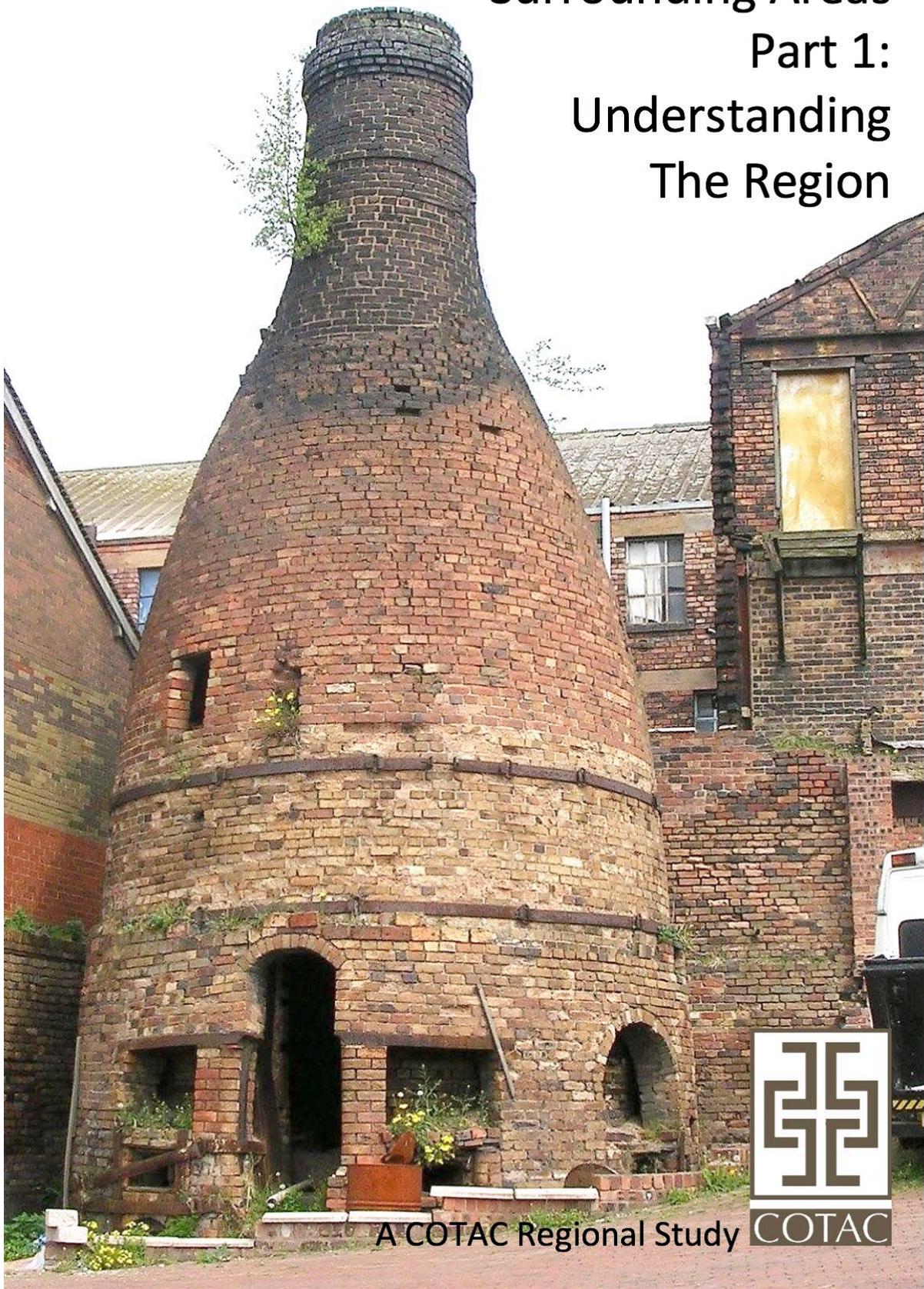


The Potteries and
Surrounding Areas
Part 1:
Understanding
The Region



A COTAC Regional Study



COTAC

The Potteries and Surrounding Areas

Part 1: Understanding The Region

Barry J Bridgwood and Ingval Maxwell

Council on Training in Architectural Conservation (COTAC)

COTAC originated in 1959 in response to the need for training resources for practitioners so they could properly specify and oversee work involved in repairing and conserving historic buildings and churches. Since its inception the Charity has persistently and influentially worked to lift standards, develop training qualifications and build networks across the UK's conservation, repair and maintenance (CRM) sector, estimated at over 40% of all construction industry activities. This has involved working partnership with national agencies, professional and standard setting bodies, educational establishments and training interests.

This study is directed towards a general audience and those wishing to increase their knowledge of The Potteries area, and its specific form and type of buildings in addition to assisting in providing a framework for carrying out similar regional studies. As a regional case study appearing on the COTAC www.cotac.global website the approach aims to follow a methodology that reflects the comprehensive 14 ICOMOS Education and Training Guidelines.

The two-part study has been undertaken for COTAC in support of its objective to advance the education of those involved in the protection, preservation, and sustainability of the historic environment, and to provide knowledge in support of training in the art and skills required to protect and preserve it. Part 1 of the study should be read in conjunction with Part 2: Appreciating the Region.

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1 Understanding the Area

Clarity of understanding of how and why an area or region has developed in the way that it has must be a pre-cursor to making appropriate changes to avoid the risk of damage to the social, developmental, architectural and historical record offered by the existing built environment – its *Palimpsest* [an, overwritten manuscript]. There is a need to appreciate the underlying features, both natural and man-made, that have influenced development and change. It is an essential skill of all interested parties to be able to source appropriate advice and information about how and why an area has developed and been built in the way that it has. Such material informs how we might interact with the historic environment in order to avoid damage to the range of contained information about its history and factors that have influenced and affected its various usage over time!

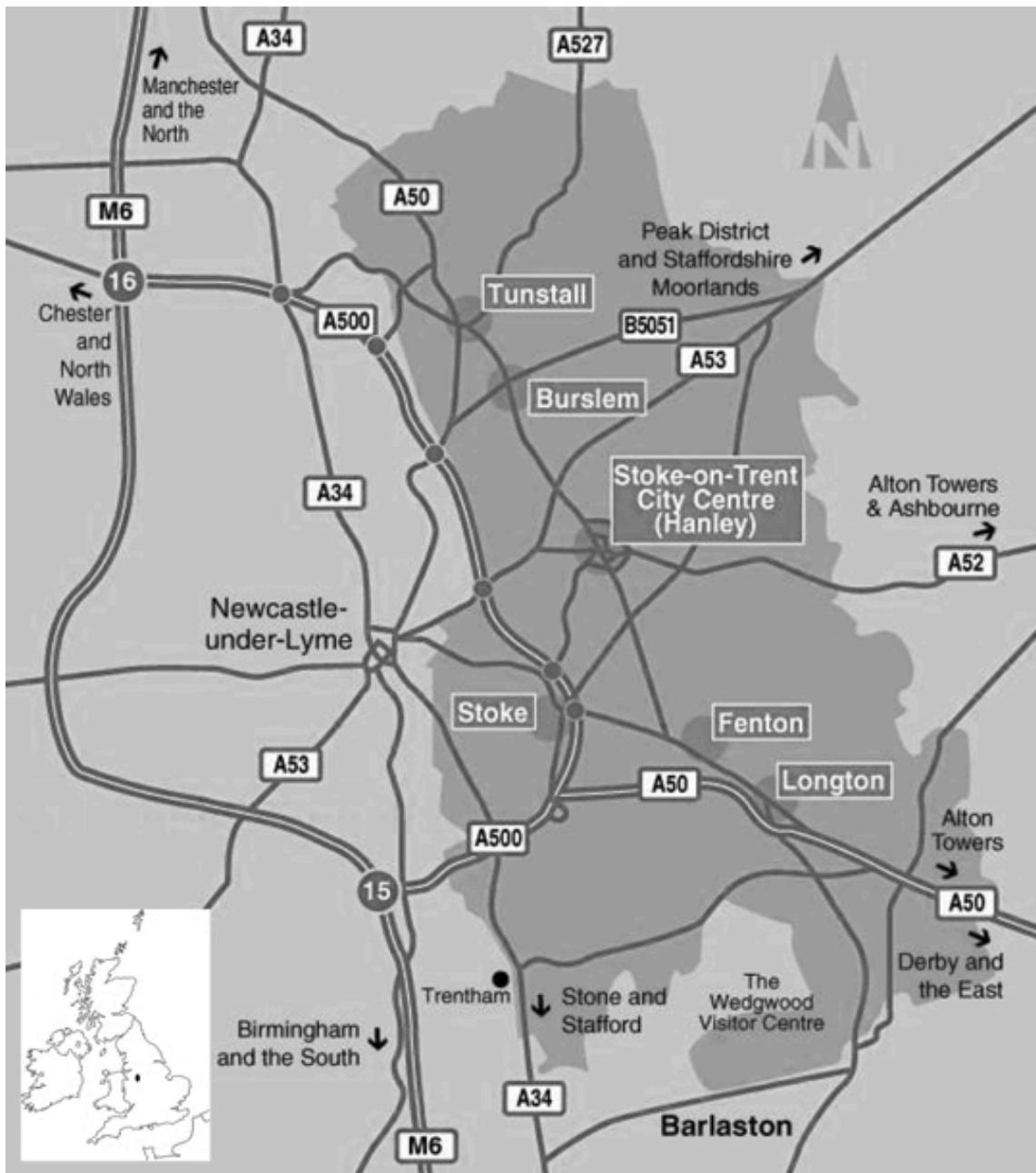


Fig.1.0 Location Map of The Potteries and its Six Towns

This fundamental approach should underpin all decisions made in order to manage change, without damage to the historical record, fabric and embedded information that reflects the changes to which the built environment has been subjected.

