUUS LIMESTONE DEPOSITS ARE SHOWN IN DARK BLUE AT GRACEDIEU, OSGATHORPE, BARROW HILL, CLOUD HILL (BREEDON CLOUD), BREEDON, DIMSDALE / DIMMINSDALE AND TICKNALL



The following is taken from:-

THE GEOLOGY OF
THE LEICESTERSHIRE COALFIELD
AND OF THE
COUNTRY AROUND ASHBY-DE-LA-ZOUCH
BY EDWARD HULL, B.A., F.G.S.

This formed part of the:-

MEMOIRS
OF THE
GEOLOGICAL SURVEY
OF
GREAT BRITAIN
AND OF THE
MUSEUM OF PRACTICAL GEOLOGY

PUBLISHED IN 1860

CARBONIFEROUS LIMESTONE

This formation reaches the surface in eight isolated area, namely, Ticknall, Calke Park, Dimmingsdale, Breedon Hill, Breedon Cloud (Cloud Hill), Barrow Hill, Osgathorpe and Gracedieu.

At Breedon Hill and Breedon Cloud (Cloud Hill) we are presented with beds lower down in the Limestone formation than those of the remaining localities. At Ticknall, Calke, Dimminsdale and Gracedieu, the highest beds occur; and the strata of Barrow Hill and Osgathorpe are probably intermediate.

The strata of the two Breedon Hills are almost identical with each other in lithographical character, as they also probably are in stratical position. They are composed of Magnesian Limestone or Dolomite, exceedingly hard, brittle, full of cavities, and traversed by joints. The colour of the rock is generally yellowish-brown, but frequently tinged red by the presence of peroxide of iron, and the structure is frequently sub-crystalline. The beds of the two hills plunge at angles varying from 40 to 80 degrees to the westward, the great amount of inclination being due to the proximity of the axis of disturbance which traverses Charnwood Forest, as also to a fault of later date, which passes along the eastern edge of the limestone between Wilson and Osgathorpe.

The stratification at Breedon Hill and Breedon Cloud may be observed with greater precision at some distance, where the whole can be taken in at a glance; but care is to be exercised in discriminating between the beds and the joints, which are frequently very deceptive.

The stone is extensively quarried, threatening some years hence to make a considerable alteration to the original form of the hills. It is carried on tramways to the Leicester and Burton Railway and Ashby Canal. ***It is however, unsuited for architectural purposes, being full of irregular cavities.***

The fossils at Breedon and Breedon Cloud (Cloud Hill) generally occur in casts, and in some specimens of Spirifer the internal spiral processes are beautifully preserved in calcareous spar (some of these are in the cabinet of Mr. M. Huish of Castle Donnington).

The following list of fossils is furnished from the collection of Mr. A. H. Green, of Ashby, and by Mr. J. W. Salter, from specimens obtained by the Fossil-Collector of the Geological Survey:

Fossils from Carboniferous Limestone, Breedon and Breedon Cloud

Orthoceras giganteus	-	*A shell*
Bererophon opertus	-	*Do.*
Trochus	-	*Cast*
Euomphalus Dionysii	-	*Do.*
E. tabulatus	-	*Do.*
Acrocula spirata	-	*Do.*
Maccrcheilus	-	*Do.*
Spirifer duplicicosta	-	*Do.*
S. papilionacea	-	*Do.*
Cyrtina septosa	-	*Do.*
Athyris (small species)	-	*Do.*
Syringopora genivulata	-	
Zaphrentis cylindrical	-	

EXAMPLES OF MINERAL SPECIMENS FOUND AT CLOUD HILL QUARRY

Over the years, excellent mineral specimens have been found in Cloud Hill Quarry and recorded. The author recommends that anyone wishing to know more about this specialised subject should refer to the recently published book entitled “Minerals of the English Midlands” by Roy Starkey, where specific reference is made to Cloud Hill Quarry. Below are photographs of examples of crystals found in the quarry, which have been kindly supplied by Roy Starkey who owns the copyright.

CHALCOPYRITE ON CALCITE

GALENA

GOETHITE

THE DEVELOPMENT OF LIMESTONE BURNING AT BREEDON & CLOUD HILL

Cloud Hill quarry was once part of an area of woodland known as Breedon Cloud. The later maps show the woodland area (now owned by "Leicestershire Wildlife Trust") as Breedon Cloud Wood, but in more recent times, the wood became known as Cloud Wood and the quarry as Cloud Hill. The quarry developed to the west side of the wood and gradually encroached into it as it developed over the years. The name 'Cloud' derives from "a rocky hill" or "mass of rock", known as a "clud". Both the quarry and adjacent wood is of significant historical importance. The name Breedon combines the ancient British *bre* and the Anglo-Saxon word *dun*, both of which mean "hill".

Breedon Cloud Wood was given the status of a site of special scientific interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981. They were awarded SSSI status due to the fact that Cloud Wood is ancient semi-natural woodland of a type which is now scarce in lowland Britain and lies on deposits of Keuper Marl and Boulder Clay which overlie the Carboniferous Limestone on the upper slopes of Cloud Hill. It supports a ground flora that is exceptionally diverse and includes several species which are rare in Leicestershire. Cloud Hill Quarry is also a nationally important geological site.

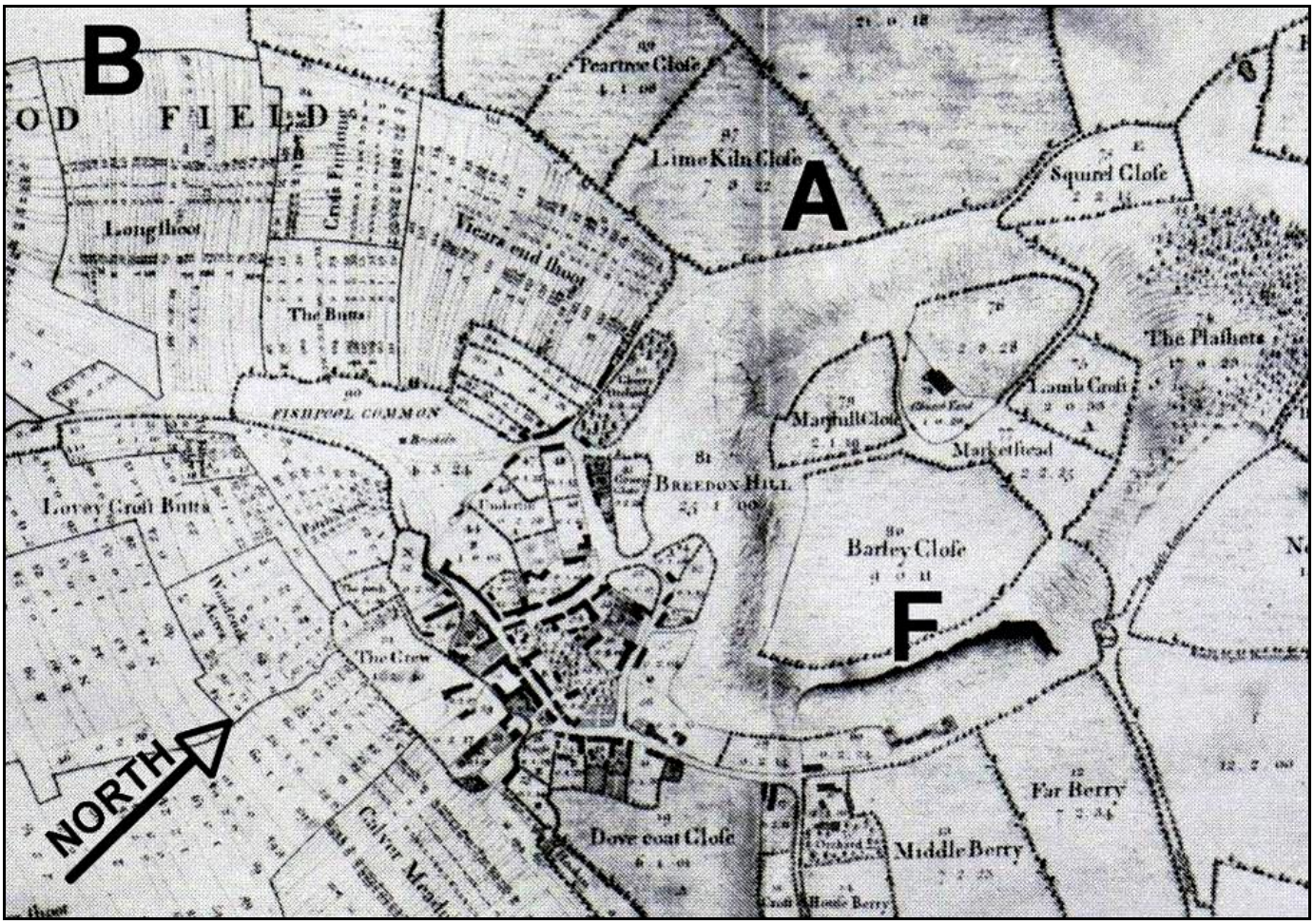
In their bulletin 13:1990/1, the "Leicestershire Industrial Historical Society" describes the clearance / excavation of a lime kiln (field kiln) discovered by quarry workers engaged in making preparations for an extension to the limestone quarry at Breedon on the Hill in April / May 1967. The report states that: - *This kiln lay some 230 metres north of Breedon Church. Unfortunately the mechanical excavator had destroyed most of the top of the kiln. This structure of the kiln apparently matched the following description given by William Marshall in 1784 and John Nichols in 1804 of the continuous draw kilns at Breedon Quarry.* (copyright LIHS)

Due to its location, well away from the quarry, it is not unreasonable to assume that this kiln dates back well before the kilns leased by Nathaniel Curzon at the quarry in 1759 and described later by William Marshall following his visit in 1784. It was most likely owned by a single operator paying a fee to the Lord of the Manor. See the following information regarding 'Lime Kiln Close' shown on the 1758 map of the "Lordship of Breedon"

THESE PHOTOGRAPHS ARE TAKEN FROM LIHS BULLETIN 13:1990/1

Although described in the report as being situated 230 metres north of the church, the author believes that this Lime Kiln may have been situated in Lime Kilne Clofe, which is marked **A** on the following extract from the 1758 pre-enclosure map of "The Lordship of Breedon". The quarry face is marked **F** and it is unlikely that there would have been any lime burning kilns at the quarry when the excavated field kiln was in operation, although limestone was obviously being quarried from there for burning in the field kilns.

A LIME BURNING FIELD FLARE KILN - 1806
AN ETCHING BY W H PYNE



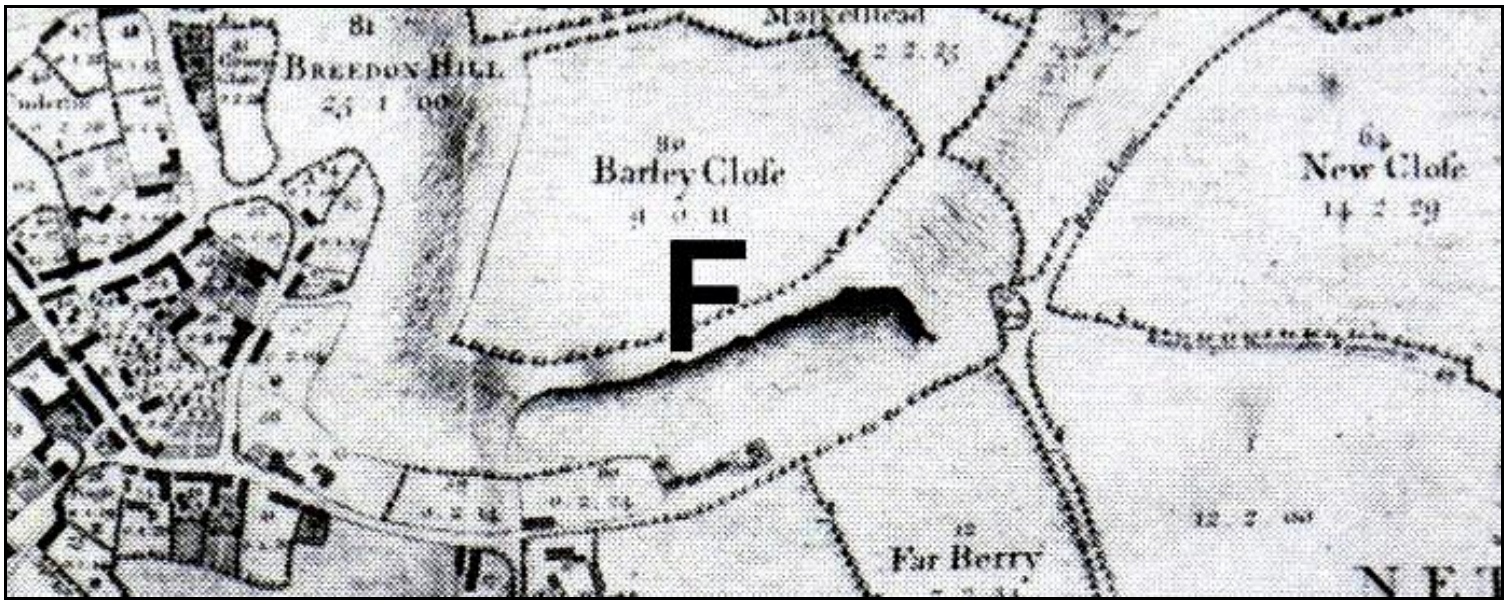
In John Nichols history of Leicestershire Vol.1. Pt. 2. page 686, the following is recorded:-

The following names are from a list of '<u>Bredon</u> rents' due to my Lord of Stamford at Michaelmas 1683

Francis Poxon for limestone	*£6 13s. 4d.*
George Kinsey & John North for limestone	*£2 10s. 0d.*

It is not unreasonable to assume that this limestone from either Breedon or Cloud Hill quarries was for burning in field kilns similar to that shown on the preceding pages. If that was proven to be the case, it is the earliest record the author has found indicating lime burning taking place in the vicinity.

In 1759, Nathaniel Curzon was renting the small quarry at Breedon Cloud (*approx 12 acres in 1761*) along with the lime kilns. He also leased the kilns at the main quarry at Breedon Hill, together with those at the very much smaller one at Barrow Hill (*approx 9 acres in 1761*), which lies to the south east of Cloud Wood on the Osgathorpe parish boundary. The lease for Cloud Wood was for seven years and two pence in every shilling, i.e. = 1/6th, of all profits from the sale of burnt lime going to his landlord, the Earl of Stamford. In 1769, the kilns at Cloud Wood produced lime with a value of £770, which was about half that realised at the main site at Breedon Hill. Two years later, Curzon renewed his lease on the properties and agreed to mine sufficient stone to keep the kilns working at full capacity (Enville Hall archives).



The above map is an enlargement of the area around the quarry. This shows at **F**, the quarry face and below it are depicted what are thought to be the lime kilns and associated buildings at the time Nathaniel Curzon leased them.

William Marshall's "Rural Economy of the Midland Counties" (1790) makes it quite clear that when he visited Breedon in **1784**, there were six or seven kilns at work; each built at the foot of the quarry, and against the base of the hill, with only one side open to draw at (his complete report features later). These would have been the kilns that Nathaniel Curzon leased, although the author cannot find any evidence to confirm that he was still leasing them at the time William Marshall visited the site. There would have been similar kilns in operation at Cloud Hill.

The burning of limestone at this time relied on a steady and plentiful supply of coal which would most likely have been supplied from local coal pits at Staunton Harold and Lount..

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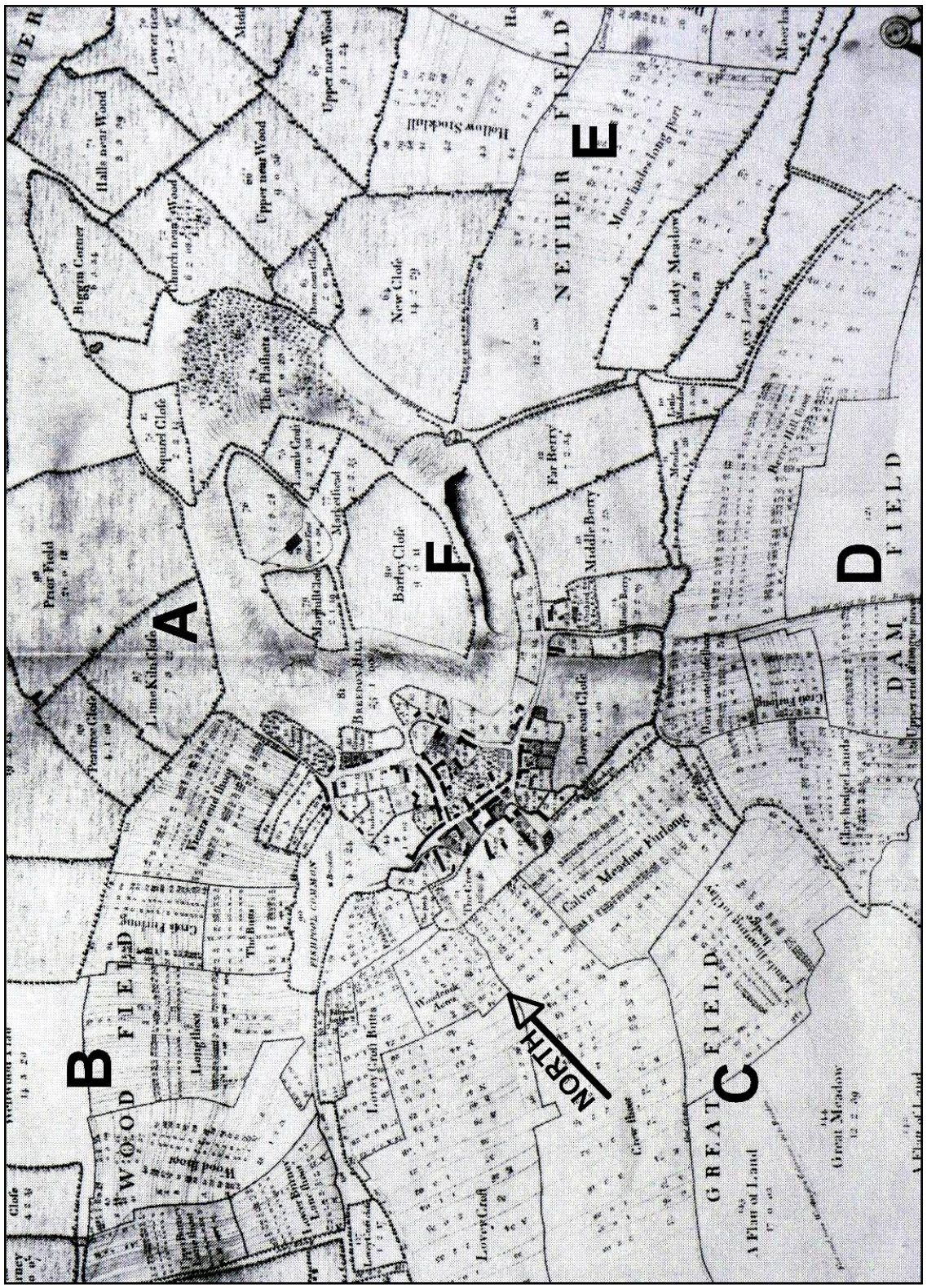


The above is a wider extract from the 1758 map of “The Lordship of Breedon”. The lands around the village were divided into four large fields, those being: - Wood Field (**B**), Great Field (**C**), Dam Field (**D**) and Nether Field (**E**). Breedon Quarry face is designated **F** and Lime Kiln Close **A.**

1758 PRE-ENCLOSURE MAP OF PART OF THE "THE LORDSHIP OF BREEDON" IN THE COUNTY OF LEICESTER

THE 1759 ACT FOR DIVIDING AND ENCLOSING THE OPEN AND COMMON FIELDS OF BREEDON, TONGUE AND WILSON IN THE MANOR OF BREEDON AND COUNTY OF LEICESTER, AND CERTAIN COMMONABLE AND WASTE GROUNDS WITHIN THE RESPECTIVE LIBERTIES THEREOF

THE FOLLOWING IS TAKEN FROM "THE HOUSE OF LORD'S JOURNAL" VOL 29 APRIL1759 21-30 PAGES 488 TO 496:-

Breedon Common, Bill:

The Lord Bishop of *Litchfield and Coventry* reported from the Lords Committees to whom the Bill, intituled, "An Act for dividing and enclosing the Open and Common Fields of *Breedon, Tonge*, and *Wilson*, in the Manor of Breedon and County of *Leicester*; and certain Commonable and Waste Grounds within the respective Liberties thereof," was committed: "That they had considered the said Bill, and examined the Allegations thereof, which were found to be true; that the Parties concerned had given their Consents, to the Satisfaction of the Committee; and that the Committee had gone through the Bill, and directed him to report the same to the House, without any Amendment."

Breedon Common, Bill:

¶*Hodie* 3ª *vice lecta est Billa*, intituled, "An Act for dividing and enclosing the Open and Common Fields of *Breedon, Tonge*, and *Wilson*, in the Manor of Breedon and County of *Leicester*; and certain Commonable and Waste Grounds within the respective Liberties thereof."

The Question was put, "Whether this Bill shall pass?"

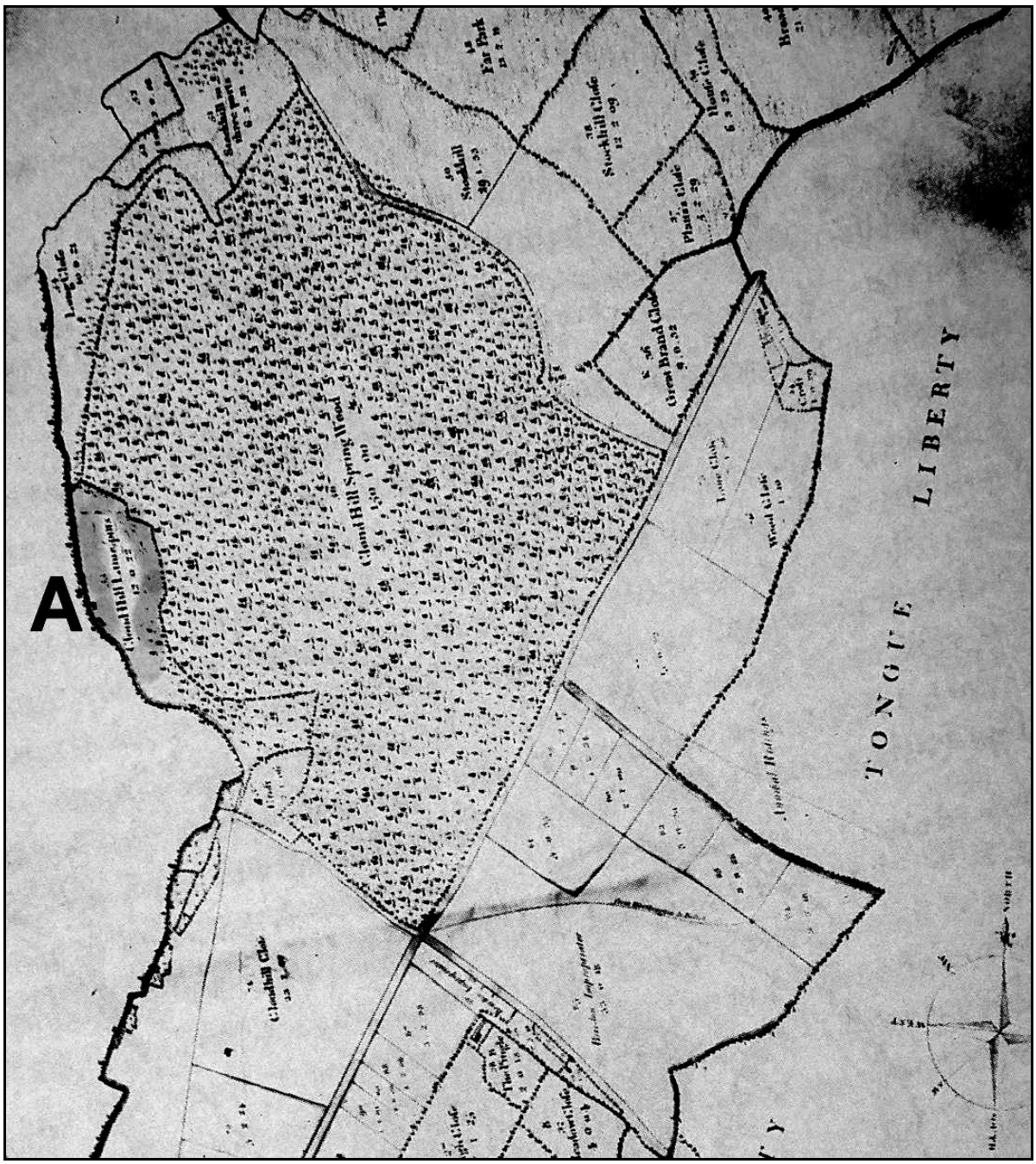
It was Resolved in the Affirmative.

A further enclosure took place in 1802 to 1806 which is referred to in part of another book by Samuel T Stewart, entitled "A Social & Industrial History of Griffydam and Peggs Green".

Cont'd over leaf

Below is an extract from a 1761 dated map, drawn following the 1759 enclosure Act and shows evidence of “Cloud Hill Lime Pitts” at **A** having an area of 12 acres 0 roods 22 perches. The wood is interestingly referred to as Cloud Hill Spring Wood and covers an area of 150 acres. (Grey Manuscripts L&RRO DE 311)

NORTH



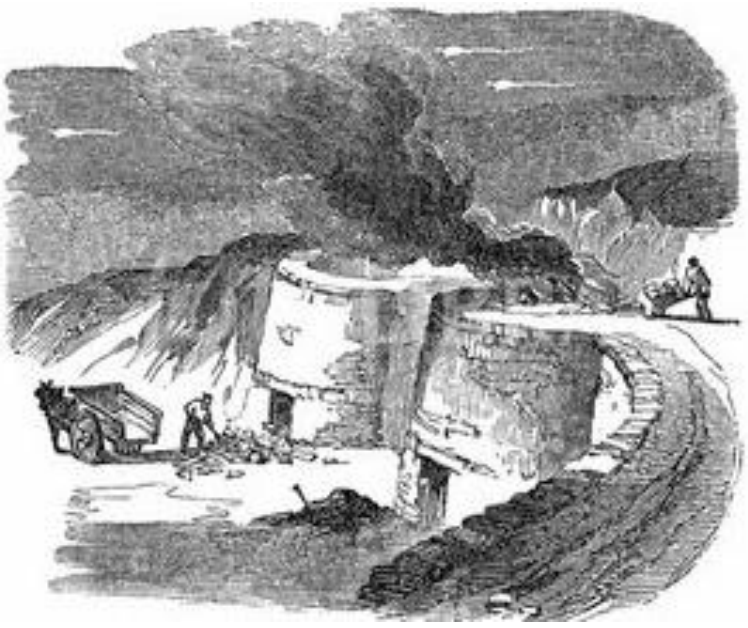
It was in 1793 that the ‘Board of Agriculture’ was founded and subsequently commissioned general reports on the state of agriculture in Britain. From the different view points expressed by the Board of Agriculture and other respected people at the time, it seems that there was an agreement that the increasing use of burnt / quick lime on the land was extremely beneficial in

making it more productive for the growing of crops. Prior to land being enclosed by Act of Parliament, a great deal of heath land had been left to waste and the condition of the soil was in desperate need of improvement.

The lime kilns at Breedon were described by Pitt in his 'General View of the Agriculture of the County of Leicester' published in 1809 as follows:-
The kilns are in the form of an inverted segment of a cone, upon the perpetual kiln principle of laying in alternate layers of fuel and limestone at the top in constant succession and drawing the burnt lime out at the bottom, through an arch constructed for that purpose (Pitt 1809, 7).

He also describes the increasing use of lime as manure for improving land, reporting that quick (burnt) lime was laid on the land at 10 to 12 quarters to the area and then farrowed in. On newly reclaimed land, it was limed heavily every other year, elsewhere, probably every three or four years.

The county historian John Nichols, writing at about the same time, and in fact repeating extensively from William Marshall's 'Rural Economy of the Midland Counties' of 1790, gives a fuller description of the six or seven continuous burning kilns working at Breedon as follows:-
There are six or seven kilns at work; each built at the foot of the respective quarry, and against the base of the hill; with only one side open to draw at (this suggests they were cut into the base of the quarry face); *with only one side open to draw at* (rake out the burnt quick lime), but *with two and some three, eyes or draught holes, made wide and commodious, with an arch turned over each to support the top of the kiln; and within this archway, above the eye, are air holes to feed the fire (a new idea); these air holes, six or eight in number, reaching half way up the kiln. From the top of the archway projects a penthouse, or roof of faggots* (brush wood) *forming a shed, under which a quantity of drawn lime may be out of the way of the rain The burners make their layers unusually thick; the stone half a yard, and the coal five or six inches; coaling very highly (the pits only two or three miles from the kiln); throwing in coal as large as the head; their only idea seeming to be that of keeping up a strong fire in the kiln. They are all drawing kilns, being never let out during the burning season, unless to repair*, *drawing four or five loads from each kiln daily. The price at this time at the kiln is 18d. a quarter, with a perquisite to the burners of meat and drink.*



PROBABLY NOT UNLIKE THE SCENE JOHN NICHOLS AND WILLIAM MARSHALL WOULD HAVE EXPERIENCED AT BREEDON AND CLOUD HILL

The cost of five loads stands thus:-

	£	s	d
Thirty quarters at 18d	*2*	*5*	*0*
Lime men 2s. a load and 2s. over ***X***		*12*	*0*
Total	*2*	*17*	*0*

Or - 11s. 5d. a load of five quarters, namely about a cauldron and a half, common lime measure. The cost of fetching fifteen or seventeen miles away may be estimated at a guinea, with turnpikes near 3s. a load, together with watering, turning, and spreading. The whole amounting to 40s. an acre for the dressing.

John Nichols addendum to above at **X**:-
The latter particular is not quite accurately stated by Mr. Marshall; as will appear from the following communication, with which I have been favoured by the present renter of the lime-works; When our men promise the lime, they have 1s. for booking each person for the lime for the year; and 1s. 3d. for each wagon - load for perquisite for the lime-burners, no other demand being made. When the waggon comes for lime, it is customary for the servants to bring victuals and drink for themselves, and they sometimes give the lime-burners some with them, when they come to load very early in the morning, which is not a time men generally come to work. But, when the men burnt lime by the quarter, it was more a practice to bribe them it as a present; as we now pay them by the day, and charge the waggons ourselves. For those not satisfied with the charge, we have iron strikes with which we measure them. (**John Hackett gave this account to John Nichols on April 30th 1801**). **In Leicestershire Alehouse records, John Hackett is shown as having an Alehouse License in Breedon on the Hill from 1782 through to 1813.**

John Nichols continued:-
Mr. Monk in his agricultural report, says, "Breedon lime is not in high estimation for the farmers' use; they complain it is too strong, and they are afraid to use it on account of its great strength. Ticknall lime they approve, because they may lay on a large quantity without fear of injuring the land, the Breedon is six pence per quarter and the Ticknall somewhat dearer. Builders prefer the Breedon for their use. I recommended them to try the Breedon lime in compost with earth &c., as I should think by that method it would be found to answer, and prove a much better and cheaper manure than Ticknall".(Nichols 1804. Vol 3)

According to the date given in the above addendum by John Hackett, Nichols must have been writing these records in 1801

THE ADVANTAGES OF LIMESTONE WITH A HIGH MAGNESIA CONTENT

The advantages of limestone with a high magnesia content for producing quick lime that was advantageous to the growing of crops cannot be over emphasized, and this was a major feature of the limestone found in the quarries dealt with in this study, and particularly in those at Breedon Hill and Cloud Hill. **An analysis of Breedon Hill limestone taken in 1937 and which features in more detail later, showed the magnesia content to be 34.4%.**

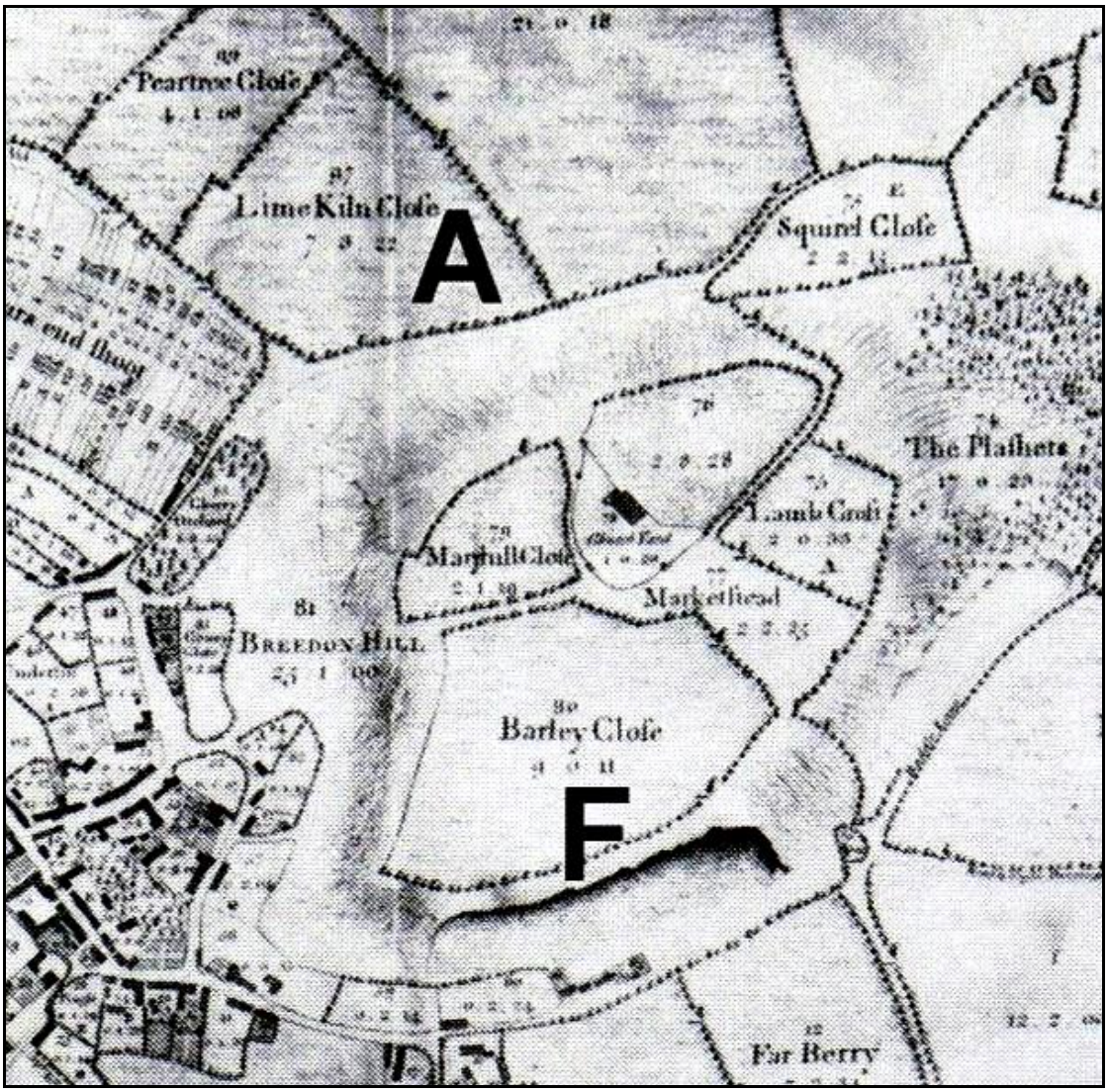
The author felt that the following extract of an article taken from 'The monthly magazine' No 271 Vol 40 **August 1st 1815** and written by Robert Bakewell would prove interesting. Robert Bakewell (1768-1843) was an English geologist:-

……..The late much regretted Mr. Tennant first ascertained that many of the limestones in the Eastern part of England contain as much as two fifths of Magnesia; this was supposed to be injurious to vegetation, and it was stated, that where a heap of it had been left in one place, it was rendered barren for many years. The magnesian limestone possesses certainly different properties to the common limestone; but it is not injurious to land if used sparingly. In some parts of Derbyshire where the limestone is employed in agriculture, I am informed by persons who use it constantly, that it produces all the good effects of the common limestone; but a smaller quantity is necessary; and where a heap of this limestone has been laid, though the spot remains barren for two or three years, it is afterwards covered with a crop of thick and luxuriant white clover. Whenever limestone is to be brought from a great distance, the farmer will find the magnesian lime most beneficial as a smaller quantity will produce the same effect as a larger quantity of common lime. For some years after the discovery of the magnesian limestone in England, it became fashionable amongst agriculturalists to decry its use and regard it as containing the elements of sterility.

It is not a little remarkable that Breedon-Hill in Leicestershire which is an isolated rock of magnesian limestone on which Mr. Tennant made his first experiments, should afford a striking illustration of the futility of this opinion. The rock is, as I have observed a mass of magnesian limestone with a flattened summit which is covered with vegetable soil. This summit is the most bleak and exposed situation in that part of the country; yet, not withstanding the situation, it is perhaps one of the most fertile pieces of soil in all England. When I last visited (1811)***, it was covered with as fine a crop of barley as I have ever seen; and I am informed, that it has seen a constant succession of heavy crops, without manure, for the last nineteen or twenty years.***

Now, if the magnesian limestone were so unfavourable to vegetation, it is a little remarkable that a mass, entirely comprised of it, but thinly covered with soil should present some of the most productable arable land in England; for the soil must contain a considerable portion of calcareous earth, of the same nature as the rock which projects through it in several parts of the hill. From the properties of magnesian limestone, it would seem more suited than the common limestone, to lay upon ground under fallow, to clear it from weeds, and also to assist the decomposition of vegetable matter in fresh manure……..

The following map shows Barley Close marked **F** on the top of Breedon Hill as being "9 acres 0 rood 11 perch" and confirms Robert Bakewell's preceding description. The 1761 date of the map also confirms that Barley Close was in use for growing barley many years prior to that described by Tennant.



EXTRACT FROM A 1758 MAP OF "THE LORDSHIP OF BREEDON"

SUPPLEMENTARY INFORMATION ON THE EARLS OF STAMFORD:-

In the middle of the nineteenth century, the Earl of Stamford and Warrington as Lord of the Manor, held much of the land in the Parish of Breedon and in 1834 had paid for the construction of the Free School (now 'The Old School House') off Hollow Road (White, 1846, pp328-9). The Curzon family of Breedon Hall were also important landowners in the Parish (White, 1846, p329). The Curzons (Earls Howe) acquired estates at Lockington by 1870 and Nathaniel Charles Curzon acquired Lockington Hall c.1872, transferring the family seat from Breedon Hall.

The Earls of Stamford and Warrington were descended from the Grey family of Groby (Leicestershire), which was founded by Sir Edward Grey, second son of the third Lord Grey de Ruthyn. He married Elizabeth, granddaughter and heir of the fifth Lord Ferrers of Groby (whose family had held land in Leicestershire since the thirteenth century), and died in 1457/8. His grandson Thomas Grey was created Marquess of Dorset in 1475. The third Marquess was created Duke of Suffolk, but was attainted and executed in 1555. His Groby and Bradgate

(Leicestershire) estate passed, however, to his nephew Sir Henry Grey, who was created Baron Grey of Groby in 1603. The second Baron married in 1620 Anne, youngest daughter of the second Earl of Exeter, through whom the manor and borough of Stamford (Lincolnshire) was acquired. He was created Earl of Stamford in 1628.

Enville (Staffordshire) was inherited by Ambrose Grey, younger son of the first Lord Grey of Groby, in 1594, on the death of his distant relative John Grey of Enville. John Grey's ancestor, Edward Grey of Whittington (Staffordshire), had acquired a moiety of the neighbouring Enville property in 1540. In 1687 there was another failure of the direct Enville line, and the estate passed to a cousin John Grey, a younger son of the first Earl of Stamford. On John's death in 1709 he was succeeded by his son Harry who in 1720 also succeeded his first cousin as third Earl of Stamford, thus uniting the Staffordshire and Leicestershire estates. Property in Nottinghamshire (North and South Collingham, near Newark, and Newthorpe, near Nottingham) came to the Grey family through the marriage of Anchitel Grey, another son of the first Earl of Stamford, to a co-heir of the Willoughby family of Risley (Derbyshire).

Harry Grey (1715-1768), elder son of the third Earl, married in 1736 Mary, only daughter of George Booth, second and last Earl of Warrington, through whom estates in Cheshire (Dunham Massey, Altrincham, etc) and Lancashire (Ashton-under-Lyne, Stalybridge, etc) came to the Grey family. Harry Grey succeeded his father as fourth Earl of Stamford in 1738, continuing to live at Enville until his death in 1768. His son the fifth Earl, having succeeded his mother in 1772, was created Earl of Warrington in 1790, and was lord lieutenant of Cheshire, but he too died at Enville, in 1819, as did his son the sixth Earl, in 1845. Important work was carried out on the gardens at Enville in the mid-eighteenth century (by the fourth Earl) and on the house towards the end of the eighteenth century (by the fifth Earl). The seventh Earl, who succeeded in 1845, enlarged the Enville estate and remodeled the gardens, but later built a new house at Bradgate Park, where he died in 1883.

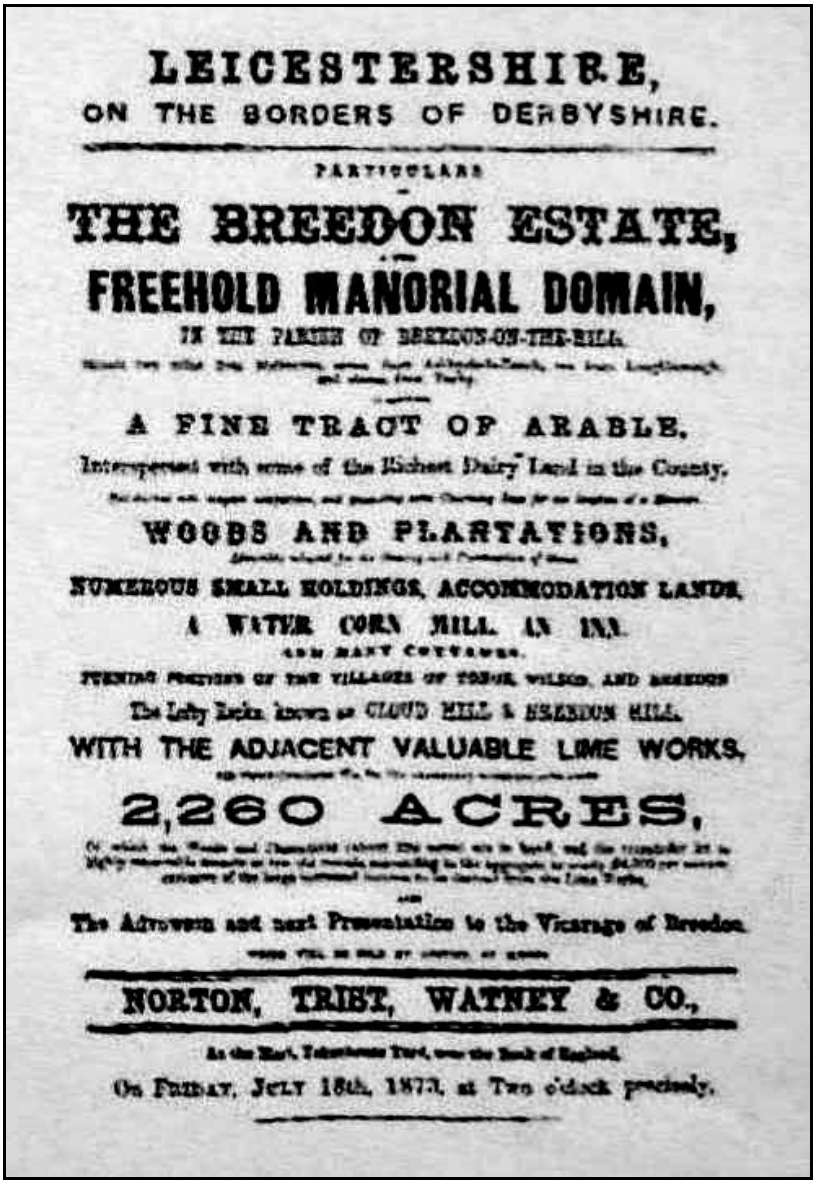
He left the Stamford and Warrington family estates to his widow for life, but on her death in 1905 they were divided, the Leicestershire estates passed to his niece Mrs Arthur Duncombe,

In 1883 the Stamford estates consisted of 9,012 acres in Leicestershire.

When Lord Stamford (7th Earl) sold his manor of Breedon, which extended over 2260 acres, to Charles Frederick Clifton (Abney-Hastings), of Donington Hall in 1873, for £173,000, following his marriage to the Countess of Loudon who died in 1874. The area of Breedon Cloud Wood at this time was given as 146 acres. Abney-Hastings was awarded the title of Lord Donington in 1880. The sale included both the Breedon and Cloud Hill quarries and lime works. In 1873, Breedon Cloud Wood was still a very valuable property and in nature was much as it had been for at least the previous three and a half centuries and probably very much longer. The 1761 map (post enclosure) gives the wood as 150 acres and demonstrates that not much had changed in respect of this over a period of 100 years.

Apparently, Abney-Hastings had the Breedon Estate valued, with a view to increasing the rents of farms and quarries, and he was advised that the quarries should pay £1,500 p.a.

Mr. John Bostock **(see the later features on the Bostocks')** whose family had been long standing tenants of Earl Stamford refused to pay the increase, and the quarries were let to a Mr. Fieldingmore of Leicester, who paid the rent for only one year, but worked the quarries for a further two years before going bankrupt.



LEICESTERSHIRE,

ON THE BORDERS OF DERBYSHIRE.

PARTICULARS

OF

THE BREEDON ESTATE,

AND

FREEHOLD MANORIAL DOMAIN,

IN THE PARISH OF BREEDON-ON-THE-HILL.

A FINE TRACT OF ARABLE,

Interspersed with some of the Richest Dairy Land in the County.

WOODS AND PLANTATIONS,

NUMEROUS SMALL HOLDINGS, ACCOMMODATION LANDS,

A WATER CORN MILL, AN INN,

AND MANY COTTAGES,

FORMING PORTIONS OF THE VILLAGES OF TONGE, WILSON, AND BREEDON

The Lofty Rocks known as CLOUD HILL & BREEDON HILL,

WITH THE ADJACENT VALUABLE LIME WORKS,

2,260 ACRES,

The Advowson and next Presentation to the Vicarage of Breedon.

NORTON, TRIST, WATNEY & CO.,

On FRIDAY, JULY 18th, 1873, at Two o'clock precisely.

Lord Donington was a frequent visitor to Scotland, and during one of his visits to Stewarton, he met Mr. John Gillies Shields, a farm labourer at that time. He created such a good impression on him that Lord Donington offered him the position of farm bailiff on his estate at Isley Walton. Mr. Shields accepted the post, and with his wife and young son moved to the manor house at Isley Walton which became the family home for the rest of Mr. Shields' life. Lord Donington later promoted Shields to become his land agent.

Following the bankruptcy of Mr. Fieldingmore, Lord Donington decided to run the quarries himself with a Mr. Stapleford from Coalville as his manager. From 1880 to 1886, the returns from the quarries decreased, with the net profit never being more than £400 per annum and in one year only achieved £3 8s. 4d. Abney-Hastings, now Lord Donington asked Mr. Shields, his loyal servant, to take control of the quarries, this he did and subsequently employed a Mr. Thomas Jamieson as manager. He helped to turn around their fortunes, and between 1886 and 1895, profits between £800 and £1,000 were achieved.

Lord Donington died in 1895, however, John Gillies Shields of Isley Walton had apparently been sufficiently astute to obtain a 30 year lease from the estate's trustees for Breedon and Cloud Hill quarries, including some cottages and land for £1,000 p.a. Subsequently, a number of large circular industrial continuous burning kilns were built at Breedon and Cloud Hill, and more importantly following significant further investment, two continuous burning "Sercombe" kilns were constructed c.1900, one at Breedon and the other at Cloud Hill. This heralded a new era of investment in order to meet the growth in demand for burnt lime and roadstone. **Details of these kilns feature later.**

After 300 years of Hasting's ownership, Donnington Hall and park land fell under the auctioner's hammer on 24th October 1901. The Hall was purchased by Frederick Gretton, the younger, brother of John Gretton MP of Stapleford Park. John Gillies Shields, who had been Lord Donington's (Abney – Hastings) loyal and astute land agent, continued to maintain the hall and park over the next decade in Gretton's absence. J. G. Shields was already a well known local personality and land investor, married with a young family and still living in the manor-house at Isley Walton, which was also the company headquarters.

In 1914, the First World War started and Donington was commandeered and transformed into a detention barracks. After the war, the building was renovated to an acceptable standard and handed back to Frederick Gretton. After Gretton died in 1929 the estate was inherited by his brother, but apparently he had no interest in it. John Gillies Shields had clearly been waiting in the wings, and he purchased Donington Hall for himself.

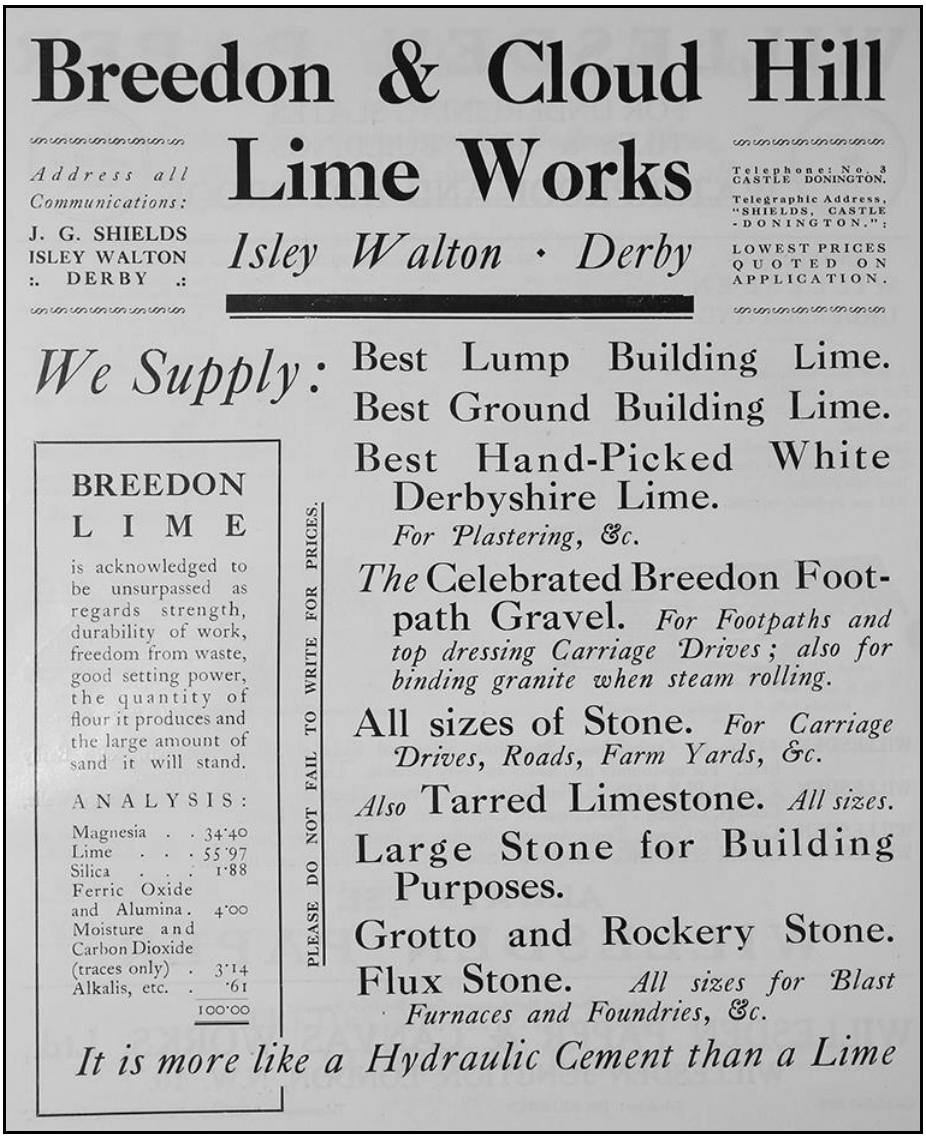
By 1920, before his lease expired, Mr. Shields had purchased both quarries and the adjoining wood at Cloud Hill outright. This very able businessman went on to acquire much of the remainder of the Donington lands in Breedon Parish, including Breedon Hall, which he purchased from the Curzons.

On the 4th of January 1933, J. G. Shields formed his entire mining operations into a limited company known as "Breedon & Cloud Hill Lime Works" and this name continued until 22nd May 1987. John Gillies Shields died in 1943 and his son Captain Charles Shields then took over the business. Various Annual General Meetings recorded in newspapers give Mr. F Wooley-Hart as chairman of Breedon and Cloud Hill Limeworks between 1935 and 1964.

Both Breedon and Cloud Hill quarries supplied quick lime (burnt lime) for use on the land by gardeners and farmers, and for use in mortar for building work etc. Apart from quick lime, the lime stone itself proved ideal for use in buildings walls, roadways, footpath gravel etc. However, it was not suitable for architectural purposes due to being full of irregular cavities and the only structure know to be built from Breedon Stone is the small memorial building on The Green at Breedon on the Hill.

The author understands that during World Wars I & II the burning of lime was halted and thousands of tons of limestone for use as a flux in the smelting of iron ores in blast furnaces and foundries was supplied to the industry; limestone containing Magnesia, as at Breedon & Cloud Hill, making a better flux stone than pure limestone. The reader will see at the end of the book a feature on the "Moira Blast Furnace" which used limestone from Cloud Hill quarry as a flux during the smelting of iron ore.

The Hastings of Donington Hall, were owners of the Moira Blast Furnace & foundry, the Moira Collieries and the Moira Lime Kilns for a long period. Abney-Hastings also purchased the Breedon and Cloud Hill quarries and lime works in 1873 from Earl Stamford as explained above. It is recommended that the reader refers to the feature entitled "A Basic history of the Moira blast Furnace, Foundry, Early Moira Coal mines & Lime Kilns" on page 111 onwards for further information.



AT THE TIME OF THIS 1927 ADVERTISMENT, J. G. SHIELDS OWNED THE COMPANY AS EXPLAINED PREVIOUSLY. From Grace's guide to British industrial history.

The following analysis of "Breedon Lime" is taken from the above 1927 Breedon & Cloud Hill advertisement.:-

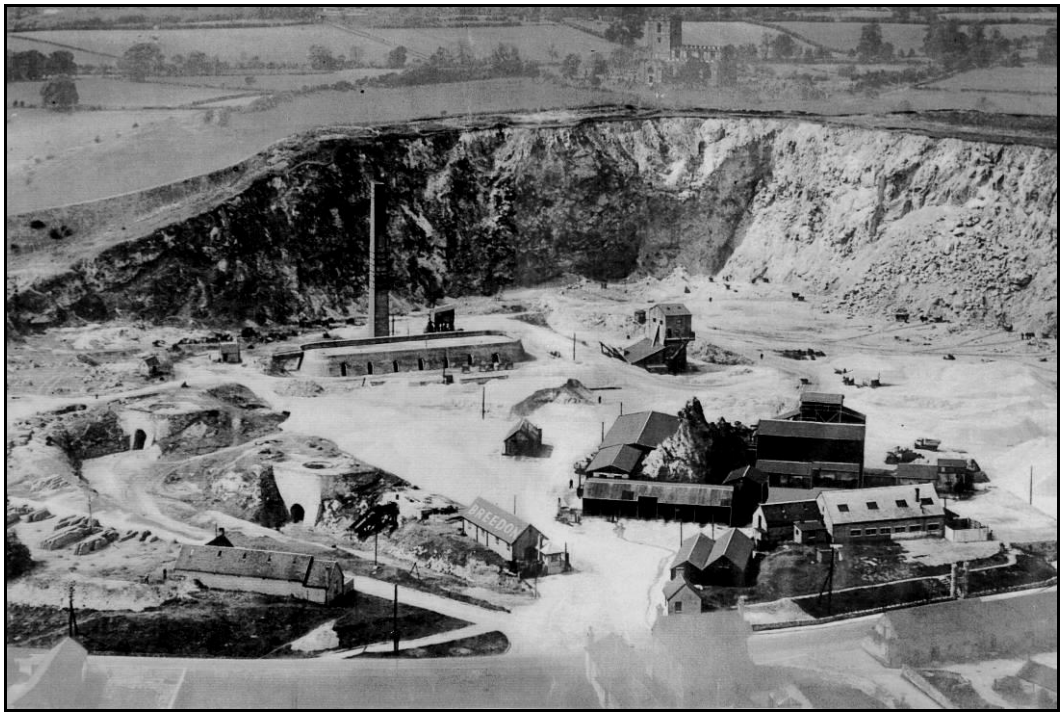
Magnesia 34.4%, Lime 55.97%, Silica 1.8%, Ferric Oxide & Alumina 4%, Moisture & Carbon Dioxide (traces only) 3.14%, Alkalis etc., 0.61%.
The Breedon / Cloud Hill limestone is extremely hard and almost semi-crystalline in nature.

At the 1937 British Industries Fair Exhibition, Stand No. B.518, the following products were listed as being made by at Breedon and Cloud Hill Lime Works - **Breedon Footpath Gravel. Breedon Concrete Kerbs. Breedon Concrete Flags. Breedon Building Lime. Breedon Rockery Stone. Breedon Tarred Limestone. Breedon Concrete Roofing Tiles. Breedon Limestone. Breedon Hard Tennis Court Surfacing Materials.**

JOHN GILLIES SHIELDS 1857 - 1943

PHOTOGRAPHS OF BREEDON QUARRY

PHOTOGRAPH TAKEN IN 1936 JUST PRIOR TO THE 1937 BRITISH INDUSTRIES FAIR EXHIBITION. THE TWO LARGE ROUND LIME BURNING KILNS ARE MARKED A, BOTH OF WHICH HAD TO COOL DOWN BEFORE THE BURNT LIME COULD BE RAKED OUT AND LOADED INTO WAGGONS. THE SERCOMBE CONTINUOUS BURNING MULTI-CHAMBER KILN IS MARKED B. THIS WAS IN OPERATION AT THIS TIME AS THE CHIMNEY CAN BE SEEN SMOKING



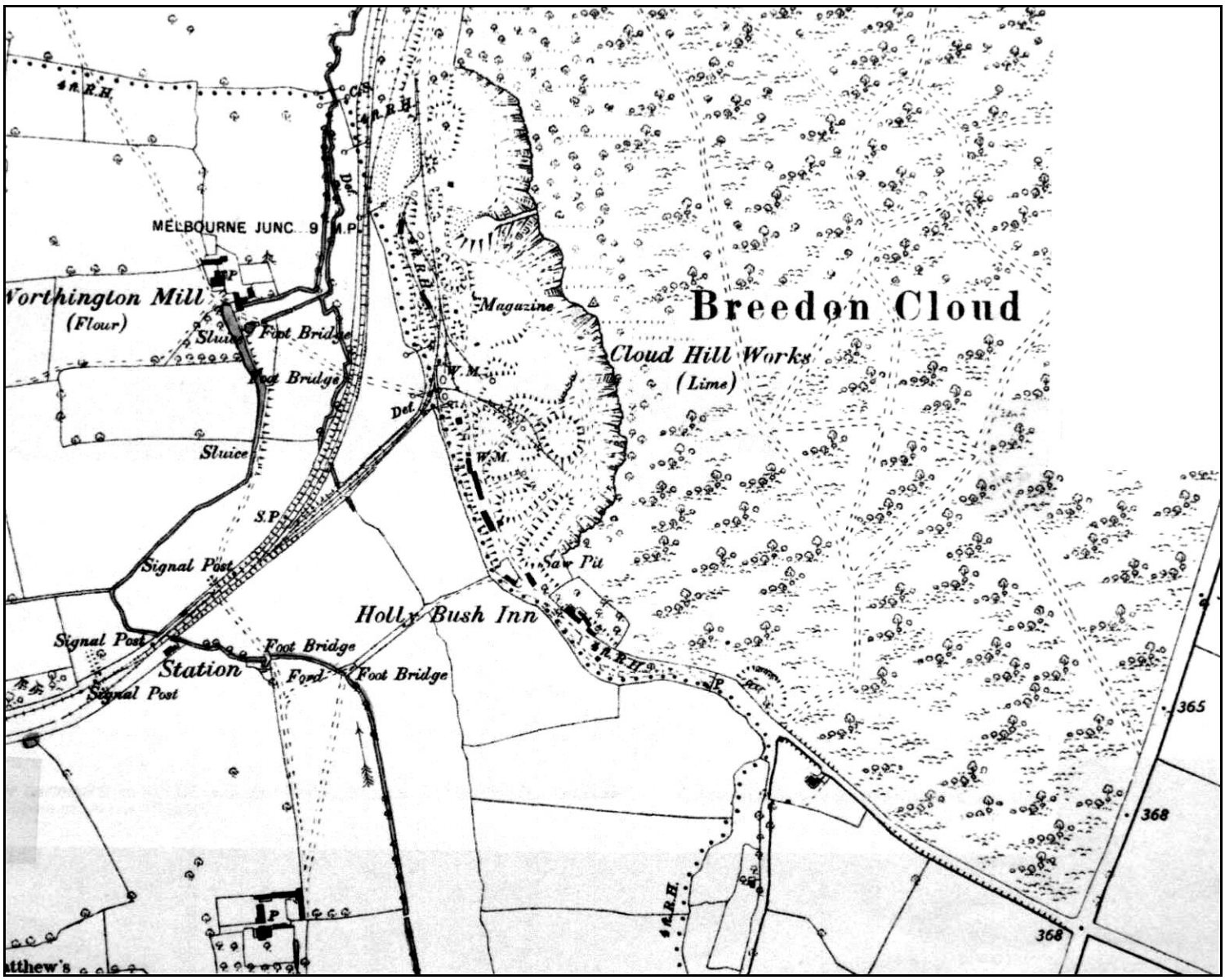
PHOTOGRAPH TAKEN IN 1946 JUST AFTER THE WAR – THE KILNS WERE NOT IN OPERATION AT THIS TIME

PHOTOGRAPHS OF CLOUD HILL QUARRY

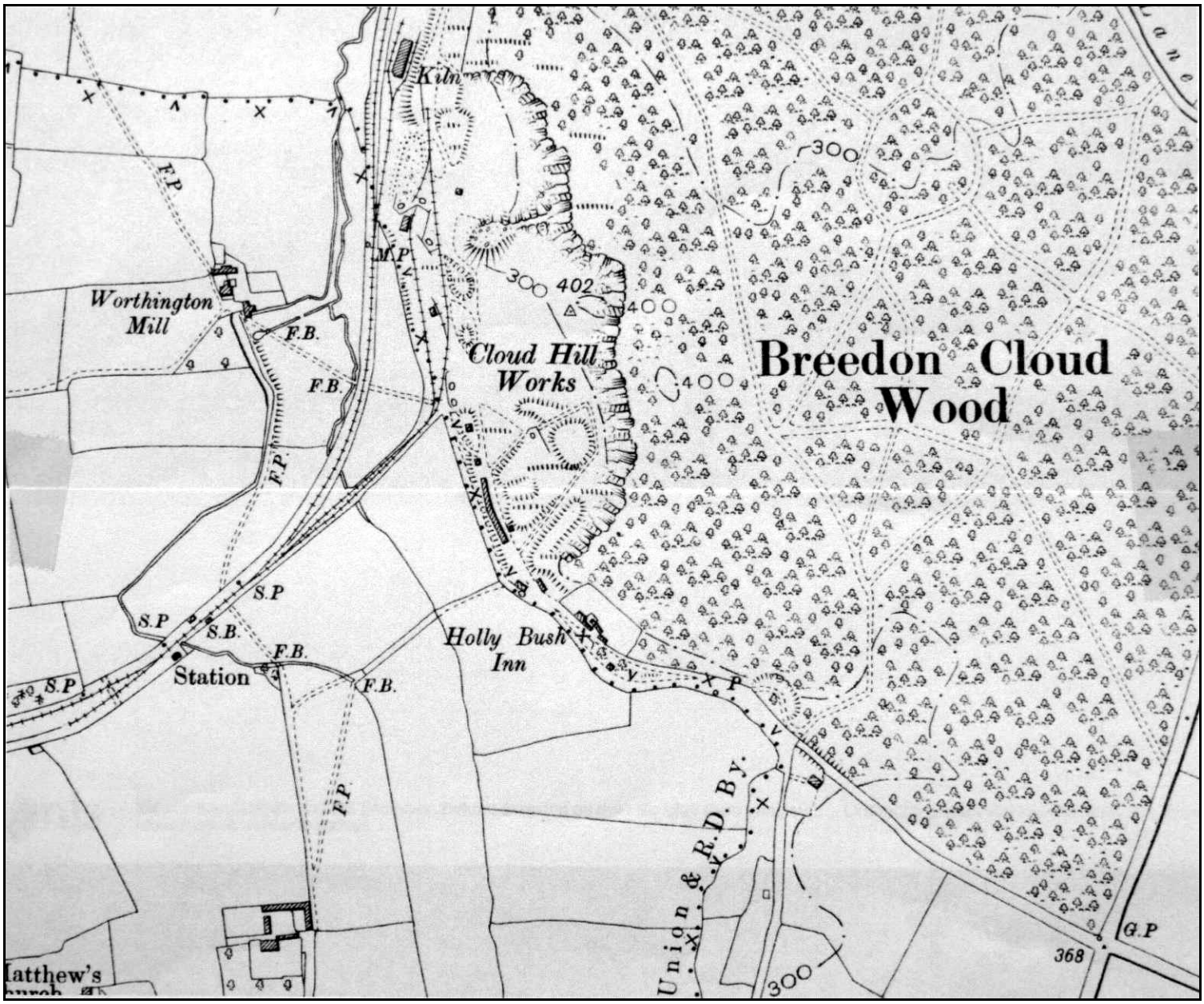
THE SERCOMBE KILN CAN BE SEEN MARKED 'A'
IN THIS c.1946 PHOTOGRAPH

This 1946 aerial photograph taken from the south west shows two kilns marked **A**, which were still in use, and burnt lime from the RH one is being loaded into a truck. At this time, there appears to be large metal covers on the top which would have been used to both control the amount of hot gasses drawn through the kiln and to protect the burnt limestone from the elements as rain falling on it would have ruined it.

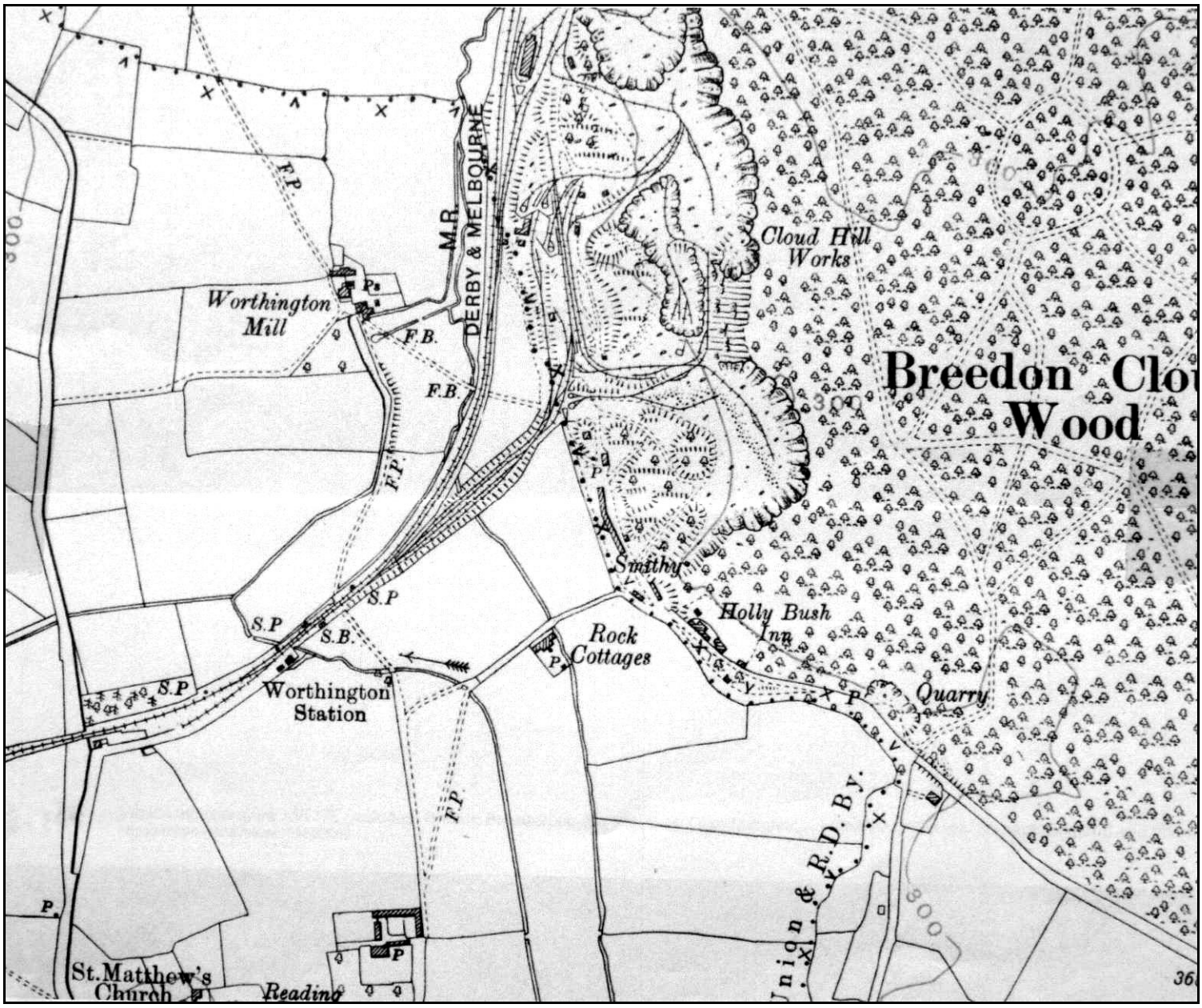
A SERIES OF O/S MAPS FROM 1881 TO 1925 TO ILLUSTRATE THE EXPANSION / DEVELOPMENT OF CLOUD HILL QUARRY OVER THAT PERIOD WHEN ONLY LIME BURNING WAS TAKING PLACE AT THE QUARRY



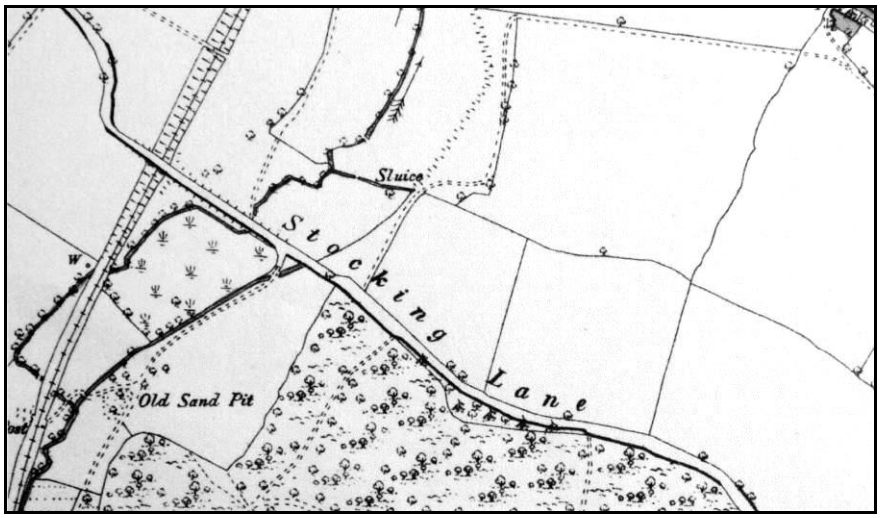
1885 PUBLISHED O/S MAP - SURVEYED 1881/2

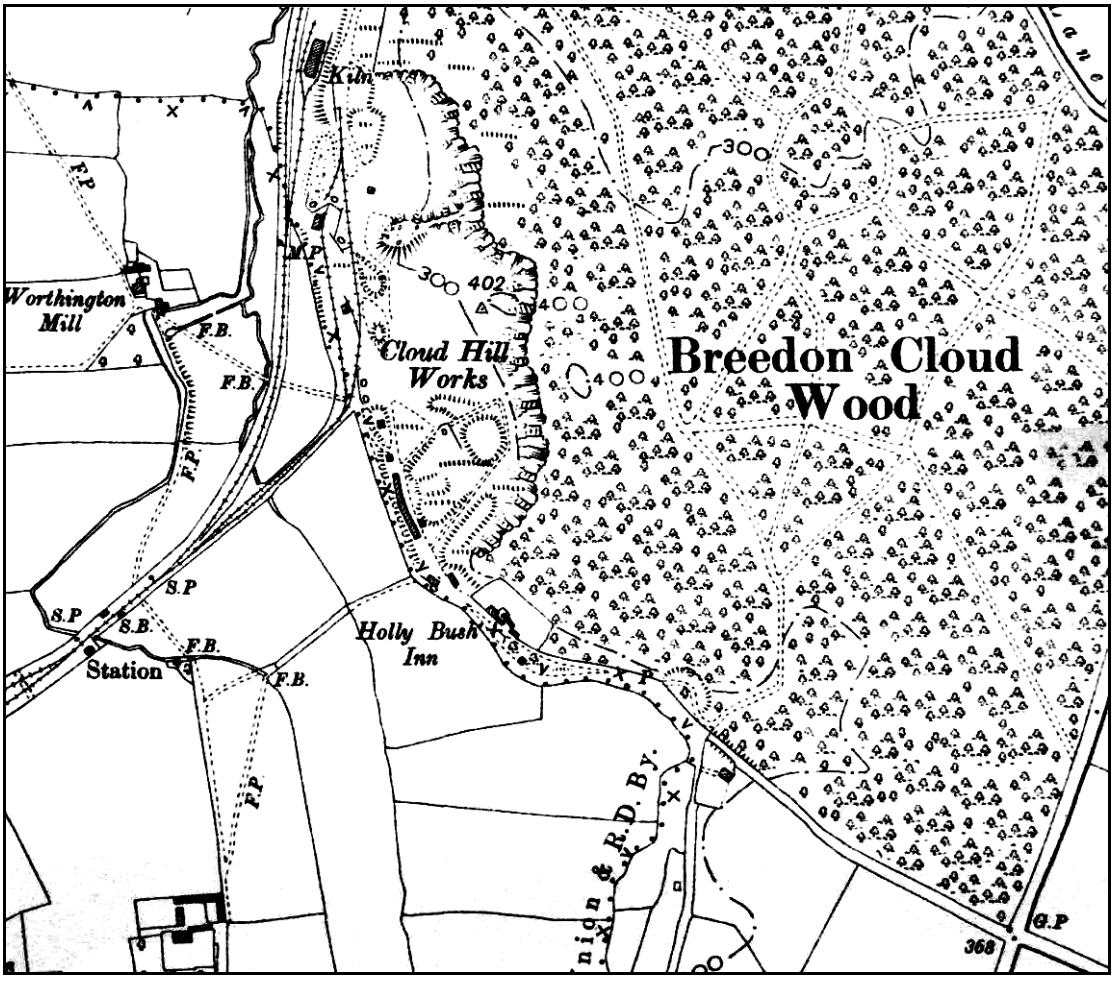


1903 PUBLISHED 0/S MAP



1925 PUBLISHED O/S MAP

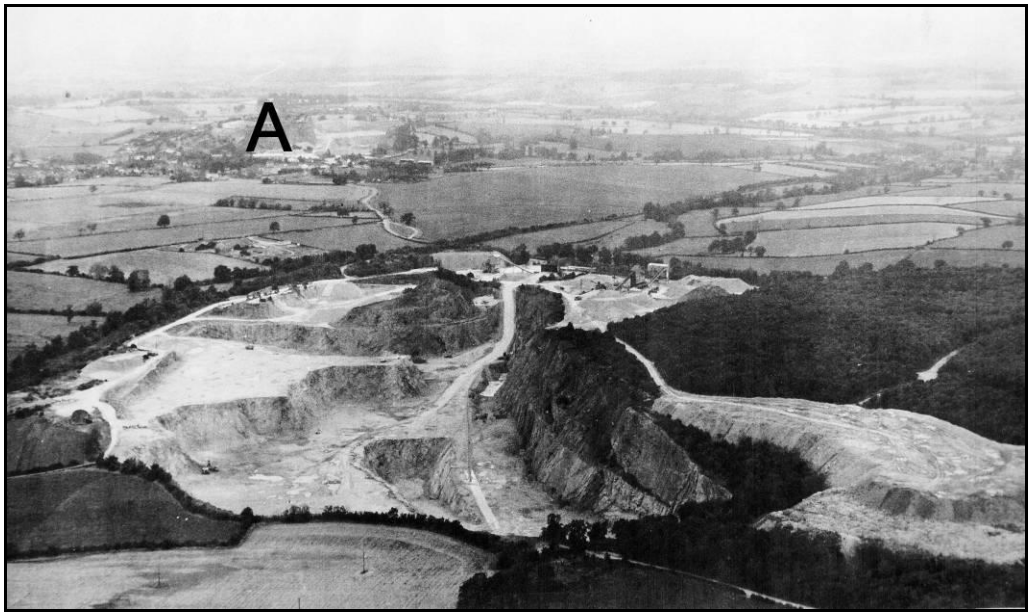




SPLIT 1903 PUBLISHED O/S MAPS TO SHOW AREA NORTH OF QUARRY AND STOCKING LANE

NOTE THE DIFFERENCE

1946 AERIAL PHOTOGRAPH TAKEN PRIOR TO LIME BURNING AT CLOUD HILL QUARRY COMING TO AN END SHORTLY AFTER THE SECOND WORLD WAR – BREEDON QUARRY IS MARKED A IN THE DISTANCE



1970 AERIAL PHOTOGRAPH OF CLOUD HILL QUARRY – BREEDON QUARRY IS MARKED A

A SYNOPSIS OF A CONTRACT & DISPUTE BETWEEN JAMES ORME AND JOSEPH BOSTOCK & CO LTD, REGARDING THE SUPPLY OF COAL TO THE LIME KILNS AT BREEDON AND CLOUD HILL

SEE THE FOLLOWING ARTICLE ON THE BOSTOCKS' ALSO

This information is contained in papers held at Ashby Museum

Evidence of the success which Breedon & Cloud Hill quarries enjoyed in the early 1800's is illustrated below during the time when James Orme held the lease for the mining of coal on Earl Ferrers Estate at Staunton Harold and was supplying coal to both Breedon Hill & Cloud Hill lime kilns. Bear in mind that Sir George Beaumont would have also been supplying coal from his mines in the Smoile via the tramway up to Cloud Hill.

During the period when James Orme held the lease at Staunton Harold for the mining of limestone, lead ore and coal on Earl Ferrers estate, he became involved in supplying "large" quantities of coal and slack to both Cloud Hill and Breedon limestone burning kilns. At this time, Bostock & Co Ltd were the tenants at Cloud Hill quarry which was owned by Lord Stamford, as was the limeworks at Breedon. Joseph Bostock was described as a lime burner in census returns, as was his son John, who succeeded him. Bostock was clearly managing the lime burning kilns as part of his tenancy agreement of the quarry. A contract was drawn up between Orme and Bostock for the supply of coal and slack to Cloud Hill. Information on this business came to light recently in a rather complex set of papers held at Ashby Museum, the following being a synopsis only of these. Importantly, the papers also reveal two new coal mines at Staunton Harold which the author was not aware of from research carried out previously on coal mining on the Staunton Harold estate, these being "Wood Pit" and "Coppy Pit''.

The tramway, which ran from Cloud Hill to the Ashby Canal at Willesley basin facilitated the transportation of coal and slack up to the lime kilns in horse drawn wagons from the Smoile. In addition to supplying from his Woody and Coppy pits, James Orme also purchased coal and slack from Lady Beaumont's Coleorton pit adjacent to the Smoile for sending on to Cloud Hill and Breedon, plus on occasion via the tramway link to Ticknall lime kilns. Benjamin Walker was the 'Butty' (contract manager) at Lady Beaumonts pit in the Smoile at the time. Coal supplied to Breedon would presumably have gone via in the turnpike road in horse drawn wagons. It is recorded that the horse drawn wagons were led by 'apprentice boys' who were referred to as 'Nippers', a word which continues today by some of the old folks when describing small children. They were responsible to the gang waggon man.

The following extract from a document demonstrates the large quantities of coal being shipped to Breedon and Cloud Hill from the Staunton Harold coal mines:-

Jan 25th to Sept 25th 1827

		Tons	**Cwt**
Breedon –	388 Waggons	1003	12
	461 Carts	599	60
Bostock -	294 Carts	303	4
Cloud Hill	240 waggons	624	0

It is recorded that between June and October 1827, James Orme supplied from Coppy and Wood Pits, 60 tons of coal (no slack) for £23. 19s. equating to a price of 8 shillings per ton.

An acrimonious situation developed between Bostock and Orme when Bostock claimed that Orme was responsible for supplying inferior coal / slack for his kilns and evidence was sort from the mine contractors, known as Butty's and the coal miners themselves in order to refute Bostock's claims. It is not possible to record the large amount of evidence here, and anyone wishing to research this further can do so at the Ashby Museum. It is clear however, that there was very little evidence supporting Bostock's claims. For example, the same coal / slack being used at Ticknall from Lady Beaumont's mine produced good results which obviously did not help Bostock's case. It was suggested that the kilns were set differently at Ticknall to his kilns, but this was not accepted.

A case was heard before J. A. Twiggs on observations made by Mr. Mammatt on the subject in dispute between Mr. Bostock and Mr. Orme in August 1828. This was recorded in a sixteen page document which in short clearly found in favour of James Orme. The last para of this document reads:-
I have examined the slack now lying upon Mr. Orme's colliery banks and which is said to be complained of by Mr. Bostock, and have no hesitation in stating that it is a better article than what is now furnished by Lady Beaumont to the customers and it lays now ready for the inspection of any person or persons Mr. Bostock may please to appoint for that purpose.

Cont'd over leaf

JONATHAN, JOSEPH AND JOHN BOSTOCK – FARMERS AND LIMESTONE BURNERS AT BREEDON AND CLOUD HILL QUARRIES

SEE PREVIOUS ARTICLE ALSO

The importance of the Bostocks' family involvement with lime burning at Cloud Hill & Breedon Quarries for at least 60 years cannot be over emphasized. In 'Hand-me-down Hearsays' by the Rev. John Dawson, we are told that the Bostock's family rented the lime burning kilns on a year to year basis at an annual rent of £500. Apparently they had been tenants of Lord Stamford for over 200 years, which presumably included land for their extensive farming activities also. According to family genealogy records, John received a cup from Lord Stamford in 1855 for "the best kept farm" which is recorded as being retained in the family in 1959.

A record at the L&RRO – DE 311/101/2,346,6 shows that Jonathan and Joseph Bostock of Osgathorpe, in 1816 held a lease for the Kilns at Cloud Hill and Breedon Hill quarries**. John Nichols, the Leicestershire Historian records that the lime-works / lime-stone burning kilns were previously being rented by John Hackett in 1801.**

Jonathan Bostock was born 1749 and married Mary, born 1756. He had a son Joseph who was born 14/5/1780 and baptized 17/5/1781 at St. Mary, Weston-on-Trent, Derbys. He married Ann (born 1789). This Jonathan and Joseph are the two Bostocks' mentioned above as holding the lease for the lime kilns in 1816.

Joseph Bostock, son of Jonathan Bostock (1749) and Mary (1756) had seven children:-
Joseph William Mugliston (1814), Sarah (1815), Jonathan (1817) John (1818), Eliza (1820), Thomas (1823) and George Samuel (1824).

Joseph Bostock's son John also became a leesee / tenant of the lime burning side of the quarries at both Breedon and Cloud Hill. Information gathered from research shows that the Bostocks' must have formed a close relationship with the 7th Earl Stamford and Warrington who owned the quarries at the time of their long history of involvement.

By 1813, Joseph was being listed as a "Gentleman of Osgathorpe", so he clearly enjoyed some status at that time. He was a farmer of some standing, in Belton in 1815 and then onwards from 1817 at Breedon on the Hill where he combined farming with his lime burning business throughout.

At the end of November 1833, trouble had developed in the Swannington stationary haulage engine at the Swannington Incline which was at the end of the Leicester to Swannington Railway where the Coleorton Railway would later join. The engine was only installed at the beginning of November. Temporary arrangements were made with Joseph Bostock, a shareholder in the company (Leicester to Swannington Railway) and lessee of Cloud Hill lime works of course, for his horses to haul wagons up the incline, and this arrangement was still in force on 18 February 1834, when Harding, who held the contract for maintenance of the whole line, was asked if he objected to horses working the traffic along the entire length of the "upper section" as far as the top of Bagworth incline, an expedient made necessary by the acute shortage of engine power. Bostock did not appear to have asked for extra payment over and above his contract figure. A rebate of one sixth of the tonnage rate per mile was allowed on all coal and lime during this 'horse-drawn period'. The engine repairs were not completed by 7 March 1834, when the working of the incline was entirely suspended due to a dispute over an increase in rates. This was settled and working by stationary engine resumed on 11 May, though the traffic only required this on two or three days per week.

Joseph Bostock again became active in 1835, with suggestions for improving the handling of his traffic. The company agreed to remove the lime shed at Swannington to the further end of the Coleorton Railway in order to reduce the distance from the Cloud Hill lime works to the railhead. They also agreed to support him in an approach to the Ashby-de-la-Zouch Canal Company asking for their tram road from Cloud Hill to be repaired and improved so that it might convey his traffic to the Coleorton Railway for transhipment into wagons suitable for working through to Leicester (from "The Leicester & Swannington Railway" by C.R.Clinker – Leicestershire Archaeological Society).

If the reader refers to the section on the building of the Coleorton Railway, details are given there of Joseph Bostock & Co. Ltd laying a separate rib (edge) rail to the existing tramway to Cloud Hill from 'Worthington Rough' near Lount to link up directly with the Coleorton Railway's 4ft 8 ½ inch gauge track thereby preventing the need to tranship from the 4ft 2inch gauge plateway track. This was completed on August 5th 1840 and was financed with loans from both the Coleorton and Leicester to Swannington railways.

In "The Leicester to Swannington Railway" by C.R.Clinker (Leicestershire Archeological Society) it is recorded on the only *surviving* shipment document (1832 to 1845) that the following shipments of burnt lime were sent via the Railway to Leicester from Cloud Hill.

	Tons	**Cwts**	**Qt's**
First 6 months of 1833	**371**		

The above would have presumably been transported to Long Lane, Whitwick by horse drawn wagons on the turnpike roads as the railway to the "Swannington Incline" was not completed till November 1833.

First 6 months of 1844	**783**	**11**	**2**
Last 6 months of 1844	**2044**	**9**	**1**
First 6 months of 1845	**675**	**8**	**3**

The above would have been transported by horse drawn wagons on the Coleorton Railway to be transshipped onto the Leicester to Swannington railway wagons at 'Swannington incline'.

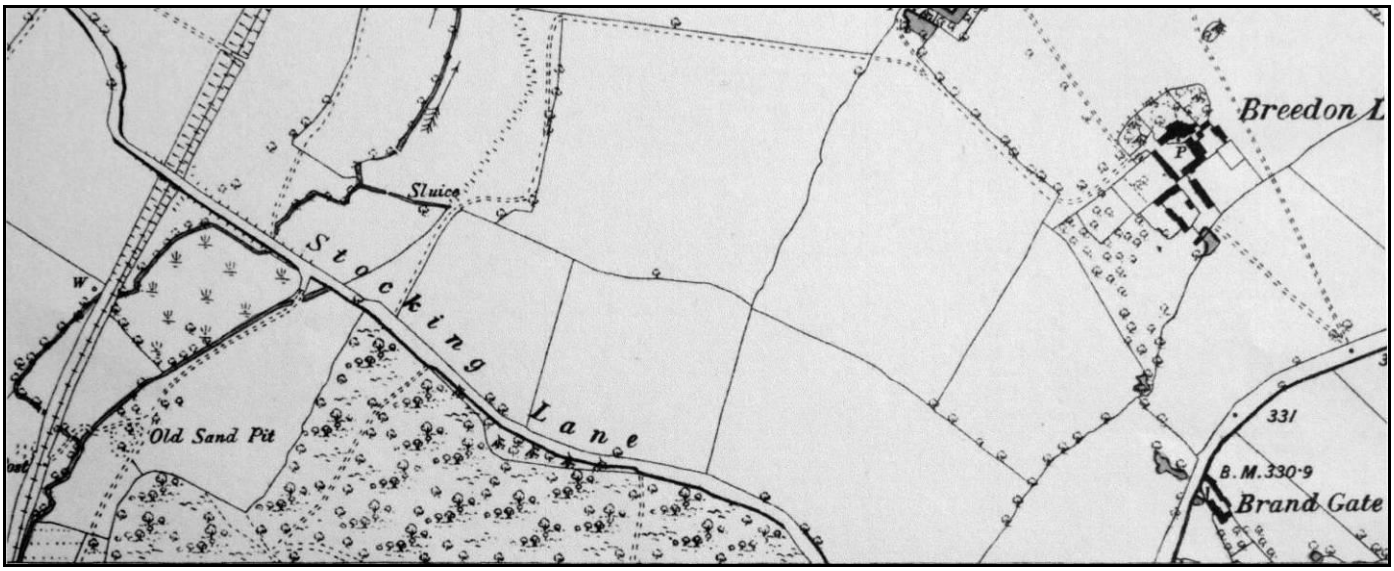
It is not known exactly when Joseph's son John Bostock (born Osgathorpe 22/9/1818) took over as lessee / tenant of the lime burning operation but in 1846 he was still listed in trade directories as a farmer. His father Joseph had died in 1853, but two years prior to his death, Joseph is still listed in the 1851 Breedon on the Hill census as still being a lime burner and tanner (quick lime was used in the tanning process) aged 69 and owning 490 acres.

In the same 1851 Census, his son John, aged 32 is listed as a farmer of 285 acres. It is likely that this was part of his father's 490 acres. John had clearly taken on the lease / tenancy at Breedon and Cloud Hill from his father following his death, as in the "Post office Directory for Leicestershire, Nottinghamshire 1855", he is given as a farmer and lime burner of Breedon Lodge. It is not unreasonable to assume that his father Joseph was living at Breedon Lodge farm prior to his death also.