Available archives and records along with local and focused interest groups, together with museums, libraries and public record offices can provide a wealth of information and understanding that informs appropriate change without risk of damage to palimpsest – this is the skill and art of conservation. The simplest form of self-imposed questions are why did this happen in the way that it did; how am I to inform my understanding of it, and how might I avoid damage to this record when considering change?

Once it is investigated and understood, the historic built environment is an invaluable resource offering visible evidence about a local area – it is an exceptional educational means that provides clues on how and why an area has developed and changed, especially when analysed against historic map evidence compared to present day conditions.

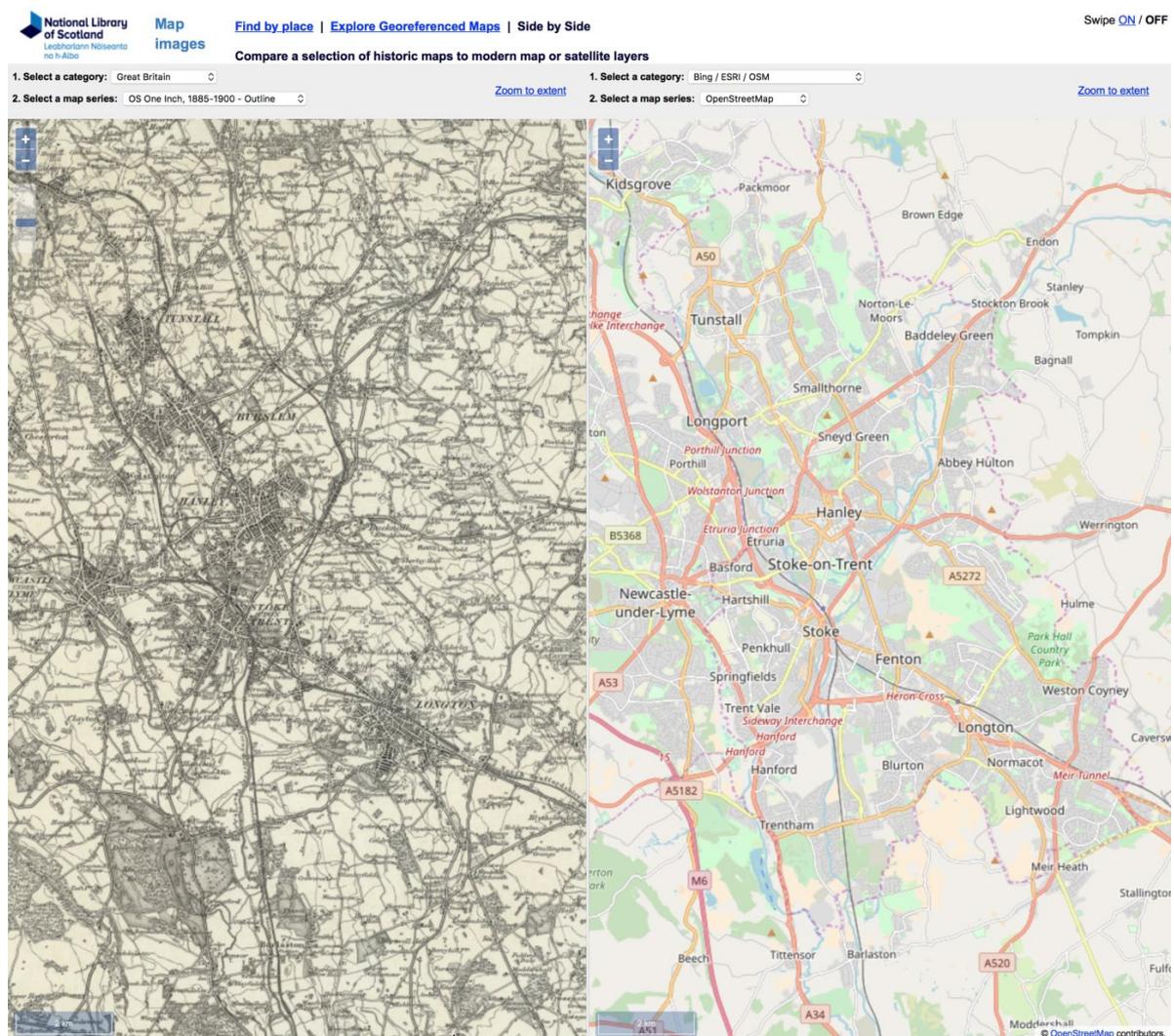
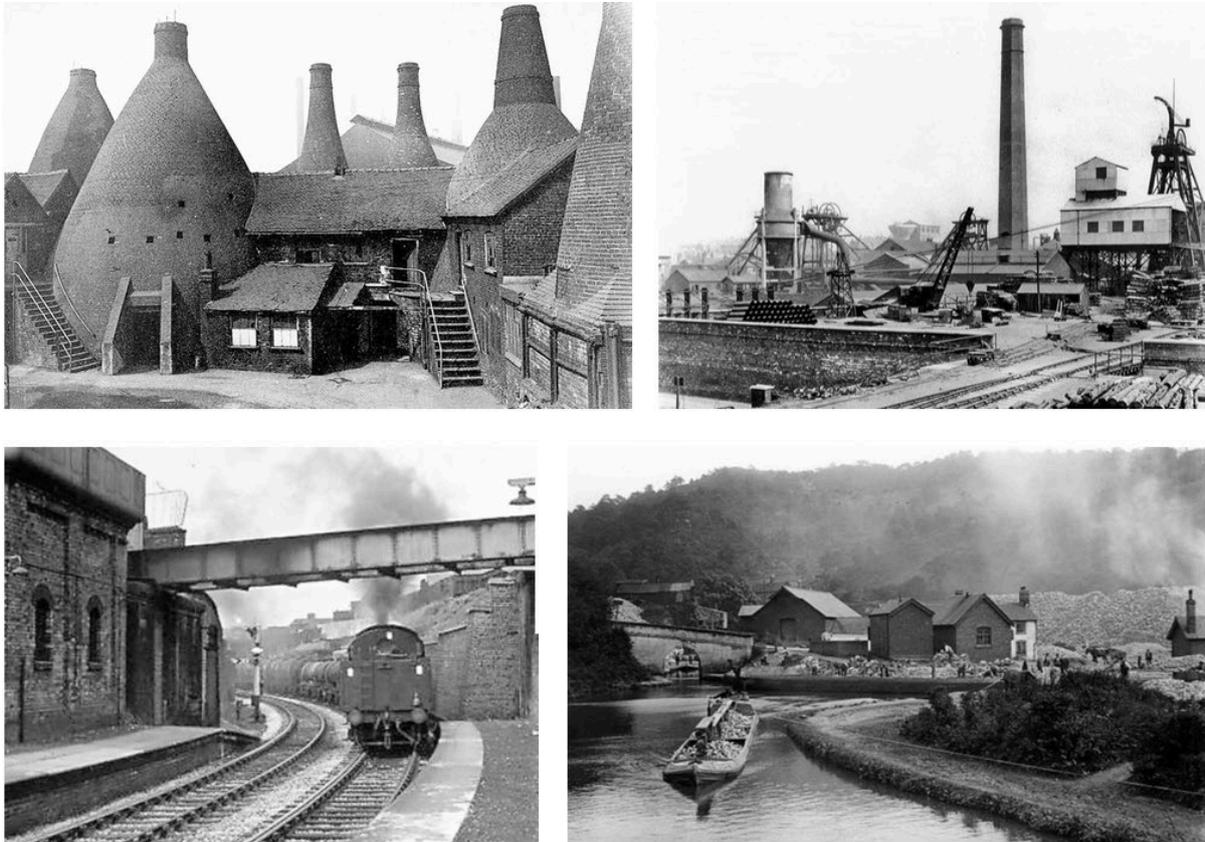


Fig.1.1 Side-by-side comparison of the late 19th C with a present-day Potteries map to illustrate how the area has developed and changed over time. Reproduced with the permission of the National Library of Scotland

Patterns influencing the historic built environment and associated social change are a continuum; affected by a process that, as time passes, is impacted by an exponential rate of change. How are we to deal with this? How can the historic environment that we rely

on to reflect patterns of change be protected in order for it to continue to offer a record of history that can be investigated and interrogated? The pressures to which it is currently subject are different to the pressures that may have influenced its formation and subsequent change: this must be understood and clarified. This rate of change, in itself, can be difficult to deal with and manage but it does need to be understood.



Figs.1.2 Historically, the most iconic architectural and landscape features of the Potteries were the bottle kilns, colliery buildings, pithead winding gears, slag heaps alongside railway and canal architecture

Such understanding will inform and underpin any work or proposals that might affect the heritage values. But, any area or region is always subject to change. How this is dealt with is influenced by the here and now and the values that this can impose.

But, with various industries having been overtaken by more modern techniques and approaches, changes in market needs, legislative impacts and the effects of the weather, numerous buildings and sites have fallen into serious disrepair or have become lost across the area.

The following study readily acknowledges the changes to which The Potteries have consistently been subjected, this whilst also exploring the risk of what is fast becoming a hidden asset that is also in danger of continuing to disappear.

Whilst in an explicit acknowledgment of the significance of the industrial past, there are currently, over 200 list entries in the wider Stoke-on-Trent area; some, sadly, are not in the best of condition, whilst other locations successfully continue to promote their value in difficult times.