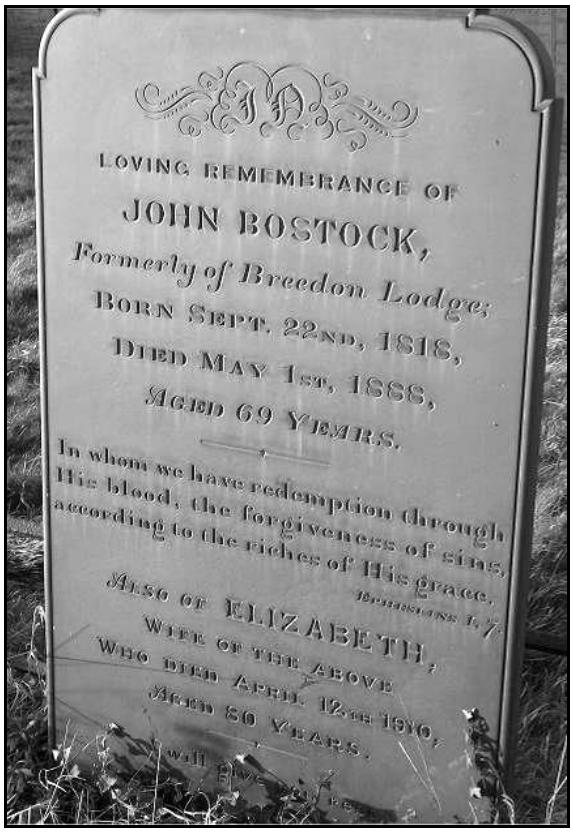
In the 1871 Breedon on the Hill census, John, aged 52, is still listed as being a farmer and lime burner, but by the 1881 census returns he is given as being a retired farmer living in Osgathorpe.

Joseph Bostock died in 1888, and he is recorded as being in Costock, Notts, although he was buried in the graveyard at St. Mary and St. Hardulph's church, Breedon on the Hill.

The Bostocks' were the proprietors / lessees / tenants of the lime burning operations at Breedon and Cloud Hill for at least 60 years and the fact that they established a substantial farming business and lived at Breedon Lodge / Farm suggest that from probably humble beginnings Joseph in particular established himself as a wealthy man which his son John inherited.



1925 O/S MAP SHOWING BREEDON LODGE / FARM (TOP RH CORNER) IN RELATION TO STOCKING LANE WHICH RUNS ALONG THE NORTH EDGE OF THE QUARRY AND CLOUD WOOD



JOHN BOSTOCK'S AND HIS WIFE ELIZABETH'S GRAVESTONE

TWO OF THE EARLY LIME BURNING KILNS AT CLOUD HILL QUARRY

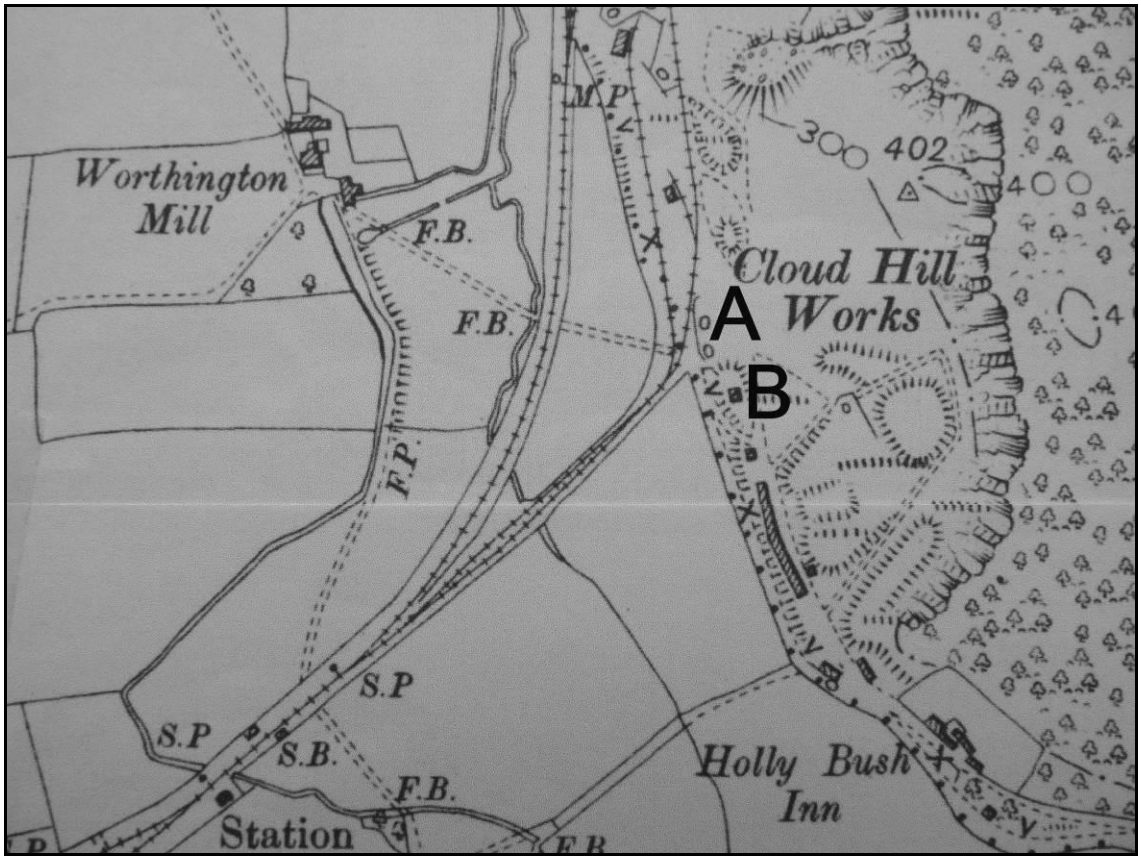
On the 1885 O/S maps we can identify 6 individual round kilns at Cloud Hill. In 1900 we know that a large 14 chamber “Sercombe” kiln was built at both Breedon and Cloud Hill quarries. In 1903, we can identify 6 individual round type kilns plus the Sercombe kiln. By 1920 we can identify 5 individual round type kilns plus the Sercombe kiln. This does not mean that all the kilns were working at this time and once the Sercombe kiln had been built, no doubt some other kilns became redundant.

A PHOTOGRAPH OF ONE OF TWO ADJACENT LARGE ROUND PRE- INDUSTRIAL TYPE KILNS MARKED A ON THE FOLLOWING 1901 MAP AND BEING CHARGED WITH ALTERNATE LAYERS OF LIMESTONE AND SLACK COAL FROM THE TOP VIA HORSE DRAWN WAGONS RUNNING ON TRAMWAY RAILS.– c.1885.

THESE KILNS OPERATED ON THE SAME BASIC PRINCIPLE AS EXPLAINED EARLIER

HEALTH & SAFETY WAS CLEARLY NOT A CONSIDERATION AT THIS TIME!!

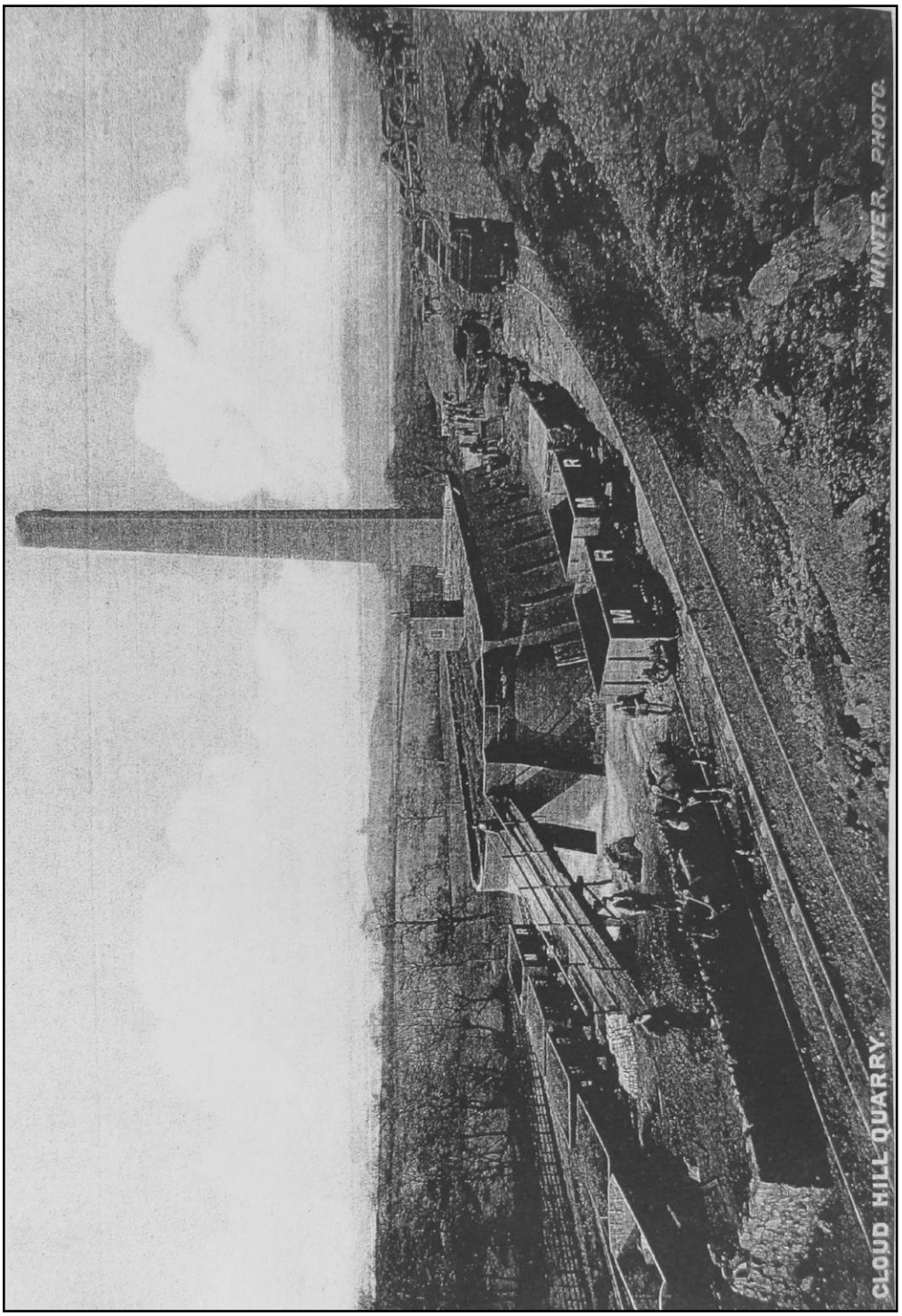
ANOTHER PHOTOGRAPH TAKEN AT THE QUARRY c.1925. SHOWING THE TOP OF THE KILNS (SMOKING) SHOWN IN THE PRECEDING PHOTOGRAPH



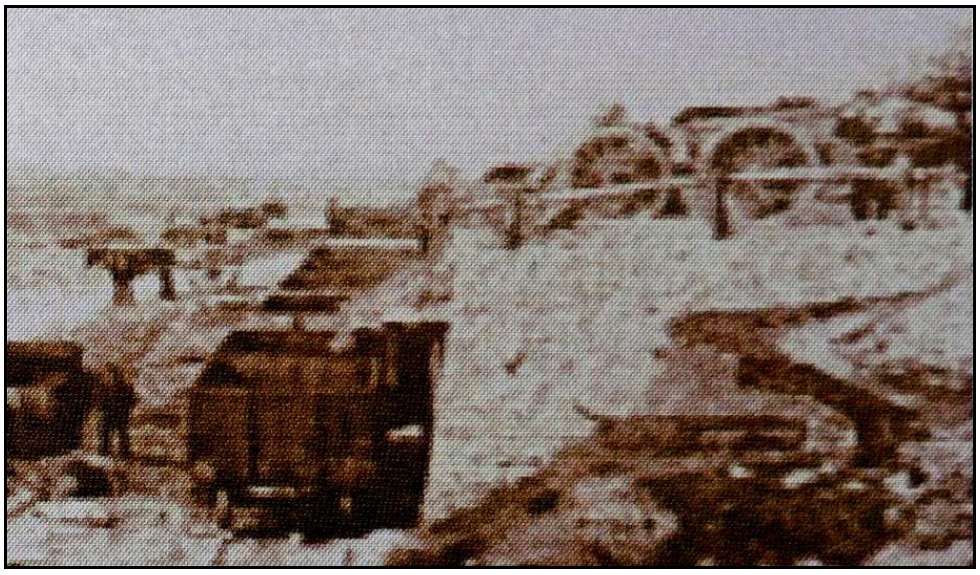
EXTRACT FROM 1901 MAP SHOWING THE LOCATION OF THE TWO KILNS WHICH ARE MARKED A . THE COTTAGE IN THE BACKGROUND OF THE PHOTOGRAPH IS MARKED B. OFFICES AND A WEIGH HOUSE WERE BUILT LATER TO THE SOUTH EAST OF THE COTTAGE, WHICH ARE THOUGHT TO BE THE BUILDINGS SHOWN IN THE ABOVE PHOTOGRAPH

This is an 1946 aerial photograph shows more clearly the location of the two old kilns marked **A** which were still in use at this time.

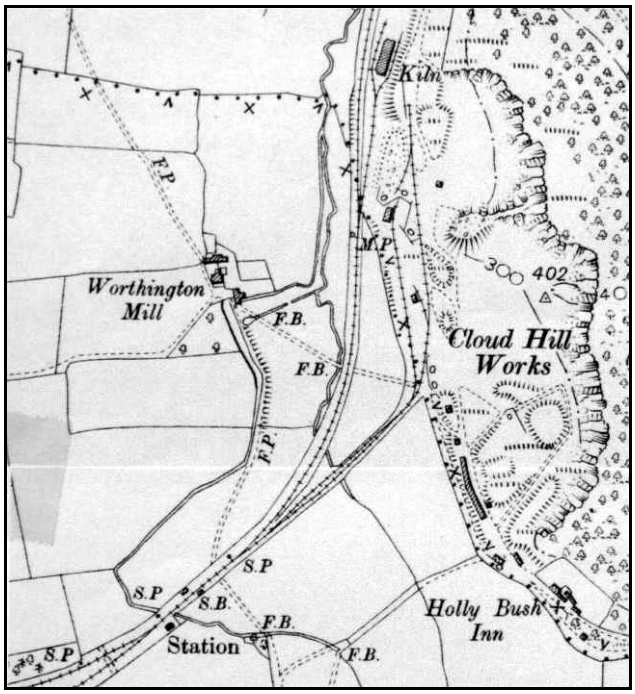
THE SERCOMBE CONTINUOUS BURNING KILN AT CLOUD HILL – 1900
(A similar kiln was also constructed at Breedon about the same time)



THE CLOUD HILL SERCOMBE KILN HAD 14 CHAMBERS AND WOULD HAVE BEEN SOME 84 METRES IN LENGTH. BREEDON CHURCH CAN BE SEEN IN THE DISTANCE. PHOTOGRAPH TAKEN c.1930.



AN ENLARGEMENT OF THE TOP RH SIDE OF THE ABOVE PHOTOGRAPH SHOWING THE SPECIAL LARGE WHEELED HORSE DRAWN CARTS FOR TRANSHIPPING LIME STONE TO BE BURNT IN THE KILN VIA AN INCLINE, AND ALSO INTO MIDLAND RAILWAY WAGONS WHICH WOULD THEN BE CONNECTED UP WITH THE DERBY TO ASHBY STEAM RAILWAY LINE VIA THE BRANCH LINE FROM THE QUARRY



EXTRACT FROM 1903 O/S MAP SHOWING LOCATION OF THE SERCOMBE KILN AT TOP CENTRE

As time moved on, a wider market for burnt lime became available. This was generated by the coming of the local railways, firstly the Coleorton Railway and then the Derby to Ashby Midland Railway. This meant that more economical and better controlled methods for producing lime were needed. As well as being used by farmers to treat the land, lime was being increasingly used in mortar, and plaster, and a much finer product was being requested by the builders. Lime was also used in industries such as tanning (leather making), textiles and paper making.

A major step forward in the continuous principle of lime burning on an industrial scale was first conceived in 1856 by Fredrich Hoffmann and was patented by him and his colleague Albert Licht in Viena and Berlin in 1858. The first patent in Britain was lodged by Hoffmann's English patent agent, Alfred Newton in 1859. Use of the technology spread around the world, and by 1898, it is recorded that there were more than 5,000 kilns in operation. His development was first used in brick making, but very quickly spread to the lime burning process.

However, It was found by all kiln managers that the flue system of the Hoffmann Kiln did not work efficiently. Because the flue was on the inner wall of the chambers, heat tended to be drawn to the inner part, leaving the outer part cooler with its lime stone not always fully burnt. This was a serious problem and not one that Hoffmann found the answer to. The men who operated these kilns observed what the problems were and as a result of this, a brickworks manager from Poole in Dorset, called William Sercombe, lodged his own patent in 1894 to improve continuous kilns like the Hoffmann design.

Sercombe modified the original Hoffman design by placing a second flue on the outer wall of each chamber, and he carried his flue under the wall of the kiln to the central flue. The inner and outer flues were controlled with the same damper rod from the kiln top. Many kilns were modified according to Sercombe's principal or to the principals of two other modifiers, Warran & Swann, who both advertised in trade journals that Hoffman Kilns could be modified at reasonable cost.

The building of the "Sercombe Continuous Kilns" at both Cloud Hill and Breedon was thought to be the answer to more economical and increased production of finer quality burnt lime.

The following is recorded in the local book “Hand-me-down-Hearsays published c.2002:-

Breedon and Cloud hill works were leased to Mr. J. G. Shields of Isley Walton, for thirty years. Under the guidance of a new quarry manager, Mr. Thomas Jamieson, who was also from Scotland, many alterations were made to increase output. In 1900, he built two continuous or “Sercombes” kilns, one at Breedon and another at Cloud Hill. Mr. Shields wrote “we never could prove that the lime was any better in these continuous kilns for building purposes, in fact we are not so sure that it was quite so good, but it made the lime more eyeable, as it came out in bigger pieces and, being more confined needed less coal to burn it.” These two kilns are capable of turning out weekly nearly four hundred tons of lime, in addition to that obtained from the old-fashioned kilns

Based on evidence from Ordanance Survey Maps, we can safely say that the kiln at Cloud Hill was built at some time between1882 and 1901.

Some of the old round topped flare kilns of which there were a total of seven identified at Cloud Hill Quarry remained in use for many years after the introduction of the Sercombe kiln.

The Cloud Hill Kiln (like the one at Breedon) had 14 chambers and would have been some 84 metres in length. The kiln was lined with firebricks to withstand the intense heat produced inside. Behind the firebricks was a limestone rubble core, which helped to keep the heat in. In the roof are the small chutes down which crushed coal was dropped to keep the limestone burning. At floor level, there were flue holes in the walls. Air was drawn from the outside under the burning limestone and the fumes went up the central core of the kiln to the huge chimney. Iron dampers on the roof allowed workers to regulate the draught in the flue system to provide the kiln with the correct temperature to burn the limestone.

The above extract from the 1925 published O/S map shows the complex tramway network that had been constructed around the “Sercombe Kiln” in order to tranship stone from the quarrying areas both to the Sercombe Kiln for processing and also into Midland Railway wagons which brought coal into the kilns from the local coal mines. This can clearly be related to the

preceding photographs. The rectangular building shown to the right was thought to be the horse shelter at that time.

Limestone blocks from the nearby quarry, were delivered by horse and cart to the kiln, and subsequently barrowed into the burning chambers and stacked by hand. The horses and unusual large wheeled carts can be seen on the RH side of the preceding photograph. It appears that the horse and carts were taking limestone both to the burning chambers and also transhipping into railway wagons via a ramp.

Coal was mixed in, and once this had been lit and caught fire, more was added through small coal chutes from the top of the kiln which had iron hinged covers. The preceding photograph of the kiln shows an inclined ramp at one end for taking slacked / crushed coal to the top of the kiln by barrow. Coal can be seen lying on top of the kiln roof.

The complicated flue system allowed the heat and speed of the burn around the kiln to be carefully regulated. As one chamber burned, waste heat warmed limestone blocks in the next two or three chambers. Behind the burning zone, two or three chambers were left to cool down before the lime could be shoveled out and loaded onto railway wagons waiting in the sidings beside the kiln (see the preceding photograph). Limestone was burned continuously in a circuit around the kiln and it took an average of six weeks to complete one whole circuit.

Four men worked inside one chamber. They packed fist-sized lumps of limestone up to the roof and it could take as much as 5 days to fill a chamber. These men were paid for the amount of work they actually did so if bad weather meant no limestone was quarried and brought to the kiln, then the kiln workers didn't get paid. At the other end of the process were the 'drawers'. They were paid a higher wage because their job of emptying (drawing) the kiln was considered to be one of the worst. The burnt lime in the chamber still looked like lumps of stone but because of the chemical changes that took place during the burning process it became much lighter. However, the heat from the fire had turned the stone pieces into a solid mass and this meant that it was not easy to remove. The workers had to try and break up the lime by hitting it with picks, and then remove large pieces that broke away with a fork or shovel. Whilst this was going on, the temperature inside the kiln chamber was still very hot. This not only made the work very hot and sweaty, but also dangerous. Powered lime often ended up in the men's clothes and boots, and it stuck to their moist skin causing an itchy rash. The dust could also become airborne and so got into their throats and lungs. These terrible working conditions contributed to the demise of Hoffmann / Sercombe kilns because no mechanical method for emptying the chambers was ever developed or used.

During the process of burning the limestone, there is a considerable loss from the original charging weight of around 50%. Therefore, around two tons of limestone was required to obtain one ton of burnt lime. Both for putting on the land and mixing mortar, and plaster, a consistency like that of flour was preferred, so after the burning process was completed and the lumps were raked out of the kiln, they were ground down, which also meant they could be delivered more conveniently in bags.

Competition from elsewhere, and a general downturn in sales for lime, led to the closure of the Sercombe kiln, however, fortunately Cloud Hill Quarry still had other major markets to supply with limestone products.

There follows in italics, an extract from a transcription of a letter written in 1846 at Breedon which appears on a genealogy website and confirms that in 1846 the lime trade was poor as was the village…….*Houses in Breedon are of very little value – 'Kinsey House'?? now stands empty besides a many others. Breedon has become a poor place as the lime trade is about done away with.*

RECHARGING THE SERCOMBE KILN AT CLOUD HILL WITH LIMESTONE

**THE SERCOMBE KILN CAN BE SEEN MARKED 'A'
IN THIS c.1946 PHOTOGRAPH OF THE QUARRY**

The Cloud Hill workforce c.1928. Sitting with hands on his knees centre front is Jim Barber, the foreman. Three places to the left, also with his hands on his knees, is Arthur Hindsley, the blacksmith at Cloud Hill and standing on the right in the back row is Josiah Weston, who looked after the Sercombe's lime kiln.

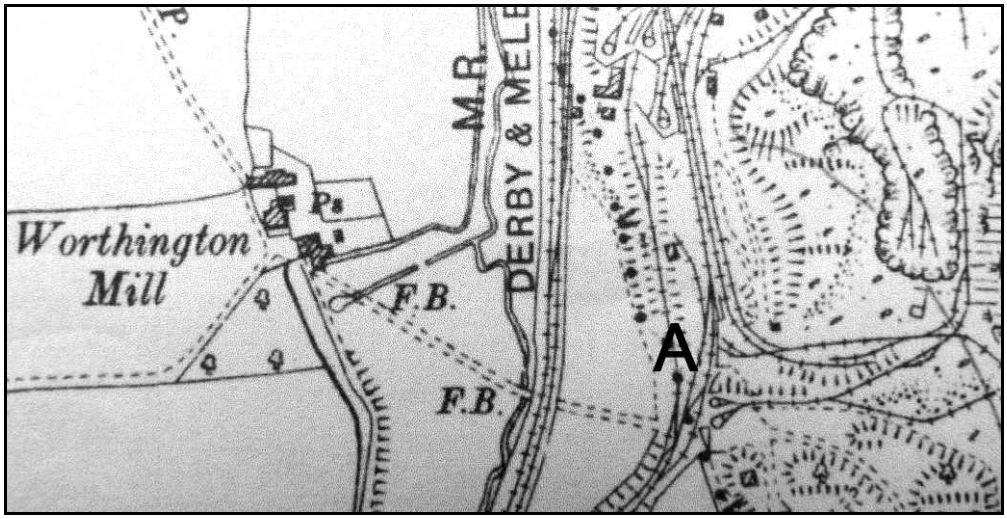
LAWRENCE KINSEY WITH HIS "OSSES" AT CLOUD HILL IN SUMMER 1947

ROUND MULTI - CHAMBER CONTINUOUS BURNING KILNS AT CLOUD HILL

The above photograph taken c.1946 shows at least 4 round multi-chamber kilns at **A** with their associated chimneys. These were built sometime between 1925 and 1946 based on the above photograph and the 1925 map below which shows their subsequent location marked **A .**

A local source claims that these were *used for the burning of limestone*, however, the author is somewhat confused by this, as this type of kiln was normally used for firing clay based products such as bricks and rosemary house tiles, and they were often referred to as Hoffmann style continuous burning kilns as the original designs were often attributed to him.

Until further confirmatory information becomes available, it is not proposed to speculate further on what these kilns were used for.



SUPPLEMENTARY INFORMATION ABOUT BREEDON HILL & CLOUD HILL QUARRIES

The following articles are taken from "The United Benifice of Breedon and Worthington – The parish Times" for which they own the copyright:-

Written by Mr. Ralph Walker in 2001:-

A man would load stone into a wheeled tub or skip of 1 ton 2 cwt capacity for it to be hauled to the crusher by pony. The rate of pay for this work which included the hazardous occupation of climbing the rock face to bring down more stone, was 6.5d / per tub (2.5p in new money). It was hard labour at its hardest. These tub fillers could expect to fill at least 20 tubs per day for a weekly wage of £3.00. On these typically weekly wages of between £2 and £3 there would be little left for food and clothing for the average family of five people after the rent had been paid. In those days, a half a pint of beer cost 3d, a packet of woodbine cigarettes 2d and a box of matches 1d (6d = 2.5p in new money).

An extract from "Quarrying in Breedon" by Maurice Harvey

In the early days, quarrying was carried out by and large by manual labour. Men using pick and shovel hewed the stone from the rock face. In the early years when stone was blasted away from the face it was removed by pony and tub and taken to stone crushers - known as Crackers. The men filling the tubs were paid as piece workers. After filling a tub, no mean task, a quarry worker would place his tally on the tub and a young lad with his pony would take the tub along rails to the Cracker. There it was crushed, screened and fed into hoppers according to size. This was very strenuous work both for the tub filler and pony pulling the heavy load. At Breedon there would be some 20 or so ponies and a similar number working at Cloud Hill. The stables at Breedon were situated where now stands a bungalow - on the road from our post-office up towards the workshops. At Cloud Hill, there were also Shire Horses, magnificent animals, which were used to pull railway wagons. These wagons were brought into sidings at the quarry, which were linked to the Tonge - Worthington railway line. This system enabled train loads of stone to be taken to iron and steel works at Corby, Northants and Stanton Ironworks, north of Nottingham.

At this time, Mr Robert Walker was the quarry manager and the Barber brothers foremen - one at Breedon and the other at Cloud Hill. Robert Harvey was head blacksmith who had a great love for horses. His 'shop' was situated at Cloud Hill (**see following map**) *- long gone now - and he had facilities at Breedon to shoe the ponies. He had apprentices to help him with the horses, strikers etc. and he and his staff were responsible for keeping the horses well-shod and their feet well-pared.*

One such youngster who assisted 'Bob' was Brian Jordan, now Breedon's Works Engineer. He remembers Bob Harvey with great affection since Bob was a real gentleman, mild and greatly respected for his love of the animals he treated. Bob was also a craftsman with iron.

Many examples of his iron-work are exhibited in the parish today. Observe Breedon War Memorial on the village green and various wrought iron gates - at the Breedon offices, Holly Cottage, The Spinney on Doctors Lane, The Breedon Café and countless others in the district.

One job Bob didn't relish doing was cleaning David Shield's donkey's feet. David as a youngster loved his donkey but it was a really stubborn animal. The only satisfactory way of dealing with this awkward mule was to rope it, turn it upside down and then, with the help of the apprentices, Bob could pare its feet. David thought this cruel, but it really wasn't. The donkey

was treated as gently as possible. The method used to treat it was necessary to stop it from kicking out and cause possible injury to the men.

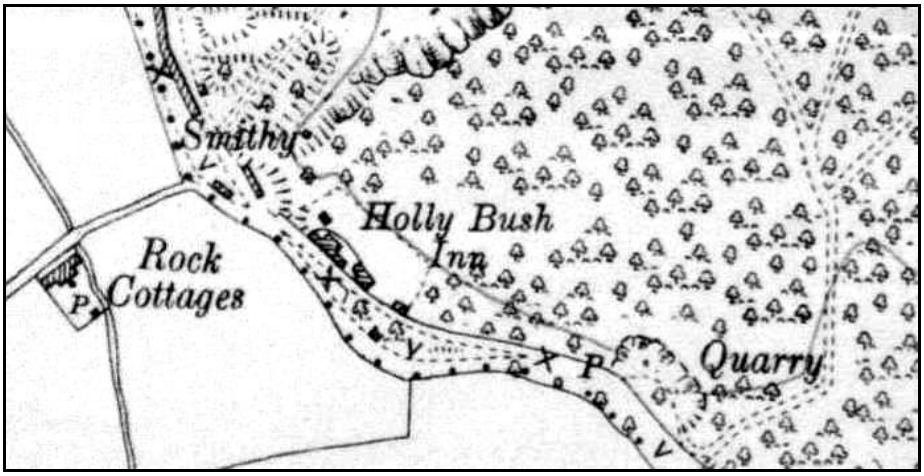
Reverting back to quarrying, modern machinery is used today, to obtain the stone, and heavy lorries take it to the crushers. In the early years deliveries were made by horse and cart. Then came steam wagons. Breedon had several of these lorries before petrol driven vehicles, and now of course, much heavier trucks driven by diesel oil are used.

Breedon stone and footpath gravel is well known throughout the land. Buckingham Palace forecourt is surfaced by the gravel. So too is the approaches to Sandringham House, in Norfolk along with many other stately homes within the U.K.

During the 1939-45 years many airfields in East Anglia had runways built with Breedon Stone and the War Effort was ably supported when the stone was used for iron and steel production. Iron and steel being essential for armaments. The stone is widely used for shoring up river banks and thousands of tons have been used for sea-defences, particularly in Lincolnshire.

ARTHUR HINSLEY THE CLOUD HILL QUARRY BLACKSMITH

Some notes taken by Alan Peters from an interview with Eric Hinsley from Coalville: -
*I was born in 1918 and brought up in a cottage owned by the quarry near the Holly Bush public house on the Woodside by Cloud Hill Wood. My father, Arthur, was the blacksmith at the quarry for more than 45 years (**see following map**). The cottages were on the corner of the Middle Brand and the Woodside. Electricity was installed in about 1935, but up until about 1945 when mains water was put in, it had to be carried by pail from a well between the Holly Bush pub and the cottages. I remember mother making nettle pop and collecting herbs from the hedgerows to make herb beer. Father used to keep two or three pigs and I remember what trouble it was getting them out of the wood if they once broke in. Cloud Wood was very different then with large oak trees, before it was felled during the war. Near to our cottage was The Delph referred to in a previous "Worthington Revisited" publications, where we picked violets and primroses. The scene is very different now. The Holly Bush and cottages are gone, pulled down in about 1965. Our cottage stood about where the viewing platform looks down to the quarry bottom.*



EXTRACT FROM 1925 O/S MAP

The above map shows the "Smithy's (Blacksmith's) Shop" to the North West of the "Holly Bush Inn", which Eric Hinsley refers to, and where his father Arthur Hinsley worked for 45 years. The actual "Blacksmith's Shop" was thought to be in the end of the long building above the word "Smithy". The two buildings directly below "Smithy" were thought to be the horse stables.

ARTHUR HINSLEY IS ON THE LEFT OF THE PHOTOGRAPH WITH HIS HANDS ON HIS KNEES C.1928.

THE HOLLY BUSH INN AT CLOUD HILL QUARRY

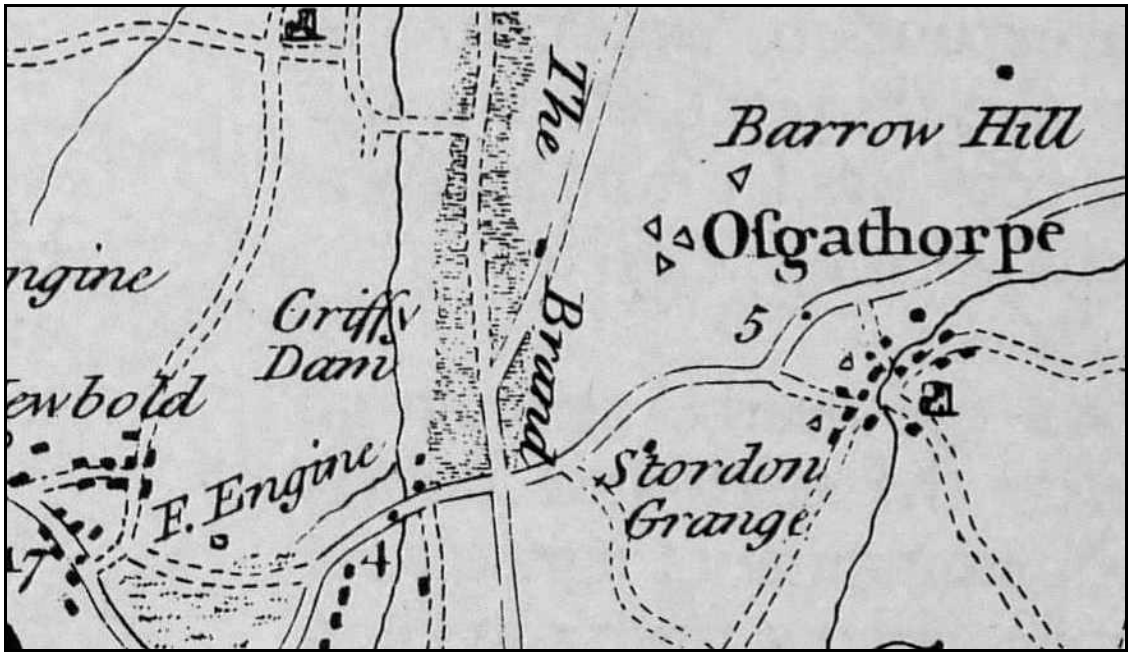
The author felt it would be an injustice not to include the former “Holly Bush Inn” in which imbibers after a hard days work at the quarry, no doubt covered in dust, would have visited on their way home. The Inn was located on the western side of the southerly edge of the quarry and is shown in various preceding maps. Inns were commonly built next to coal mines or quarries and there are numerous examples of these in the area, and it is reasonable to assume that this was the reason for the Holly Bush Inn being in this location.

It is not know when it was first opened, but it was certainly plying its trade in 1842 as it appeared in the Ashby-de-la Zouch first register for licensed houses list at that time.

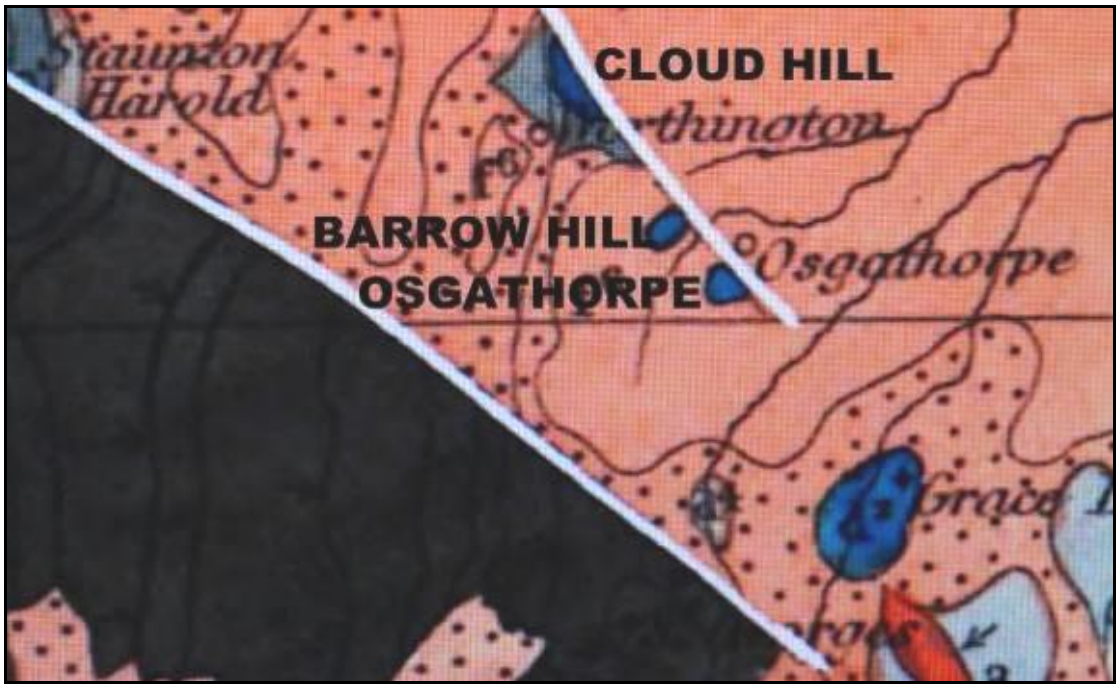
On the 26th June 1964, an application from the Ashby Petty Divisional Session was not renewed, and the Inn was pulled down in 1965 to make way for the quarry to be extended.

In the book ‘Hand-me-down Hearsays’ by John Dawson there is an entry by Ralph Roberts which states:-
The men who worked at Cloud Hill used to go to the Holly Bush, and on pay days, the wives had to go to Cloud Hill for the money or else they wouldn’t have got any. Although the pub was supposed to be licensed, it was open all hours, and they were getting 20 to 25 shillings a week then (1911/12). Mind you, there wasn’t much drunkenness. I mean, although beer was cheap at 2d per pint, 4d at best, it didn’t affect them. Working at the quarry, you needed a drink.

THE LIMESTONE QUARRIES AT BARROW HILL AND OSGATHORPE



PRIOR'S MAP OF 1777 IDENTIFIES A TOTAL OF 4 LIME KILNS AT BARROW HILL, DEFINED AS TRIANGLES



EXTRACT FROM THE PRECEDING 1860 MAP DEPICTING CARBONIFEROUS LIMESTONE DEPOSITS AT CLOUD HILL, BARROW HILL, OSGATHORPE AND GRACE DIEU - COLOURED BLUE

With reference to the earlier articles on the Bostocks' lime-burning activities at Cloud Hill, it is quite likely that Jonathan Bostock first involved the Bostock family in lime burning activities at Barrow Hill limestone quarries, before moving over to Cloud Hill and Breedon quarries, where we know he was granted a lease for lime burning in 1816.

Others have assumed that Prior's 1777 map of Leicestershire above, indicates four lime kilns at Barrow Hill quarry. However, Prior's map can be confusing and it cannot be said with any certainty that he is not indicating kilns at Osgathorpe also. We know from the following 1761 map that Barrow Hill was being quarried for limestone at that date for lime burning purposes. No conclusive evidence has come to light when Osgathorpe quarry became a serious business, if ever it did. There is no evidence that an attempt was made to connect Osgathorpe quarry with the canal, as was the case with Barrow Hill. The quarry almost certainly connected with the road through the village via a track from Snarows Farm or possibly even a short tramway and then onto the adjacent turnpike roads.

Confirmation that lime burning was carried out at Osgathorpe is given by William White in his 1846 'History, Gazetteer & Directory of Leicestershire & Rutland' in which he states:-

Osgathorpe, 5 miles E.N.E. of Ashby –De-La-Zouch is a neat village in a fertile valley, near the western termination of the disused 'Charnwood Forest Canal' ***and has three lime kilns****. William White records a Mr. Ratcliffe as being a lime burner at Osgathorpe.* Coincidentally, a Mr. Thomas Ratcliffe is also recorded as being a lime burner at Breedon. James Clark is also given as a farmer and lime burner at Osgathorpe.

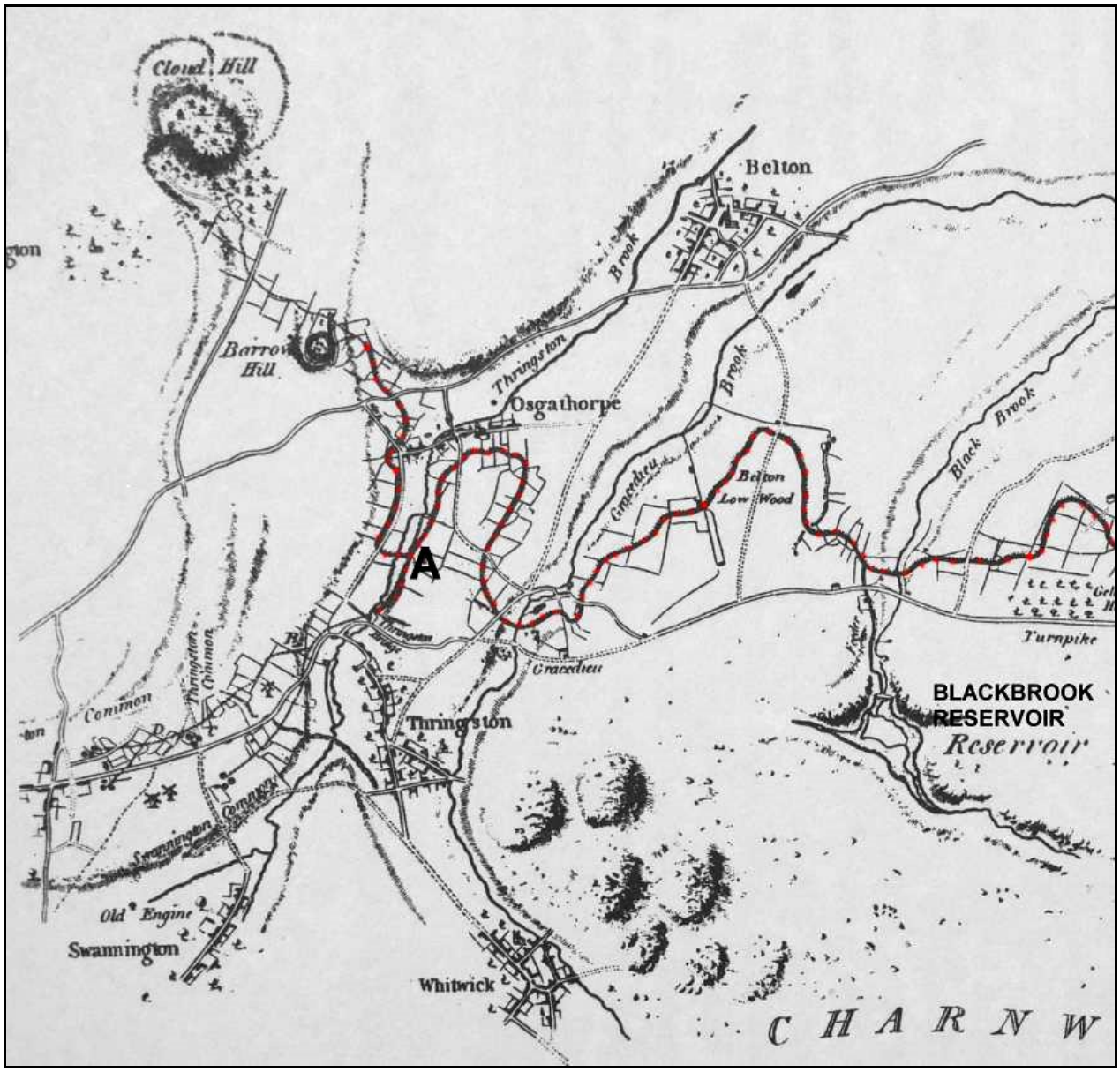
The quarrying of limestone and subsequent burning in kilns to produce quick lime at Barrow Hill and Osgathorpe never reached the extent of their neighbour Cloud Hill. Barrow Hill never had good transport links, being only briefly connected to the canal network via the ill-fated Charnwood Forest Canal from its opening in 1794 to its closure in 1799

The following map, which is an extract from the original map of the 'Charnwood Forest Canal' drawn in 1791 by the canal's engineer Christopher Stavely (shown earlier), depicts the Canal as a dotted red-line coming from Nanpanton, with a link from Junction House, marked **A**, and going up to the 130 yard long railway track which went into the quarry for the purpose of transhipping the coal and lime into and out of the lime barges. Note the canal feeder link from Black Brook Reservoir completed in 1796 to provide more water for the canal.

Prior to the building of, and following the canal's closure, lime would have had to be collected from the quarries by local farmers with horse drawn wagons or alternatively transported further afield on the local turnpike roads as required.

It was intended to build a tramway from Barrow Hill to Cloud Hill so that lime could be shipped from Cloud Hill onto the Charnwood Forest Canal, and although the land was purchased, this did not materialize. Both Barrow Hill and Osgathorpe quarries were thought to have closed in the mid - nineteenth century and the remains have been reclaimed by nature with little evidence of the quarries ever existing now.

Although the author has no proof of this, lime from Barrow Hill could well have been transported by horse drawn wagons to Cloud Hill for transhipping onto the Cloud Hill tramway to go to the Ashby Canal or onto the Coleorton Railway when the latter was built.



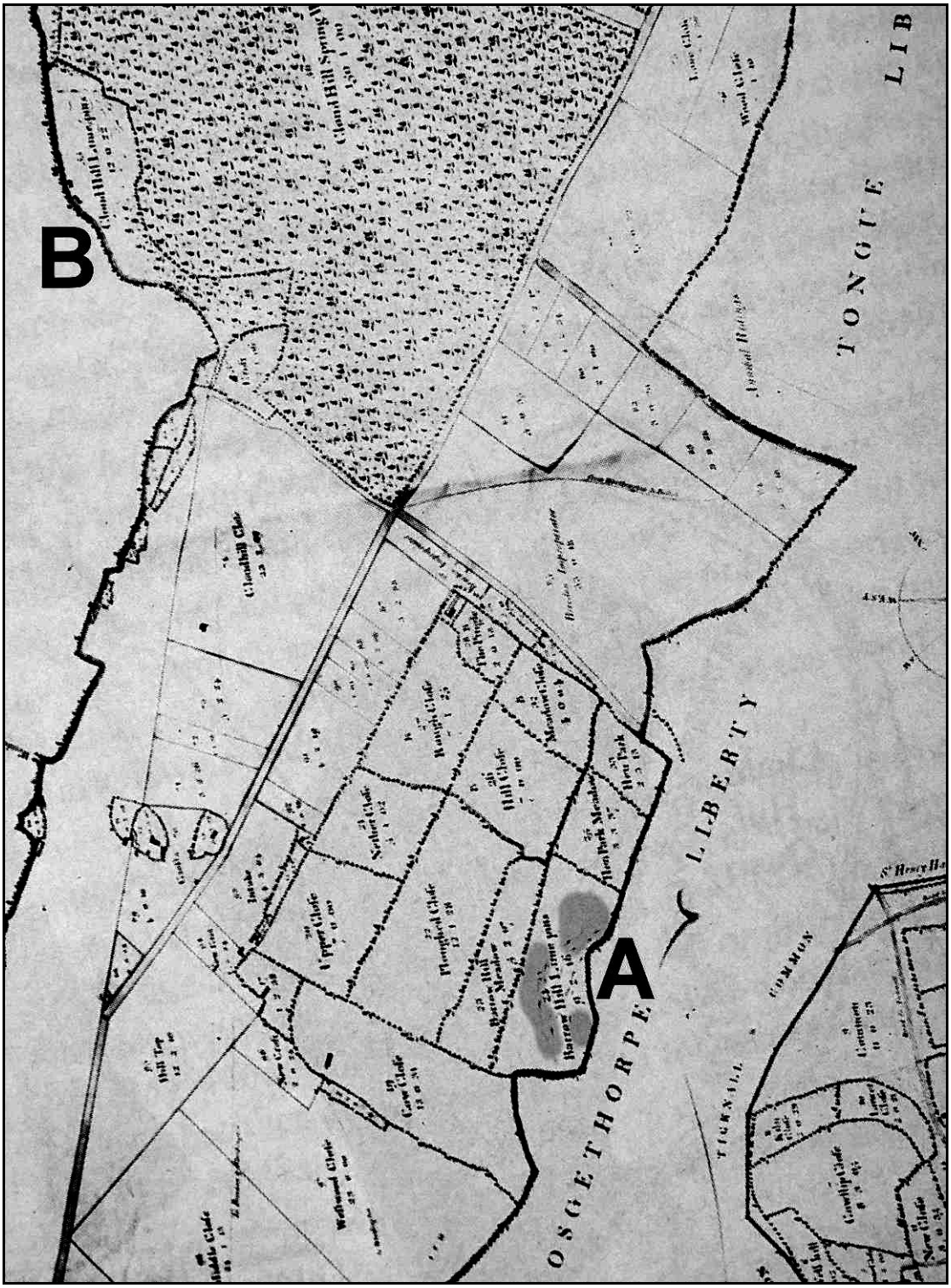
1974

1986

1999

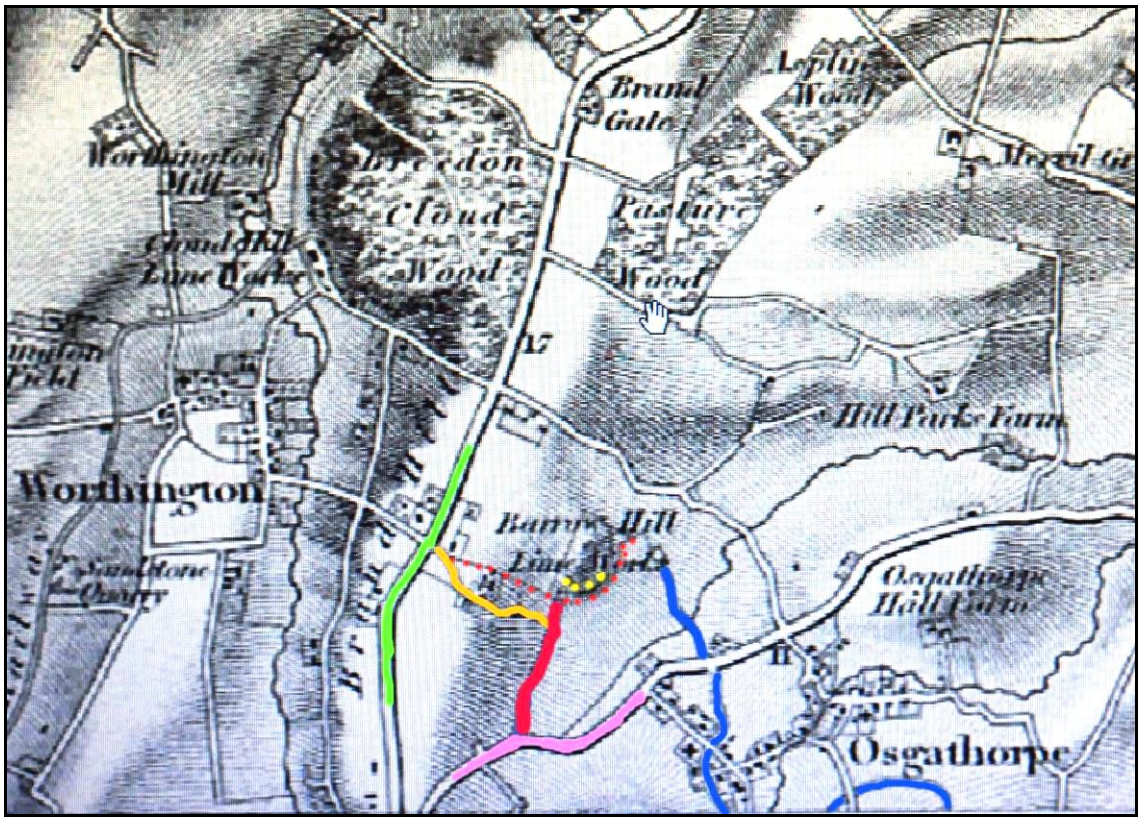
JUNCTION HOUSE AT 'A'

NORTH



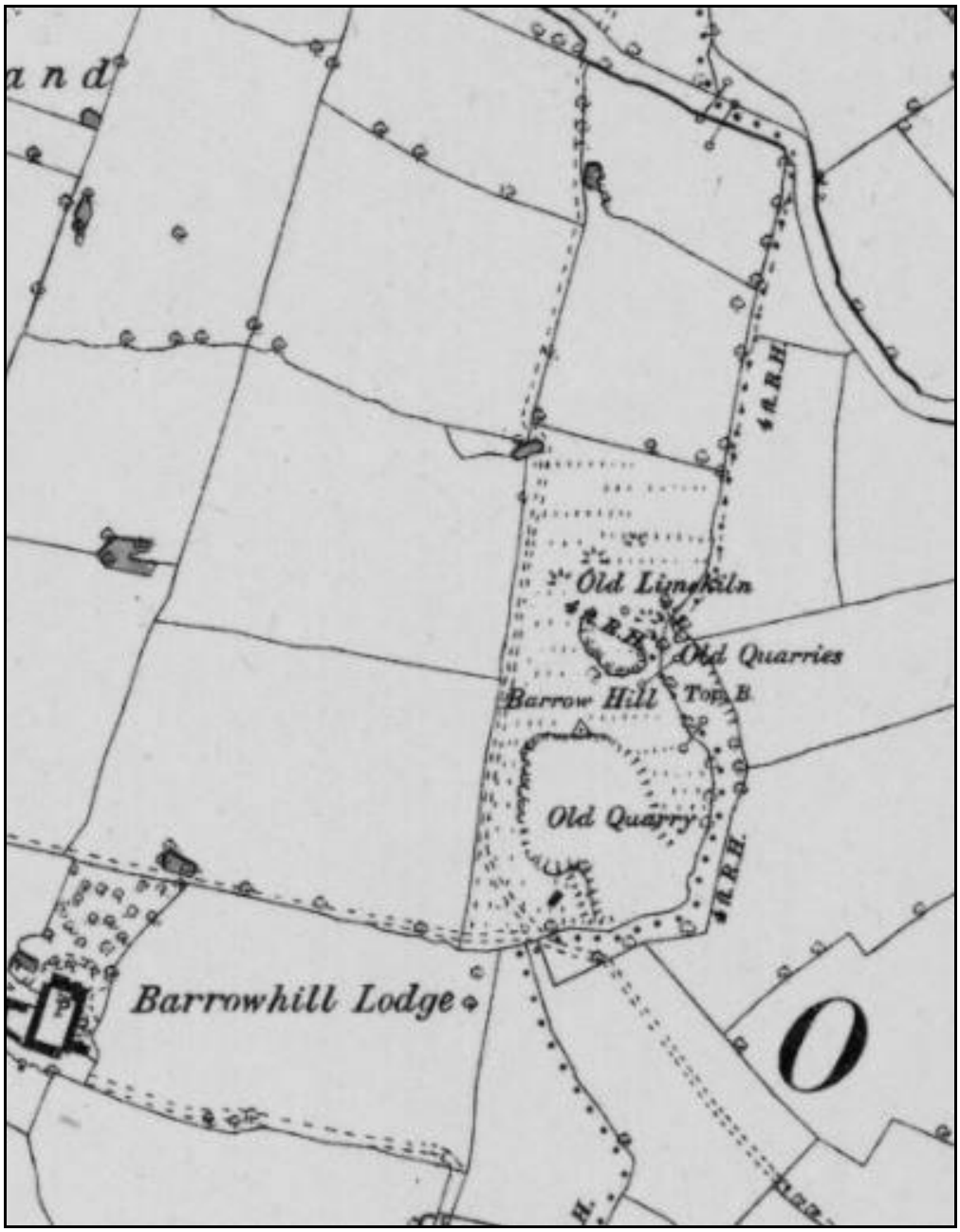
The above extract from a 1761 map shows Barrow Hill quarry marked **A** and Cloud Hill quarry marked **B**. The area of Barrow Hill quarry at this time was 9 acres 2 roods 22 perches against Breedon Cloud's (Cloud Hill) 12 acres 0 roods 22 perches.

FIRST EDITION 1836 O/S MAP SHOWING THE EXTENT OF BARROW HILL LIME WORKS – AUTHOR'S INTERPRETATION

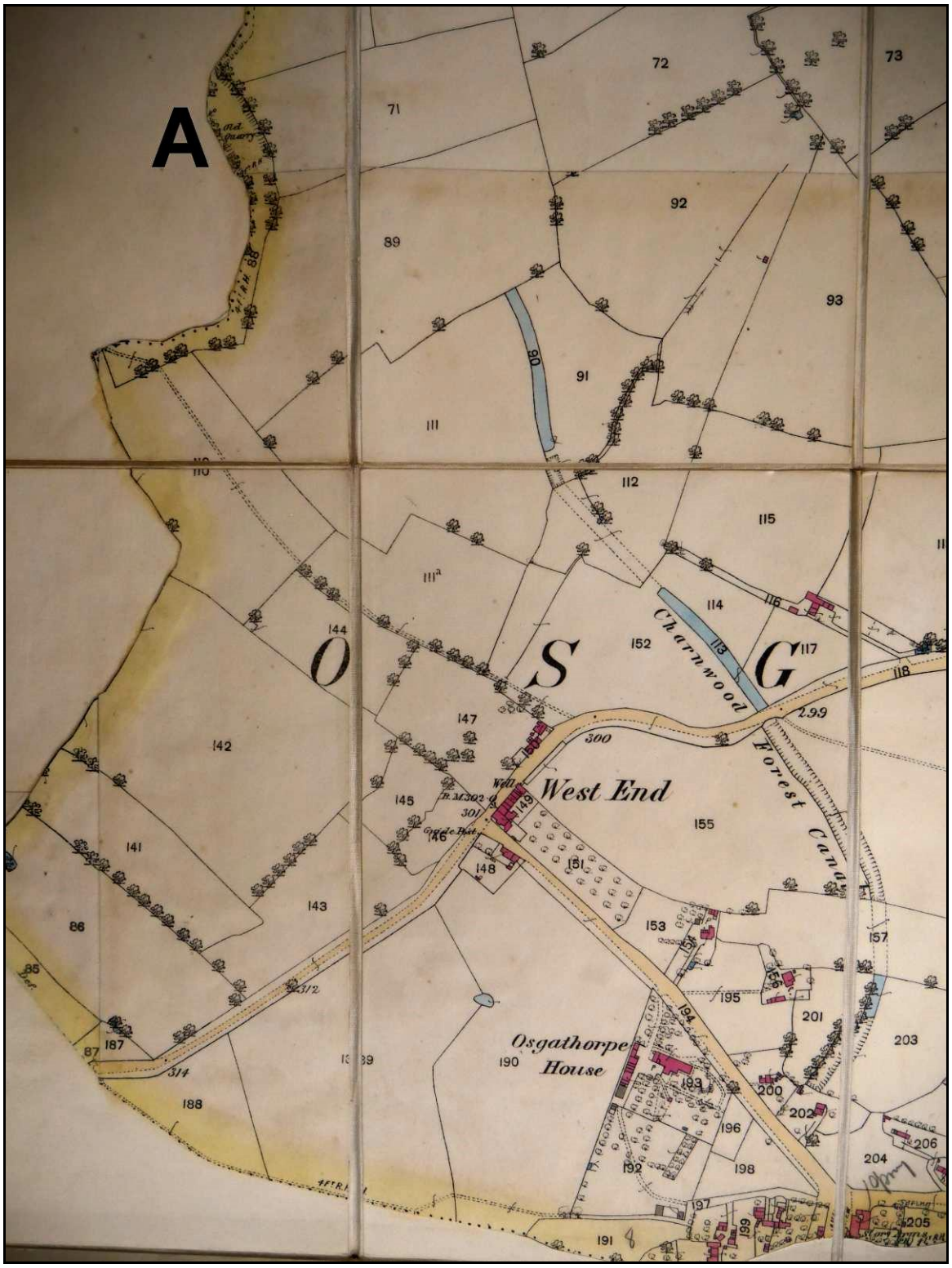


YELLOW DOTS	LIME KILNS (AUTHORS INTERPRETATION)
DOTTED RED LINE	TRAMWAY (AUTHORS INTERPRETATION) IF NOT, THIS WAS JUST A TRACK ROAD
HEAVY RED LINE	QUARRY TO REMPSTONE TO COLEORTON TURNPIKE ROAD
YELLOW LINE	LINK ROAD THROUGH BARROWHILL LODGE FARM (SEE FOLLOWING MAP)
BLUE LINE	DISSUSED CHARNWOOD FOREST CANAL
GREEN LINE	BRANCH TURNPIKE ROAD TO REDWOOD GATE, FROM HINCKLEY TO MELBOURNE TURNPIKE ROAD AT PEGGS GREEN
PINK LINE	REMPSTONE TO COLEORTON TURNPIKE ROAD

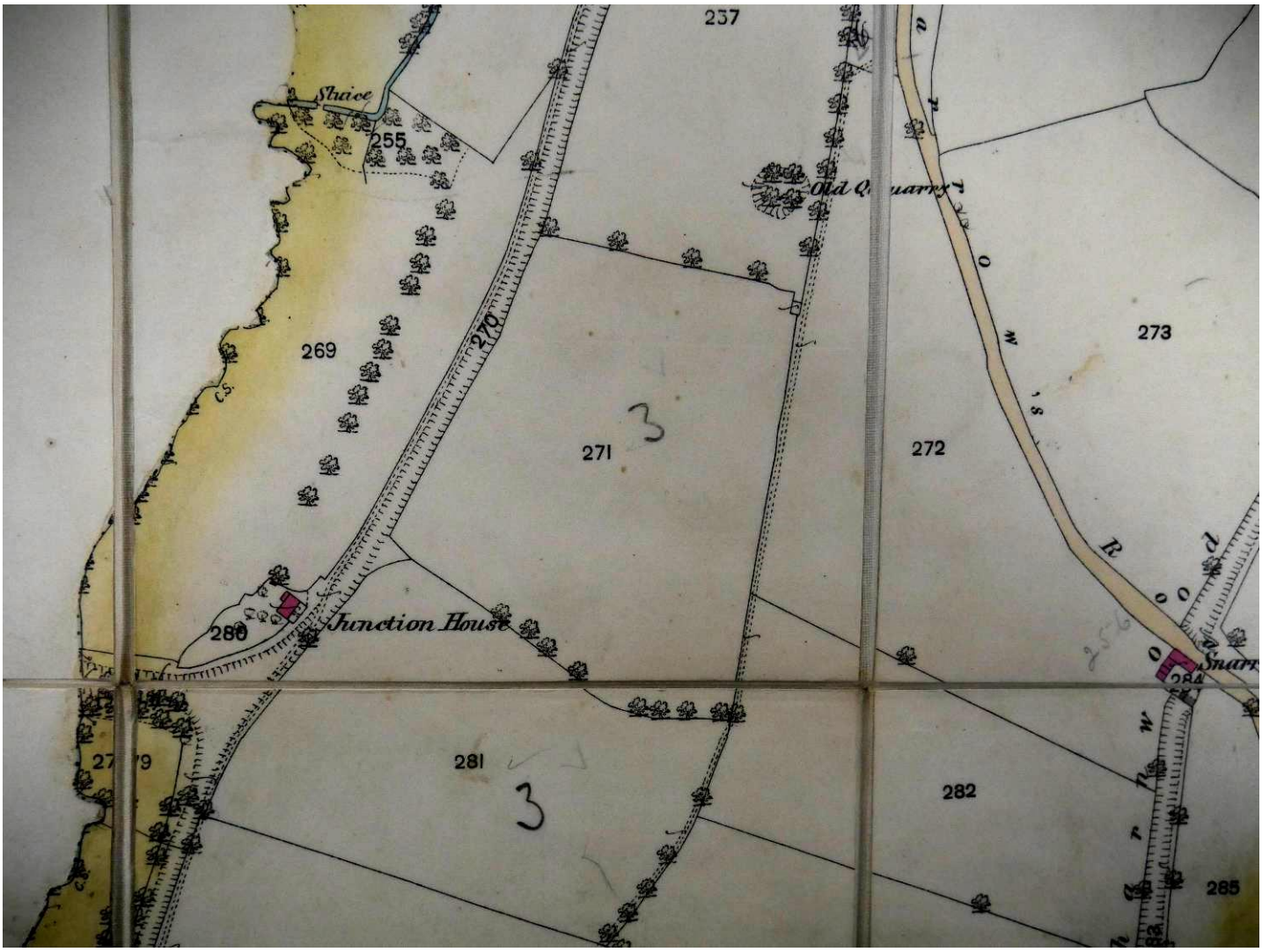
1881/82 SURVEYED O/S MAP (PUBLISHED 1885) SHOWING THE THEN DISSUSED BARROW HILL LIMESTONE QUARRY



The above extract from the O/S map, surveyed in 1881/82 and published 1885, shows a considerable difference to the preceding 1836 map particularly in terms of the extent of the quarry site. It depicts the remains of four lime kilns now sited to the north of the quarry and the siting of these compared to those established in 1836, clearly necessitated a change in the roadways / tramways in order to get the coal to the lime kilns from the local areas. **The reader should also bear in mind that this map was surveyed some thirty years following the closure of the quarry.**



This is the first of a series of three extracts from the 1881/82 surveyed O/S map showing the path of the Charnwood Forest Canal from Junction House and the location of Barrow Hill quarry marked **A**. **These can be related to Christopher Staveley's map of 1791.**



This section of the map shows the path of the canal (270) heading south and subsequently branching off at 'Junction House' to go north again up to Barrow Hill quarry as shown in Stavely's 1791 map. See the following map which shows a wider view of the area.

This section of the map shows the path of the canal coming from 'Thringstone Bridge' via 'Snarrows Farm' **B** (an area known locally as 'The Snarows'), then looping north to west to south to 'Junction House' at **A**. The former Osgathorpe quarry is marked **C**

The following reference to Barrow Hill and Osgathorpe quarries is made in the book referred to earlier by Edward Hull and published in 1860:-

The small round knoll, which from its appearance has obtained the name Of Barrow Hill, is formed of limestone ***formerly quarried****. At Osgathorpe, the limestone, which is very impure, is interstratified with shale, and full of joints. In one of the quarries the red marl is seen resting upon it, the base being a limestone - breccia, irregularly bedded and from 2 to 3 feet thick. On the opposite side of the western quarry the beds are probably broken off by the fault already alluded to.* **The statement 'formerly quarried' confirms that quarrying / lime burning had ended by this time at Barrow Hill.**

In the book published in 1822 and entitled 'The Geology of England and Wales etc.' by Rev W. D. Conybeare FRS, MGS &c and William Phillips FRS, MGS &c., the following is included to describe the islets of limestone:-

Some of these islets of limestone are nearly horizontal in their stratification, and in that case lie low: others are highly inclined and rise into hills, but of no great elevation.

As a guide to those who may be inclined to have a further elucidation of this district, a list of these points is subjoined, following in the order they occur from south to north:-

> *1. The most southerly of these points is about five miles from Ashby on the Loughborough road, a quarter south of that road, at the point where it is crossed by the projected canal; here on each side of the little streamelet of Grace Dieu, are quarries of limestone. The strata are viewed on the large scale, nearly horizontal, but have several partial undulations. The sienitic crags of Charnwood forest rise within a quarter of a mile on the south, and the coal measures are not far distant on the west; but the relations of the limestone with neither formation is distinctly displayed.*
> *2. One mile north from this spot, close to the village of Osgathorpe, are quarries of the same rock, which here appear almost horizontal.*
> *3. Half a mile north of this village, rises Barrow Hill, entirely composed of this rock; the strata here are highly inclined, but the stratification is very indistinct.*
> *4. Three quarters of a mile north-north-west, and in a line with this hill, is Cloud Hill, altogether of the same nature; here the srata rise towards the east seventy degrees.*
> *5. On the further side of a plain occupied by red ground, and at a distance of one mile and a half north-north-west from Cloud Hill, rises Breedon Hill; which although it cannot boast any considerable elevation, is rendered by its insulated position and the church tower on its summit, a very conspicuous object……..*

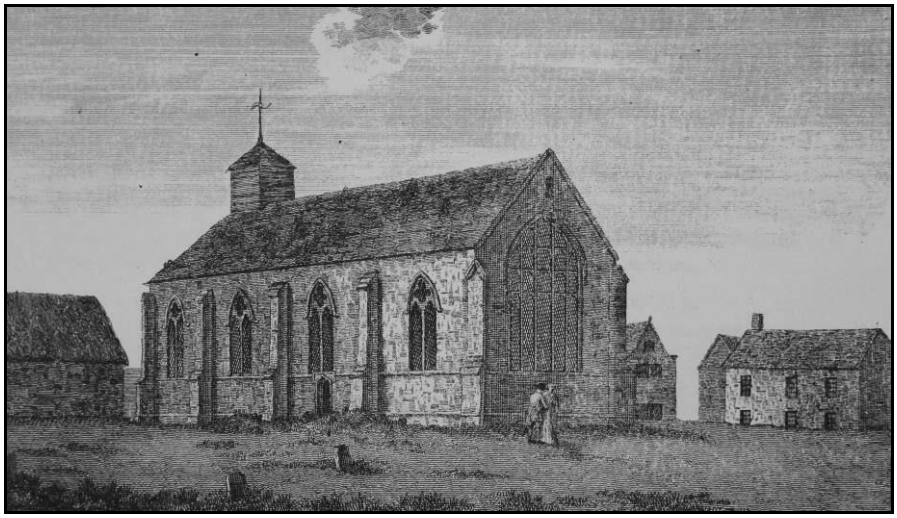
The following is taken from a 'Strategic Stone Study - A Building Stone Atlas' of Leicestershire. First published by English Heritage April 2012 Rebranded by Historic England December 2017:-

Cloud Hill Dolostone Formation
"Osgathorpe Dolomite"- A very fine-grained, cream-coloured dolostone with fossil casts and many small voids, it is used in association with a conglomeratic stone containing dolostone pebbles ***in the church at Osgathorpe****.* ***Both stones are believed to have come from the quarry on Barrow Hill, just above the village.*** *The latter is described with the Triassic rocks.*

Gunthorpe Formation
"Osgathorpe Conglomerate" The "Osgathorpe Conglomerate", ***recognized only in Osgathorpe village church****, comprises pale buff, sub-rounded dolomite pebbles set within a weakly cemented, gritty dolostone sandy matrix.* ***It is believed to have come from Barrow Hill Quarry, together with the Carboniferous Osgathorpe Dolomite****. It probably occurs as a* brecciоconglomerate within the Gunthorpe Formation, the pebbles being eroded from and deposited against the Carboniferous limestone hills in the Triassic desert.

William White describes St. Mary's Church, Osgathorpe in 1846 as:-
An ancient structure, with a short tower crowned by a wooden belfry in which hang two bells.

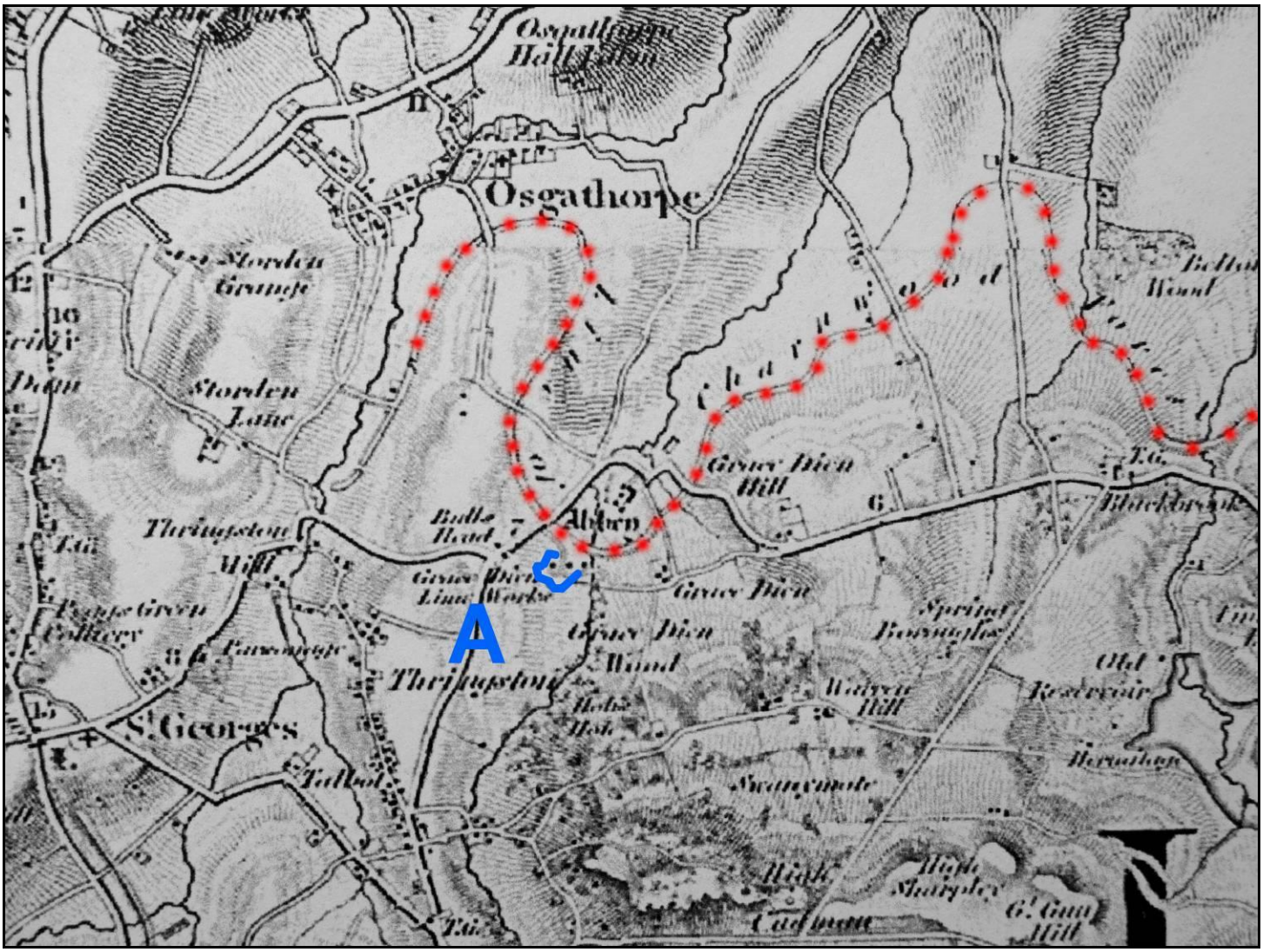
Apparently, the dolostones used in St. Mary's church Osgathorpe can still be seen in the lower parts of the stone tower thought to have been built around 1860 as part of an extensive re-build.



ETCHING OF ST. MARY'S CHURCH, OSGATHORPE BY MALCOLM 1795

A MODERN PHOTOGRAPH

THE LIMESTONE QUARRY AT GRACEDIEU



The above extract from the 1835 first series O/S map shows the location of the Gracedieu limestone quarry works marked **A.** The quarry face is outlined in blue. Importantly, it clearly shows three lime kilns. The old “Charnwood Forest Canal”, dotted red, passed close to the edge of the quarry, but the author has found no proof of whether burnt lime was shipped from there on the canal during its short life, but it almost certainly was.

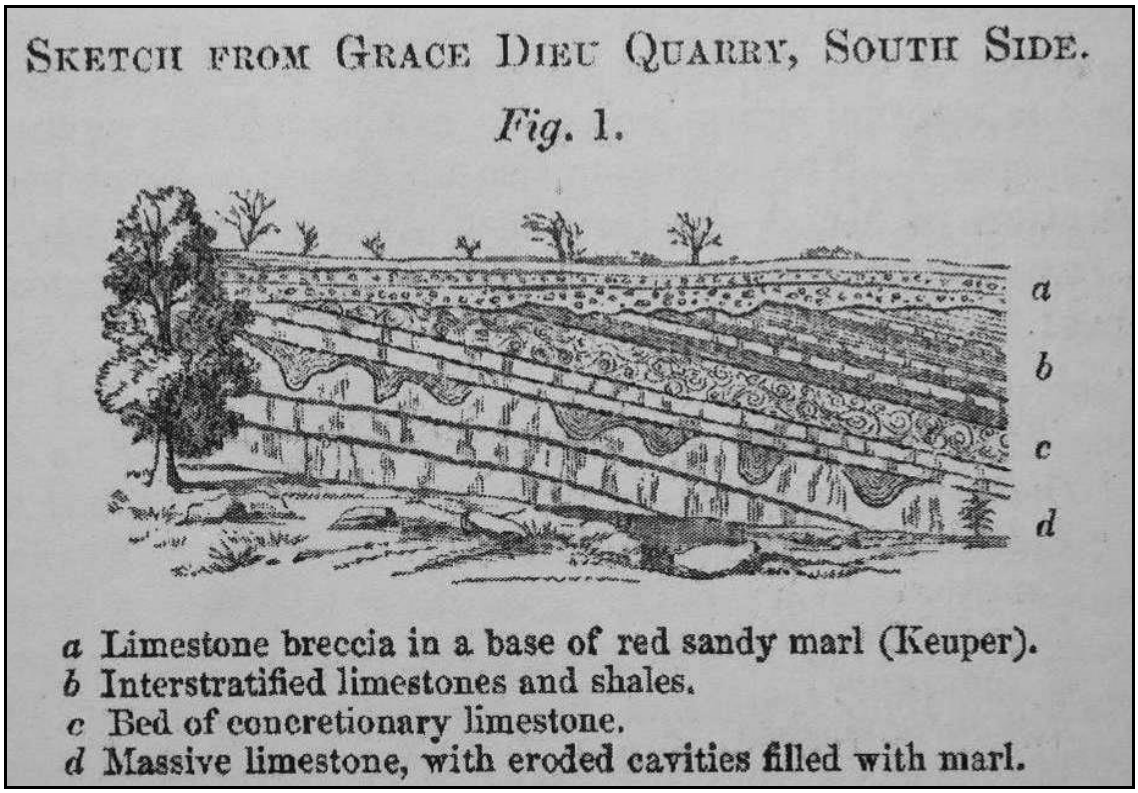
An extension from the Loughborough to Ashby turnpike road went into the quarry, so it was convenient to ship burnt lime out by horse drawn wagons following the closure of the “Charnwood Forest Canal”, and presumably prior to the canal being built also.

In the history of ‘The Leicester to Swannington Railway’ by C. R. Clinker (Leicestershire Archeological Society) it is recorded in the only surviving shipment document (1832 to 1845) that 86 tons of burnt lime from Gracedieu lime works was transported on the railway to Leicester during the first 6 months of 1833. At that time, it would have been transported from the quarry to Whitwick station on Long Lane by horse drawn wagons for transhipment into railway wagons there. No further lime shipments via the Leicester to Swannington Railway from

Gracedieu is recorded, suggesting that limestone burning as a serious enterprise at Gracedieu was coming to an end about that time.

TAKEN FROM 'THE GEOLOGY OF THE LEICESTERSHIRE COAL-FIELD AND OF THE COUNTRY AROUND ASHBY-DE-LA-ZOUCH' BY EDWARD HULL – 1860

At Grace Dieu, the vertical walls of the old quarry afford an admirable opportunity for studying the stratification and mineral composition of the rocks in which they have been excavated. The higher beds are interstratified with shales, and are of doubtless contemporaneous with those in similar positions in the Ticknall and Dimmingsdale sections. It is extremely doubtful, however, whether any great mass corresponding to the Breedon rocks actually exists between the Grace Dieu series. The proximity of the Charnwood Forest rocks, upon which the limestone rests, and around which it was deposited uncomfortably, renders such a proposition improbable



The limestone and shales are surmounted by brecciated strata of Triassic age, which rest upon them uncomfortably, the former dipping to the northward at angles varying from 10 degrees to 6 degrees, while the breccia is horizontal. Fossils are very scarce at Grace Dieu and Osgathorpe.

The following text in italics, is taken from 'Observations in Husbandry', Volume 1 by Edward Lisle and published in 1757. In 1693/94, Edward's father Thomas Lisle started to make a study in agriculture which had been his lifetime's ambition. He started to prepare and make public his observations in 1713, but before they were published he died in 1722. Thomas was clearly a wealthy man and owned several estates. He was a Justice of the peace and fathered twenty children, seventeen of whom survived him.

His father in Law was Sir Ambrose Phillipps (a successful Lawyer) who had purchased Garendon House from the 2nd Duke of Buckingham in 1684. Garendon House (eventually to become know as Garendon Hall) was built on the site of Garendon Abbey, Loughborough.

The de Lisle family of Quenby Hall, Leicestershire were originally the Phillipps from London (reference Sir Ambrose Phillipps above) so it is reasonable to assume that Thomas Lisle inherited lands from his wife, and through this came into contact with Sir Ambrose Phillips;-

December 9th 1699, I went to Gracedieu, and discoursed with the person who rents the lime-kilns of Sir Ambrose Philips; and, two or three of his workmen being present, I with them took the measures of the kilns, which was two and a half yards high from the very bottom to the top, one yard lengthwise in the bottom, and two feet wide: they told me that I must take care not to widen it too much at top, not exceeding two yards, by reason of the great consumption of coals; for the more gradual the widening is, the better: there was a layer of bricks' run within the side of the kiln, a-cross between the two vent holes where they draw out the lime, for the better support of the lime from tumbling down too soon. They burnt with culm or coal slack, which they accounted as well, or better than the other coal, and costs but 1s. per load, whereas the fine coal would cost 6s.--------The kiln had five air holes, two on each side of the bottom, and two on each side of the top, and one in the middle, of about a brick thickness wide; the stone is very hard, and they said, three quarters of coal would only burn seven or eight quarters of lime; the larger the kiln the more profitable. There was a stone that laid the length of the kiln to keep up the walls from falling; the wall of the kiln against the bank was but the thickness of a brick length in thickness. This kiln would burn twelve quarters of lime in twenty-four hours.

Method of liming in Leicestershire

In Leicestershire, they sow or scatter the lime on wheat land when they sow the wheat, but on barley-land the last earth save one; and so plough it in, left, if they should sow it with barley in the spring, it might burn it. They lay five quarters on an acre of each, according to the measure as it comes from the kiln, for after it is slack'd those five quarters will near make it ten.

Liming of the land being to bind it, it seems to me, land should not be limed late in the year, no more than building should go on then; because, the land being cold and moist, and but a weak sun to consolidate it, the end of liming is lost; for if it consolidate not at first liming, it will not afterwards.

Mr. Chestlin of Leicestershire says, he pays about 12d. per quarter for his stone-lime, and fetches it two miles; he lays fifty bushels on an acre, because his is colder moister land than his neighbours.---------He says, as it binds sandy ground, so it mellows and flats cold and clay-land. He can with a dung-pot and two men shovel it on about an acre and a half per day. He says he has had a fill-horses black coat burnt red with it: if it be wet weather when they spread it out of the dung pots, they cover their horses with old hammock-cloths, and yet it will burn them very much..---------Mr. Bowly says, he never lays above forty bushels on an acre, but that forty when flack'd will be near eighty; if it lies out in the weather any little time, to have the dews or a shower of rain, it will flack of itself, but if they fetch it and lay it on their grounds directly, then they flack it with water.-----He thinks lime shews not its full strength and power till the third crop. One may over-lime; for where the lime is laid in heaps in the field before spreading or spurning it, there will seldom grow any corn for a year or two.----------He says, they generally sow the lime on the ground, and then the wheat, and then turn it in under furrow; but in sowing it with barley, they generally sow it the last earth save one, and turn it in, and then give the last earth for sowing the barley; but, if they sow with a wheaten crop, and then lay down to grass, they sow the wheat on the plough'd land, and harrow it in, and then sow the lime, and harrow it in, in order to lay it down smooth to grass; for if they should harrow the lime in first, and sow their wheat, they would not in the second harrowing it be able to bury it, the ground would be so fine.

Sheep Rot

I asked Mr. Clerk about the method of liming about Loughborough; he said, they laid on their grounds they laid up to grass forty bushels per acre about the beginning of October, and on their arable lands the same measure; their way is, as the cart goes along the ground, to fling it over with shovels, and to spread it thin. It seems it has been very hurtful to their grass ground in rotting their sheep in wet years; for it has proved the grass so fast, as to rot the sheep.----------
I supposed the lands were subject to rot before, or else the lime would not have subjected them to it; but Mr. Clerk said, no, that the lands were high up-land-downy grounds, never subject to the rot before; and that many men in that country had proved it to their sad experience; and, since they found it, their way to remove such sheep in a wet summer out of such grounds, and put others in. Note the lime in this country is strong; Mr Chestlin is of the same opinion.

In a book entitled "A Sketch of a Tour into Derbyshire, Yorkshire…." by William Bray and dated 1778, he comments as follows during his visit to **Barrow-on-Soar** lime quarries:-
……*the burning of one of these heaps takes up two days and three nights. The demand for it (burnt lime) has increased within these few years in a very great deal.* ***The lime for manure is chiefly burnt at Gracedieu, some miles off****. On extending the 'inclosures' in this country, many of the old ones (*fields?*) are broken up, and it is found very good husbandry do so. They lime them, and in three or four years, lay them down again.*

The following appears in John Nichols history of Leicestershire Vol 3 Pt 2:-
In 1793, the manor of Belton was put up for sale……..An unlimited right of common upon Charnwood Forest is attached to the estate, which is in excellent condition ***and a little more than a mile from the lime works at Gracedieu***

For anyone wishing to see present day evidence of the quarry, sadly, it has now become filled with earth and is used as a mountain biking facility. **Yet another part of our industrial heritage lost!**

THE DEVELOPMENT OF LOCAL TRANSPORTATION LINKS FROM THE 18TH CENTURY TO ENABLE INDUSTRIES INCLUDING BURNT LIME PRODUCERS AND COAL OWNERS TO GAIN ACCESS TO A WIDER MARKET - TWO PROPOSALS WHICH DIDN'T MATERIALISE HAVE BEEN INCLUDED FOR INTEREST

It was felt that in addition to writing about the development of the actual quarries themselves, the reader would benefit from having an understanding of the various transport system links developed to provide the quarries with access to wider markets for their burnt lime and limestone.

We must of course consider the road systems that were developed prior to the canals, tramways and railways etc. All the quarries dealt with in the book would have used local and turnpike roads to transport their burnt lime by horse drawn wagons.

Breedon Quarry which benefited from the Tamworth to Sawley turnpike passing by the quarry, was the only one in the area which never eventually achieved a link to a canal or tramway / railway system.

THE LOCAL TURNPIKE ROADS

HIGHWAYS ACT 1555 – This was the first legislation of any importance which affected roads. It transferred responsibility for the upkeep of the King's highways to the parishes. Each parishioner owning a plowland in tillage, or keeping a draught or plough, was liable to supply a cart for four days a year for use in road repair. Each able bodied house holder or tenant was required to give four days 'Statute labour a year' (increased in 1691 to six). It was possible to pay a fine to commute this, or else provide a substitute (LRFHS Journal 145 2011).

The takeover of major roads by the turnpike trusts began in the UK in 1726, with the main London Road through Harborough via Leicester to Loughborough. In 1753-4, the roads from Hinckley, Coventry, Uppingham, Narborough and Ashby were turnpiked, and a number of other roads were added. In the 1760's, toll bars at which the finance for the maintenance of the roads was collected from travelers'' were established.

Following the introduction of maintained Turnpike Roads, the local areas of Griffydam, Pegg's Green, Gelsmoor, Swannington, Coleorton, Newbold and Lount were fortunate in being well served by a network of these, which made the transportation of goods such as coal, lime and pottery etc, to outlying places much more efficient. In former times, horse drawn wagons and carriages had to use unmaintained cart tracks where, particularly during inclement weather, horse and carts and carriages would have become stuck and broken down in the muddy and deep ruts which would have formed. Wagons with loads of up to 7 tons and being pulled by up to 8 horses were not unusual when hauling lime or coal.

Turnpike trusts were bodies set up by individual acts of Parliament, with powers to collect road tolls for maintaining the principal roads in Britain from the 17th century, but especially during the 18th and 19th centuries. At their peak, in the 1830s, over 1,000 trusts administered around 30,000 miles (48,000 km) of turnpike road in England and Wales, taking tolls at almost 8,000 toll-gates and side-bars. They declined with the coming of the canals and railways and then the Local Government Act of 1888 gave responsibility for maintaining main roads to county councils and county borough councils. From the 1880's, Toll Houses and Gates were being sold off and many were demolished.

The Trusts were empowered to construct metalled (broken stone and cinders) roads along the lengths of which were situated bars or gates, which were opened to allow passage on payment

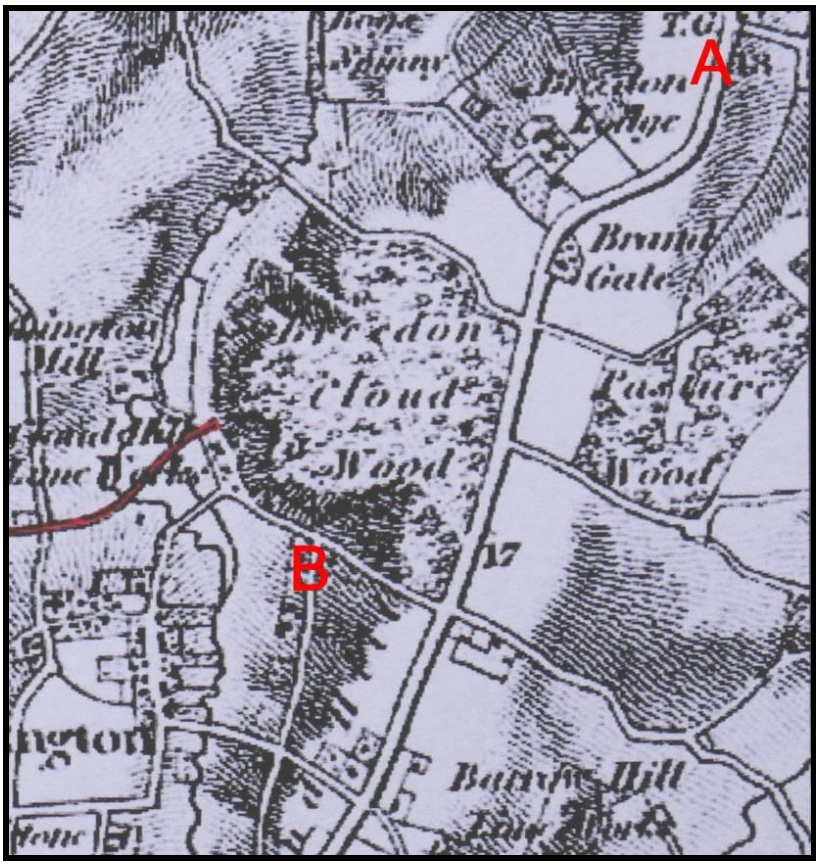
of a toll. Tolls were fixed according to a scale, depending upon the type of vehicle, animal or travelers passing the point; the tolls being advertised on a Toll Board on a pole or adjacent building. Toll Gates (normally associated with a Toll Gate house) and Toll Bars where the tolls were collected, were located at strategic points, and where possible, at the junction with other roads.