Fig.1.3 Abandoned bottle ovens at Bournes Bank, Burslem *



Fig.1.4 Refurbish and new-build work at the CoRE Centre (formerly Enson Pottery), Normacot *



Fig.1.5 Derelict Prices Teapots Factory Longport *

2 What is important about The Potteries?

By the end of the 19th C the six centres of population; Tunstall, Hanley, Stoke-Upon-Trent, Fenton, Longton and Burslem [considered to be the Mother Town of the six], had developed into a sprawling conurbation that collectively became known as *The Potteries*. Renowned throughout the world as a centre for the production of fine ceramics and with its former urban landscapes featuring its iconic bottle kilns and ovens. The area is the home of many famous manufacturing names such as; Wedgwood, Spode, Moorcroft, Doulton and Minton as well as a multitude of less well-known others both large and small.

Over the wider Potteries area and across its period of production, there were some 1,500 active pottery manufacturers. It is the only UK area known by its principle manufacturing process. But it was also a centre for coal mining, iron and steel production, brick making, tile making and (Michelin) tyre manufacture and the production of sanitary ware and salt-

glazed drainage products. This resulted in a regional complexity that warrants detailed and informative study.

Its earliest record of pottery making was confirmed by excavation of Roman kilns and pots at Trent Vale with other excavations recording domestic pottery production in the 14th C and before.

Until the early 18th C the area was isolated and landlocked, with a rural economy based on subsistence farming, mostly dairy as the soil, being clay based, is too heavy and the topography too hilly for arable: this in addition to small-scale production of earthenware pots for storage of locally produced dairy products. It was poorly served by roads with transportation of produced wares by packhorse to the navigable parts of the rivers Mersey or Trent; and, later, via the Turnpike road (now the A50) between Derby and Newcastle under Lyme, a sister town to the wider Borough/City of Stoke-on-Trent.

The area, was historically moated by its geography and location, isolated from its surroundings, this came to define an insular and independent spirit of its population who are outspoken, friendly and fiercely loyal to their surroundings, its culture and industrial heritage.

Its industrial development was defined by the north-south orientation of the underlying seams of coal and clay used in pottery production and local brick and tile manufacture. It was exploitation of this underlying geology, with outcrops of ironstone that was to fundamentally transform the area into a hive of manufacturing activity.

In their hey-days, the pottery and iron and steel industries employed up to 30,000 individuals; the pottery industry alone, at its height, employed some 20,000 people.

Both were central to the economy of Stoke-on-Trent and were fundamental to its importance during the late 19th C and early 20th C. Shelton Bar was the main steel production plant; covering an area of some 400 acres. It sank a total of five coal mines within its site and had its own complete railway system to provide for internal transportation.

It was partially closed as a fully operational site in 1978 but was still producing rolled steel until 2000. Indicative of ongoing change, 200 acres of the site was cleared and used for the temporary National Garden Festival in 1986. Additionally, coal mining, as will be discussed, was also of major importance employing up to 20,000 personnel.

The development of canals

Within the comprehensive canal network of England and Wales, two main canals served the Potteries area – the Trent & Mersey and its easterly branch the Caldon canal. The success of such a heavily industrialised region, centred round the northwest Midlands between the sources of the Trent and Mersey rivers systems, relied on having good transport and communications. Consequently, these west/east navigable rivers were eventually linked via the Trent & Mersey Canal and its Harecastle tunnels.

Formed under an Act of Authorisation in 1766; encouraged and partially funded by Josiah Wedgwood, the canal was initially constructed by James Brindley and completed in 1773 by Hugh Henshall after Brindley's death in September 1772. The canal was fully opened in 1777. A second tunnel with a towpath was constructed by Thomas Telford and completed in 1827.

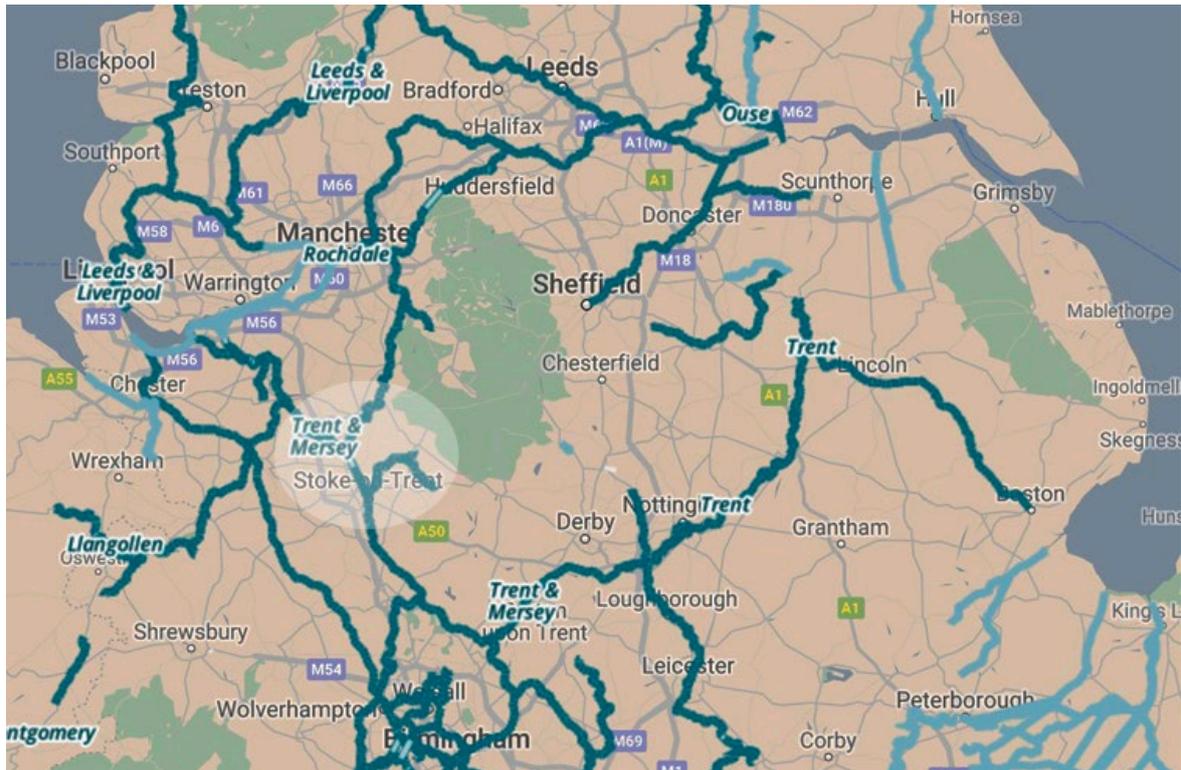


Fig.2.0 England and Wales: 2,000 miles of canals map extract illustrates how The Potteries were connected within the canal system. The Caldon Canal is the crooked spur running east from Stoke; this included a branch to Leek, joining the Caldon at Hazelhurst © 2018 Google Map source



Fig.2.1 Legging it through Harecastle tunnel on the Trent & Mersey canal

The original Brindley tunnel did not have a towpath and narrow boats had to be *legged* through.

This was done manually by two men lying flat on their backs on temporary outriggers on either side of the vessel to propel it through by *walking* on the tunnel sides.

Note the use of the correct term, *Narrow Boat*. These have a beam of 2.1m (7 feet) as opposed to a barge which is wider.

This essential water-based system enabled The Potteries, as skills developed, to make greater use of Cornish kaolin and ball clays from Devon and Dorset. Produced goods could then be moved via the River Trent to Hull and Europe, the Rivers Thames and Severn to wider markets, and to Liverpool for export to America.

The Caldon Canal or, to be correct, a branch of the Trent & Mersey Canal was owned and funded by the Trent & Mersey Canal Company; it was completed in 1779 and opened the same year under an Act of Authorisation dated 1776. The canal linked Froghall (east of the area) with the Trent & Mersey canal at Etruria: this over a distance of 17 miles

supplying quicklime from the Froghall and Consall lime kilns and flint to and from the Cheddleton Mill to the Potteries. The kilns were supplied with limestone ore from the quarries at Caldron Low via gravity tramways which terminated at the Froghall lime kilns (Fig.2.2). The tramways ceased operation in 1920.