THE REDWOOD TOLL GATE AND CLOUD WOOD BAR

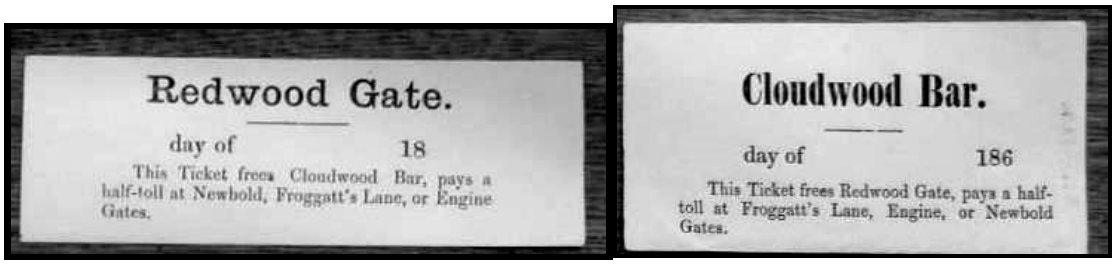
This section has been included to show the location of the "Redwood Toll Gate" and "Cloud Wood Bar", through which horse drawn wagons carrying burnt lime from Cloud Hill and Barrow Hill quarries plus coal from local coal mines would have passed. The map below shows where they where located.

From the appended 1880 Turnpike Trust sale document, it confirms that there was an actual Redwood Gate Toll House at **A**. The Cloud Wood Bar, thought to be located in the area marked **B,** was actually operated from a hut. The map on the next page shows in blue, a branch extension of the Hinckley to Melbourne turnpike road which is coloured red. This extension started at Tugby's Lane, Peggs Green and went up Eggington's Hill, Peggs Green and along Griffydam Top Road (formerly known as *Froggat's Lane*) to the cross roads. It then continued along the Top Brand and went at least as far as the Redwood Toll Gate. The Rempstone turnpike road is coloured green.

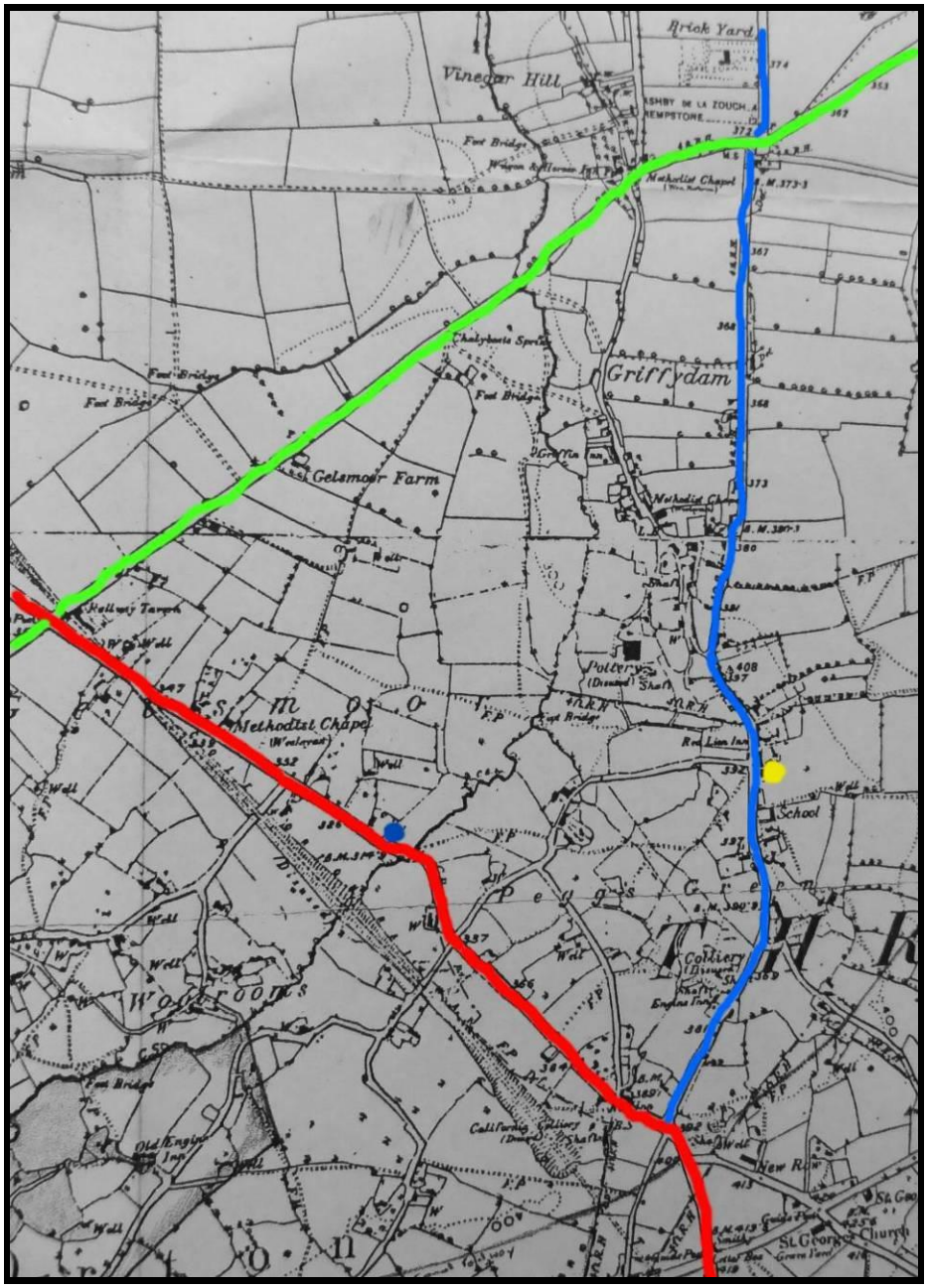
See the book by Samuel T Stewart entitled "A Social & Industrial History of Griffydam & Peggs Green" for further details.



EXTRACT FROM THE 1836 O/S MAP



ACTUAL TOLL BAR AND TOLL GATE TICKETS USED



BASED ON THE 1885 O/S MAP

TURNPIKE TRUST.

Expiration of the Local Act of Parliament and Sale of the Toll Houses and Gates.

NOTICE IS HEREBY GIVEN

That in consequence of the Abolition of the Tolls on this Road on the 1st day of November, 1880, the

MATERIALS OF THE TOLL HOUSES

AND THE TURNPIKE GATES,

WILL BE SOLD BY PUBLIC AUCTION,

For removal immediately after that day, by

MESSRS. GERMAN, GERMAN, AND LOWE,

Subject to such Conditions as will be read at the Time of Sale, and at the following times and places:

LOT 1.—THE HINCKLEY GATE TOLL HOUSE and Gate, *on Thursday, the 28th day of October*, 1880, *at* 11 *o'clock* in the Forenoon precisely, at the Hinckley Gate.

LOT 2.—THE STAPLETON GATE TOLL HOUSE and Gate, *on the same day, at* 11.30 *o'clock* in the Forenoon precisely, at the Stapleton Gate.

LOT 3.—THE CADEBY MACHINE GATE TOLL HOUSE and Gate, *on the same day, at* 12 *o'clock* in the Afternoon precisely, at the Cadeby Machine Gate.

LOT 4.—THE OSBASTON BAR TOLL HOUSE and Gate, *on the same day, at* 12.30 *o'clock* in the Afternoon precisely, at the Osbaston Bar.

LOT 5.—THE OSBASTON GATE TOLL HOUSE and Gate, *on the same day at* 12.45 *o'clock* in the Afternoon precisely at the Osbaston Gate Toll House.

LOT 6.—THE BELCHER'S BAR TOLL HOUSE and Gate, *on the same day, at* 3 *o'clock* in the Afternoon precisely, at the Belcher's Bar.

LOT 7.—THE PISCA LANE BAR TOLL HOUSE and Gate, *on the same day, at* 3.30 *o'clock* in the Afternoon, at Pisca Lane Bar.

LOT 8.—THE HEATHER MILL BAR TOLL HOUSE and Bar, *on the same day at* 4 *o'clock* in the Afternoon precisely, at the Heather Mill Bar.

LOT 9.—THE SWEPSTONE BAR TOLL HOUSE and Bar, *on the same day, at* 4.30 *o'clock* in the Afternoon precisely, at the Swepstone Bar.

LOT 10.—THE OLD LANE GATE TOLL HOUSE and Gate, *on Friday, the 29th day of October*, 1880, *at* 10.30 *o'clock* in the Forenoon precisely, at the Old Lane Gate.

LOT 11.—THE SWANNINGTON BAR TOLL HOUSE and Gate, *on the same day, at* 11 *o'clock* in the Forenoon at Swannington Bar.

LOT 12.—THE FROGGATT'S LANE TOLL HOUSE and Gate, *on the same day at* 11.30 *o'clock* in the Forenoon precisely, at the Froggatt's Lane Gate.

LOT 13.—THE FROGGATT'S LANE BAR TOLL HOUSE and Bar *on the same day at* 11.45 *o'clock* in the Forenoon precisely, at the Froggatt's Lane Bar.

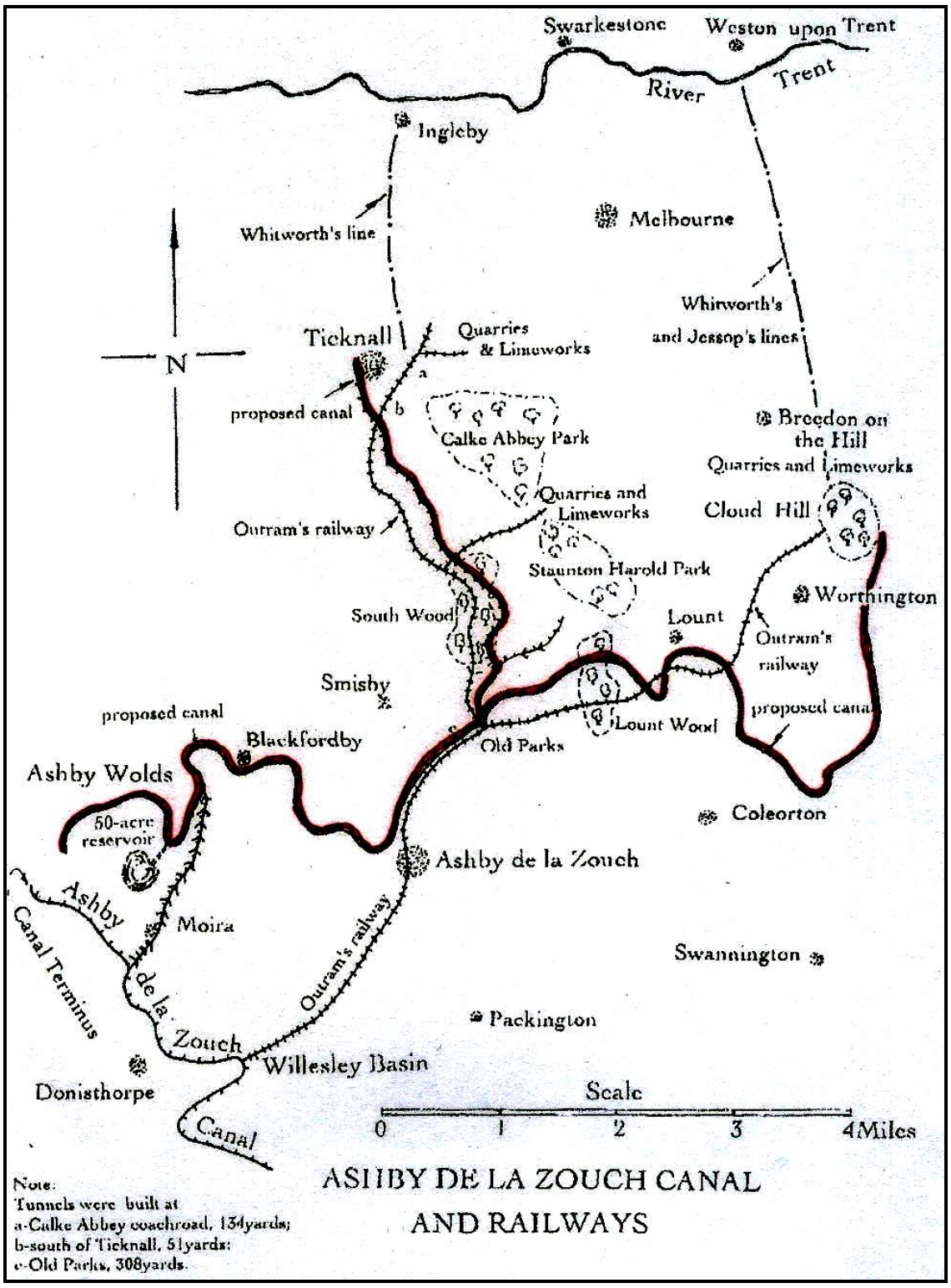
LOT 14.—THE CLOUDWOOD BAR TOLL HUT and Bar, *on the same day, at* 12.30 *o'clock* in the Afternoon precisely, at the Redwood Gate.

LOT 15.—THE REDWOOD GATE TOLL HOUSE and Gate, *on the same day at* 12.39 *o'clock* in the Afternoon precisely, at the Redwood Gate.

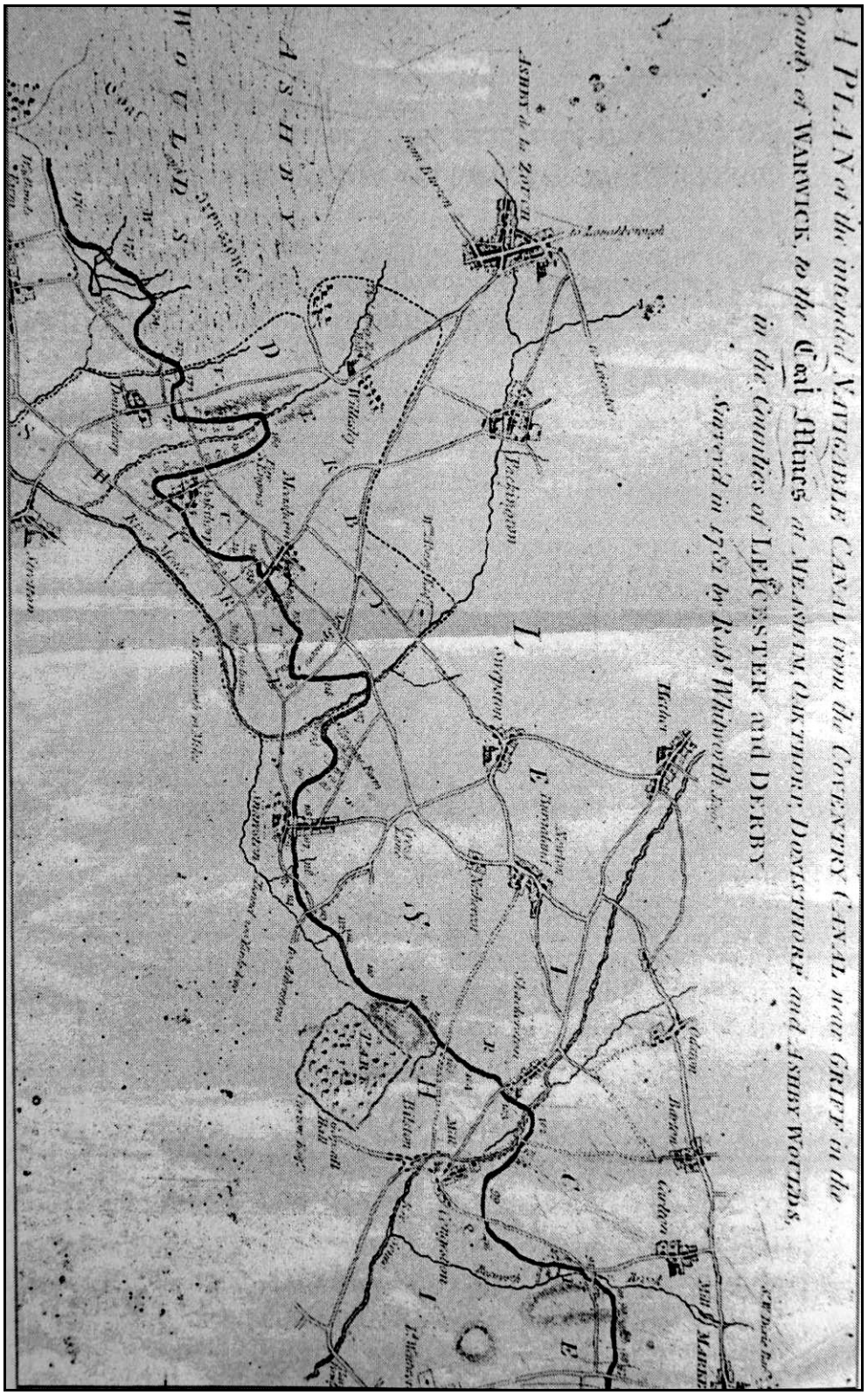
LOT 16.—THE ENGINE GATE TOLL HOUSE and Gate, *on the same day, at* 2 *o'clock* in the Afternoon precisely, at the Engine Gate.

LOT 17.—THE CARTBROOK BAR TOLL HOUSE and Bar, *on the same day at* 2.30 *o'clock* in the Afternoon precisely, at the Cartbrook Bar.

THE PROPOSED ASHBY CANAL EXTENSION TO CLOUD HILL, TICKNALL AND DIMMINSDALE FROM ASHBY WOULDS WHICH DIDN'T MATERIALISE



ROBERT WHITWORTH'S ORIGINAL PLAN SHOWING IN RED THE PROPOSED EXTENSION FROM THE ASHBY CANAL AT ASHBY WOULDS NORTHWARDS



The above is an extract from Robert Whitworth's original plan for the Ashby Canal from its connection with the Coventry Canal near Griff at Nuneaton to its termination at Wadlands Wharf, Moira. This portion of the map shows the canal from Market Bosworth to Wadlands Wharf only

In the latter half of the seventeen hundreds, pressure was being brought to bear to create a transport route to exploit the coal reserves and lime quarries in the areas to the north and west of Ashby-de-la-Zouch. Several solutions were proposed, and failed to materialize until in October 1792, Robert Whitworth revised his original plan from 1781 and presented a proposal for a level canal from the Coventry Canal at Griff, near Nuneaton, to Ashby Wolds, which would cost £63,402. It had been further proposed to extend the canal northwards from Ashby Wolds to allow collieries at Staunton Harold, Lount, Coleorton etc and Lime Works at Ticknall, Cloud Hill, Staunton Harold etc, to ship their products to markets further afield. The cost of this further extension was estimated at £82,143 making a total of £145,545.

In May 1794 the act was passed authorizing a canal of about 50 miles in length. **The extension from Ashby Wolds, coloured red on the above map**, would rise 139 feet and be supplied with water by a steam pumping engine. Over a further 5 miles, it would fall 84 feet to level branches, which would have required a series of locks. The extension would be serviced by horse drawn wagons. A private Act of Parliament was obtained in May 1794 to construct this extension to the main Ashby canal, and work began soon after. A transcription of the 1794 Act follows:-

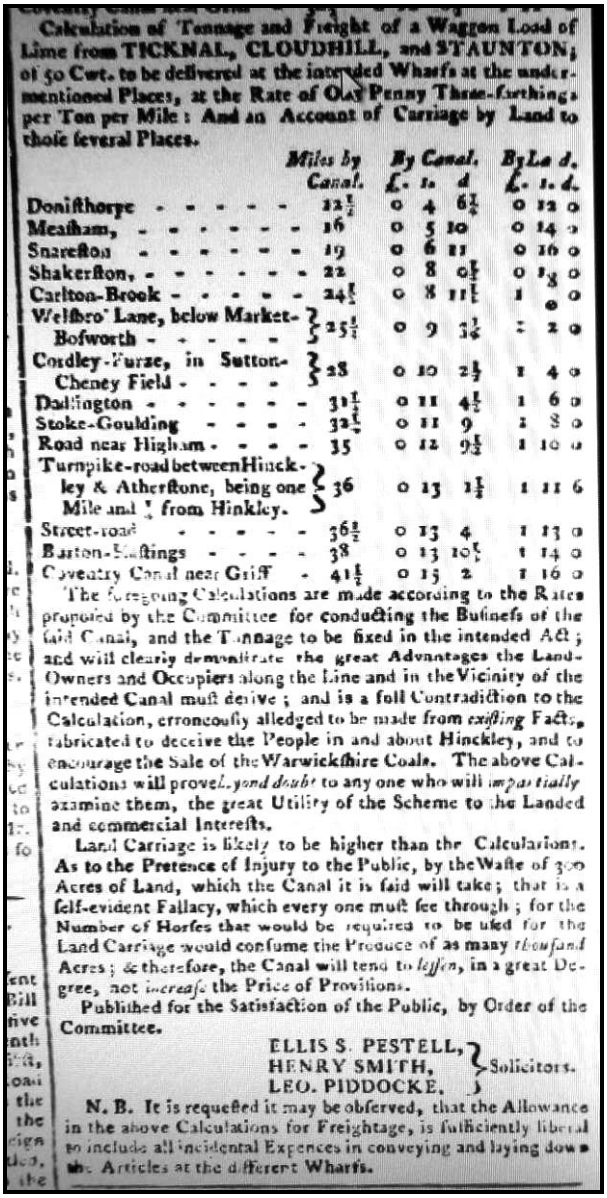
FROM THE JOURNAL OF THE HOUSE OF LORDS 1794 – GEORGE III

The Lord Bishop of Bangor, reported from the Lord's committees, to whom the bill, entitled an act for making and maintaining a navigable canal from the Coventry canal, at or near Marston Bridge, in the Parish of Bedworth, in the County of Warwick, to a certain close in the Parish of Ashby de la Zouch, in the County of Leicester, and for continuing the same from thence in one line to the lime works at Ticknall, in the County of Derby, and in another line to the lime works at Cloud Hill, in the said County of Leicester, with certain cuts or branches from the said canal, was committed: That they had considered the said bill, and examined the allegations thereof, which were found to be true; and that the committee had gone through the bill, and made one amendment thereof, which amendment was read by the clerk as follows:- and it be further enacted, that it shall be lawful for Sir Henry Harpur Crewe of Calke Hall in the County of Derby, bart, his heirs and assigns, at his or their own charge or expense, to make railway or stone or other road from the Lordship of Calke, to join or communicate with the said canal, at some convenient place between number 383 and 391 marked in the map or plan herein after directed, to be certified by the RT. Hon, the speaker of the House of Commons: provided that such railway, stone or other road, shall not pass over any other lands in the Lordship of Staunton Harold, nor be commenced or made, until the said Earl Ferrers, his heirs or assigns, shall make, or cause to be made, any railway, stone road or any other such road from his said lime works at Staunton Harold to and upon the said canal; or until the said Earl Ferrers, or any person or persons who may hereafter by owner or owners of the said lime works at Staunton Harold, to and upon the said canal; or until the said Earl Ferrers or any person or persons who may hereafter be owner or owners of the lime works, shall discontinue or shut up from sale, by his or other consent or approbation, the said lime works, and things in this act to the contrary thereof not withstanding. The said amendment, being read a second time, was agreed by the house.

The cutting for the main Ashby canal was started at the Wolds in 1794 and was to run from the Coventry Canal, at Marston junction, to Ashby Wolds for a length of 30 miles, without the need for locks. By October 1796, it had become obvious that the costs of construction had been seriously underestimated, and around one quarter of the shareholders had not honoured their pledges, and so the company had less capital than expected. It was in light of this fact that the canal company decided soon afterwards that, in agreement with the landlords, the proposed canal extension from the Wolds northwards should be substituted by tramroads to Cloud Hill and Ticknall using horse drawn wagons. Horse drawn Tramways, sometimes referred to as Railways, were in common use even at the time the Ashby Canal was being planned, and the Ashby Canal Act of 1794 fortunately gave them powers to transport traffic by 'Rollers, Inclined Planes or in any manner other than by water'.

By March 1798, the canal was open from the Wolds to Market Bosworth, however, the canal company had anticipated that by this time the coal owners like “The 2nd Earl Moira”, and Joseph Wilkes of Measham would have opened their collieries and be transporting coal on the canal to wider markets thereby providing good revenues for the canal. This of course proved not to be the case.

By 1803, the Ashby Canal from the Coventry Canal to the Wolds had still not been fully completed, even though the company had invested £184,000 in it against the original estimate of £63,402. It was finally opened to traffic in 1804, coinciding with the first pit at Moira known as “Double pit” being sunk to the main coal at 600ft. The canals delayed opening, undoubtedly had a serious effect on the economic development of the coalfields, thereby further reducing the profitability of the canal itself.



Calculation of Tonnage and Freight of a Waggon Load of Lime from TICKNAL, CLOUDHILL, and STAUNTON; of 50 Cwt. to be delivered at the intended Wharfs at the undermentioned Places, at the Rate of One Penny Three-farthings per Ton per Mile: And an Account of Carriage by Land to those several Places.

	Miles by Canal.	By Canal. £. s. d	By Land £. s. d.
Donisthorpe	22½	0 4 6½	0 12 0
Measham,	26	0 5 10	0 14 0
Snarestone	29	0 6 11	0 16 0
Shakerstone,	32	0 8 0½	0 18 0
Carlton-Brook	24½	0 8 11½	1 0 0
Welsbro' Lane, below Market-Bosworth	25½	0 9 3½	1 2 0
Cordley-Furze, in Sutton-Cheney Field	28	0 10 2½	1 4 0
Dadlington	31½	0 11 4½	1 6 0
Stoke-Goulding	32½	0 11 9	1 8 0
Road near Higham	35	0 12 9½	1 10 0
Turnpike-road between Hinckley & Atherstone, being one Mile and ¼ from Hinkley.	36	0 13 1½	1 11 6
Street-road	36½	0 13 4	1 13 0
Barton-Hastings	38	0 13 10½	1 14 0
Coventry Canal near Griff	41½	0 15 2	1 16 0

The foregoing Calculations are made according to the Rates proposed by the Committee for conducting the Business of the said Canal, and the Tonnage to be fixed in the intended Act; and will clearly demonstrate the great Advantages the Land-Owners and Occupiers along the Line and in the Vicinity of the intended Canal must derive; and is a full Contradiction to the Calculation, erroneously alledged to be made from *existing* Facts, fabricated to deceive the People in and about Hinckley, and to encourage the Sale of the Warwickshire Coals. The above Calculations will prove *beyond doubt* to any one who will *impartially* examine them, the great Utility of the Scheme to the Landed and commercial Interests.

Land Carriage is likely to be higher than the Calculations. As to the Pretence of Injury to the Public, by the Waste of 300 Acres of Land, which the Canal it is said will take; that is a self-evident Fallacy, which every one must see through; for the Number of Horses that would be required to be used for the Land Carriage would consume the Produce of as many *thousand* Acres; & therefore, the Canal will tend to *lessen*, in a great Degree, not *increase* the Price of Provisions.

Published for the Satisfaction of the Public, by Order of the Committee.

ELLIS S. PESTELL,
HENRY SMITH,
LEO. PIDDOCKE. } Solicitors.

N. B. It is requested it may be observed, that the Allowance in the above Calculations for Freightage, is sufficiently liberal to include all incidental Expences in conveying and laying down the Articles at the different Wharfs.

THE ABOVE ADVERTISEMENT APPEARED IN THE DERBY MERCURY IN JANUARY AND FEBRUARY 1793, APPARENTLY TO JUSTIFY THE FINANCIAL ADVANTAGES OF BUILDING THE EXTENSION TO THE ASHBY CANAL

FROM THE LEICESTER CHRONICLE

January 12 1895

MOIRA ICE BOUND BOATS - The severe weather has caused great loss to the boatmen at Moira. The canal is frozen, and the ice is about six inches thick. A large quantity of coal is usually sent daily from Lord Donington's Moira Colliery to Oxford and Braunstone. About a dozen boats followed the ice boat, but were unable to proceed further than Measham, a distance of about five miles

January 3 1891

MOIRA ENTERTAINING THE BOATMEN - Through the exertions of Police Sergeant Allen of Overseal, funds were recently raised to provide the boat people with a Christmas entertainment. These people have for some time been laying ice bound at the Rawdon and Reservoir Pit of the Moira Colliery. On Christmas afternoon, they were provided with an excellent dinner in a tent at the Reservoir Pit, Messrs Nixon, Thornewill, Ison, Holbrooke, Buxton and others assisting Sergeant Allen. After dinner, Mr Ison presided, pipes and tobacco were distributed, and a few pleasant hours were spent in conversation, speech making, &c. On the following day, the boatmen were each presented with a bowl of good soup.

ASHBY CANAL – SHORTHEATH RD, MOIRA C.1913

ASHBY CANAL - MOIRA BATHS WHARF C.1913

A PROPOSAL FOR A TRANSPORT LINK TO BREEDON QUARRY WHICH DIDN'T MATERIALISE

Cargoes of burnt limestone from quarries in the ownership of Lords Stamford, Earls Ferrers & the Burdett and Harpur–Crewe estates (ie: Ticknall, Calke, Dimminsdale, Breedon and Cloud Hill) were the main **potential** sources of revenue for the Ashby Canal. In 1787, William Jessop had proposed a canal and railway system to link Lord Stamford's Breedon Quarry with the River Trent. This is described in detail by R. B. Schofield in his book entitled "Benjamin Outram 1764-1805". A synopsis of this is included below in italics for which the copyright is owned by R. B. Schofield and the publisher which must be respected. This proposal was never executed and therefore this important quarry was the only one in the area which never achieved a link to a canal or tramway / railway system:-

William Jessop prepared a rather limited scheme for the Earl of Stamford for a railway or stone road, in addition to a short canal, which would lead from the lime works at Breedon down to the River Trent. He reported this in his findings in September 1787 (PRO, RAIL 803/15). In his report, Jessop drew attention to the increasing demand for lime for agricultural purposes, noting that "No lime works that I remember to have seen appear to afford so much room for an increase in sale with so little difficulty in the way of it, as those in the neighborhood of Breedon". Land carriage costs (as much as 12s. per ton) and the inaccessibility of the quarries were obstacles to sales. In spite of the benefits the products could bring to farming. The charges for the 2 ½ mile run down to the Trent would not cost more than 8d. per ton and from there the lime could be sent to Warwick, Stafford, Derby and even into Lincolnshire, at a cost saving of 8s. to 10s. per ton. "many will use four times the quantity they do at present and others within the same district will get it, who never got it at all". He anticipated that the current production of 20,000 tons per annum from Stamford's Breedon quarries could increase fourfold and, upwards of 60,000 tons of this would go off by water. If that be so "I would not think it matter for astonishment".

Jessop's proposals were for 1,800 yards of double railway (he did not state whether this was a plate way or edge-rail) from Breedon Hill to connect with a four foot deep canal section, 1 ½ miles long, leading in a straight line to the Trent. There were to be three locks, each capable of holding two Trent barges, and the water supply would be provided from nearby brooks. The canal would terminate at Weston Cliff and he further recommended one or two locks in the opposite bank of the river to allow access into the Trent & Mersey Canal, which was some 14 ft above normal river level. The latter proposal was in fact incorporated into the later plans of Benjamin Outram when building the Derby Canal, although these locks were rarely used in later years, and eventually became derelict. Jessop also suggested that a "stone road" might be built instead of a railway at half the cost. Formed with small stones and used by carriages with cylindrical wheels, it could be maintained at nominal expense. The estimate for his plan was £6,216 and yet for all its advantages for increasing trade, Lord Stamford took no further action on the matter. Perhaps the fact that the route passed through Lord Huntingdon's deer park, as well as Lord Melbourne's meadows, on its way down to the Trent influenced that decision.

When the Cloud Hill tramway was opened later in 1802 to enable lime and coal to be transported down to the Ashby Canal, the author has found no evidence that the tramway was extended up to Breedon Quarry to enable lime to be taken from there to be transshipped at Cloud Hill, which would seem to have made sense. Maybe lime was taken to Cloud Hill by horse drawn wagons on a made up track way, but no evidence has been found to suggest that this was the case. It could be said that Breedon quarry did have a transportation link by way of the Turnpike Road from Ashby to Sawley which by-passed the quarry so it is quite possible that lime from Breedon did reach the Trent by the turnpike road, but the author has found no evidence to confirm this.

THE CLOUD HILL AND TICKNALL TRAMWAY

Please note the route of Outram's railway / tramway from the Ashby Canal at Willesley basin to Cloud Hill and Ticknall is superimposed on Robert Whitworth's preceding map.

Due to the cancellation of the Ashby Canal extension as previously explained, and the decision to build a tramway instead, the company sought the advice of the respected engineer, Benjamin Outram, of Butterly Ironworks, Derbyshire. Eventually, it was decided that a double track tramway (except for a single track only at the Burton Rd level crossings in Ashby) should be built from Willesley canal basin wharf as far as the 447 yard long "New Parks Tunnel", from where it would split into single track branch lines to Cloud Hill and Ticknall. This major project was completed and opened for traffic in late 1802. However, in March, 1803, the Ashby Canal Company seconded engineers to make an inspection of the completed tramway, resulting in a critical report being issued which reflected badly on Outram. A program of repairs was carried out and Christopher Staveley, a Leicester based surveyor responsible for the "Charnwood Forest Canal" was brought in to carry out an examination of the repaired tramway.

Much later, in 1830, a single track branch line was opened from Calke and Dimminsdale limestone quarries, which joined the Ticknall branch tramway on the west side of South Wood near Ashby, which enabled lime to be shipped to the national canal network from there for a time.

The following map (in two parts), is taken from the Worthington and Newbold enclosure map dated 1806, and is the earliest map record the author has found which shows the initial route of the Cloud Hill Tramway from the quarry, which is actually depicted on the map as a railway. The first half of the map shows the tramway, dotted red, leaving the Cloud Hill Quarry (part of the Parish of Breedon at that time) and the second part shows its continuation on to Smoile Colliery near Lount from where it then continued on to the Ashby Canal at Willesley basin.

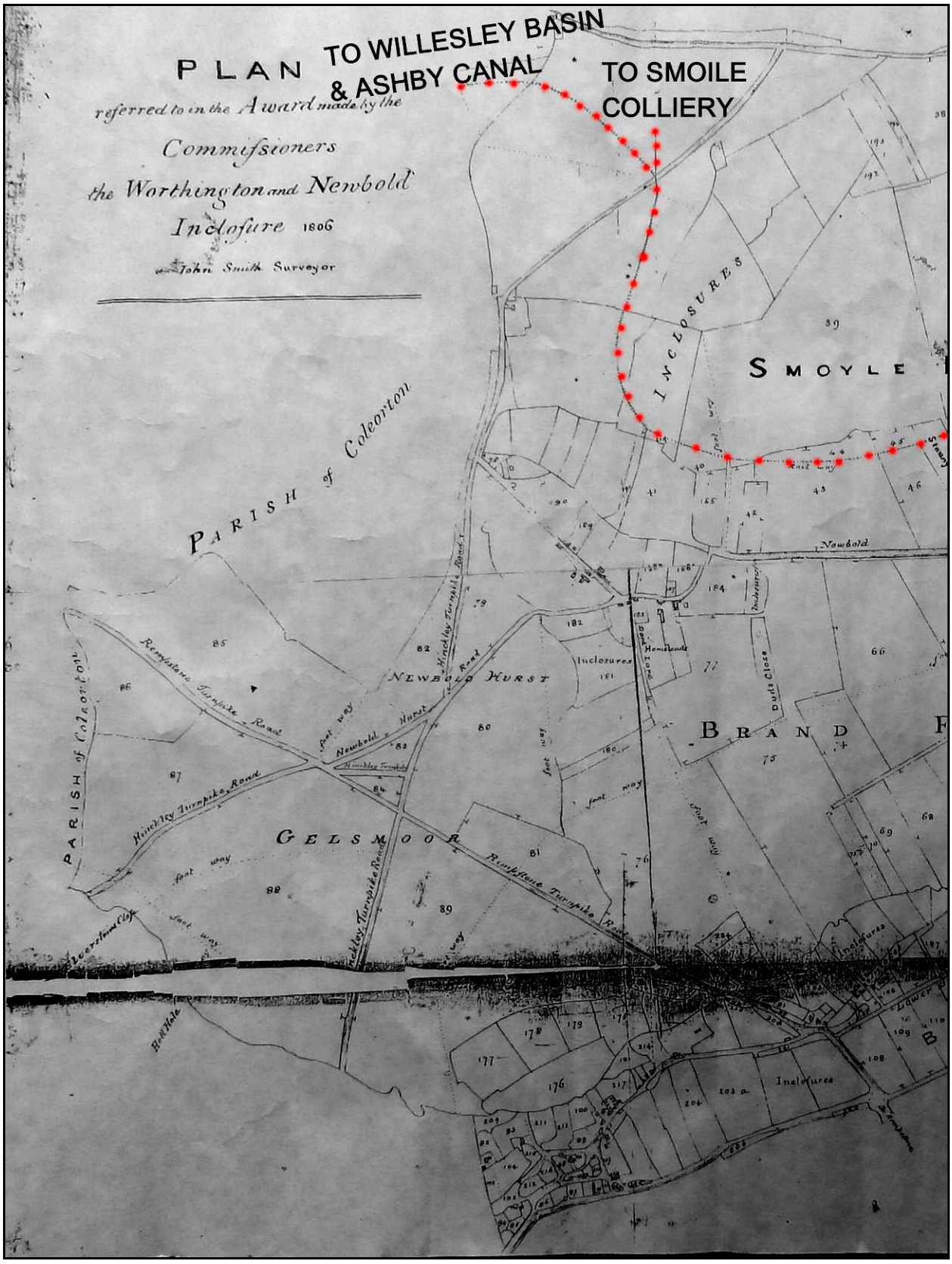
Once the Ashby Canal became fully operational in 1804, the Cloud Hill tramway gave Earl Stamford a significant advantage in getting his limestone and burnt lime to the wider markets via the national canal network.

Cloud Hill benefited further when the Coleorton Railway reached Worthington Rough in 1835, thereby opening up the market to Leicester.

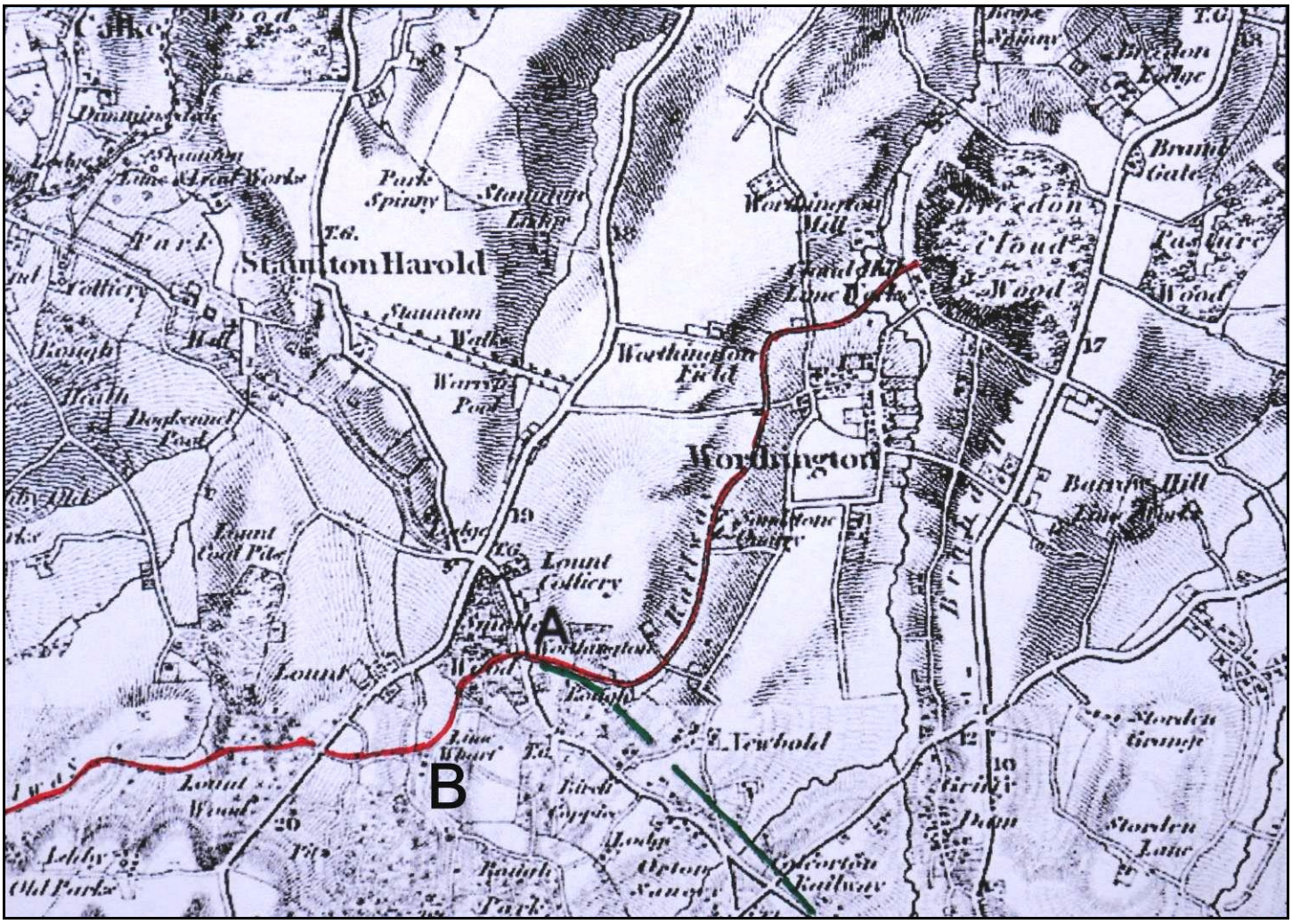
When the Railway was first opened, the lime had to be inefficiently transhipped at Worthington Rough from Cloud Hill horse drawn wagons to Coleorton Railway horse drawn wagons. Changes were quickly put in place to build a separate edge rail tramway from Cloud Hill to link up directly with the Coleorton Railway, details of which are given in the later feature on the Coleorton Railway. Only horse drawn wagons were ever used on the Coleorton section and it wasn't till it joined up with the Leicester to Swannington Railway at the Swannington Incline that steam engines were used, meaning goods had to be transhipped at that point.

The final and perhaps most profitable transport link for Cloud Hill was when the final stage of the Derby through to Ashby Midland Railway line was opened on September 1st 1868 linking with the Burton to Leicester Midland Railway which had already been opened in 1850 and was initially reached via the tramway over an 18 year period. From Cloud Hill to Ashby, the railway was laid mainly on the track bed of the old tramway, except for a few places where it was re-aligned to ease the curvature.

WORTHINGTON & NEWBOLD ENCLOSURE MAP 1806 – PART 1
(NOTE NORTH FACING ARROW RE CORRECT ORIENTATION OF MAP)



WORTHINGTON & NEWBOLD ENCLOSURE MAP - PART 2



FROM FIRST O/S MAP DATED 1834 - 1836

The area of the Cloud Hill Lime Works being quarried to the south west of Breedon Cloud Wood where the tramway enters the quarry can be discerned on the above map, and buildings / lime kilns are shown.

This map depicts the Cloud Hill Tramway (marked as a “Railway” on the map and coloured red) leaving the quarry, and bypassing a sand-stone quarry till it reached “Worthington Rough” and “The Smoile” near Lount at **A** and then winds its way to a “lime wharf” marked **B.** The wharf is adjacent to three lime kilns shown on the following map and as far as the author is aware following a search of old records, that no further records of these lime kilns still exist.

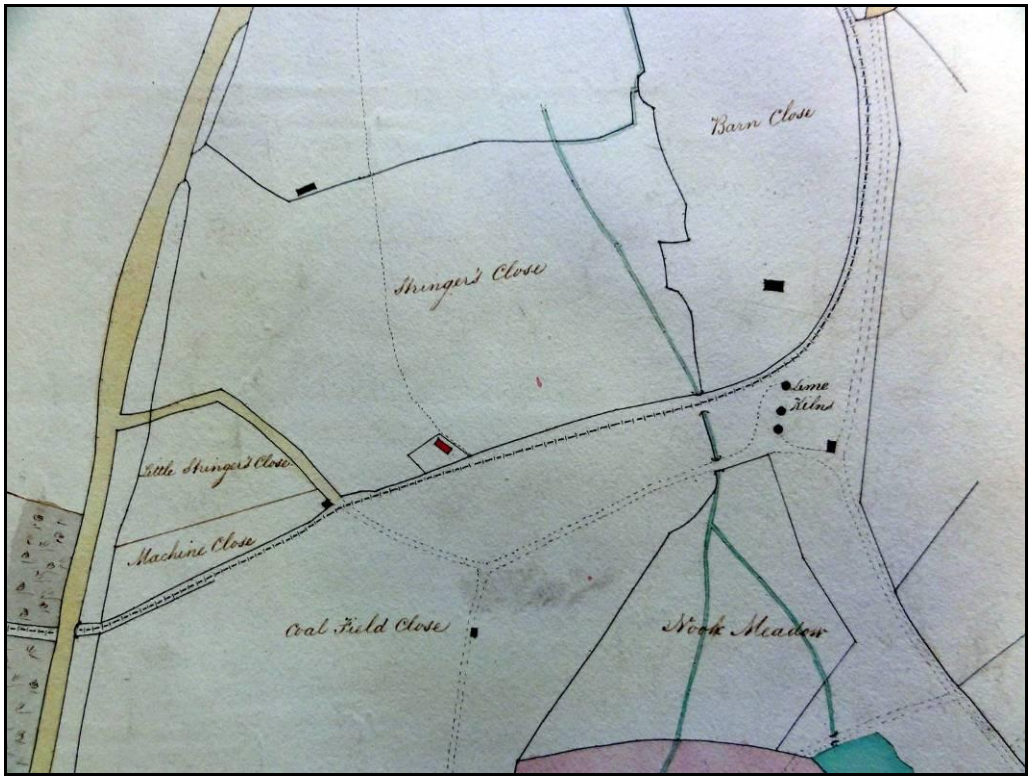
The land on which the three lime kilns and wharf was built was certainly owned by Sir George Beaumont of Coleorton Hall. No lime stone was present on any of their local estate lands, but of course, the Beaumonts’ had developed many coal mines in this area, Smoile Colliery and the adjacent Lount Colliery being just two of them, both of which were a stones throw from these lime kilns

The author takes the view that Sir George Beaumont made an agreement with Bostock & Co. Ltd, Lord Stamford’s tenant at Cloud Hill quarry, to have lime stone shipped from Cloud Hill via the tramway and transhipped at the kilns wharf so that he could produce his own quick lime,

presumably for use on his own estate. In return for this, Bostock would presumably have been able to obtain coal for his kilns at competitive rates. The author emphasises that this is only conjecture of course and has found no written proof of this.

If the above was the case, this further added to the network of industrial activity established by Beaumont in this area, with Coleorton Pottery (Opened in 1835), his coal mines and lime burning kilns, brickworks/ sanitary pipe works all on the edge of his estate boundary and just across the road from the Ferrers estate boundary. **Samuel T Stewart has written a book entitled "Coleorton Pottery 1835 – 1938" for anyone wishing to know more about this interesting pottery.**

The three lime kilns referred to, can clearly be seen at the centre right on the following undated map, with the Cloud Hill tramway sweeping round in close proximity. Whether these kilns were linked together with a common draw tunnel is not known. The road to the left hand side, coloured yellow, was the Tamworth to Sawley turnpike road at that time (currently the main Ashby to Breedon Road) under which the tramway went.



MAP FROM THE COLEORTON ARCHIVE HELD AT ASHBY MUSEUM

The tramway carried on to "Old Parks Tunnel" where it joined the branch line from Ticknall just before entering the tunnel. From there it went onto Willesley basin and joined the Ashby Canal.

To give the reader some idea of the scale of the Cloud Hill tramway, from Old Parks tunnel to Cloud Hill was 4 miles 2 chains 16 yards and the total length from Willesley basin (Ashby Canal) to Cloud Hill was 7 miles 74 chains 23 yards. The tunnel itself was 447 yards long. Quite a project!

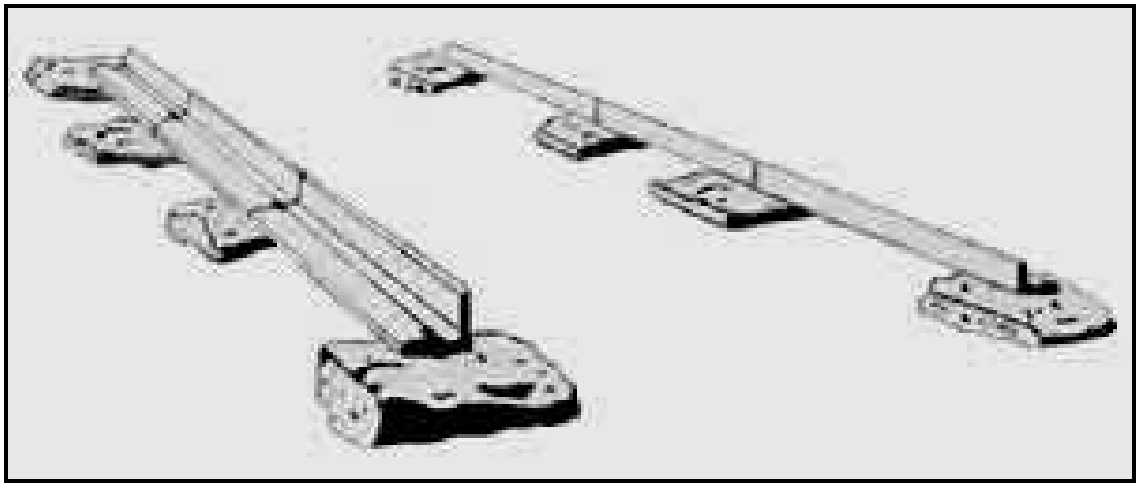
THE CLOUD HILL & TICKNALL TRAMWAY ENGINEERING DESIGN FEATURES

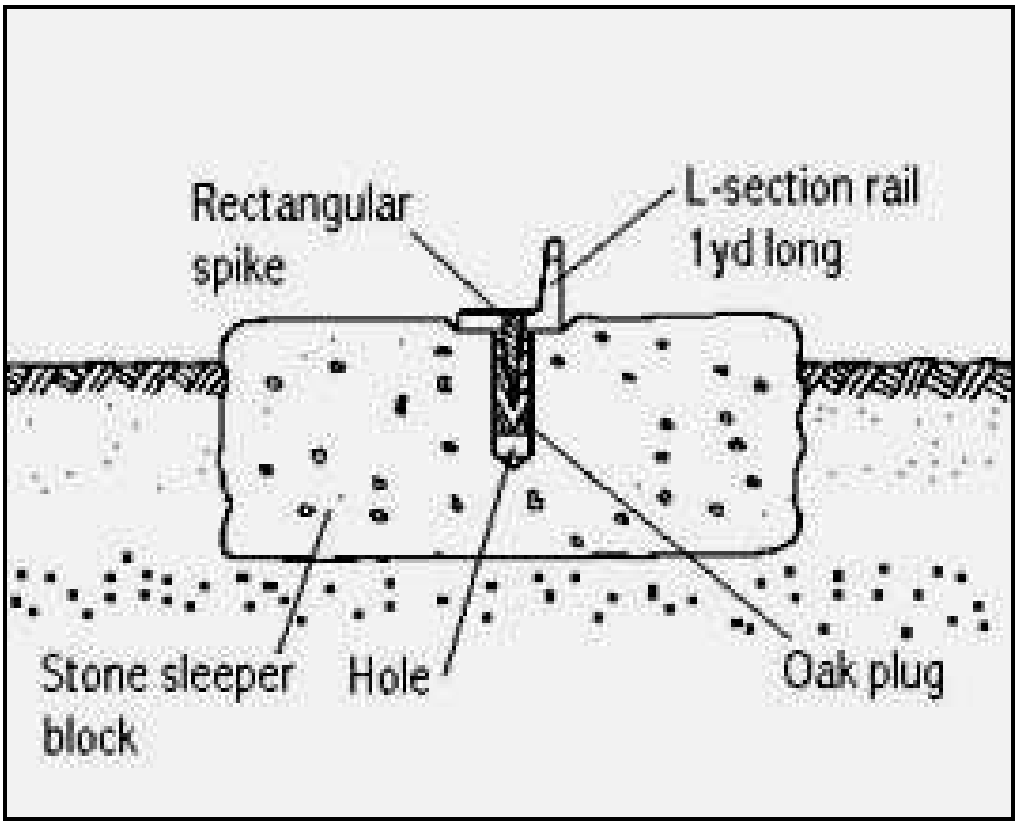
The tramway was mainly a product of the renowned Derbyshire engineer Benjamin Outram, and the following is a synopsis of the specification he laid down.

The stone sleeper blocks (sometimes known as chocks) for mounting the rails on weighed on average 150 lbs each and had a central hole drilled in them. Outram laid down the specification for the hole at 1½ in. diameter x 6 inch deep. The blocks were to be firmly embedded on ballast and the space between and around them filled up with small stones and gravel. The distance between the hole centres in the blocks, along the line of the rails, was to be set at 3ft to suit the 3ft long vertically flanged cast iron plate rails which had a notch at each end to form two halves of a hole which the securing spike went through. These were specified to be "the stoutest cast iron rails, one yard in length and to weigh on average 38 lbs each", with proportionately stronger ones at road crossings. The two rows of rails and stone blocks were set by an iron gauge to achieve a width of 4ft 2in over the rail vertical flanges. It was recorded that the width of the base flange of the rail was 4inches wide on the Ticknall Tramway and the vertical one 2¾ inches high. A bye-law was passed in April 1804 making it an offence to use wagons with a gauge (distance between the wheels) of less than 4ft 2in minimum and 4ft 3½in maximum, although the minimum gauge seem to conflict with the rail gauge of 4ft 2in.

Tight fitting octagonal wooden oak pegs were to be driven into the hole in the sleeper blocks, and hand made wrought iron spikes made to fit the countersunk notches at the end of the rails were then driven into the wooden pegs through the notched holes, to secure the rails in position. According to Outram, the wooden plug was to be octagonal and 5in. long, and the spikes were to be made to fit the rectangular countersunk notches in the end of the rails in order that they finished flush with the rails.

It was intended that the narrow wagon wheels ran close to the vertical flange of the rails. In reality, the spikes would have worked loose under the continuous impact from the max 4 tons per wagon load, and no doubt the wheels would have been bumping along over the spike heads most of the time, meaning that they would have had to be continually maintained. However, in 1806 the General Assembly made a regulation prohibiting the transit of any wagon exceeding two tons gross. Two years later, speed was reduced to walking pace.





The reader should note that the following photographs of the Dimminsdale and Ticknall tramways are included as they are representative of the original Cloud Hill tramway specification also.

TWO SLEEPER BLOCKS WHICH WERE FOUND ON THE TOP OF THE BRIDGE AT DIMMINSDALE IN SOME CASES, IT WAS NECESSARY TO DRESS THE SLEEPER BLOCKS TO PROVIDE AN ACCEPTABLE SURFACE FOR THE RAILS TO SIT ON AS SHOWN IN THE RH PHOTOGRAPH THESE BLOCKS WERE SET AT 3FT CENTRES

Amazingly, a nail / spike had survived in one of the holes in another sleeper block found close to the bridge. This was in a very rusty and eroded condition as can be expected after nearly 200 years. This is shown in the following photographs.

THE SLEEPER BLOCK FOUND ADJACENT TO THE BRIDGE WITH THE SURVIVING NAIL / SPIKE SHOWN ADJACENT TO THE HOLE IN WHICH IT WAS FOUND

A TYPICAL COMPLETE NAIL / SPIKE

A horse drawn wagon typical of those that would have been used on the tramways. The design allowed for wooden containers to be placed on top of the chassis thereby preventing damage to the basic wagon and these could be easily removed and repaired. This particular wagon is on display at the Forest of Dean Heritage Centre complete with cast iron rails mounted on stone blocks at 3ft centres.

A Ticknall tramway wagon on the weigh-bridge between Old Parks Farm and Ashby. Note the removable wooden container mounted on top of the wagon chassis. Apparently, after the line closed in 1913, the Midland Railway Company made occasional trips over it to try and keep the “Right of Way” open, but it was officially closed in 1915.

By 1775 Earl Ferrers had started mining lime stone and lead at Dimminsdale. The Harper-Crewe family starting to work the Calke side shortly afterwards. **A detailed account of this is included in the book by Samuel T Stewart entitled "A Social & Industrial History Study Based Upon Staunton Harold, Lount, Dimminsdale & Heath End".**

A total of 16 lime kilns were eventually built (10 at Dimminsdale and 6 on the Harper-Crewe side). Up until September 1830 when the tramway branch from Calke & Dimminsdale to join up with the Ticknall branch to the west of South Wood was built, burnt lime had to be collected by the customers from Dimminsdale and Calke by horse and cart. Coal to fuel the lime kilns was brought into the quarry by the same means from local coal mines.

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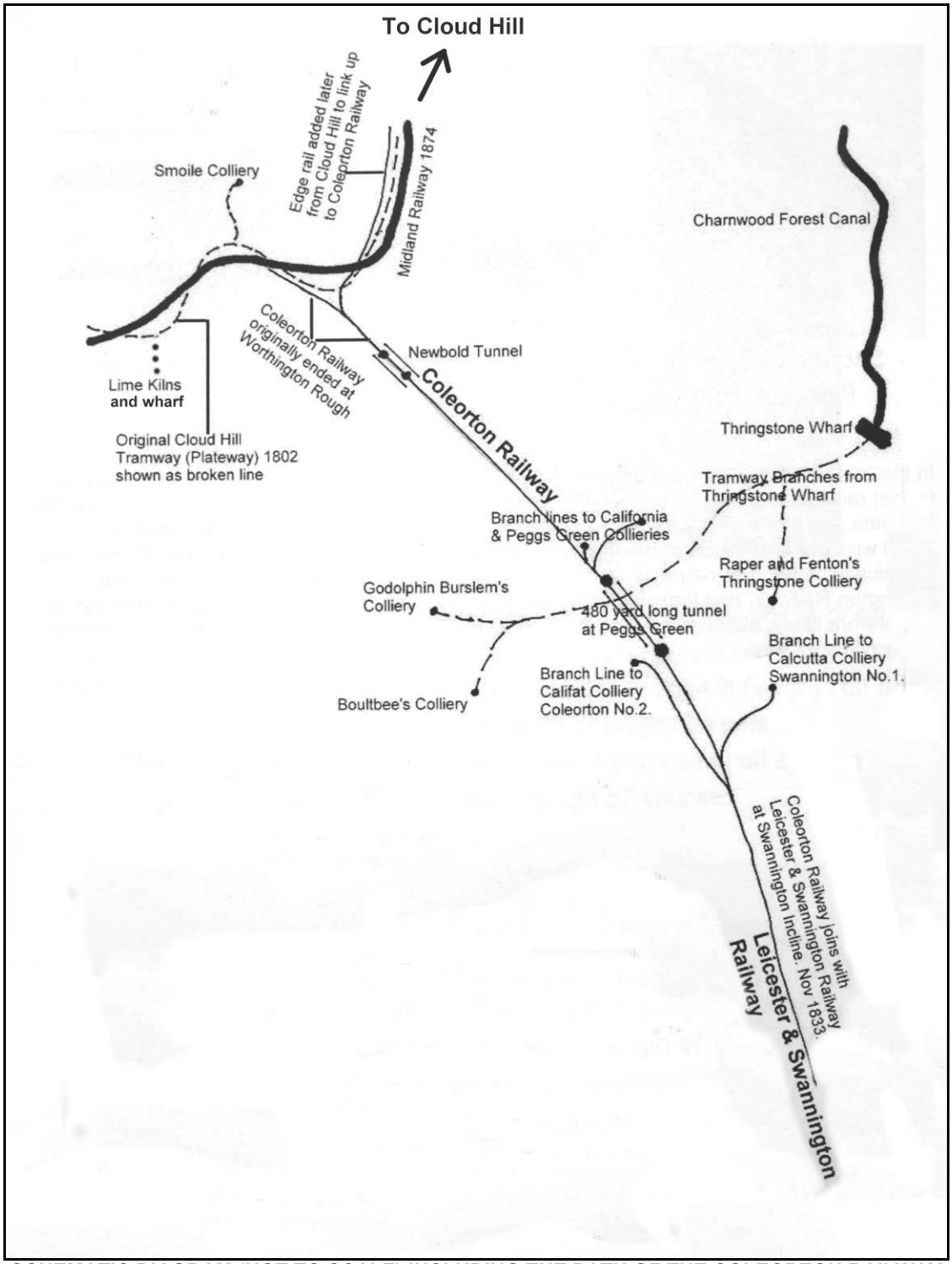
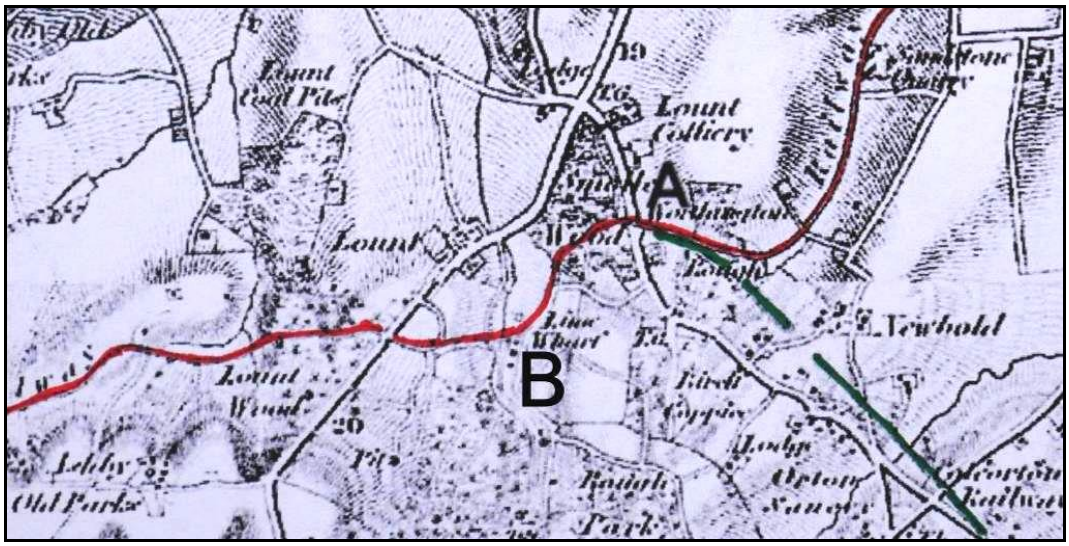
THE BUILDING OF "THE COLEORTON RAILWAY" TO LINK UP WITH "THE LEICESTER TO SWANNINGTON RAILWAY"AT SWANNINGTON INCLINE



SCHEMATIC DIAGRAM (NOT TO SCALE) INCLUDING THE PATH OF THE COLEORTON RAILWAY AND THE TRAMWAY BRANCH LINES FROM THE CHARNWOOD FOREST CANAL AT THRINGSTONE WHARF TO THE COLLIERIES AT THRINGSTONE AND COLEORTON



The above map also shows coloured green, the route of the Coleorton Railway coming from the Pegg's Green in a north westerly direction, going through the Newbold tunnel and finally running alongside the Cloud Hill Tramway for a short distance at "Worthington Rough" where lime from Cloud Hill and coal from the Smoile area was initially transhipped into the Coleorton Railway horse drawn wagons.

Sir George Howland Willoughby Beaumont, 8th Baronet, was responsible for the promoting, building, and a substantial part of financing the "Coleorton Railway", and also for the promoting of the "Coleorton Railway Act", passed by Parliament on June 10th 1833, which permitted the railway to be operated. Most of the land on which it was built was owned by Sir George, so his contribution to the cost would have been more than what it actually appeared. The total money raised was apparently £15,240, of which Sir George contributed £5,500 (36%). He held 109 of the 340, £50 shares, and was the major shareholder. **The primary purpose of the railway, was to serve Beaumont's collieries in the Peggs Green and Coleorton areas, however, other key people like the Earl of Stamford & Warrington, the owner of Cloud Hill Quarry, and Lord Ferrers with his mining and quarrying interests would have had an involvement.**

Sir George had seen the Leicester & Swannington Railway project as containing both potential and threat. Yes, it would bring the new railway network into the Leicestershire coalfield, but it would stop short of serving all his potential colliery interests. Beaumont was fairly new to the area, having inherited the estate in 1827 (**see the book entitled "A History of Coleorton and the Locality" by Samuel T Stewar**t). He had previously lived in Surrey, and it seemed that he did not know, or was more likely misled by his agents, about the extent to which the Coleorton coal reserves had already been mined. However, he still had inherited wealth and perhaps some political influence, as his father, the 7th Baronet had been MP for Bere Alston in Devon.

Before the Bill was presented to Parliament in March 1830, Sir George spoke to a number of MPs asking them to oppose the line unless it extended to serve Coleorton too. On behalf of the Leicester and Swannington promoters, Sir Charles Hastings and Mr Keck responded to the danger of this threat. They agreed with Sir George….."*to render you every assistance in their power to enable you to communicate by a Branch to the main line of the Railway, and that in the case of your being compelled to apply to Parliament to effect that objective, that the expenses to be thereby incurred, should be repaid to you out of the tonnages which might become payable for Coals and other minerals conveyed from your works*…". On the last day of March 1830, the Coleorton agreement was confirmed, and on June 10th 1833 the Leicester & Swannington Railway obtained its Act.

Sir George had not managed to persuade the promoters to build his line, but he had at least ensured that legal costs associated with it would be refunded to him. In fact, the Leicester & Swannington Railway Company was rather shrewd in all its dealings, only actually paying for two (Bagworth and North Bridge) of the six branches which brought additional traffic over its route in the coming decade. The main line from Leicester to Bardon and Bagworth Colliery was completed in two years, and was officially opened on July 24th 1832. By 1833, it had reached Long Lane, Whitwick, and was soon extended to the 1 in 17 Swannington Incline.

George Stephenson reported to the Board on his survey of the extension beyond Swannington, including levels. Samuel Smith Harris later stated that these included inclined planes and a branch to Cloud Hill Lime works. In August, Sir George Crewe requested that any such extension should serve his Ticknall Lime works. At the end of September, Sir George expressed a willingness to promote a railway from the Coleorton and Peggs Green Collieries, under the terms of the Coleorton Agreement, and the Coleorton Railway project was officially announced in the Leicester Chronicle of November 20th 1832. During the winter of 1832/3, Samuel Harris (an architect and surveyor, as well as being a partner in Whitwick Colliery) drew a section of the route. William Dicken was then appointed engineer and finally drew up the plans for submission to Parliament. The "Leicester and Swannington Railway Co" actually supported the project, by paying the costs for processing the Act of Parliament, and also supplied technical knowledge in building the railway.

The contractors for the railway were Messrs Nowell and Son, and one of their first major tasks was to build a 480 yard long tunnel at Peggs Green, which the line coming from the bottom of the Swannington incline passed through, before heading south east towards "Worthington Rough".

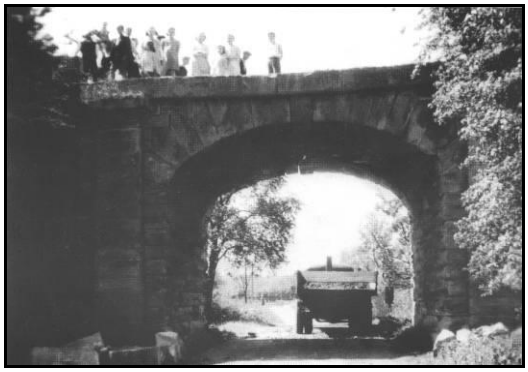
THE ENTRANCE TO THE CIRCULAR BRICK TUNNEL AT ST. GEORGE'S HILL, SWANNINGTON WHICH HAS NOW BEEN FILLED IN

From the estate records, we know that "Coleorton Brickyard", managed by Thomas Thirlby at that time, supplied some 868,000 bricks between August 1833 and February 1835, mainly for the building of the Peggs Green tunnel. The price for these bricks started at 22 shillings per thousand, reducing later to £1 per thousand*. The brickyard was owned by Sir George Beaumont, and had a reputation for making high quality bricks, many of which were supplied to St.Pancras station. 5,800 common bricks were supplied to Coleorton Pottery in 1841 at 25s. per thousand for the start of building the first kiln.* **See the book entitled "Coleorton Pottery 1835-1938" by Samuel T Stewart.**

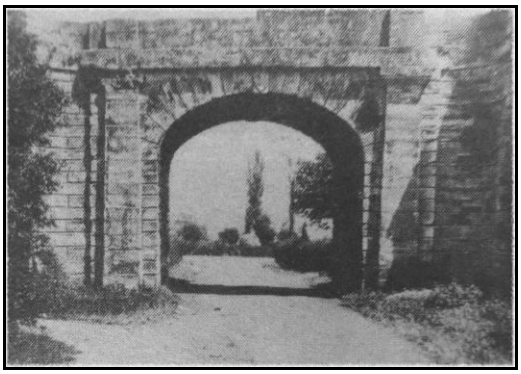
In September 1835, Nowell & Son and Thomas Platts were paid for fencing, hedging and dyking along the route.

The line continued onto Gelsmoor via an embankment, which crossed the bridge on Aqueduct Lane, which was / is always referred to by the locals as *Acadoc*. It is thought that it got its name from a wooden sough on stilts which was created at one time to bring the pumped water from a mine shaft which was sunk in the field to the north of what was once Providence Chapel and is now Providence House on Gelsmoor Road, down to the brook at the bottom of Zion's Hill. The shaft was approx 200 meters from the current Rempstone Road and 15 meters in from the current Gelsmoor Road. However, this does seem a rather fanciful story.

The following photographs are of the former bridge on Aqueduct Lane, which the Coleorton Railway once ran over. The first photograph was taken as the bridge was being demolished; note the group of people standing on the top. The bridge, in dressed sandstone, was constructed as part of the Coleorton Railway project c.1834. The side walls of the bridge are still there.

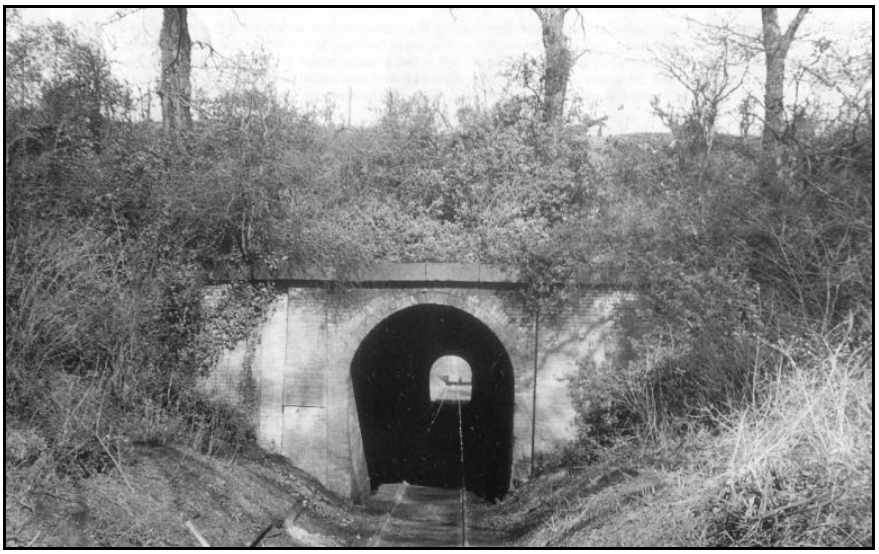


THE BRIDGE BEING DEMOLISHED



THE BRIDGE AS IT LOOKED C.1900 VIEWED FROM GELSMOOR ROAD

A circular brick tunnel had to be constructed through the embankment at the bottom of Zion's Hill to allow the brook to pass through, and which still exists today. The embankment then continued on to a point close to the "The Gelsmoor" on Rempstone Road. "The Gelsmoor" restaurant originated in the 1840's as the "Railway Hotel", the licensee being George Crabtree. It later became the "Railway Tavern" and then the "Railway Inn". Apparently the road crossing at this point was controlled by a keeper, who was provided with a wooden box. Following pressure from Sir George Beaumont, the line was extended to continue along another embankment to cross the road just below Newbold School, and then via a cutting and short tunnel (c.90 yards long) to the terminus at the Hinckley-Melbourne turnpike, which was originally built in 1750. At this point, the railway had reached the Cloud Hill tramway (plateway) at what was also known as Worthington Rough, and ran alongside it in a westerly direction for a short distance, but did not connect with it at this time (see schematic diagram at the beginning of this section). It was thought to have been completed to this point from Swannington Incline in early 1835. For a relatively short railway (c. 2 ½ miles long), a high degree of civil engineering was involved in its construction.



NEWBOLD TUNNEL

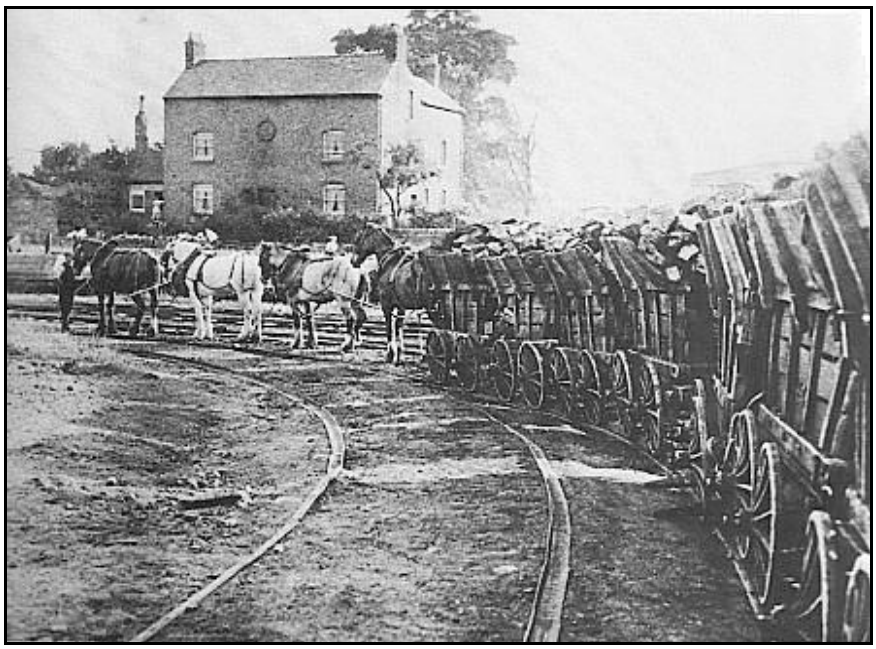
The railway also had a wharf at Gelsmoor, next to the Rempstone Turnpike, which was run by George Crabtree (also licensee of the "Railway Inn"), and operated transferring coal, slack, lime and any other items that could be conveyed on the railway, such as pottery from "Coleorton Pottery". Although the line was the standard 4 feet 8½ inch gauge, and used edge rails, it was worked by horse drawn wagons with flanged wheels and there is no documentary evidence that steam engines were ever used on the "Coleorton Railway" (see later photographs).
The failure of the original aim to reach "Smoile Colliery" which was leased from Sir George by Benjamin Walker proved costly, and initially coal wagons had to be double loaded from the coal shaft to reach the railway for transportation to Leicester. This was clearly inefficient. It is possible, that an extension of the line to one of the Smoile Colliery shafts was constructed c.1836, based on the submission of a bill from George Chubb for 2 guineas for surveying the extension. He was the surveyor and resident engineer of the railway.

Lime from "Cloud Hill Quarry" would have had to be transhipped onto the "Coleorton Railway" due to the fact that the Tramway was in fact a 4 feet 2 inch gauge plateway (see later photograph). The L shaped line plateway, used narrower wagons with plain rimmed wheels, and therefore this did not match either the rail type, wheel type or gauge of the "Coleorton Railway". The "Ashby Canal Company" which owned the tramway had anticipated this, and considered Lord Stamford's (owner of "Cloud Hill Lime Works") proposal in Feb 1833 to lay a compatible rib (edge) rail from Cloud Hill, to connect with the "Coleorton Railway" at Worthington Rough. This was not carried out, and the "Ashby Canal Company" then considered a proposal in 1837 from the "Leicester and Swannington Railway" board, who had become concerned about the lack of traffic over Swannington Incline from "Coleorton Railway", to lay down rib (edge) rails parallel with the tramway from its intersection point with the "Coleorton Railway" to "Cloud Hill Lime Quarry". The canal company went one step further, and requested their company engineer to prepare costings for relaying the whole of the tramway from Willesley basin to Ticknall and Cloud Hill with rib (edge) rails, and also to prepare an estimate for the likely increased traffic. Clearly, this proved too expensive, and the final solution, agreed by the "Ashby Canal Company" on Dec 4th 1838, was to lay a rib (edge) rail on the tramway from Cloud Hill to "The Smoile", the cost of which was borne by "Bostock & Co" (Lord Stamford's tenant at Cloud Hill), and "Coleorton Railway" via loans from the Swannington and Leicester Railway of £600 and £633.13s.11d respectively. The work was recorded as not being completed till Aug 5th 1840.

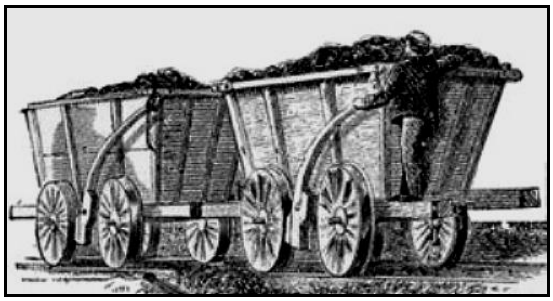
The “Coleorton Railway” and “Leicester and Swannington Railway”, clearly stood to benefit from considerable extra traffic over the line, which proved to be the case. The rib (edge) rail proved to be a success, and traffic from Cloud Hill continued steadily over the line until the building of the Midland Railway from Derby to Ashby took place. From the time the section from Worthington to Ashby was opened in 1874 no further shipments from Cloud Hill over the Coleorton Railway were recorded for obvious reasons. See the following feature on the Midland Railway developments.

Although the information available is somewhat sketchy, it appears that “Coleorton Railway” was latterly (by 1862) extended to another of the “Smoile Colliery” shafts in an effort to improve its financial viability. It is recorded that by c.1849, a short branch line had been added to take coal from the “California Colliery”, and in c.1853 and c.1855, two further short branch lines had been added to the “Calcutta” and “Califat” collieries and another to the ”Peggs Green Colliery”. The following recorded statement was made in Oct 1857 by Charles Smith who was the receiver for “Wyggeston’s Hospital” (a charitable institution) on whose land the Califat and California Collieries stood - “*Mr. Worswick has erected two collieries on the estate (Califat and California), and has far exceeded the minimum quantity of 12 acres per annum. He has recently erected a private railway nearly parallel to the Coleorton line from the terminus of the old Swannington to his newest pit on the common“.*

The “Coleorton Railway” survived for c.40yrs, and had a somewhat roller coaster life, with some high points of profitable traffic, and a lot of lows when traffic was inadequate. Overall, the line was a financial failure, in part, as a result of the very competitive prices being achieved in the Leicester coal market, due to a price-cutting war between the Derbyshire collieries and the new collieries at Coalville. The New Lount colliery used part of the line until the closure of the pit in 1968..

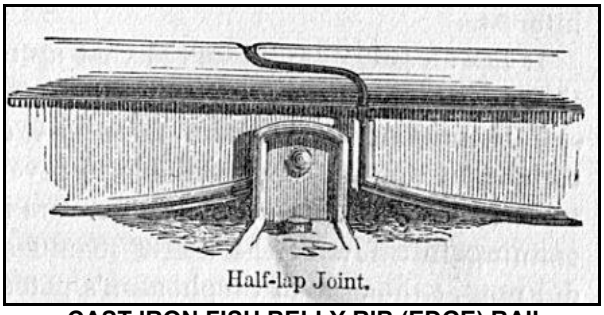


The above photograph shows coal being transported along a plateway rail system by horse drawn wagons. This would have been similar to how it would have been on the Coleorton Railway, except that it was a single track rib (edge) rail line, and the wagons would have had flanged wheels. The original Cloud Hill tramway was a plateway rail system as per the above photograph.



A typical design of horse drawn wagons with flanged wheels that would have been used on the Coleorton Railway, running on rib (edge) rails.

SECTION OF TYPICAL PLATEWAY RAIL



CAST IRON FISH BELLY RIB (EDGE) RAIL. STEPHENSON 1818 PATENT

In the early 1800's, George Stephenson held the patents and rights for the best cast iron rib (edge) rails (see illustration above), which were typically only 3 feet in length. These tended to be brittle and broke easily. John Birkinshaw in 1820 developed and patented a method of rolled wrought / malleable iron edge rails which could be made in 15 foot lengths. These were technically better in all respects, and Stephenson used these rails on the "Stockton and Darlington Railway" and they were also used on the "Leicester and Swannington Railway". It is therefore likely, although no records exist, that the same rails were used on the "Coleorton Railway". The author recalls these lines still existing in Stoney Lane, and going over the lane from the embankment on either side. They were later taken up by the council.

In "The Leicester to Swannington Railway" by C.R.Clinker (Leicestershire Archeological Society) it is recorded on the only *surviving* shipment document (1832 to 1845) that the following shipments of burnt lime were sent via the Coleorton Railway and Leicester to Swannington Railway to Leicester from Cloud Hill.

	Tons	**Cwts**	**Qt's**
First 6 months of 1833	**371**		

The above would have presumably been transported to Long Lane, Whitwick by horse drawn wagons on the turnpike roads as the railway to "Swannington Incline" was not completed till November 1833.

First 6 months of 1844	**783**	**11**	**2**
Last 6 months of 1844	**2044**	**9**	**1**
First 6 months of 1845	**675**	**8**	**3**

The above would have been transported by horse drawn wagons on the Coleorton Railway to be transshipped onto the Leicester to Swannington railway wagons at 'Swannington incline'.

THE MIDLAND RAILWAY COMPANY DEVELOPMENTS

In 1849, Mr. C. Abney, who owned land on which the part of the Cloud Hill tramway between Willesley basin and Ashby had been built, gave notice that he required possession of it, and on consulting the lawyers, the Midland Railway discovered that, as successors to the Canal Company, they were tenants and not owners of the land. They therefore decided to close that section on Abney's land on June 1st 1850, and informed the various traders accordingly. The rails were removed and the traffic transferred to the newly opened railway which the company had built from Leicester to Burton, utilizing part of the Swannington to Leicester section of the railway. This closure left the tramways from Ashby to Ticknall, Dimminsdale and Cloud Hill isolated from the canal system, and their traffic was therefore transshipped to the Leicester to Burton railway at Ashby instead.

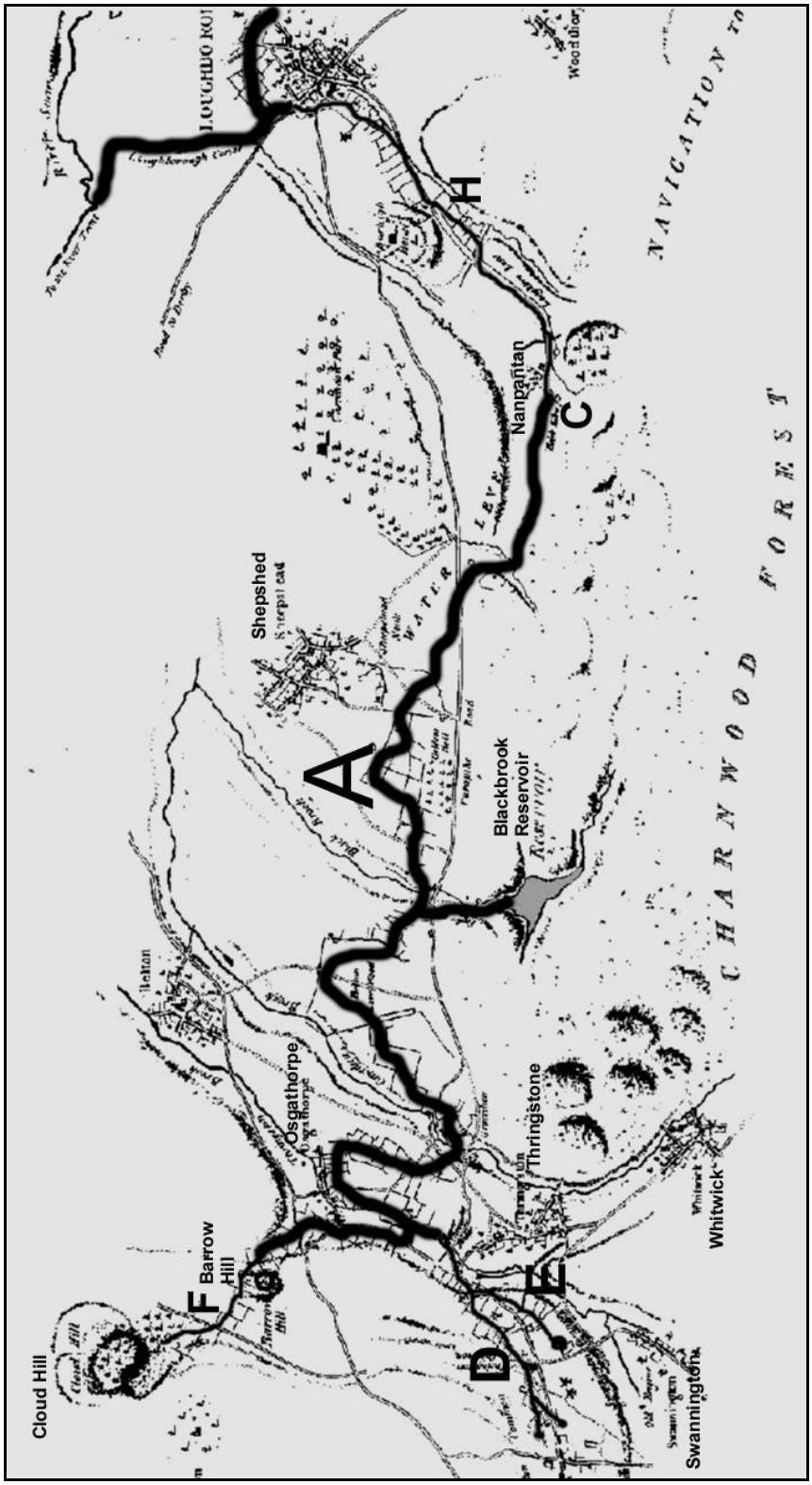
On September 1st 1868, a new Midland Railway service began linking Derby to Melbourne. In October 1869 a single track line was opened to Worthington and the final section of the line from Worthington to Ashby was opened on January 1st 1874. The section of the tramway between Cloud Hill and Ashby was replaced with a standard gauge railway which approximately, except for slight changes in curvature, followed the route and bed of the old tramway with the Old Parks tunnel being enlarged to take full size steam trains which was shortened at the same time.

The above photograph was taken in 1885 and shows the branch line of the Derby to Ashby Midland Railway entering the Cloud Hill Quarry and Lime Works.

Behind the locomotive, two tall kilns are smoking merrily away and at the foot of the kiln, the right hand one is being emptied. **These are the same kilns shown later in the Cloud Hill quarry feature marked A.**

Passenger services had ceased by 1930 but limestone products continued to be carried from Cloud Hill Quarry to Derby along the line until 1982. The line between the quarry and Ashby had been closed and removed by 1955. Cloud Hill Quarry therefore benefited from the Cloud Hill tramway, the Derby to Ashby Midland Railway, the Coleorton Railway and the Leicester to Swannington railway routes in stages over a period of 180 years which is quite remarkable.

THE CHARNWOOD FOREST CANAL – FURTHER INFORMATION IN RELATION TO THE CANAL IS INCLUDED IN THE EARLIER FEATURE ENTITLED "THE LIMESTONE QUARRIES AT BARROW HILL & OSGATHORPE"



ORIGINAL MAP OF THE CHARNWOOD FOREST CANAL DRAWN IN 1791 BY THE CANAL'S ENGINEER CHRISTOPHER STAVELY AND ANNOTATED BY THE AUTHOR

About the time that the Leicestershire and South Derbyshire turnpike system was becoming effective, business men and financiers applied themselves to a new concept of inland communication – the canal – which culminated in the notorious "canal mania" of 1791-3. Sponsors of the various canal projects believed this new form of transport would drastically cut costs, and open up new distant markets, particularly for bulky commodities such as coal and lime.

Following the successful completion of the Duke of Bridgewater's canal, a new interest was awakened in the ill fated Soar Navigation project, with the desire in Leicester for cheaper Erewash Valley coal. The Erewash Valley Colliery owners had built their canal to the Trent by 1779, and the Soar Navigation had completed the section from the Trent to Loughborough the year before. By 1779, the Erewash canal had opened from Trent Lock to Langley (Mill) Bridge. By May of that year, West Hallam coal was being transported in 30 ton barges to be delivered in 3 to 4 days at Loughborough Wharf at plus 9s 0d a ton. Denby coal sold for 6s 1d a ton soon afterwards. This brought huge competition for the coal owners, as now those on the Derbyshire side of the River Erewash were able to sell their output in Nottingham at a reduced rate by transporting it by barge along the new canal and onto the River Trent. Canal boats carrying 30 tons of coal, manned by a crew of three, and pulled by one horse, could complete the voyage from Erewash pithead to Loughborough Wharf in three and a half days in calm weather. At Loughborough, coal had to be transferred into carts to complete the journey to Leicester by road, and serious attention was again being given to extending the navigable waterway through to Leicester. The Leicester Navigation was proposed, but was met with violent opposition from Sir George Beaumont and other Leicestershire pit owners, whose interests had already been damaged by the Soar Navigation. The sponsors, however, of the proposed Navigation were able to buy over the Leicestershire coal-owners by agreeing to include them in their scheme, a proposed canal from the Soar, near Loughborough, to the Coleorton coalfield. This, on the face of it, should have given the Leicestershire pits a small advantage, and probably would have done so if the original proposals for a continuous waterway had been carried through.