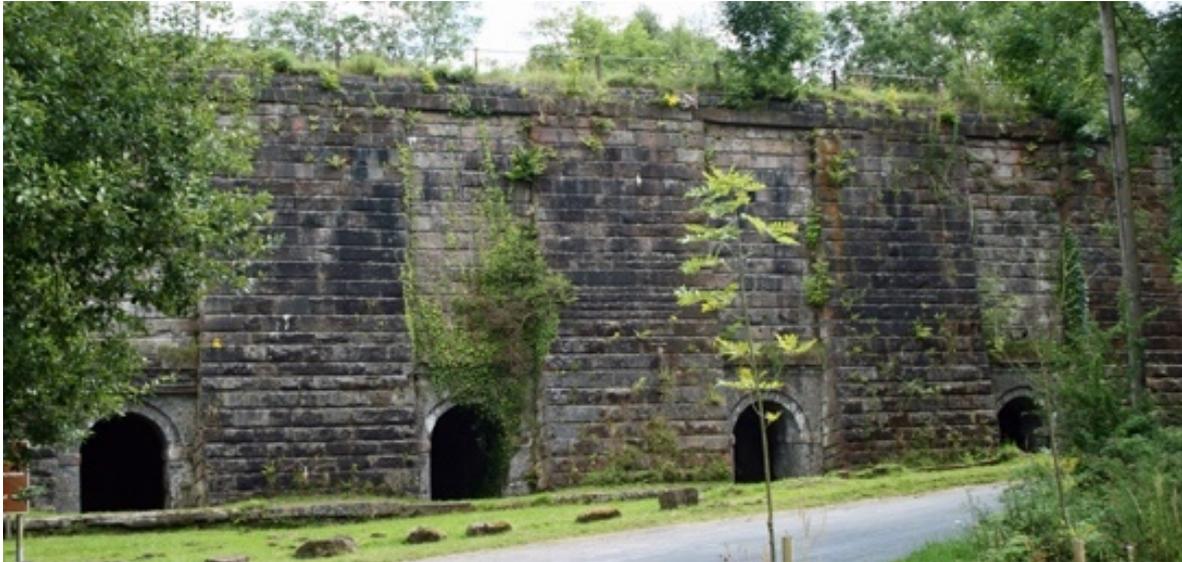


Fig.2.2 Lime kilns and top-level tramway at Froghall Wharf interchange *



Fig.2.3 Froghall Wharf and Basin at the terminus of the Caldron Canal, opposite lime kilns illustrated above *



Fig.2.4 Froghall tunnel's limited headroom *

However, a particular problem existed on the Caldron Canal near Froghall Wharf due to the lack of height in the Froghall tunnel. This meant that only low narrow (tub) boats could use the system, particularly when the water level in the canal was high and the necessary raw material supply issue to factories had to be resolved in other ways. The developing railways offered a solution and, eventually, bypassed much of the canal system.

The quicklime produced at Froghall was used in the building and iron and steel industries and for soil conditioning in agriculture, as well as being used in small quantity in pottery processes.

The Caldon Canal was more elevated than the Trent & Mersey and required reservoirs to feed and provide for its flow down to the lower level at Etruria. This supply of water was drawn from the River Churnet and several created reservoirs including Rudyard Lake which was, and still is, a popular leisure centre for The Potteries. The Caldon had two further rural sub-routes; the Leek branch and the Froghall to Uttoxeter Branch, each leaving their original industrial footprint on the existing landscape.



Fig.2.5 Caldon Canal Hazelhurst junction (Leek Branch Canal is off image to right) *



Fig.2.6 Leek Branch weir overflow, sluice and drain near Longsdon *

The Leek Branch was some three-miles long linking Leek with the Caldon Canal at Hazelhurst junction. It is laid flat with no locks, one 130-yard tunnel and 9 bridges, passing over its primary canal (Caldon) via an aqueduct at Hazelhurst, then continuing to join the Caldon at Hazelhurst. It now starts near Ladderedge south west of Leek having been filled in and built over at its Leek approach.



Fig.2.7 1841 Hazelhurst Aqueduct, Caldon Canal below with Leek Branch above *



Fig.2.8 Leek Branch spanning the Caldon on Hazelhurst Aqueduct *

The Uttoxeter Branch ran for 13 miles with 19 locks between Froghall and gravel pits at Uttoxeter. Constructed by John Rennie, it opened in 1811 but closed as early as 1849: This under the influence and development of the railways. The line of the canal eventually

provided the route of the early Churnet Valley Railway; itself to be closed under the Beeching reforms of 1963.

A main feature of Froghall village at the terminus of the Caldon Canal was the copper and brass works of Thomas Bolton and Sons; much of the factory was demolished in 2011 although its main chimney was retained and preserved. As one of five facilities operated by Messrs. Bolton, the company had erected the Brass and Copper Works at Froghall in 1892 for the production of high-conductivity copper cables for telegraphy and electric generators; becoming notable also as the suppliers of cables for the Transatlantic telephone line.



Fig.2.9 Froghall Valley industrial complex. The aerial photograph from the SE directly relates to the extent of the map extract below in Fig.2.10 © Historic England: Britain from Above, EAW024699

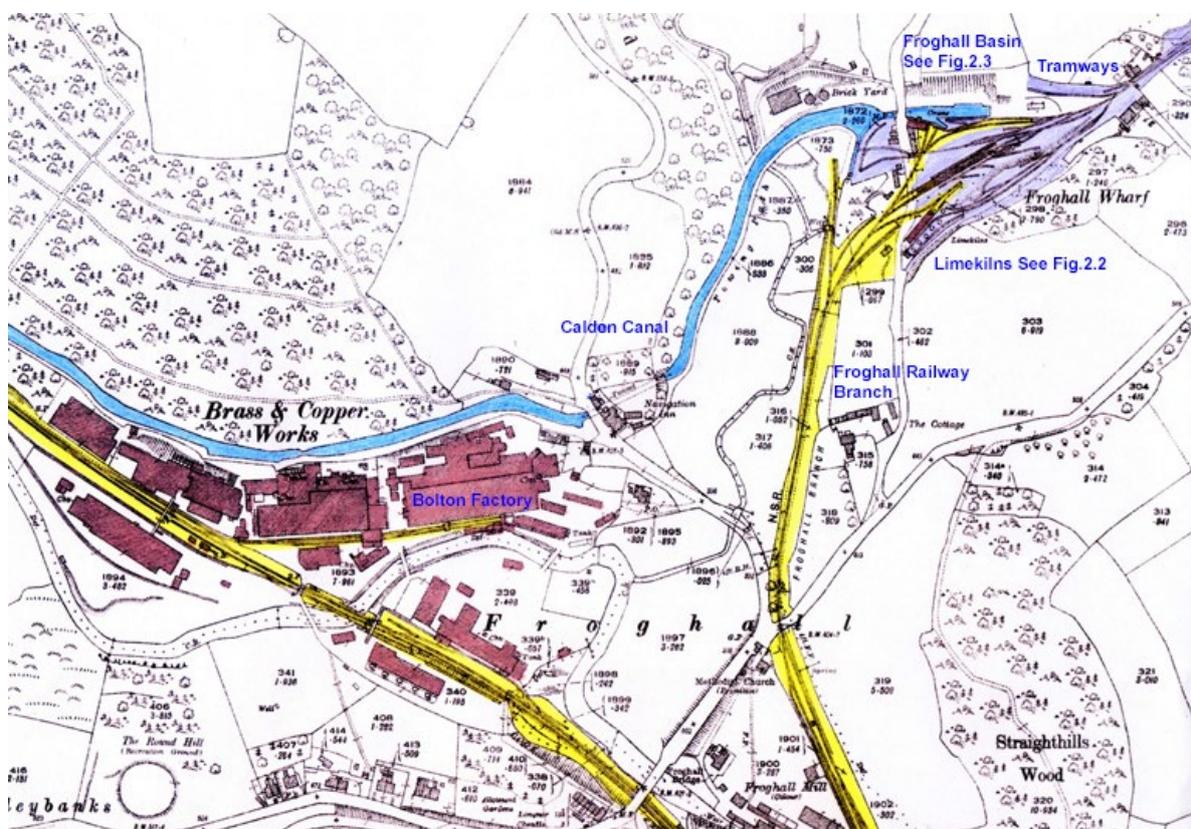


Fig.2.10 Bolton Brass and Copper Works and surroundings, Froghall (1921) OS 1:2500 Staffordshire Sheet XIII.15 1922 Reproduced with the permission of the National Library of Scotland (See also Figs.2.2 and 2.3)

Part of the Bolton site is still used in the production of copper; historically, the raw ore was sourced from the Ecton Copper Mines of the Manifold valley (north east of the area in the lower Pennines) and brought down via tramways to Froghall.

Recently much of Bolton's Victorian factory buildings at Froghall have been demolished and the land cleared for redevelopment. A masterplan was prepared in 2011 anticipating a new approach to unlock the valley's potential for employment opportunities, residential developments and heritage tourism. As part of this plan the existing railway system between Cheddleton and Froghall has been re-opened by the Churnet Valley Railway as a privately owned and operated heritage steam line; it is planned to extend the existing nine miles track back to Leek and beyond, possibly as far as Stoke-Upon-Trent.



Fig.2.11 Tourist steam train service between Froghall Station and Cheddleton *

Froghall tramways

Due to the steepness of the local terrain, canals would not be able to accommodate such topography. An alternative means of moving limestone ore down to the kilns at Froghall from Caldon Low quarries was needed. Thus tramways became the easiest early solution.

The first tramway (1778) at Froghall was horse drawn with individual wagons routing to the limestone quarries at Caldon Low. It was constructed using wood rails topped with iron fixed to wooden sleepers. The second tramway was better engineered but still employed the same technology and remained precarious and virtually impassable in winter.

The third version by the Scottish engineer John Rennie opened in 1804. It was a plateway rather than a railway – flanged rails and smooth non-flanged wheels. It was better-built and adopted an improved route and twin tracks to accommodate passing traffic. The

inclines were oppositional gravity powered with the flatter sections (planes) adopting horse power. Full multiple wagons (up to nine in a train) would counter the empty ones (sometimes coal-filled) drawing them back up the slopes via ropes on inclined sections.

A much improved and far better engineered fourth route was designed and built by James Trubshaw in 1847. It adopted a three-rail system with the middle rail shared by both up and down traffic with cross-over sections at passing places. It was a braked cable system with manually operated brake drums at the top of each incline controlling descending wagon speed.



Fig.2.12 Cable tramway braking system foundations above the lime kilns at Froghall at the top of an incline down to the wharf level *



Fig.2.13 Tramway upper level flat or plane section at Oldridge *



Fig.2.14 Mid-level incline en-route to Caldron *

The Trent & Mersey had branches to Newcastle and Burslem. Together with tramways to Burslem, Hanley and Longton such links initiated by local industrialists were crucial to the development of these towns and the surrounding area along with important examples of the narrow canal infrastructure of wharfs and warehouses. Tramways and plateways were the precursor to railway developments. They were critical for the transshipment of coal from mines to other transportation terminals in the wider Stoke-on-Trent area.

Railway developments

The coming of the railway in the late 1840s heralded a slow demise in the use of canals as the principle, but slow, method of transport although the network was still in commercial use as late as the 1970s: notably by Johnson Bros factory, Hanley.

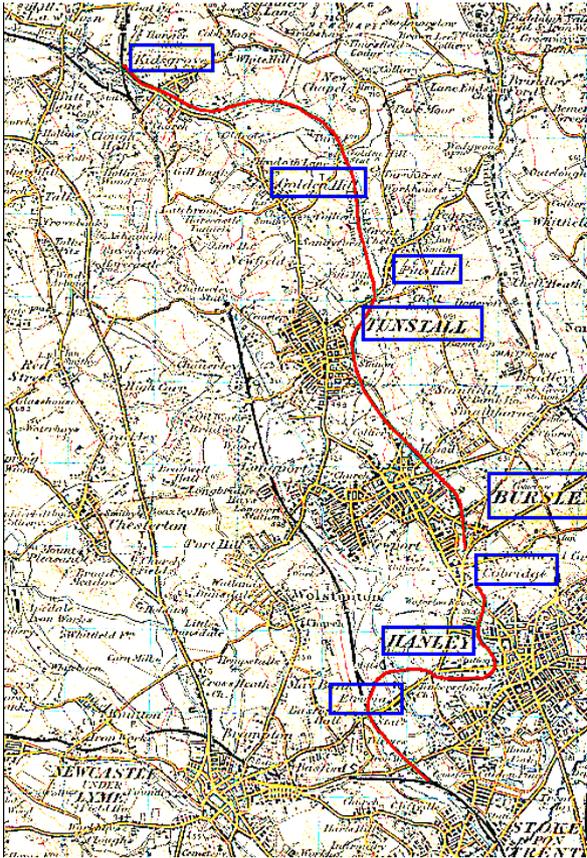


Fig.2.15 Route of the Loop Line on a 1902 Map highlighted in red

The area was served by an internal railway known as the local Potteries Loop Line, constructed by the then North Staffordshire Railway Company.

Running between Stoke/Etruria and Kidsgrove/Crewe it linked the local stations with the West Coast Main Line via its two terminals.

It provided for the transportation of goods (mostly coal) from its inception in 1850 and for passenger traffic from 1862, closing in the early 1960s under the Beeching cuts. Due to the hilly nature of the topography in some parts of the area the route was renowned for its severe gradients and sharp curves.

But, by linking with the West Coast Main Line whose route was also determined by the local topography, the Loop Line provided an essential connection to other areas of the UK.



Fig.2.16 Longton Railway Bridge on the North Staffordshire Railway

Pits and Pots

As early as the 13th C coal mining in North Staffordshire was recorded by the monks at Hulton Abbey. The industry grew rapidly during the Industrial Revolution when coal was used to fuel the growing pottery and iron industries, with ironstone deposits also being found alongside the coal seams in some areas. Ultimately encompassing an area of some 100 square miles the coal fields were virtually contained within the entire boundaries of the Borough of Newcastle-under-Lyme and the City of Stoke-on-Trent.

Throughout the history of coal and ironstone production there were some 90 mines (pits) recorded as operational in the area, with coal sourced via two main seams, the Black Band, and Middle and Lower Coal Measures.

The industry peaked just before the First World War when over 20,000 were employed and over 50 pits were still in operation. After nationalisation in 1947 the size of the industry was gradually reduced and began its final decline after the 1970s and 1980s miners' strikes.

But, the production of coal was an essential industry in The Potteries during the late 19th and early 20th C; this in order to satisfy the ever-increasing demand for fuel to fire pottery factory bottle ovens/kilns. Demonstrating the symbiotic reliance of the coal and pottery industries it was stated in the January 1921 edition of the *Pottery Gazette and Glass Trades Review* that 250,000 tons of coal were used annually for pottery firing in Stoke-on-Trent.



Fig.2.17 Typical coalmine slag-heap and open cast clay pit serving a brick yard. The Berry Hill coal mine winding gear can be seen in the background behind the heap

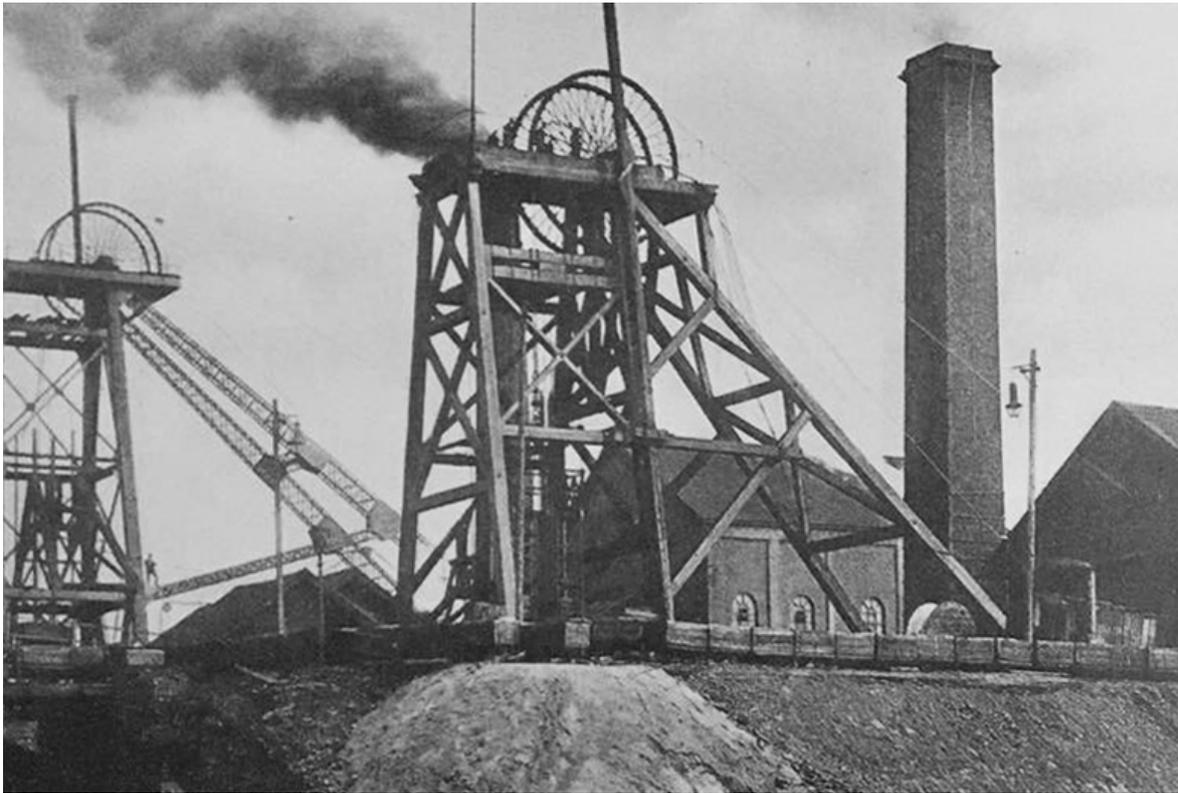


Fig.2.18 Typical early pit-head winding gear Glebe Colliery, Fenton (closed 1964) © Stoke-on-Trent City archives

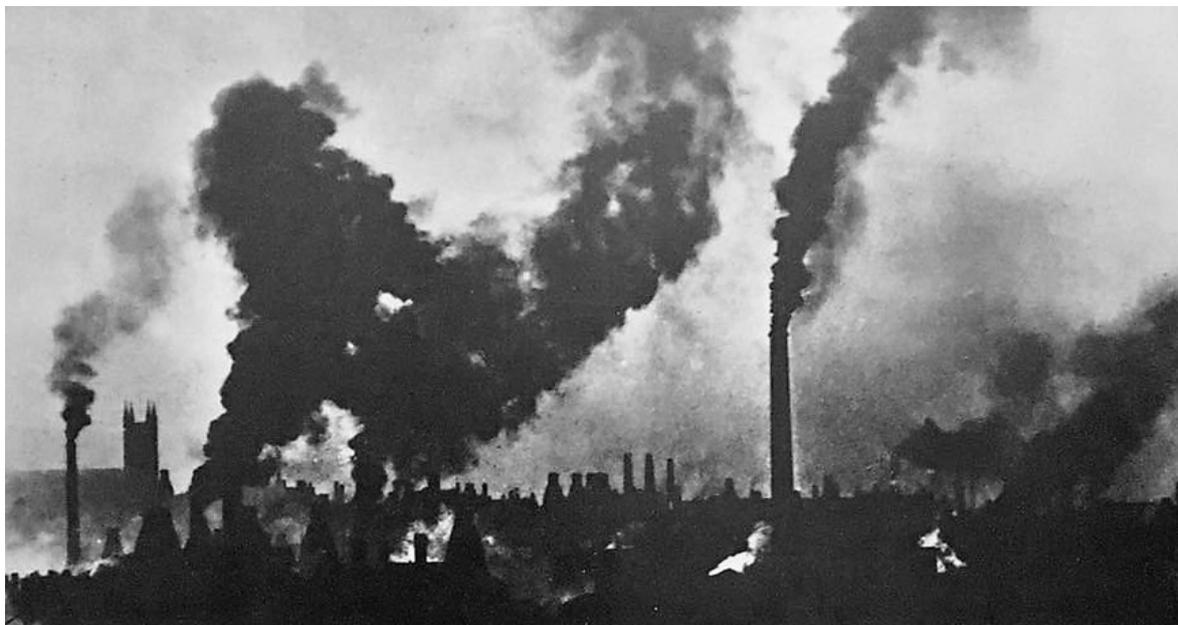


Fig.2.19 Typical pollution of the late 19th and early 20th centuries, Longton c1920s. *When Stoke smokes* © E.J.D.Warrillow

Regarding *pots*, in the book *Bottle Ovens and the Story of the Final Firing* the Woolliscrofts considered that at the height of use there were some estimated 2,000 brick-built bottle kilns/ovens in the area, (other sources suggest some 1,500) whereas by the 1950s these numbers had been re-evaluated to less than half. Today (2019) there are only 50

remaining, all of which are no longer in use and have been Listed. But, sadly, not all are in the best of repair.