The original Charnwood Forest Canal was to begin at Thringstone Bridge, close to the Coleorton and Swannington pits, and was to pass north of Sheepshed and Loughborough to join the Leicester Navigation, via a series of locks, at Barrow-On-Soar.

A prominent part in the negotiations which followed was played by the now wealthy Leicester banker, and coal mine proprietor Joseph Boultbee, who was also a tenant of one of Beaumont's mines at Coleorton.

Various bills before Parliament between 1786 and 1789 were thrown out under pressure from landed interests, but the Bill finally gained assent in 1791, and the Leicester Navigation Company, of which Sir George Beaumont was a shareholder, was formed. There follows an extract and copy from the original petition made to Parliament in 1786:-

A petition of the several Noblemen, and the humble petition of the several Gentlemen, Clergy, merchants, Tradesmen, manufacturers, and others whose Names are thereunto subscribed, on Behalf of themselves and others, was presented to the House, and read; Setting forth, That by surveys lately made, it appears, that a Canal, for the Navigation of Boats and other vessels with heavy Burdens, may be made from Thringstone Bridge, in the Parish of Whitwick, in the County of Leicester, to the Town of Leicester, to commence at near Thringstone Bridge aforesaid, and to proceed from thence through or near the several Parishes, Townships or hamlets, of Thringstone, Whitwick, Osgathorpe, Belton, Sheepshed, Garrendon, Thorpe Acre, and Loughborough, and there to cross the Loughborough Canal Navigation which communicates with the Trent Navigation, or instead thereof, if it thought to be more beneficial to the Public, to pass on the South Side of Loughborough aforesaid, and to proceed from thence, in either Case, through or near the several Parishes, Townships or Hamlets of Loughborough, Woodthorpe, and Quarndon, to or near Barrow upon Soar, there to communicate with River Soar, from whence a Navigation may be continued, by Means of widening, deepening, and

cleansing the said River Soar, and making necessary Cuts and Deviations by the Sides thereof, to or near Lady's Bridge, in the Parish of Saint Margaret, in or near the said town of Leicester, or to or near West Bridge, in the Parish of Saint Mary in the said Town of Leicester, or to or near both these places; and also, that one or more Rail or Waggon Way or Ways for the conveyance of Coal, Stone, Lime, and other Goods, to or near the several Coal Pits and Lime Works opened, or to be opened, or worked, in the several Parishes, Townships, or places of Swannington, Coleorton, Thringstone, Staunton Harold, Osgathorpe, Breedon, and Grace Dieu, contigous or near to Thringstone aforesaid, and the line of the said intended Canal, may be made and completed from the said Canal Navigation; and that from making the said above-mentioned Canal and Navigation, and Rail or Waggon Way or Ways, the Petitioners conceive that great public advantage may be derived, by extending the Intercourse of Trade and Commerce, as well as many local Benefits produced to several local Towns and Places, and particularly in the articles of Coal and Lime……..

Christopher Staveley was brought in to survey the area and came up with a seven and a half mile long contour canal between Thringstone and Nanpantan, near Loughborough (**see Stavely's map of the canal at the beginning of the article**).

The 1791 Act meant a major change to the original proposals, since the vexed question of water rights owned by watermills at Gracedieu, Sheepshed and Dishley, prevented the use of water for heading the lock system, so it was agreed to run a level canal along what is the 300 feet contour, so far as it would go, which was at Nanpanton near the Priory Hotel, 170 ft. above the Soar. The final route of the canal began at Thringstone Bridge, running north as far as Osgathorpe, before turning sharply south again to pass behind Gracedieu Priory and skirted the edge of the lime quarry there. Here it turned east to run (roughly) along the line of the current Ashby Road, before passing under Tickow Lane and coming into Shepshed. From here it continued south east under Ashby Road and the line of the present M1, and on across the site of Longcliffe Goal Course. The canal part of the line ended at Nanpantan, in an unloading wharf just behind "The Priory" pub.

This necessitated horse-drawn tram road connections at each end, one to Loughborough from Nanpantan (marked **H** on the preceding map), which was two and three quarter miles long with a section of 1 in 30 down-hill gradient. At the other end, between the pits and Thringstone Wharf were two lines marked **D** and **E** on the preceding map each about one mile long, with gradients in places of 1 in 24 and 1 in 26 which were in favour of the loaded wagons. One leg ran to Burslem's and Boultbee's collieries near to the George Inn, Coleorton and the other to Raper and Fenton's Thringstone Colliery **(See the schematic map attached to the earlier feature on "The building of the Coleorton Railway" onto which the locations of the collieries are superimposed)**.

John Nichols, the Leicestershire historian, tells us :-
a branch of ¼ of a mile proceeds almost S, and level, to Thringston-bridge Wharf and Warehouses; and thence Rail-way proceeds SSW ¾ m to Swannington-common Colliery; and another such branch SW, ¼ m. to Cole-Orton Colliery; and another branch from the last, of a ¼ m. to another colliery in Coleorton, was also provided for in the Act: and any other Rail-way branches are allowed to be made to Mines, &c. within 2000 yards: these Rail-way branches rise considerably from the Water-level, but I am unacquainted with the particulars: except that the descent is so considerable from Cole-Orton, that the Trams of coal descended without Horses, regulated by means of a clamp or logger, acting on the wheels, by a man who rode on each, and the empty trams were drawn up again by Horses.

The level canal was seven and a half miles long from Nanpanton to Junction House, south of Osgathorpe, from where a mile long branch arm took the canal north to Barrow Hill lime works basin, from where a 130 yard long tramway continued into the lime works. This was built in order to allow burnt lime (quick lime) to be transhipped onto the canal barges. Land was

purchased in order to build a tramway to connect Barrow Hill lime works to Cloud Hill (marked **F** on the preceding map), but this never materialized. This would of course have enabled Cloud Hill lime works to tranship burnt lime onto the canal via Barrow Hill to Leicester, both lime works being owned by Earl Stamford at this time of course. When the tramway from Willesley basin to Cloud Hill limestone quarry was built in 1802, this allowed Cloud Hill to tranship lime to the national canal network via the Ashby Canal when it was opened in 1804, and later by the Coleorton Railway to Leicester.

After delays and financial problems, which were to beset the project right through to the end, and although much work still needed to be completed, the Charnwood Forest Canal was declared open for the transportation of coal and lime on 24th October 1794, and with it the whole of the Leicester Navigation to Leicester. Three days later, two barges arrived simultaneously at Leicester – one laden with coal from Godolphin Burslem's mine at Coleorton, and the other with best Derbyshire house coal.

In October 1791, **Godolphin Burslem**, full of optimism over the starting of the Charnwood Forest Canal, opened a new colliery at Coleorton which was leased from Sir George Howland Beaumont, 7th Baronet, and was able to raise thick coal of excellent quality. The colliery was situated just to the north of what is now the George Inn, on the Loughborough Road. It was drained by a new engine capable of raising 760 gallons of water per minute. It was said, that this, and **Boultbees'** new colliery just to the west of the George Inn, were capable of producing a lasting supply to the whole county. As a result of Burslem's dissatisfaction with the new canal when it was opened to traffic in October 1794, the Navigation Company agreed to buy £40 worth of his coal immediately, and up to £20 worth per week thereafter at a price of 8s per ton, and to carry it free of charge to Thringstone Wharf, on condition that Burslem would buy back any unsold coal once the canal had become effective**.**

The Derbyshire barges had to wait at Loughborough whilst Burslem's' coal was transferred, once at Thringstone Bridge from coal wagons into barges, then at Nanpanton Wharf back into wagons, and again at Loughborough Wharf back into barges. Goodness knows what degraded state the coal was in when it finally arrived at Leicester.

John Farey described the edge rails and trams that were used on the branch lines as follows:-
*The railways belonging to this company are single, have bars (rails) flat at the top, and the wheels cast with flanches, inside, for keeping the trams upon them. The bodies of the trams were made to lift off, or to be placed on their wheels, by cranes erected in the Forest-Lane and Thringstone Bridge wharfs, so that the bodies of the trams only, stowed close together could be carried in the boats on the water level……..***It is not thought that this system was ever used, although the description he gives is not dis-similar to that used on the Little Eaton Gangway from the Derby Canal which was in use c.1795.**

Nevertheless, Burslem had solved his immediate problem, and in June 1775, John Gildart, the manager of Thringstone Wharf, reported to the company that 330 tons of Burslem's coal had arrived and was awaiting collection. Sir George Beaumont, however, carried on a lengthy dispute with the company over tonnage rates, maintaining that he could not deliver coal to Thringstone Wharf for less than 8s 4d per ton, and that when tonnages had been added, it was more expensive than the north Derbyshire coal when sold in Leicester. It was some time before the company reluctantly agreed to reduce the tonnage on coal between Thringstone and Loughborough from 1s 6d to 10d. During the three months of April to June 1796, only 195 tons of coal was sent along the Forest Canal, and the collector at Thringstone Wharf was shortly afterwards relieved of his post. It was claimed that the colliery proprietors were unable to produce coal at a competitive price.

Godolphin Burslem was apparently having "cash flow" problems owing to the inability of the Navigation Company to transport his coal, which was piling up at Thringstone Wharf. By July 3rd 1796, there was a stack of about 300 tons of coal, which the Navigation Company actually

purchased and resold at cost. At the end of 1796, Burslem probably decided that there was little point in continuing and he went out of business shortly afterwards, due to geological difficulties. However, ten years later he was reputedly working a new colliery at Peggs Green.

A fully-equipped colliery, designed to work the Swannington coal and situated at Coleorton, was advertised to let in June of the following year, and it is likely that this was his new colliery opened in 1791. Early in 1802, Godolphin Burslem sold the contents of his home at Ravenstone Hall and moved to Hampshire, where he died in 1809.

It was soon found that more water was required for the canal resulting in the building of a new header reservoir at Blackbrook. Presumably, in order to reduce costs, the engineers decided to incorporate an earthwork dam using local materials. Work was postponed due to further financial difficulties, and exceptionally severe and prolonged frosts in the first 3 months of 1795 had seriously reduced income from the canal. The reservoir finally reached completion in 1796
In May and June 1796, tolls on the Canal were down to a few pounds, making it uneconomical to keep a collector there, and whatever hopes the Leicestershire coal-owners had entertained of the canal venture, they were bitterly disappointed, for although the reservoir was completed in 1796, the whole enterprise was vastly under-utilised and threatened to become a "white elephant". For two years, negotiations between Sir George Beaumont's' agent and the company failed to establish an acceptable shipment charge, and it was not until 1798 that an agreement was reached, one of the conditions being that the company would help Beaumont extend the railway 200 to 300 yards from his pits to meet their own rail head at Thringstone. The tramway was extended to Boultbees' mine near the George Inn at Coleorton. Surface evidence of the mine and tramway can still be seen today. Announcements were made in September 1798 that Coleorton coal would shortly be available at Loughborough, but in December, tolls of only five guineas were received for the conveyance of some 12 tons of coal.

Shortly afterwards, following heavy falls of snow and freezing rain, the great thaw in February brought massive quantities of water down the valley into the Blackbrook reservoir (see map of canal), which on February 20th 1799 at 11 o' clock in the morning, burst the dam and carried all before it, including a great section of the Canal Aqueduct, wreaking horrifying damage all the way down to Dishley Mill at Loughborough. Apparently, it took just eleven minutes for the reservoir to empty. In an article in the 'Leicester Mercury' dated 15.12.75. there featured a letter written on February 21st 1799, by Mr. Herrick of Beaumanor Hall, giving a vivid account of the tragic floods which swept through the Shepshed and Loughborough area at that time, devastating crops, farm animals and property. Mr. Herricks account was recorded as follows:-
When we got to within a mile of Garendon, it was like a sea which roared as if to be heard. It swept all before it – cattle, sheep, houses, hedges, cornfields – and large oak trees were torn up by their roots.

We saw cheeses, loaves of bread, furniture of all sorts, beds, tables, ridge tiles off houses, doors, window frames, etc., all brought down in the torrent.

People were up to their neck in water saving sheep of which vast numbers were drowned. Whole fields of turnips were washed away and wheat fields the same. A more dreadful sight I never beheld.

The Leicester Navigation spent over £6,000 on repairs, but the canal continued to be both a technical failure and an economic disaster, leaving the Leicestershire collieries at the mercy of their northern competitors. The Canal was eventually written off in 1804. This put an end to any hopes the Leicestershire coal-owners still entertained of competing with their Derbyshire rivals, and many of the foundations cut their losses and closed down. For a generation, until the dawn of the railway age, there was a depression in the Swannington / Coleorton coalfield, whilst Derbyshire and Nottinghamshire coal enjoyed a monopoly in Leicester and its neighbourhood. As the Charnwood Forest Canal closed, the Ashby Canal was opened to traffic in the same year. Even though the Ashby Canal Company had spent £184,000 on the canal, its late arrival undoubtedly retarded the economic development of the coalfield and limited the profitability of the canal itself.

The tramways laid to and from the Charnwood Forest Canal by William Jessop in 1793 were cast iron, fish belly, flat-headed edge-rails for use with flanged wheels, and there is an example in Leicester Museum. They were 3ft long and weighed 28-30lbs. The contract indicated that the gauge of the rails was between 4ft 8ins and 4ft 10ins. The rails were to be laid on 6 ft long oak sleepers with a pad at each end to which the rail was to be fastened with oak pins. This was a totally different system to that used on the Cloud Hill tramway where the rails were laid on stone sleeper blocks, many of which have survived unlike the oak sleepers. It has often been stated that these lines were the first edge-railways, but this is not so, since cast iron edge-rails were first made and used at Coalbrookdale foundries in the 1760's. However, this may have been the first time fish-belly rails were used. With the failure of the canal, Jessop's' railway lines were taken up and sold, bringing to an end any hopes of an alternative to the expensive and inefficient road transport system of the day.

SUPPLEMENTARY INFORMATION

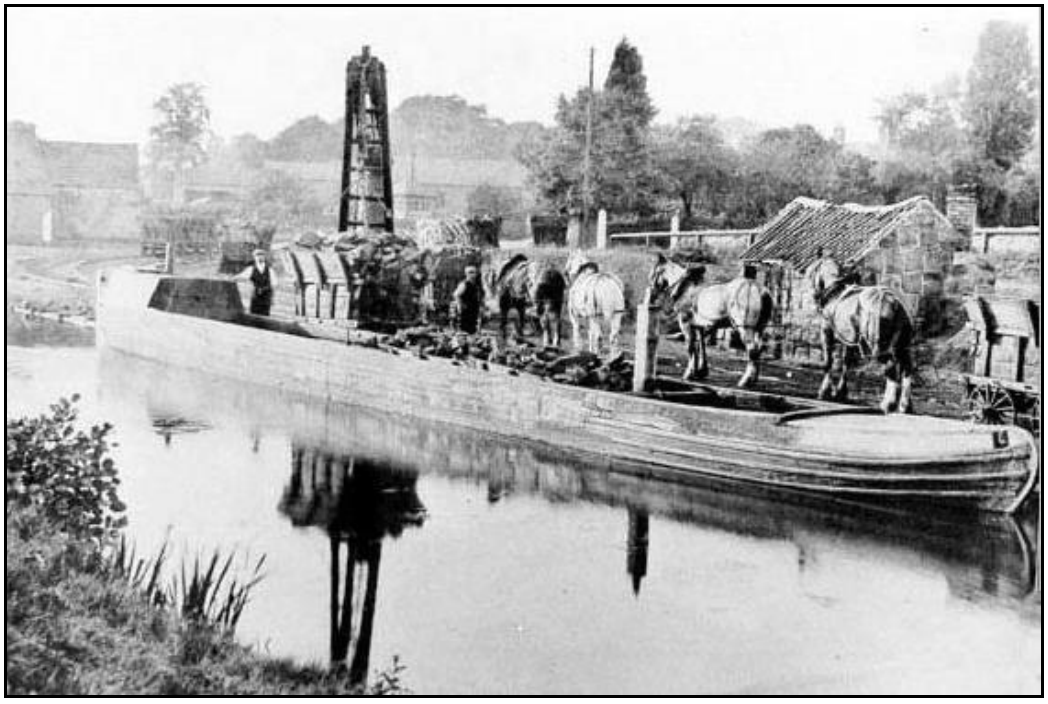
An interesting commentary by John Farey, the respected geologist, on his visit to the area in 1807 reads as follows. **The reader should note that John Farey should have been talking in the past tense as the Canal had been closed for over seven years prior to him visiting**:-

……..*From the Loughborough Basin to Forest-lane Wharf, is 2 ¾ miles of Rail-way, with an ascent of 185 feet: thence to the foot of Barrow Hill, NW of the village of Osgathorpe is 8 and 5/8s miles, and level: and thence there is a Rail-way extension of 130 yards rising into the Barrow Hill limestone quarries; and a further extension of 7/8ths of a mile of Railway-way is provided for in the Act, to Clouds-Hill Limestone Quarry; where had this last extension been executed, junctions would have nearly been effected, with the Ashby-de-la-Zouch Rail-way, and also with the proposed Breedon Rail-way* (the latter never materialized as explained earlier). *From the SE of Osgathorpe Reservoir* (must be referring to the canal itself as there was not a reservoir at Osgathorpe. Apparently, a small stream from the moat surrounding the long gone Stordon Grange ran into the canal as did Thringstone and Gracedieu Brooks) *a branch of ¼ of a mile proceeds almost S, and level, to Thringston-bridge Wharf and Warehouses; and thence Rail-way proceeds SSW ¾ m to Swannington-common Colliery; and another such branch SW, ¼ m. to Cole-Orton Colliery; and another branch from the last, of a ¼ m. to another colliery in Coleorton, was also provided for in the Act: and any other Rail-way branches are allowed to be made to Mines, &c. within 2000 yards: these Rail-way branches rise considerably from the Water-level, but I am unacquainted with the particulars: except that the descent is so considerable from Cole-Orton, that the Trams of coal descended without Horses, regulated by means of a clamp or logger, acting on the wheels, by a man who rode on each, and the empty trams were drawn up again by Horses.*

The Rail-ways belonging to this company are single, and have bars flat at top, and the wheels are cast with flanches, inside, for keeping the Trams upon them. The bodies of the Trams were made o lift off, or to be placed on their wheels, by means of Cranes erected on the Forest-lane and Thringstone-bridge Wharfs, so that bodies of the Trams only, stowed close together, could be carried in the Boats on the Water-level. The width of the side-cuts for avoiding the Mills, and the Locks, on the main line of this Canal, are adapted for the Barges that navigate the Trent river…… At a branching of the Black-brook vales, about ¼ of a mile above the Canal, there is a large reservoir for supplying the Water-level, the head of which gave way, soon after the works were completed, and occasioned such an inundation, that Mr. Jester's Farm-house and premises were destroyed, and a Hay-cock was borne down by it, and wedged in the Aqueduct Arch, by which means, the Valley above the Embankment became filled, and by the pressure, a breach in the same was effected, which emptied the whole Water-level, whereby such an enormous flood was occasioned in this Valley(which passes through the late Mr. Robert Bakewell's Farm at Dishley), that a great many sheep, &c. were drowned thereby, and other serious damages were done…… I believe when I viewed the Forest in 1807, the Canal was without any water in it, Cattle were rapidly treading in the banks, the Bridges were fast dilapidating by mischievous boys &c.

The reader should note that the Charnwood Forest Canal was built for the transportation of coal, from the mines at Swannington and Coleorton. Burnt lime from Barrow Hill, Osgathorpe and Gracedieu only formed a small percentage of the tonnage transhipped via the canal during its short life.

The canal was <u>officially</u> abandoned by an Act of Parliament in 1848.



LOADING OF COAL FROM HORSE DRAWN WAGONS ALONGSIDE A HORSE DRAWN TRAMWAY THIS WOULD HAVE BEEN A TYPICAL SCENE AT THRINGSTONE WHARF.

A HORSE DRAWN CANAL BARGE CARRYING LIME

THE DRIED UP BED OF THE CHARNWOOD FOREST CANAL SOUTH OF OSGATHORPE

THE DERILICT CHARNWOOD FOREST CANAL ALONGSIDE THE ENTRANCE TO LONGCLIFFE GOLF CLUB IN NANPANTAN

THE REMAINS OF JUNCTION HOUSE ALONGSIDE THE CHARNWOOD FOREST CANAL AT THE JUNCTION WITH THE BARROW HILL LIME WORKS BRANCH SOUTH OF OSGATHORPE c.2000.

A BASIC HISTORY OF THE MOIRA BLAST FURNACE, FOUNDRY, EARLY MOIRA COAL MINES AND LIME KILNS

The author decided to include this feature due to the Moira Blast Furnace and Lime Kilns historical importance in the local industrial landscape and its relationship to Cloud Hill and Ticknall limestone quarries, the Cloud Hill and Ticknall tramway and the Ashby Canal. The furnace, lime kilns and canal have been restored over many years and a museum created, this provides the public with a wonderful visual record of what it was like from the early 1800's combined with an impressive informative museum.

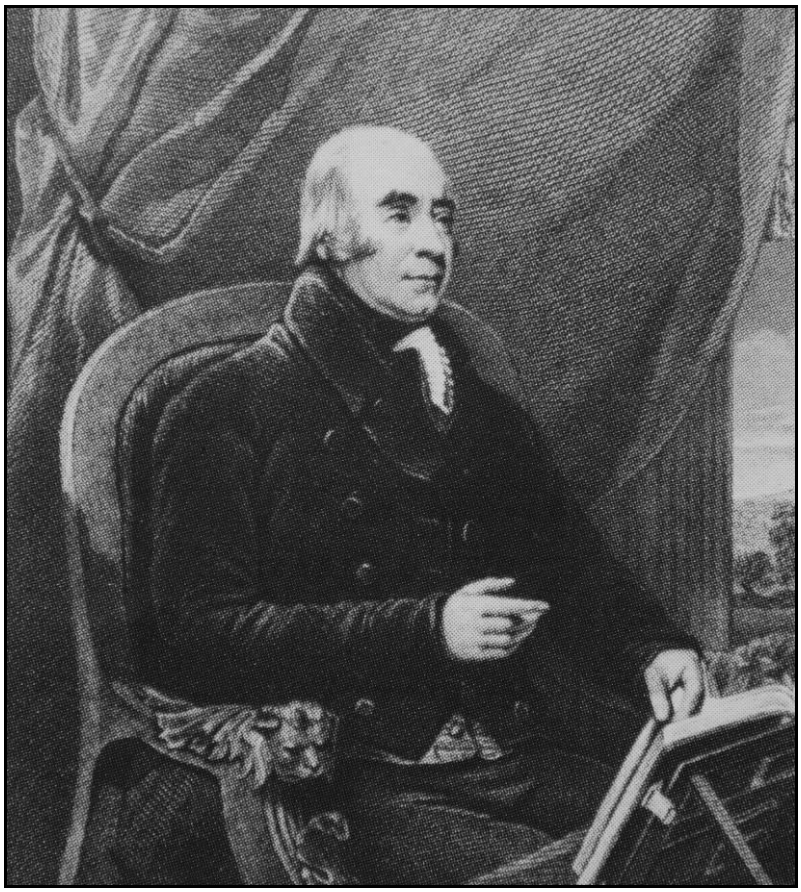
PREFACE

The Ashby Canal had only opened as far as Market Bosworth in March 1798 and not reached the Woulds as had been expected. By this time, the canal company had anticipated that prospective coal mine owners like "The 2nd Earl of Moira", and Joseph Wilkes of Measham would be sinking their collieries and transporting coal on the canal, thereby providing good revenues for it. The canal company were already struggling for capital and it was at this time when the idea of building tramways to Ticknall and Cloud Hill, instead of extending the canal, to Ticknall, Cloud Hill, Lount & Coleorton clearly came to fruition. Joseph Wilkes was instrumental in the construction of the canal and financing the continuation of the work when many of the share holders failed to uphold their payments which they had originally committed to.

By 1803 the Ashby Canal to Willesley basin and the Wolds had still not been fully completed, even though the company had invested £184,000 in it. It was finally opened to traffic in 1804, but the fact of its late opening undoubtedly had a serious effect on the economic development of the coalfields in the local area, thereby reducing the profitability of the canal itself.

By the end of 1802, the tramway from Willesley Basin to Cloud Hill and Ticknall limestone quarries had been completed but because the Ashby canal was not open till 1804, this restricted them shipping their products to new markets via the national canal network.

FRANCIS RAWDON HASTINGS, 2ND EARL OF MOIRA AND 1ST MARQUIS OF HASTINGS 1754-1826



IN HIS LIBRARY AT DONINGTON HALL

It was from the 2nd Earl of Moira that the village of Moira took its name. Through his vision and enterprise, the early Moira coal mines were developed and these are dealt with in a later feature.

He had inherited lands in the area including his future residence Donington Hall with its park lands from his Uncle Francis, the 10th Earl of Huntingdon, on his death in 1789. Francis Rawdon Hastings was born at Moira, County Down, Ireland, the eldest son of John, Baron Rawdon, 1st Earl of Moira and Elizabeth Hastings, the 13th Baroness Hastings who was a daughter of the 9th Earl of Huntingdon.

It should be noted that the Ashby Woulds were 'enclosed' by Act of Parliament in 1800 and the 2nd Earl of Moira's mineral rights were documented, thereby giving some clarity to the land owned by the Earl.

Earl Francis lived well belong his means at Donington and by the end of the first decade in the nineteenth century he was seriously in debt. In 1812, it could be said that he avoided his creditors when he went to India following his appointment as Governor-General of Bengal and Commander-in-Chief of the British Army there. Clearly his coal mines were not developing the income he had anticipated at this time, and what profits they did make were evidently squandered. In 1818 he achieved recognition for his successful direction of military operations

in Nepal, and as a result was created Viscount Loudon, the Earl of Rawdon and the 1st Marquis of Hastings. Two years later, he was instrumental in purchasing the island of Singapore for his country, which was another example of his renowned military vision and strategy. He did not return to Donington Hall till 1823. In the last three years of his life he was still separated from his wife Flora, Countess of Loudon for long periods. He had been made the Governor and Commander-in-Chief of Malta where he was buried following his death.

He was succeeded by his only surviving son George Augustus Francis who was a minor, who on his death in 1844 left five children and a pregnant wife. His eldest son Reginald became the third Marquis at the age of twelve. He was killed at the age of eighteen whilst with his regiment in Ireland in 1851.

Henry (aka Harry) Hastings at the age of 9 became the new 4th Marquis of Hastings achieving his majority in 1863. His main claim to "infamy" was to squander a fortune on the race track suggested to be equivalent to at least £25 million today! By 1868 when he died he was apparently ruined in health and a pitiful sight. The great Hasting's estate had to be broken up, but Donington Hall and park remained in the hands of the Hastings, only through the determined efforts of the 4th Marquis of Hastings wealthy sister Lady Edith. Through her marriage to Charles Frederick Clifton (awarded the title of Lord Donington in 1880), they assumed the surname and arms of Abney-Hastings, purchased the reversion of the 4th Marquis's English estates, paid off his debts, and took up residence at Donington Hall.

In 1873, Abney-Hastings purchased part of Earl Stamford's estate which included the Breedon and Cloud Hill quarries and lime works which presumably meant that as he was now the owner of the Moira Blast Furnace & foundry, the Moira Collieries and the Moira Lime Kilns etc. Any limestone being burnt in these kilns post 1873 would undoubtedly have come from Cloud Hill quarry via the tramway, thereby cutting off any supply from Ticknall.

For further information regarding Lord Donnington the reader should revert to pages 27 to 30.

The Countess of Loudon died in 1874 and Lord Donington died in 1895. On the death of Lord Donington (Abney-Hastings), the Moira Collieries Company was taken over by the Trustees of the estate, with a Mr. John Turner as General Manager. On October 21st 1895 "The Moira Collieries Ltd" (a limited liability company) was formed with Mr. Christopher Spalding appointed as Chairman.

It is self evident from the above, that for long periods, the development of the Moira Collieries Company coal mines and lime kilns etc was carried on by appointed trustees / managers / agents.

THE MOIRA BLAST FURNACE

(TO BE READ IN CONJUNCTION WITH THE APPENDED MAPS AT THE END OF THE SECTION, PLUS THE VARIOUS APPENDED PHOTOGRAPHS)

TAKEN IN 1982 BEFORE RESTORATION WORK BEGAN

THE MOIRA BLAST FURNACE AND MUSEUM TODAY

Between 1804 & 1806, Sir Francis Rawdon Hastings, 2nd Earl of Moira had a furnace for the smelting of iron constructed to take advantage of the iron ore which existed around the western edge of the Woulds. An abundant local coal supply in the area would be provided by pits which he intended to sink close by.

Limestone, which acted as a flux in the smelting process, would be brought in by the tramway to Willesley Basin from Cloud Hill and Ticknall quarries, so, all the necessary materials to start the smelting process were available locally. Cloud Hill limestone had a high magnesia content which was preferable for use as a flux in blast furnaces. David Cranstone in the book entitled "Moira Blast Furnace" explains that it was a Thomas Cox from Dale Abbey who was given the job of erecting and managing the furnace at a salary of £500 a year by an agreement dated January 1802. Two years later, Cox was apparently corresponding with the 2nd Earl of Moira from Dale Abbey hoping that he would find him a house, as the furnace needed his full attention.

The Moira Blast Furnace, reputed to have cost £30,000, was fueled by coke. It was constructed when the design of more efficient blast furnaces were quickly evolving, and clearly there was aspects of the Moira Furnace that were not successful, because after first being "fired" on 7th July 1806, it was "blown out" on 22nd May 1807. From Francis Rawdon Hasting's (2nd Earl of Moira) own letters written at the furnace in June 1810, the furnace was "in blast" and "blown out" later in the year due to the need to re-direct coal supplies to their customers. It was not recorded whether the furnace was ever used again, but there are indications that it may have been used in summer months when coal stocks were plentiful and not required for domestic use. Apparently, it was abandoned in 1811 with the final charge, partially smelted, being left inside. Many reasons have been put forward as to why the furnace proved to be a failure, but it seems likely that it was due to a combination of several things.

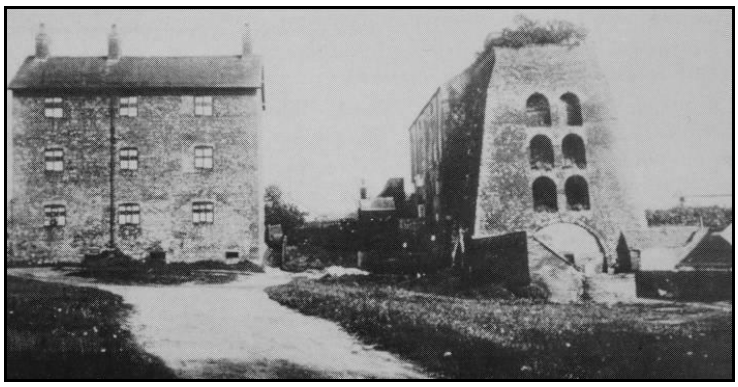
The following is taken from "Early Blast Furnace News" 1984 edited by Charles R Blick :-
Moira Blast Furnace, Leicestershire MR SK 314153 - Report No 1 January 1984, and a follow-up report of May 1984 have been received from David Cranstone, senior archaeologist of the North Western Leicestershire District Council. Much of interest has arisen, is arising and the final report — in due course — will be of great value. The samples of burden and cindery material, taken from the stack in July/August 1982, were analysed by courtesy of the Managing Director, Brymbo Steelworks Ltd, to whom we owe our sincere gratitude. Professor Tylecote has examined these results, which covered material from the top of the bosh down to the bottom of the hearth. He reports that the high iron contents indicate some iron must have been in the metallic state and that there was a lot of unreduced ore, so that slag formation had been poor. The slag was a potential calcium silicate one, with high sulphur, clearly signifying a coke/coal fuel. The samples were very heterogeneous and any further work must start with mineralogical phase analysis.

The furnace was charged with a mixture of iron ore, coke and limestone, the latter acting as a flux**.** It was charged via a charging hole at the top which was accessed through the bridge house loft running along the inside top of the bridge house built onto the end of the furnace. A loading ramp on top of the canal bridge was used to tranship the raw materials through an opening in the bridge house loft in readiness for mixing prior to charging the furnace.

Coke was used as a fuel and as a reducing agent in the smelting of iron ore in blast furnaces. The carbon monoxide produced by its combustion, reduces iron oxide (hematite) in the production of the iron product. Bituminous coal needed to meet a set of criteria for use as coking coal. These include moisture content, ash content, sulfur content, volatile content, tar, and plasticity. This blending is targeted at producing a coke of appropriate strength. In simple terms, coking was carried out mainly to remove the sulphur in the coal. At this time, it seems likely that the coke for the blast furnace would have been produced by partially burning coal in open hearths on the floor.

The raw iron ore had to be put through a calcining process prior to smelting in the furnace in order to bring about a thermal decomposition. The appended 1835 map shows three black circles adjacent to the lime kilns location **J**, in what is now the lime kilns car park. These are thought to represent chimneys connected to flues beneath the heaps of iron ore where the process would have been carried out in open hearths. These heaps, much like the very early lime burning process, using coal as the fuel, would have most likely been covered in clay and turfs to control the flow of oxygen, in order to ensure a controlled burn process. These are shown in the photograph of the model at the end of the feature.
There can be little doubt that coal would have been brought from Double / Spinney pits (**see following details on these pits under the early development of coal mining section**) for the limestone calcining, coking processes and lime kilns in horse drawn wagons, although it is possible that short tramways were built which were extended to the wharf for transhipping onto coal barges. However, it is not thought that a great deal of coal would have gone directly onto the national canal network in the first decade of the 1800's.

The building to the left of the furnace (following conversion to residential accommodation), originally housed the large steam powered blowing engine, which, via a regulator, provided a continuous blast of air to either side of the base of the blast furnace to maintain the high 1535 degrees centigrade temperatures required in the smelting process.



PHOTOGRAPH c.1915

In "The Moira Furnace" publication edited by David Cranstone © NWLDC 1985, we are informed that the furnace *"Blowing Engine" and its house were an integral part of the iron works as originally designed. The engine was a beam engine of "Boulton & Watt" type (but probably not manufacture), both steam and blowing cylinders being within the engine house, and had been described in 1816 as "steam 50 horse double power (double acting) engine, embracing one boiler, cast iron beam, with two sets of parallel gear , condensing cistern and cast iron support columns".*

*David Cranstone further states that in **1821** an atmospheric beam engine for pumping and winding was built at "The Moira Furnace". It had a vertical cylinder of 30in. diameter and a 5ft stroke and was originally worked by steam from two haystack boilers. This engine was still working at Reservoir Colliery in 1919* (**see the following supporting notes**) *and ended its life in the Henry Ford Museum at Dearborn, Michigan*.

The following extract was taken from notes specially compiled by Mr. P. Beaumont in 1919 as part of a memento of the completion by Mr. John Turner of 25 years association with the Moira Colliery Company / Moira Colliery Company Ltd, and appears in the book entitled "A History of the Moira Collieries 1804-1919" by Keith Gilliver © with reference to "Reservoir Colliery":-

An interesting relic of the early days of the Moira Collieries, and one which is still in use at this pit (Reservoir) *is an atmospheric beam engine for pumping and winding, **built in 1821 at the Moira Furnace**. It has an open top vertical cylinder of 30 in. diameter, with a jet condenser below and a 5 ft. stroke. It was formerly worked by steam generated in two "balloon" boilers, which "blew off at 2 ½ lbs. steam pressure". The pit* (Reservoir 1851) *was sunk by this engine and coals were turned **until the erection of a more improved type of winding engine in 1866.** The pumps deal with the top water from a depth of 60 yards in two lifts. The buckets are 8 in. and 6 in. The pump rods were originally 4 in. square. This old engine still does all the work required of it and pumps for about four hours per day. From an economical point of view, it would not be an easy matter to replace it.* **It seems that after 1866, it was only used for pumping.**

There is a thirty year gap, for which there does not appear to be any records, between the steam engine built at Moira Furnace in 1821 to when it was installed at "Reservoir Colliery" in 1851 (marked **N** on the appended 1835 O/S map) where it was used as both a winding and pumping engine, until it was moved to the Henry Ford Museum in America (see the following notes). Reservoir Colliery, also known as "Cut End Pit", was built near to the terminus of the Ashby Canal, The question has to be asked – what happened to this engine from when it was built at Moira Furnace workshops to being installed at the "Reservoir Colliery" c.1851?

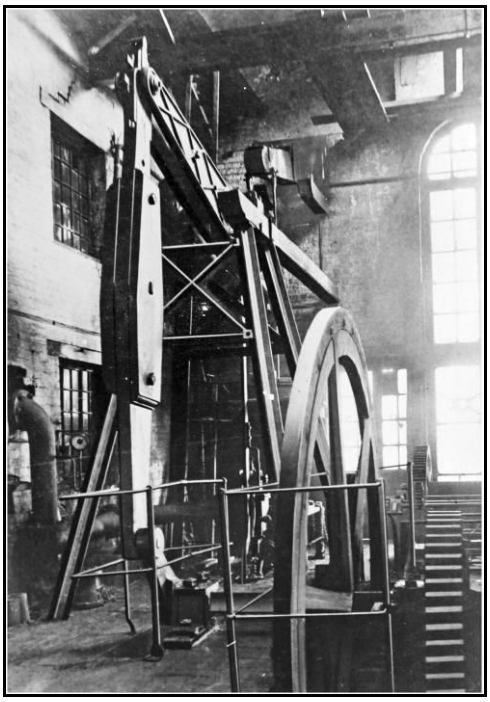
It is somewhat coincidental that Rawdon Pit (marked **K** on the appended 1835 O/S map) was sunk in 1821, so it could be conjectured that the engine was originally built at Moira Furnace for this pit and then moved to Reservoir Colliery c.1851.

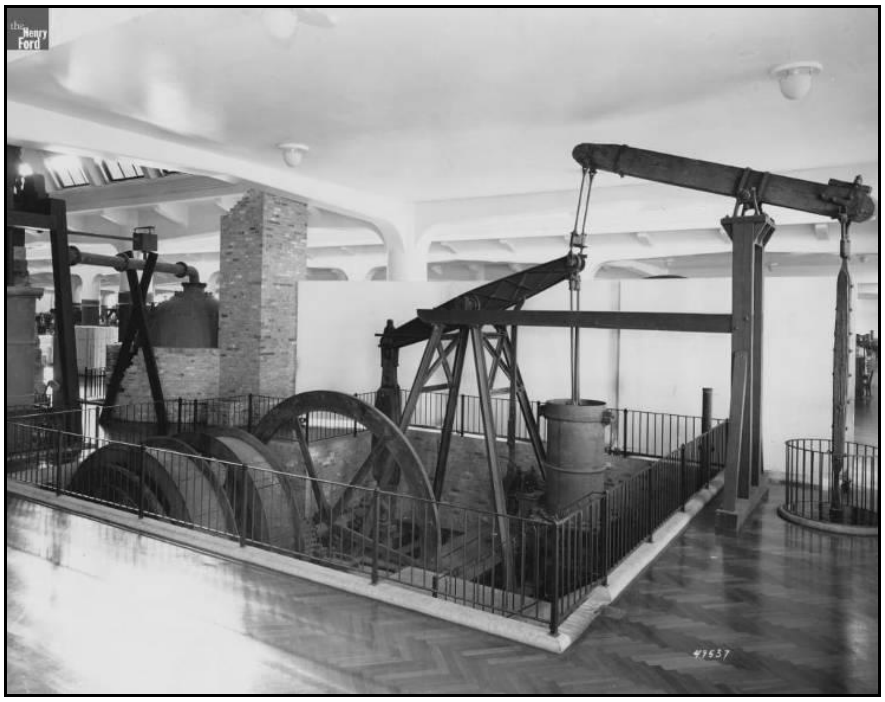
HENRY FORD'S 1928 ENGLISH HOLIDAY PART 1 – IN SEARCH OF NEWCOMEN ENGINES

Citation - David Perret of the Newcomen Society. The following is an extract from an article featured in "The History of Engineering and Technology" 88:1 Pages 37-56. Published on line by David Perret. ©

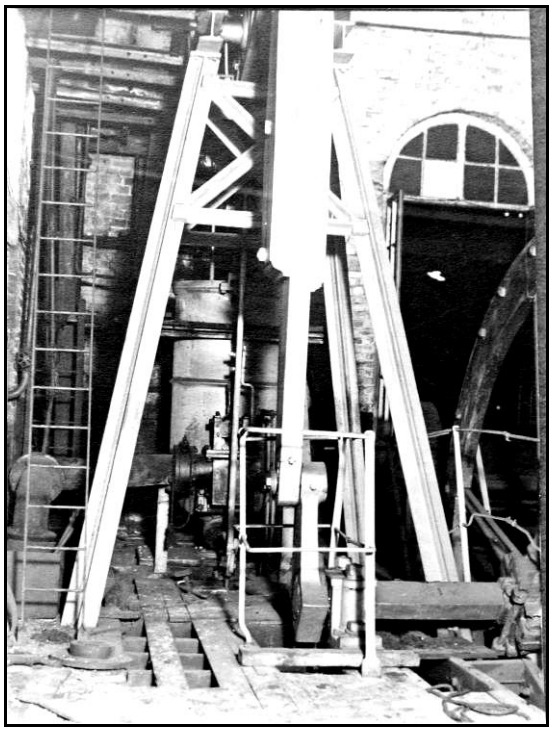
MOIRA COLLIERY ENGINE

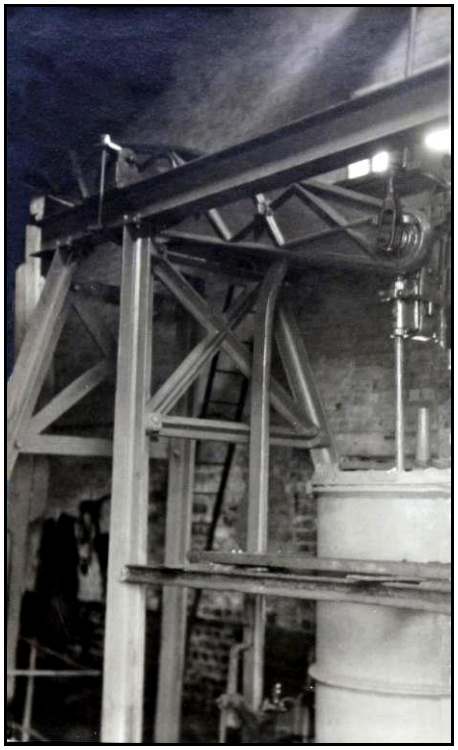
Unlike the Windmill End Engine, this engine was relatively well known having been described in the discussion to Davey's 1903 paper along with a photograph. Unusually, it was both a pumping and winding atmospheric engine. It is not clear how obtaining this engine started (**see explanation by David Cranstone & P. Beaumont on previous page).** *A copy letter by Jenkins, dated 25th November 1927, quotes H. Morton's M.B.E., M.I.Mech.E. description of the engine, saying the main cast-iron beam is inscribed "'Moira Colliery Company 1821" so must be a replacement, but the pump beam is timber and probably original. He says that that the engine is kept working on the sentimental attachment of Sir John Turner Managing Owner of the Moira collieries. A rather groveling letter was sent from Morton to Sir John on 7th March 1928 saying that the engine would be given a good home in America. The letter though does give the location of the engine as being at Reservoir Pit, Moira. Turner repeatedly refused to let it go to America. Interestingly, this was all taking place while Henry Ford was in England, but there is no record that he was taken to see the engine. On 24th May 1928, Morton cabled Dearborn for permission to purchase it saying that it could be obtained for $12,200 plus dismantling and shipping. A reply cable is simply inscribed "purchase". He immediately started negotiations and the final deal was £2000 plus the purchase and installation of new electric pumps at the bottom of the mine shaft. On June 26th, Morton writes that work is starting on installing the electric pumps whilst drawings were being made of the engine. A crude measured drawing by Morton and an annotated photograph are in the Ford Archives. The replacement pumps failed and needed repair, and in June Morton wrote that the wooden pumping beam was still in use. On 9th November, Morton reported that he had descended the shaft to check that all was at last complete with the new pumps and that dismantling could start again. The Moira engine along with a beam engine acquired from Coalbrookdale was shipped via the Atlantic Transport Line from Liverpool on Sept 29th 1929 on board Belfast-built SS Minnekahda arriving in New York 10 days later.*





The LH photograph above shows the engine in situ in Reservoir Colliery in 1928 (*Source*: Chetham Archives). The RH photograph shows it following installation in the Henry Ford Museum, Dearborn, America. Copyright owned by the originators.





Thee above two photographs of the engine still in situ at Reservoir Colliery were taken by H.Morton and kindly supplied by David Perret of the Newcomen Society.

THE FOUNDRY

A foundry which was constructed at the front end of the furnace had a floor that was part sand pit and part hard standing. The molten iron tapped off from the base of the furnace was run through channels in the sand floor into open moulds via sows and piglets. The sows being the long channels in which the pour ran and the piglets being the connections with the mould. Once the iron had cooled, the piglets could be easily sheared off. This was always the method used to cast smelted iron into open sand moulds in the sand floor and is where the term “Pig Iron” originated from.