Fig.2.20 Two hovel ovens in need of a haircut *



Fig.2.21 Three Listed downdraught ovens, part of the demolished Acme Marls factory, Bournes Bank, Burslem *

It is considered that the loss of so many ovens/kilns may have resulted from:

- a) The urge to clear run-down factory sites for redevelopment,
- b) The dismissal of the familiar in the absence of recognition of their historical/area cultural value,
- c) Subsidence, neglect and disrepair and, directly resulting from the,
- d) Introduction of the Clean Air Act 1956

Even the original and industry formative/generic buildings of the Wedgwood complex at Etruria may have been lost as a result of some these issues. The site is now a car park serving a national betting company's main office.

Although all the ovens/kilns were individually unique, being purpose built for individual pottery manufacturers, they all followed the general sinuous shape of a wine bottle, both fat and thin bodied.

The visible outer brick *hovel* construction is just a shell. The actual firing chamber is housed inside with the hovel acting as a flue for the smoke, heat and fumes of the coal fuelled firing process.

This description applies, principally, to downdraught and updraught ovens. *Muffle* kilns – used during firing of decorated ware, adopt a different structure and operation - see image below; as do calcining kilns which were used to *burn* flint and large animal bones [bovine but not horse – the latter being too soft and porous] prior to crushing for later use within the pottery production process to manufacture cream ware/white ware and/or bone china.

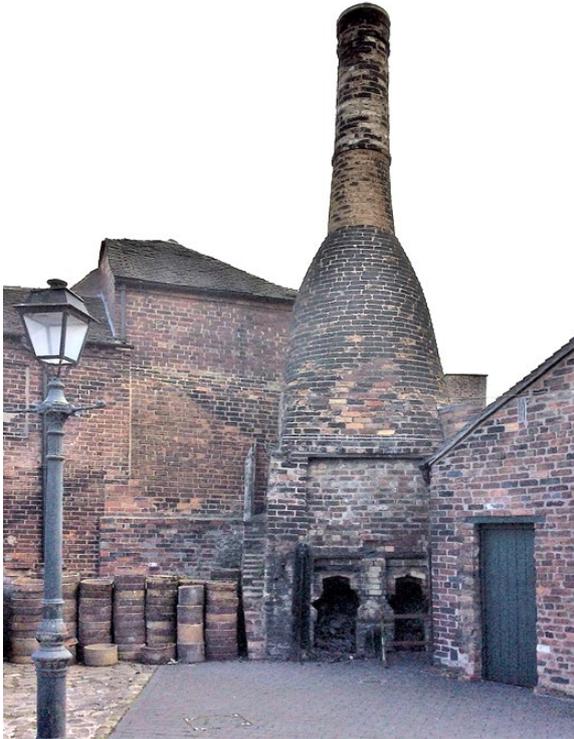


Fig.2.22 A typical muffle kiln used during firing of decorated ware, Gladstone Pottery Museum *



Fig.2.23 Listed and preserved calcining kilns at Hanley *

The two kilns at Hanley (Fig.2.23) are sited adjacent to the Caldon Canal. This allowed easy transportation of materials when in active use. They remain in-situ but are surrounded by a modern housing development.

Pottery firing processes within ovens and kilns

The pottery ware being fired would have been stacked inside the inner firing chamber within large, fireclay containers known as *saggars*. Teams of two men produced these containers; the Sagger Maker and his assistant the Sagger Maker's Bottom Knocker; the latter flattening the sagger bases by beating with a large oak mallet prior to fitting to the clay sides. These were used to contain and protect the *biscuit* ware and the following glaze firing.

Sagger placement within the firing chamber was a skilled manual operation, bearing in mind the domed nature of the chamber floor and the need to pack the first layer of saggars to ensure that following layers did not overbalance. Individual saggars within a *stack* were sealed together (only during glazed firings - *glost*) using a clay gasket (*wad*). Each type of ware may have required a slightly different firing temperature so placement of the saggars within the oven was critical – this being one example of the skill and craft of operatives functioning within the firing process. Placement operations might take two days to complete.

The wares, at their various stages of production, would have been subject to further firings as they reached several and separate stages of development from green to *biscuit* to final glazed firing. The filling of the ovens and control of the firing operation was a skilled and vital element of pottery manufacture.



Fig.2.24 A Sagg Maker



Fig.2.25 A team of Sagg Placers with saggars being filled prior to placement in an oven. All wore flat caps for protection and to help to balance the saggars on their heads during *placing*. Additionally a rolled *stocking doughnut* might be used

Firing operations from placement then firing, to cooling and ware removal *drawing* could take between 6 and 10 days. During this time the *Firemen* would maintain an essential 24-hour watch and control of the process – sleeping, as they had to, on-the-job! A failed firing could have catastrophic economic consequences for a pottery factory. Firing within a coal fired bottle oven was a skill based upon observation, experience and knowledge of how the ovens functioned – no electronic aids here! Each oven, being unique, had its own quirks and foibles, the Firemen of each pottery would become extremely familiar with the individual response of the ovens and their temperature control.



Fig.2.26 The limited space between hovel and firing chamber *



Fig.2.27 Fire mouth of a typical bottle oven, Gladstone Pottery Museum *

Not only were ovens quirky and difficult to control but each batch of coal would have had differing qualities of burning and heat generation; so, as might be imagined, a good and experienced Fireman would become hugely valuable to each pottery factory. First/biscuit firing temperatures would be up to a maximum of 1250°C [porcelain firing temperature] dependent on the products being fired. A lower temperature was used in the firing of decorated ware within Muffle kilns where a temperature of around 800°C would be maintained. These temperatures would have been maintained over a period of up to 48 hours; followed by a period of cooling before drawing the ware.

Working inside the hovel during firing was a particularly hot operation and not at all pleasant as a working environment. The Fireman and his crew had to work for long hours in close proximity to the inner firing chamber in the space between it and the hovel, see Fig.2.26 to gain an idea of the limited space available for men to work!

The increases/decreases in temperature within the brick firing chamber could result in damage to its structure, this due to rapid initial temperature increase and then cooling. To protect the inner brick chamber metal straps or *Bonts* were fitted around the outside (and, sometimes, to the outside of the hovel itself) to hold it together during rapid temperature changes. The making and fitting of these tailor-made *Bonts* was a skilled operation in its own right. A well-built firing chamber had a working life of about 30 years before re-building became necessary but, elements within it would require regular maintenance and frequent repair.

Access to the inner firing chamber was by an opening in the chamber wall called a *wicket* - just large enough for a man pass through with a saggar balanced on his head! During the firing operations this opening would be sealed using bricks and wet sand known as *clammins*.



Fig.2.28 Saggar workshop wooden drum formers *



Fig.2.29 A team of Placers at work within a firing chamber. Note the clay gasket *wad* between the saggars. This technique is only used within a *glost* (glazing) oven



Fig.2.30 Inside an inner firing chamber with saggars stacked ready for firing. The inner chamber of updraught and downdraught kilns had domed floors over the underlying flues. External horizontal iron bands or *Bonts* reinforced the inner chamber to cope with high temperature variations during firing and cooling *

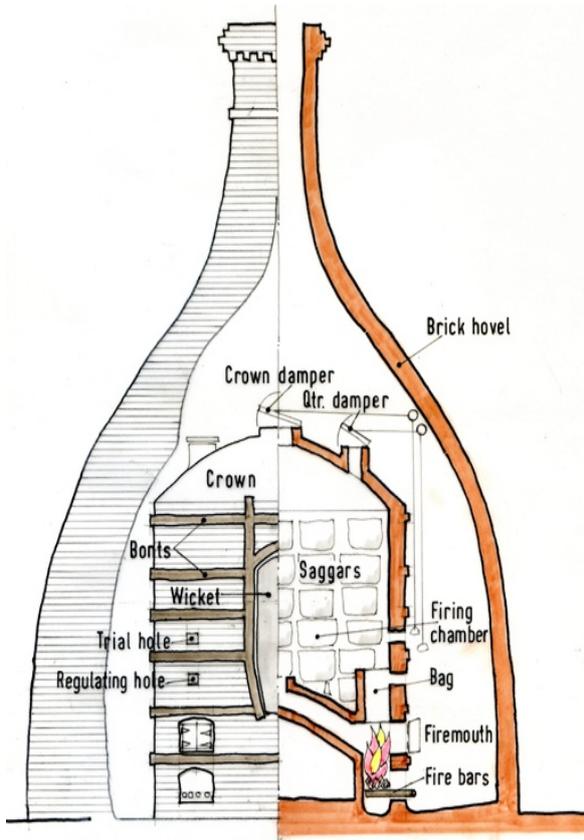


Fig.2.31 Diagrammatic section of a simplified coal fired updraught bottle oven showing the various main elements. Note the positioning of the *Bonts* *



Fig.2.32 Oven hovel external view displaying the relevance of using bricks for the construction to create the complex bottle shape, Gladstone Pottery Museum *

All ovens/kilns were purpose built to suit both pottery manufacturer and builder.

The terms *oven* and *kiln* have become confused over time. In The Potteries oven is adopted to describe those used in principal firings, i.e. *biscuit* and *glost* (glazing) firings. Kilns were structures fired at lower temperatures such as in muffle kilns and calcining kilns.

The main types and variants of bottle ovens and kilns used in the pottery production processes are as follows:

- *Updraught bottle ovens* (Fig.2.31) and *Downdraught bottle ovens* (Fig.2.21) are collectively known as *hovel ovens*
- *Cone or stack ovens* built within a factory building (Fig.2.34 and Fig.2.36) and *Skeleton ovens* (Fig.2.35) are collectively known as *close-coupled ovens*
- *Muffle kilns* used during the firing of decorated ware (Fig.2.22)
- *Calcining kilns* used to heat flint and animal bones prior to crushing for use in pottery production (Fig.2.23)



Fig.2.33 Updraught inner firing chamber showing reinforcing iron *bonts*, and the partly demolished hovel surrounding the inner structure at the Copeland factory (1960) © E.J.D.Warrillow.

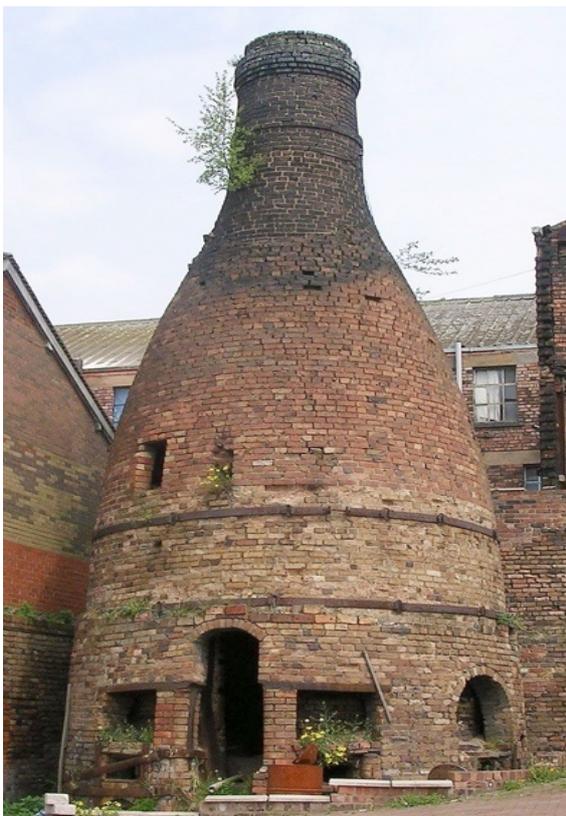


Fig.2.34 Updraught skeleton bottle oven with external reinforcing Bonts © Phil Rowley

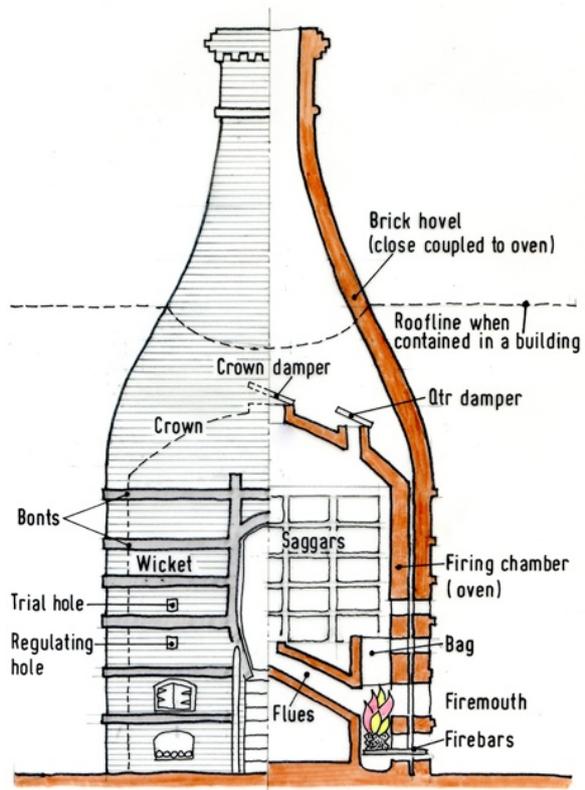


Fig.2.35 Diagrammatic section of a skeleton oven. The stack is built close-coupled round the inner firing chamber with no gap between *

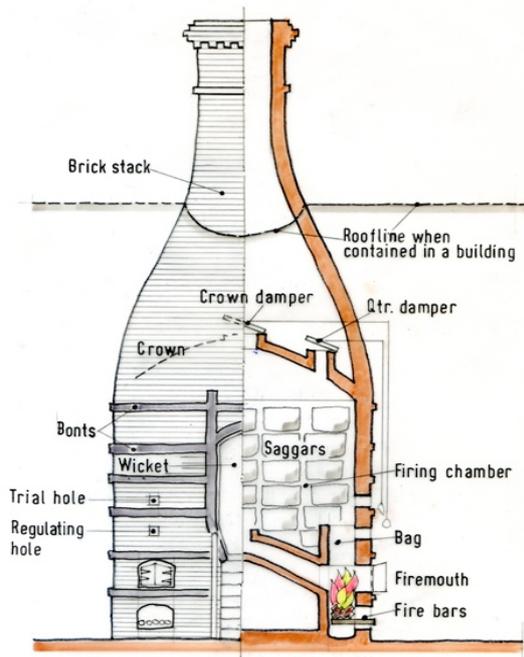


Fig.2.36 Diagrammatic section of a stack or cone oven where the intersecting building roofline can occur at different heights *



Fig.2.37 A skeleton oven at Moorcroft Factory, Burslem *



Fig.2.38 Bottle oven stacks penetrating and contained within the former Tams Factory, Commerce Street, Longton *

In the updraught stack or cone oven variant, the smoke stack, would have been built on top of the inner firing chamber; the stack being built directly off the *shoulders* above the *crown* of the inner chamber: The *fire mouths* as in Fig.2.34 can be seen on either side of

the *wicket* access. *Skeleton* and *stack* ovens would have been contained within factory buildings.

One of the many processes carried out in the manufacture of pottery was the crushing of imported flint and bone to add to clay to create more desirable *cream ware* pottery and, later, bone china. This development was stimulated by imported goods [China pottery] from the Far East; consumer demand for such cream/white ware originated during the late 18thC; porcelain or china ware was developed, initially, by Josiah Spode. Whereas earthenware pottery is produced basically using clay and a mix of other materials, porcelain ware is invariably (but not exclusively) produced using a slurry of mixed materials poured into moulds with its production falling into three main categories:

- Soft paste porcelain contains glassy materials (silica) within its composition, including *frit* and has a slightly *gritty* texture when handled.
- Hard paste porcelain uses composite clay with a mix proportion of 50% (Cornish) kaolin clay, 30%, crushed Cornish stone and 20% flint.
- Bone china has, as its name suggests, an element of bone in the following mix proportion: 50% animal bone, 25% china (Cornish) kaolin clay and 25% (Cornish) crushed stone. Bone china is fired to a temperature of 1250 degrees C to produce a partially vitrified material that is translucent and extremely hard wearing.

Raw flints and bone were calcined by being burnt in a kiln to reduce their strength thus producing a more crushable material. The crushing process was carried out by specialist millers in flint/bone mills that were initially powered by wind (Burslem had its own early windmill) and/or water such as at Cheddleton; later by steam engines as at Shirley's Bone and Flint Mill, Etruria: See Section 8.

Iron and steel production

In addition to coal mining, pottery, brick and tile manufacturing, iron and steel production became a major industry: this where the outcrops of ironstone and, limestone from Caldon Low, allowed the area to become an important production hub. The principal, and longest lasting, steelworks was at Shelton Bar, founded in 1834 by the 4th Earl Granville.



Fig.2.39 Shelton Bar steelworks at the height of its production: The Trent & Mersey canal is at top left meandering to the centre, then bottom right, of the image through the steelworks. The site has since been cleared



Fig.2.40 Shelton Bar steelworks adjacent to the Trent & Mersey Canal with a coal delivering narrow boat and Shelton named goods train wagons © Ted Stringer

The furnaces were closed in 1978 under the control of the then British Steel Corporation, however rolled production continued until 2000.

Brick and tile manufacture

Along with pottery production, coal mining and steel manufacturing; brick and tile production was developed in parallel. The bricks were essential raw materials for the construction of the pottery works and their bottle kilns, all of which were mutually dependent upon the supply of coal and lime: Thus overall, the integrated processes were symbiotic.



Fig.2.41 Aerial view of a brickworks showing 6 beehive kilns used in brick making, with a tunnel kiln and its *smoke stack* to the centre left of the image

The bricks of The Potteries area have very distinctive red/brown/blue/purple or yellow/brown colour. Although being hard, brittle and difficult to work, the importance of bricks in the history and development of The Potteries cannot be denied; this alongside the production of lime-based products used in brick-building mortars and in the iron and steel industry. The Potteries built environment fully utilised its brick production to sustain its development.