Moulds made in casting sand from wooden patterns would have had the molten iron poured into a hole in them with ladles. Another small hole let the air out as the molten iron was being poured.

Each mould formed by the use of wooden patterns would have had a heavy cast iron plate placed on the top of it, this being very important, as the liquid iron could explode as it made contact with the cool sand. The weights prevent the iron from exploding apart the sand moulds by keeping them intact.

Significant quantities of cast iron tramway rails were apparently made here for the Ashby Canal Company.

The foundry survived for a period after the furnace closed by using pig-iron rods being brought in from elsewhere and re-smelted in a cupola. The foundry had ceased operating by c.1850, and was thought to have been demolished in the early 1900’s. It was known to have been operating in the 1840’s but the workmen and equipment was probably transferred to Rawdon Foundry when it opened in 1851, which was around the time when the furnace building was being converted into houses as described previously.

THE DEVELOPMENT OF THE 2ND EARL OF MOIRA & HIS SUCCESSOR'S EARLY COAL MINES WITH THEIR LOCATION SHOWN ON THE APPENDED 1835 O/S MAP

Prior to Joseph Wilkes of Measham and the 2nd Earl of Moira sinking and developing their coal mines, serious coal mining activity had already begun many years before around Measham and Oakthorpe. A Fire Engine (steam driven water pumping engine) installed in 1729, is marked **A** on John Prior's 1777 map appended at the end. There are also eight shafts indicated around that location. As can be seen from Prior's map, the northern section of the Leicestershire coalfields is dominated by the wastelands / heath lands of Ashby Woulds. A water and windmill at Barratt Pool are shown on the map marked **B**. This area was not enclosed till 1800 which at least gave some clarity to the land owned by the 2nd Earl of Moira which he had inherited from his uncle, and his rights to mineral reserves were also documented.

Colin Owen in his respected book "The Leicestershire & South Derbyshire Coalfield 1200-1900" explains with supporting bibliography, that following the opening of the Ashby Canal in 1804, the coal supply situation had still not improved, and the canal company commissioned Willis Bailey and Jonathan Woodhouse to carry out yet another survey of local coal resources. It may have been that the encouraging results of this finally persuaded the Earl of Moira to sink his first pit as follows. It should be remembered that for various political and military reason the Earl had significant debts by the end of the 1700's.

The successful sinking of Double or Spinney Pits (marked **M** on the appended 1835 O/S map) in 1804 about one mile north west of the "Moira Blast Furnace" by the 2nd Earl of Moira, clearly acted as the catalyst to his ambition to develop a coalfield on his land and he subsequently established the Moira Colliery Co. Double or Spinney pit (**M**) was sunk to the over and nether seams that had joined to give a seam 15ft (4.75m) thick at about 600 ft. This coincided with the time when the Ashby Canal was finally linked with the national canal network in 1804. Double pits were mention as still working in 1810 by Farey, although there was a big underground fire recorded in that year. The antiquarian John Nichols records around this time that "*the Earl of Moira has erected a fire engine* (Newcomen steam powered pumping engine) *on Ashby Woulds to raise coals*"

"Furnace Pit" (also known as Harvey's or Bye pit) was sunk in 1806, to the SSE of Double Pit and closer to the furnace. The downcast shaft was sunk to the main coal at 750 ft. (231m) and the upcast to 590 ft (182m) A third pit, "Bath Pit" (**A**) was sunk in 1812 and opened in 1813 nearer to the canal head (**D**) and about one mile north of "Double Pit". These three pits were interlinked with tramways to bring coal down to the coal wharf about a mile to the south west of where the Moira Blast Furnace stood in order for it to be transhipped onto barges for distribution via the national canal network to wider markets.

The following interesting article appeared in "The Times" on Sept 20th 1815:-

Those who are curious in the true English blessing of coals, and give some attention to domestic comfort and economy, would do well at this season to attend a new quality of Coal found in LEICESTERSHIRE at Ashby-De-La-Zouch and called "MOIRA COAL", being found on the Estate of the Nobleman of that title; it is brought by the canal to Paddington at about 40s. per ton of 62s. a Chaldron, in boats which carry 44 tons. This appears little higher than good Newcastle Sea Coals at this cheap time, but on trial of its economy of use, burning very slow, clear and bright, without the aid of a Poker, without smoke or smell, and having no cinders, it will be found a most agreeable and desirable fuel for the Public Office, the study, bedroom, apartment of the sick, hospital, parlour, and drawing room; it burns like wood, leaves no more residium than Charcoal, and requires no attention to keep alight through a long night; the experiment will justify this description. Applications for this coal by letter only, post paid, to A. B. at Gray's Inn Hotel, Holborn, will be attended to if sufficiently numerous and extensive, at theprice above stated; only the cost at the Pit and Canal freight are included; the carriage of delivery and a tradesman's profit; which on this article would be small, are not considered.

In 1816, "Marquis Pit" (**B**) was then sunk to the north west of Bath Pit. The final of the five pits to be sunk in the early Moira coalfield was "The Hastings & Grey" also known as "Newfield Pit" (**C**) almost a mile to the east of Bath Pit. Its shafts reached the main coal at about 1,000 ft. (308m). This had a tramway down to its own wharf on the canal, about half a mile north to where the furnace stands. This can be discerned on the appended 1835 map.

Realising that Double pit (closed 1819) & Furnace pit (closed 1822) were nearing exhaustion, a fifth colliery was developed at Moira, to become known as Rawdon colliery (**K**). This was sunk to the 14ft 4in (4.3m) main seam at 730ft, and was opened c.1821.

"Reservoir Colliery", Moira (**N**) also known as "Cut End Pit" was sunk in 1851 near to the reservoir and the terminus of the Ashby Canal. This reached the main coal via two 7 ft. diameter shafts at 662 ft (204m). Apparently, this colliery was sunk because for technical reasons, coal raising had been suspended at Marquis and Rawdon pits from 1844. The Bath Pit ceased to raise coal by 1854 by which time Reservoir Pit was in full production. By this time, the Moira Colliery Co. was easily the largest coal producer in the coalfield (Leicestershire & South Derbyshire). In 1856 its dispatches by rail and canal amounted to 164,000 tons.

The following article appeared in "The Leicester Journal" on Sept 26th 1852:-

The minerals at the old Bath Pit being nearly exhausted, Pits, to be called the Reservoir Pits have been sunk on another part of the estate, situate about a mile from the present works. These will ultimately be worked instead of the old pit, and the business of the colliery will be carried on a more extensive scale than at present. The successful opening of these new pits is an event fraught with great interest to the neighbourhood generally, and one which is particularly important to employers and employed.

A remarkable instance of the good feeling of "Moira" men and their love of order was alluded to by Earl Howe in the after-part of the day's proceedings on Friday. It was the fact that during the great agitation which took place in 1842, they were the only coal-miners who remained quietly at work, and not only did they abstain from taking any part in the disorder of the time, but every man of them became a special constable for the purpose of protecting the property of their employers against the violence of the disaffected. This is a fact that speaks volumes, and may well be referred to with pride and gratification, as it was by the nobleman we have just named.

The new pits having been successfully opened, the Manager suggested that the event should be celebrated by a gala. The trustees in whom the estate is vested during the minority of the Marquis of Hastings cordially concurred in the suggestion, and it was resolved to provide a dinner and other entertainments for the workmen. At half-past one o'clock that morning a salute of twenty-one guns was fired from cannon fixed in the Park, and similar salutes were repeated at six o'clock, at nine, at noon, and several times later in the day.

A large tent was procured from the Arboretum at Derby by Mr. Harrison (who succeeded the late Mr. Mammatt as head of the commercial department of the Moira works), and was erected in the timber yard near the old Bath Pit.

The workmen and boys, 450 in number, were then admitted in the following order:-

The Bath Pit Company and Boys
The North Pit Company and Boys
The South Pit Company and Boys
Reservoir Pits Men and Boys
Blacksmiths and Carpenters
Wharfmen
Colliery and Farm Labourers

Places for every man and boy were marked by a ticket bearing their respective names, the Butties being placed nearest the heads of the tables. So admirably were the arrangements carried out, that the whole company were seated in less time than it has taken us to write out the order of arrival.

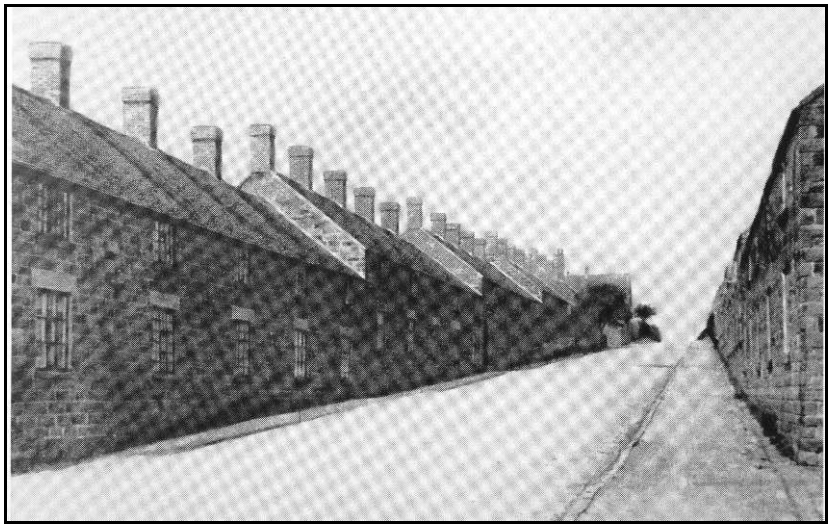
In reference to the quality of coal found, Mr. Harrison, in "proposing the toast of the Moira Coal company and the Reservoir Pits" said: 'As a commercial man, I can say that the coals we have found in these pits have never been surpassed in quality by anything introduced into the market. Everyone is going ahead, and we must go ahead likewise'.

Similar arrangements were made at Church Gresley to entertain about 140 men.

"RESERVOIR COLLIERY" ("CUT END PIT") COAL BARGES WAITING AT WADLANDS WHARF AT CUT END NEAR THE CANAL TERMINUS. "RESERVOIR COLLIERY" WAS JUST OFF TO THE RIGHT OF THE PHOTOGRAPH. THE ENGINE WAS "THE CHURCH GRESLEY".

It should be remembered, that prior to the opening of the Leicester to Burton Midland Railway in 1850 which linked the area with markets further afield, total reliance on getting Moira coal to wider markets, other than those provided by the canal, had been placed upon using horse drawn wagons on turnpike roads.

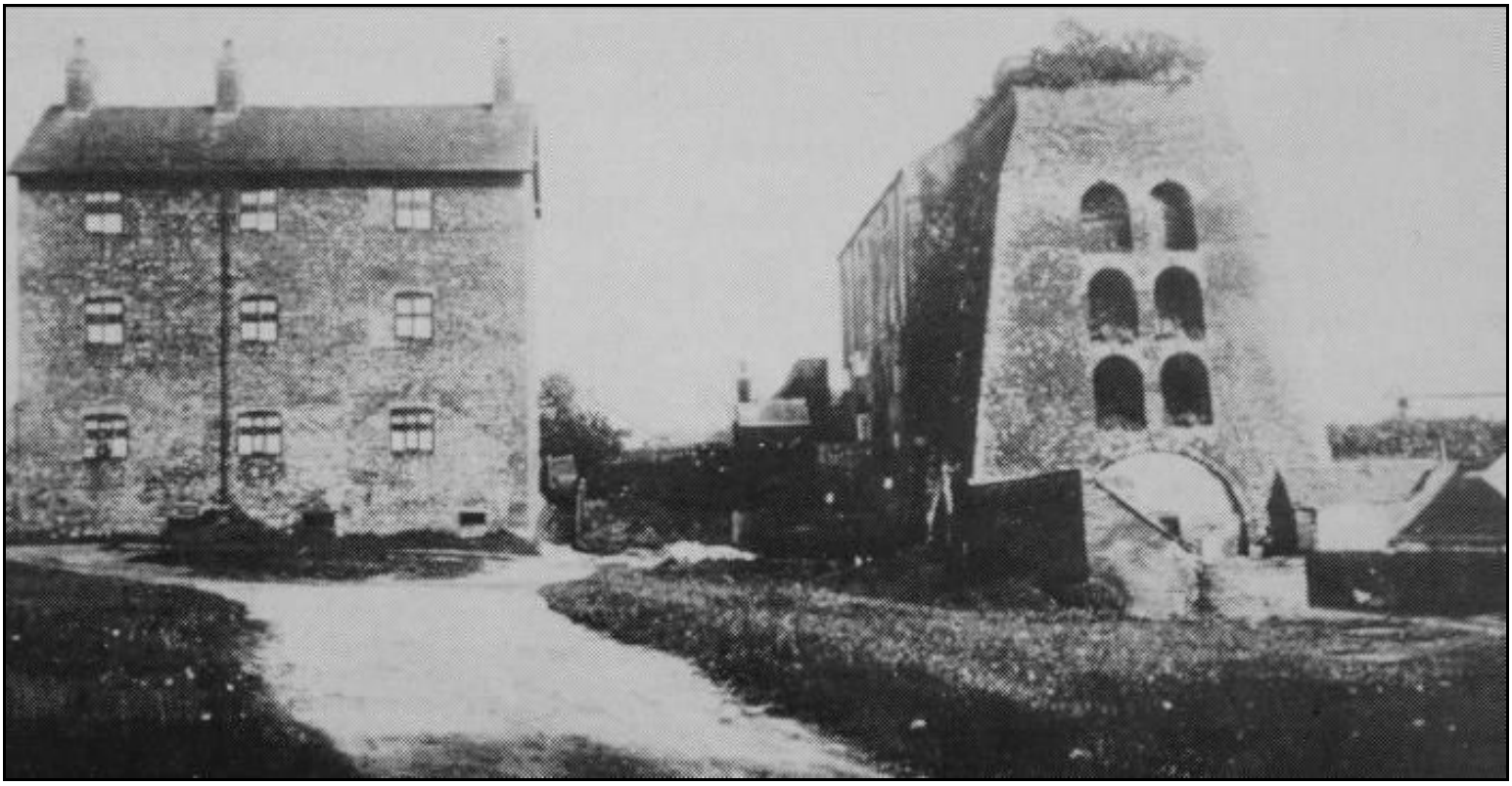
For reasons described earlier, there is no mention of the village of Moira on either Prior's 1777 map or Burdett's map of Derbyshire 1791. Moira owes its existence to coal mining much like Coalville! Note where the centre of Moira was considered to be on the appended 1835 map at that time (**H**). This was following the period when "Stone Row Cottages", built in 1811 by Moira Colliery Co. to house the Earl of Moira's workers in his furnace, foundry, lime kilns and coal mines. Each of these cottages had a parlour, kitchen, large front room, coalhouse, two large bedrooms and a good-sized garden. The location of the cottages is shown on the appended 1835 O/S map at **S**, where Moira village was originally established.



STONE ROWS COTTAGES
BUILT 1811

THE CONVERSION OF BUILDINGS ASSOCIATED WITH THE MOIRA BLAST FURNACE INTO RESIDENTIAL ACCOMODATION

Following the closure of the blast furnace, various buildings were converted into living accommodation, including the engine house on the left, which was made into three terraced cottages. These survived till the 1970s when they were demolished due to subsidence.



PHOTOGRAPH TAKEN C.1930.

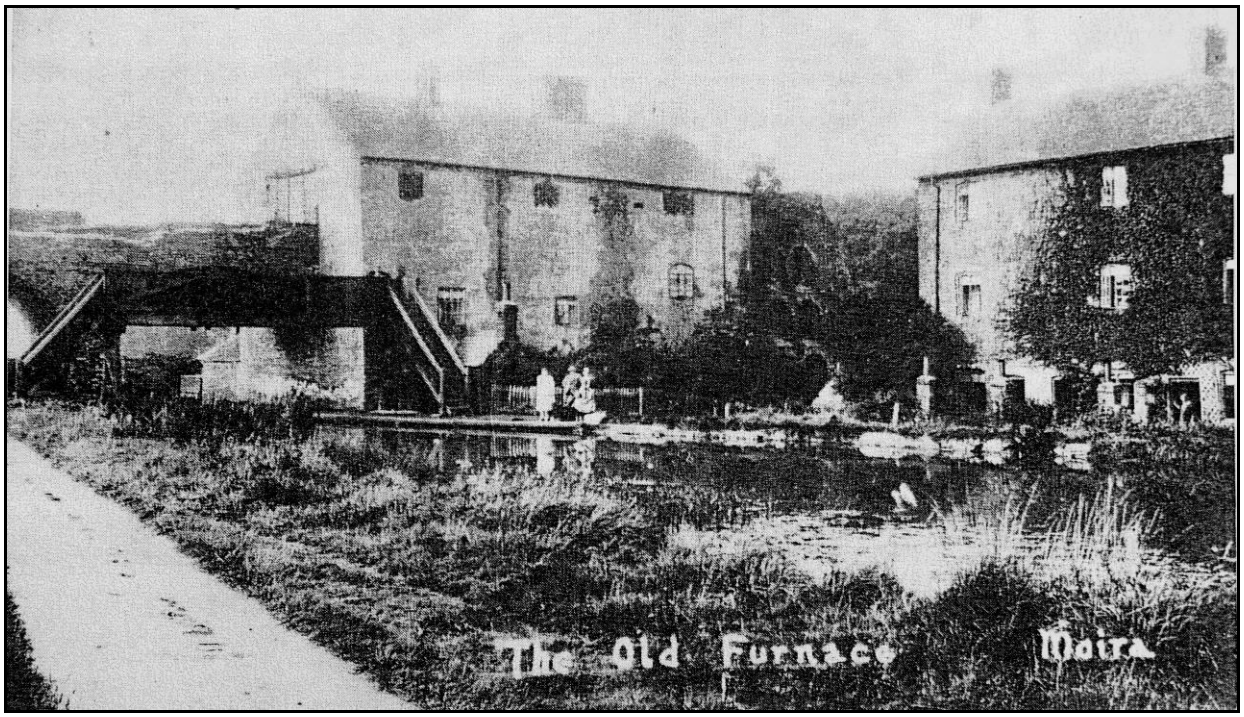
See the following photographs also

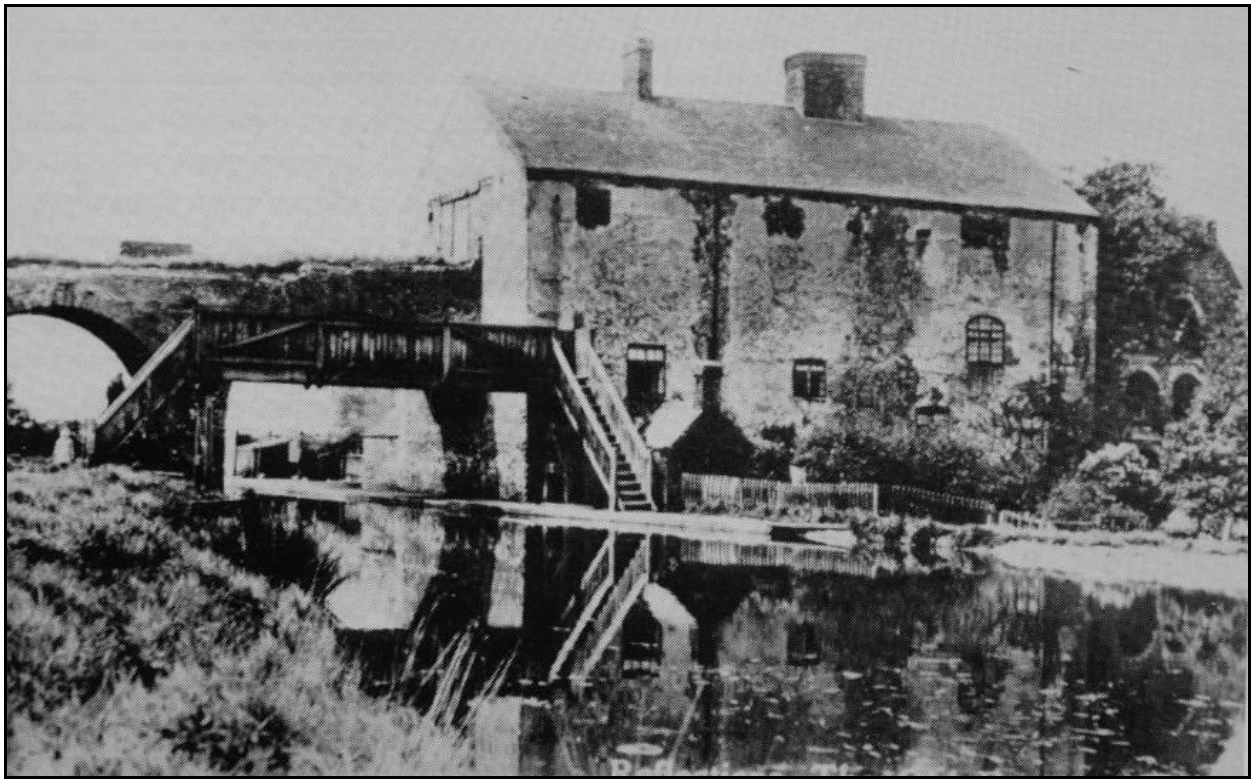
The area below the furnace bridge loft was converted into four houses, the lower back to back pair had three storeys', the upper pair having two storeys' above ground with large cellars, one of which was used to brew ale which was sold locally and also sold to barge passengers as they passed by on the canal.

The second arch of the canal bridge was also converted into living accommodation. See the following photographs. When the 1851 census was taken, three families lived in the cottages under the bridge loft and as many as 65 people were recorded as living on the site at one time. Families were still living in the cottages under the bridge loft in the 1970's which by then had been extended in parts.

A POSTCARD BY W. FAIRBROTHER POSTED FROM MOIRA IN AUGUST 1913.
(NOTE THE ONE UP ONE DOWN LIVING ACCOMODATION IN THESECOND ARCH OF THE BRIDGE)

PHOTOGRAPH TAKEN C.1930.





PHOTOGRAPHS TAKEN C.1916 WHICH SHOWS THE FOOTBRIDGE OVER THE CANAL STILL IN PLACE, OVER WHICH THE CHILDREN WENT TO WALK ACROSS THE FIELD TO THE SCHOOL ON MEASHAM ROAD.

THE LIME KILNS ADJACENT TO THE MOIRA BLAST FURNACE SITE

The Ashby Woulds were 'enclosed' in 1800 and the 2nd Earl of Moira's mineral rights were confirmed

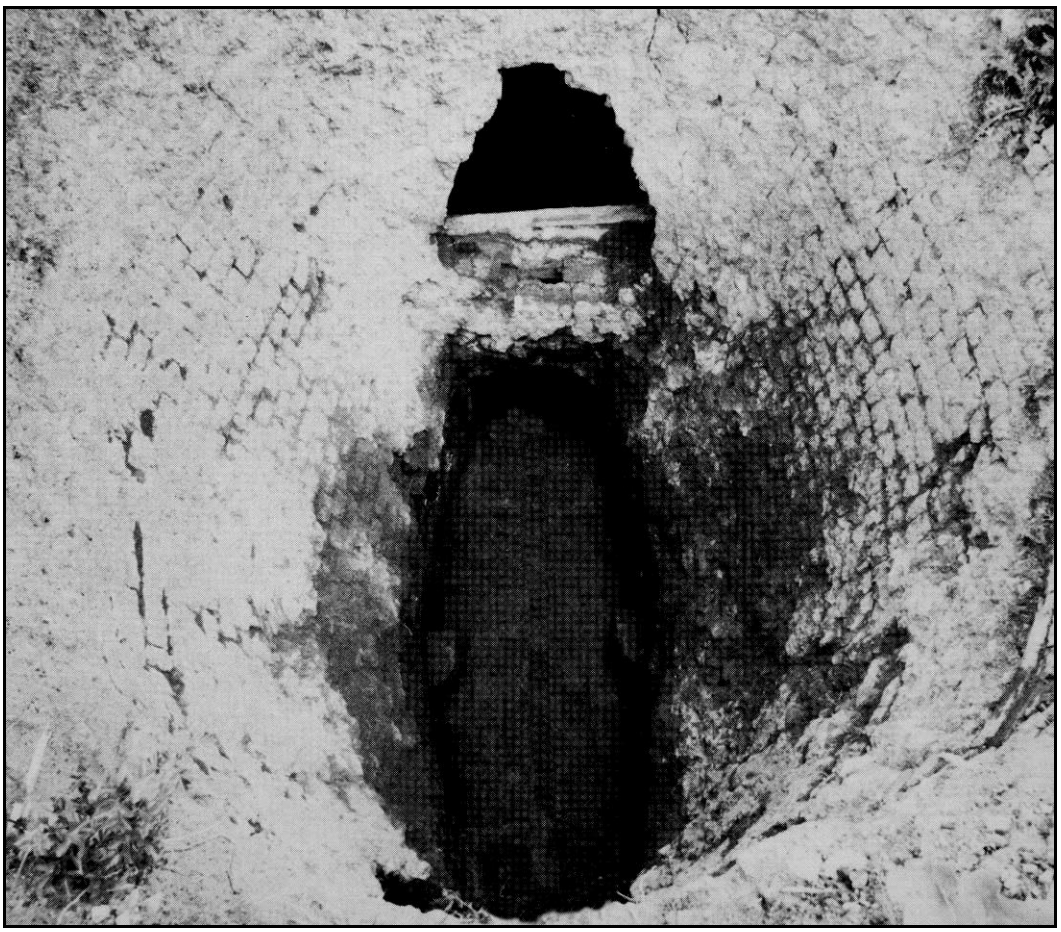
It was in 1793 that the 'Board of Agriculture' was founded, and it commissioned general reports on the state of agriculture in Britain. From the different view points expressed by the Board, there was a consensus of opinion that the increasing use of burnt / quick lime on the land was extremely beneficial in making it more productive for the growing of crops. Prior to land being enclosed by Acts of Parliament, a great deal of "heath land" had been left to waste and the condition of the soil was in desperate need of improvement. Medieval land husbandry was very inefficient, and it was the fact that such crops as wheat or barley exhausted the soil. This eventually led to the development of the three-field system. In this technique, one third of all the land was allowed to lie fallow or was planted with a regenerative crop such as peas or clover every three years before it could produce another wheat crop. This was obviously wasteful of land and it was soon found that treatment of the land with calcareous clay called marl together with farmyard dung improved the fertility of the soil. It was only another short step to the spreading on the land of burnt / quick lime, which helped to break up clay soils and "manured" (sweetened) the land to give improved crop yields. The dual use of lime for mortar and for fertiliser led to the development of small local industries centred on limestone outcrops which often developed into serious quarrying businesses.

According to "The Moira Furnace", edited by David Cranstone the re-constructed kilns which were built into the canal embankment were constructed in stages and the first one was built around the same time as the furnace (1804-6). Apparently, four further kilns were built in 1812 and two more were built between 1826 and 1837. Presumably, the 2nd Earl of Moira had initially recognized the new and increasing demand for burnt lime / quick lime and decided to invest in the lime kilns. However, the Earl left for India in 1812 and his collieries and kilns etc were looked after by a managing agent. Presumably the two kilns built in 1826 and 1837 were a reaction to market forces and an increasing demand for burnt lime both in building and agriculture.

1812 accounts list the value of lime sales as being £636 14s. 11d. If one assumes a price of 10s. per ton, this would equate to 1,273 tons.

The seven kilns (in the area marked **J** on the following 1835 O/S map) were built into the embankment of the Ashby Canal in a dog leg formation over a period of time about 100m to the south west of the Moira Blast Furnace. It is assumed that these were used purely for the burning of limestone to produce burnt lime, more commonly known as quick lime. However, there is some conjecture as to whether the first kilns built may have been used for the calcining of iron ore for the blast furnace. It is interesting to note that as part of an inventory carried out in 1845 of the Moira company (LRO, DE500/91/1) who owned the Bath, Marquis, Rawdon, Newfield and Gresley pits, **8 lime kilns** are listed plus a foundry at Bath Yard and a brick-kiln at Newfield Pit. One limestone boat for use on the Ashby Canal is also listed, plus 15 narrow boats and 6 barges and 88 coal and slack wagons. However, an 1844 inventory mentions one lime kiln at Bath Pit, which would then account for the other seven lime kilns being at Moira. No further information at the time of writing has come to light on why the 8th lime kiln was built at Bath Pit.

RECENT PHOTOGRAPH OF THE SEVEN RESTORED KILNS



A MOIRA LIME KILN PHOTOGRAPHED PRIOR TO RESTORATION WORK

The development of the internal design of lime kilns varied greatly. This one gradually changes from a circular shape at the top to an elliptical form at the bottom. Kilns with a similar internal shape were built in Cope's yard at Ticknall lime works. It was thought at the time, that this shape gave a better continuous burning performance than a kiln that was circular at the top and reduced uniformly to a smaller diameter at the bottom, although the latter shape seemed to be the more favoured one, possibly because it was simpler to construct.

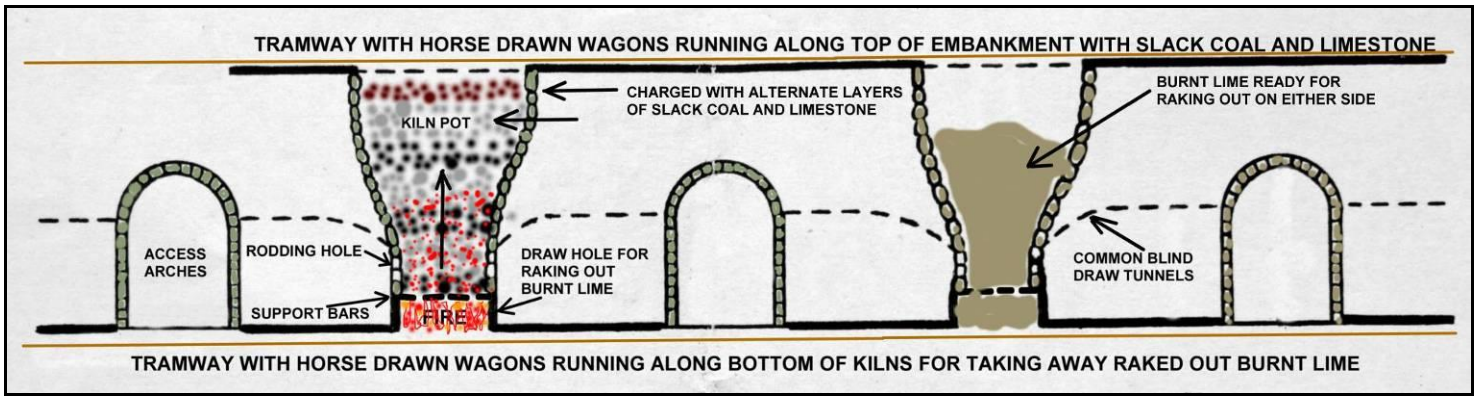
The above photograph is part of a model held at the furnace museum showing the area of the lime kilns with Ashby Canal running by, which can be related to the above photograph of the restored kilns. A lime storage shed is shown adjacent to the kilns which there would have been required to protect the burnt lime from the elements. On the right hand side of the model, heaps of iron ore for the furnace are undergoing the calcining process referred to under the earlier feature on the Moira blast Furnace.

In recent times, brick foundations of horse stables shown on the left of the model have been unearthed.

Limestone was brought to Willesley Basin Wharf (**E**), via the Cloud Hill and Ticknall tramway (**F**). The following 1835 O/S map gives no indication of tramways from Willesley Basin to the furnace or lime kilns. The record above, of one limestone boat for use on the Ashby Canal suggests this was used to bring the limestone in from Willesley basin. The alternative was that it was brought from Willesley in horse drawn wagons which would have had to pass through the toll gates on the Turnpike roads marked T.G. on the map.

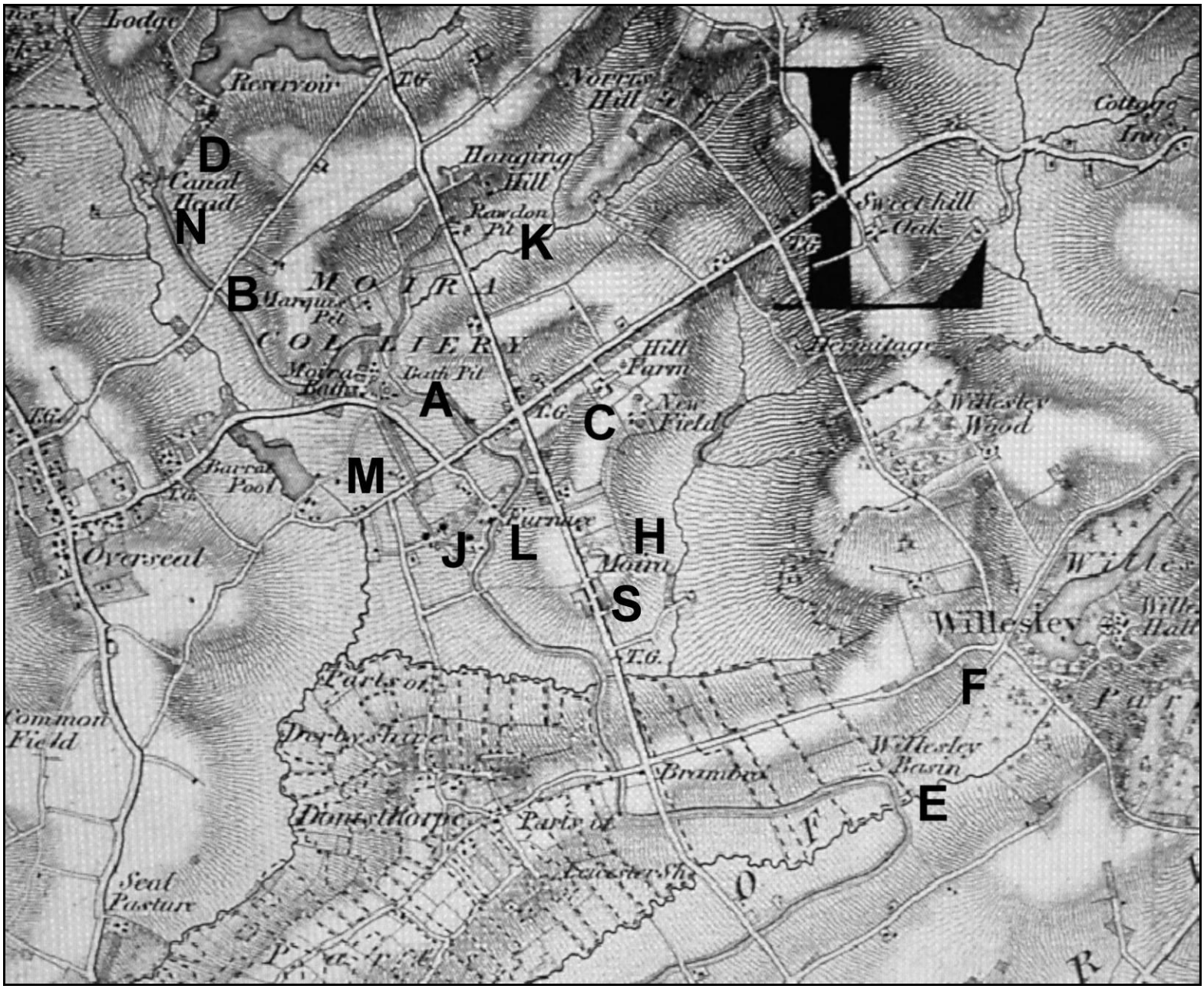
As shown in the following schematic diagram and the model, tramways from the early 1800's were usually taken up to the top of kiln embankments so that horse drawn wagons could travel up with slack coal and limestone to charge the kilns. A short tramway may have run from the base of the kilns to the canal wharf if lime was ever shipped out to the national canal network. The local tollgate controlled turnpike road network would have allowed lime to be collected by local farmers and builders directly from the lime works.

The burning of lime would have ceased at Moira when the Midland Railway built the rail line from Leicester to Burton which was opened in 1850 utilising part of the existing Leicester to Swannington railway. The tramway was subsequently abandoned from Ashby to Willesley basin and taken up. This is confirmed by the fact that the 1851 census lists a family headed by John Nichols residing at Furnace Houses. He is listed as a lime burner and his two sons aged 12 and 18 were given as labourers in the lime works. By the 1861, census no one is listed in connection with the lime works.

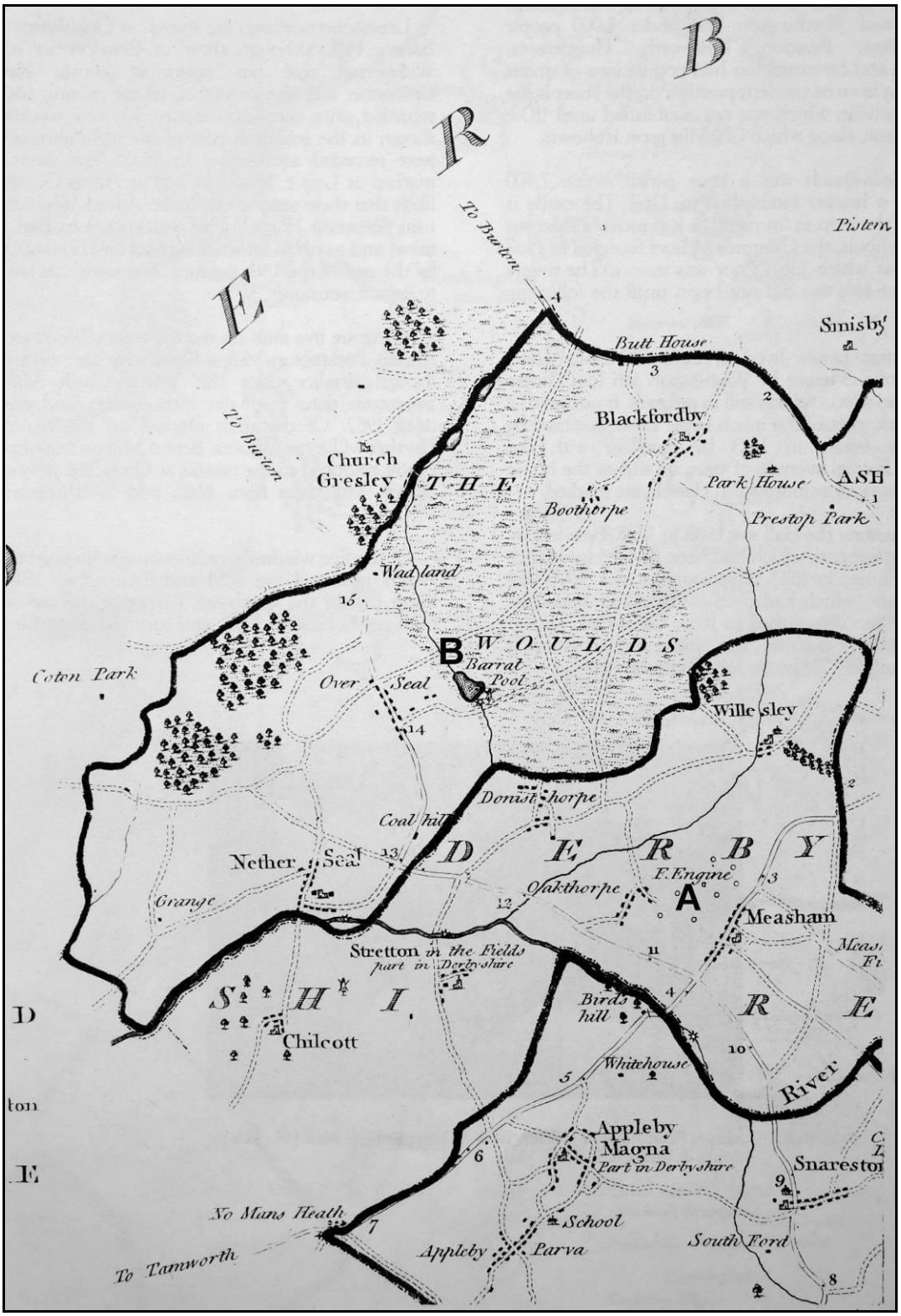


A BASIC DIAGRAMATIC ILLUSTRATION OF COMMON DRAW TUNNELS SIMILAR TO THOSE UNCORPORATED IN THE MOIRA LIME KILNS

The draw tunnels served two kiln bowls each via a cross passage and the burnt lime and ash was raked out via the arches at the front. Wooden canopies would have been erected over the arches to prevent the lime being damaged by the elements. Storage sheds were often built on site as well to protect the lime before being collected by local farmers with horse drawn wagons for example. Metal hinged canopies were normally erected over the heads of the kilns which served the dual purposes of controlling the flow of hot gases and thereby the temperature within the kiln, and also served the dual purpose of protecting the contents from the elements.

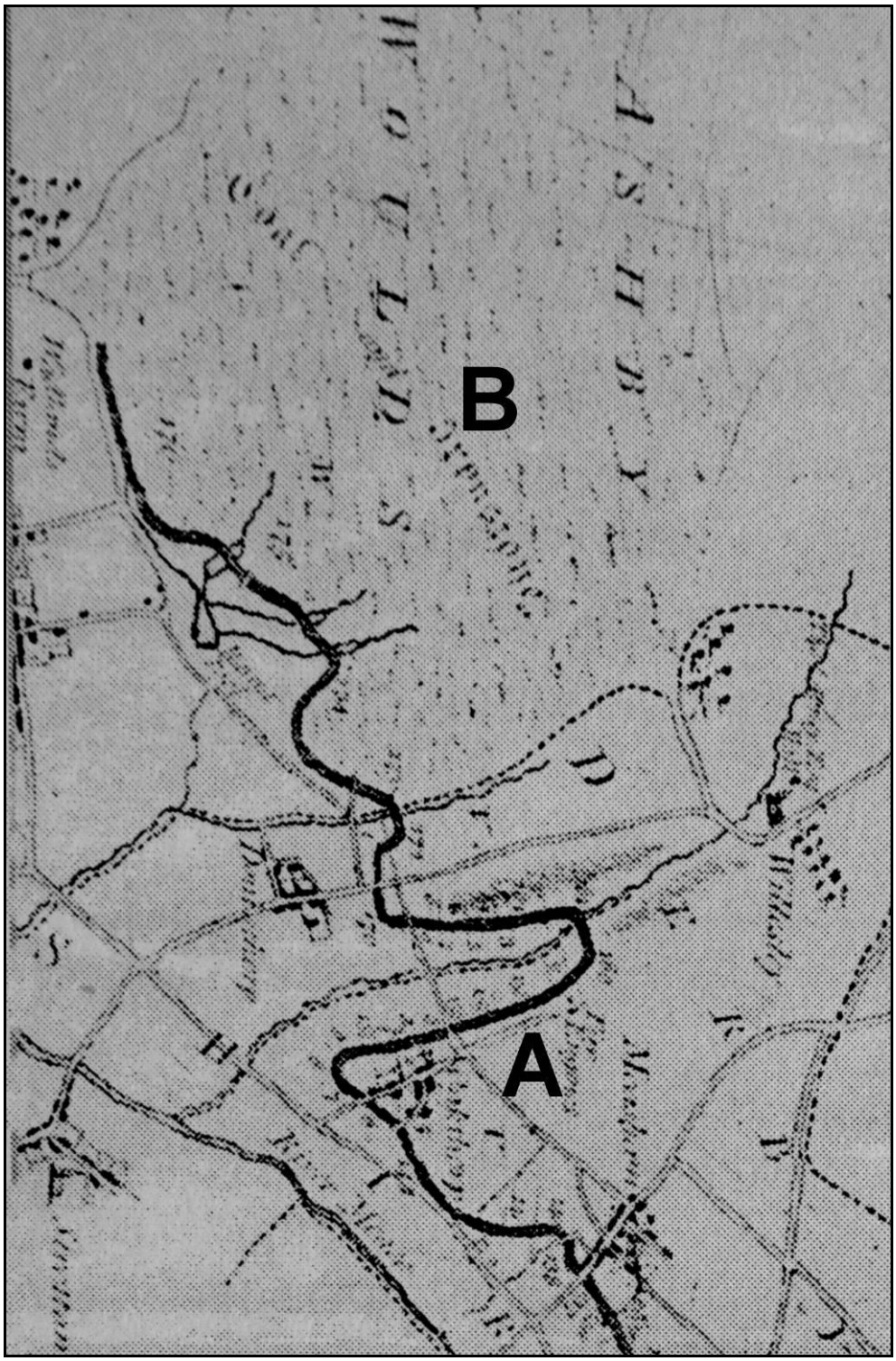


1835 FIRST EDITION O/S MAP
(NOTE THE TOLLGATES ON THE TURNPIKE ROADS INDICATED BY T.G.)



JOHN PRIOR'S 1777 MAP

(showing The Woulds, Barrat Pool with windmill at B, and the Fire Engine / Newcomen steam engine at Oakthorpe / Measham at A, surrounded by what appears to be several mine shafts)



AN EXTRACT FROM ROBERT WHITWORTH'S ORIGINAL 1781 MAP FOR THE ASHBY CANAL – NOTE THE FIRE ENGINE (NEWCOMEN STEAM ENGINE AT A AS SHOWN ON PRIOR'S PRECEDING MAP AND HIS NOTE REFERRING TO COAL AND IRONSTONE ON THE WOULDS AT B