Specially tapered bricks were created for use in the building of hovels, helping to define the areas' iconic and distinctive features. Alongside this was the development of artisan bricklaying trade skills required to create the iconic bottle-shape. Being distinct from other areas, this created a unique appearance in the environment in support of the primary manufacturing processes. The main raw material used in the production of the clay, brick and tile products were excavated from the Etruria Marl and Old Marl geological seams.

The 1881 census records 32 brick and tile manufacturers whilst over the wider Stoke-on-Trent area up to 122 different brickworks were recorded in the period 1875 - 1876.

During the late 20th century there were four substantial makers of brick still operating:

- Henry Warrington and Son – Berry Hill
- Cannon Street Brick Co. – Hanley
- E. Hampton and Sons – Eastwood Brickworks
- Cobridge Brick and Sanitary Pipe Co. – Trent Vale



Fig.2.42 Typical stamped brick *frog* from the Longton Hall Brickworks



Fig.2.43 Typical appearance of local brickwork. Probably, Longton Hall bricks *



Fig.2.44 Eroded local soft red brickwork with cinder mortar using fly/flue ash from burning coal; and later cement-based pointing *



Fig.2.45 Semi-glazed brickwork resulting from higher firing temperatures are more resilient *

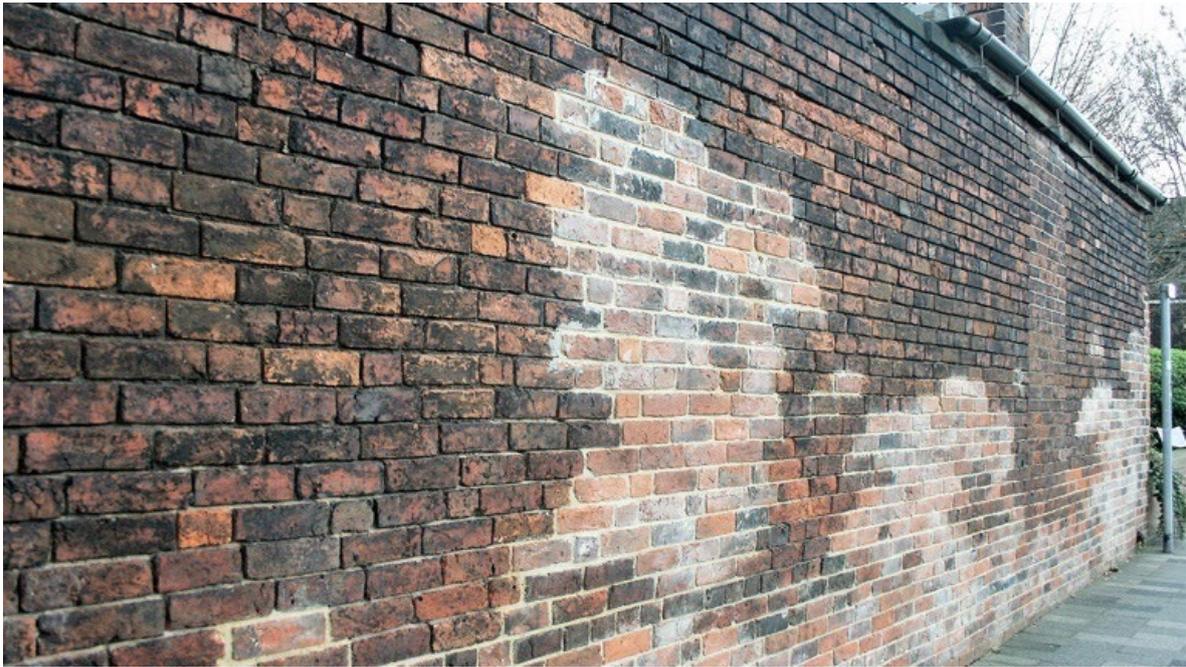


Fig.2.46 Brickwork repairs, Hanley surrounded by surface blackening occasioned by pollution *

Glazed, Encaustic and Geometric Tiles

A number of manufacturers produced glazed, encaustic and geometric tiles in The Potteries area. Building upon its medieval use, modern encaustic tile processes were developed in Stoke by Herbert Minton and Michael Daintry Hollins, with Tunstall becoming a centre for tile manufacture. Although ceramic the surface patterns of encaustic tiles are not a product of a glaze but are the result of different colours of clay *slip* used in the make-up of each tile. As a result of this in-depth process making up the body of the tile, the design remains even as the tile surface becomes worn.



Fig.2.47 Minton Tiles Catalogue

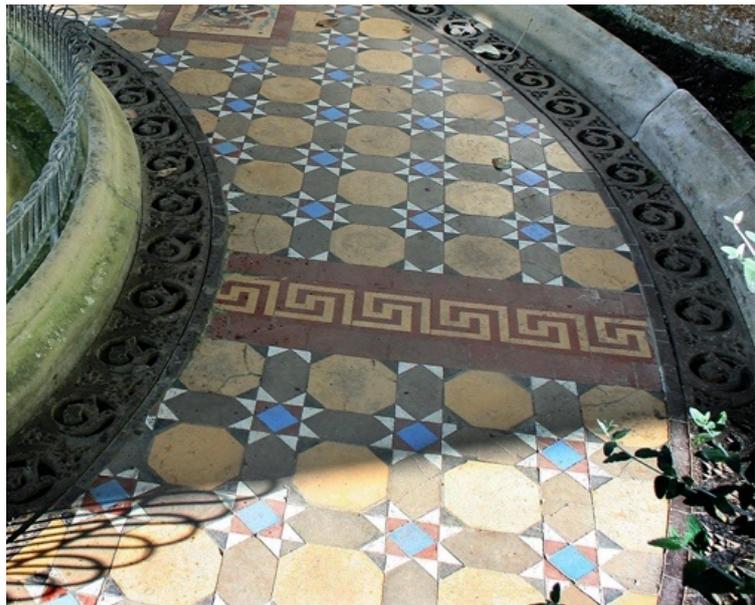


Fig.2.48 Minton geometric tiles, Lyme Park Orangery floor *



Fig.2.49 Display panel of encaustic tile designs *



Fig.2.50 Geometric tiles

Geometric tiles, however, are individual shapes placed to make up a geometric pattern on the completed floor. In the above images the Minton tiles are geometric tiles, although the Greek key pattern tiles (Fig.2.48) within the geometric tiles are encaustic.



Fig.2.51 Doulton glazed tile façade, former Edward Everard Printing Works, Bristol. Tile designer: William Neatby © Linda Bailey under the Geograph Project collection



Fig.2.52 Former Co-op building in Stoke-Upon-Trent white glazed tiled façade *

This significant element of The Potteries industries warrants a publication of its own, and a useful and more detailed introduction to it can be found on-line in the *English Heritage Teacher's Kit Pottery (ceramics) Industry* publication.

Sanitary Ware

The design, development, growing production and manufacture of ceramic sanitary ware ensured that The Potteries became a major influencer in improving the health of many through its output. As a leading pioneer in the application of sanitary principles through functional and hygienically designed appliances, Thomas Twyford was instrumental in developing the one-piece flushing WC.

By 1849 Twyford were exporting washbasins and closet pans to America, Russia, Australia, and many European countries from their factory in Hanley. In 1887 their Cliffe Vale factory was considered by the Government Inspectors of Factories as a model establishment in the whole of Staffordshire.

The continued production of sanitary ware from two Potteries manufacturers satisfied 50% of the market until 1979 but, following the significant impact of foreign imports, they currently only supply a fifth of the need.

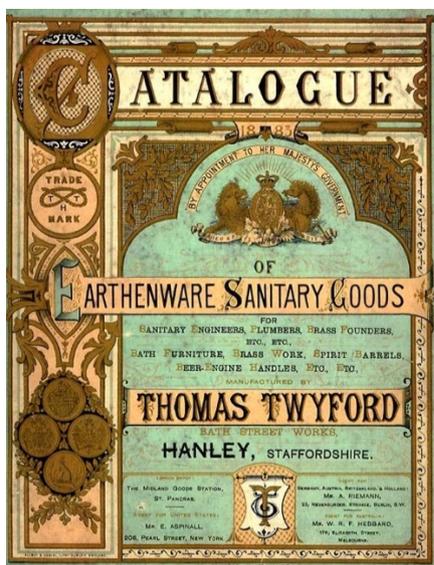


Fig.2.53 Twyford's Second Catalogue cover 1883



Fig.2.54 Twyford's Architects' Catalogue 1887 Special Water Closet Basins pp 6 -7
<https://twyfordshistory.blogspot.com/p/catalogues.html>

Salt Glazed Drainage Products

Whilst a range of salt glazed stoneware items were produced commercially from the late 17th century, it was emerging national legislative requirements for better sanitation that created a significant rise in demand for appropriate quality and hygienic drainage pipe work. Consequently, from the mid-19th century this sector of the industry flourished.

Salt-glaze pottery is created with a glaze of glossy, translucent and slightly orange-peel-like texture formed by throwing common salt into the kiln during the firing process higher temperature stage. Sodium from the salt reacts with silica in the clay to form a glassy coating. This may be colourless or coloured in various shades of brown, blue or purple.

3 The Character of The Potteries

Two distinctive built features help to define the appearance of The Potteries: bottle ovens/kilns and the formally fronted courtyard layout of its pottery factories.



Fig.3.0 Gladstone Pottery Museum, Longton. The formal frontage has the factory courtyard and hovel oven to the rear *



Fig.3.1 Typical proximity of factory and housing Lower John Street, Longton; demolished 1935 © E.J.D.Warrillow

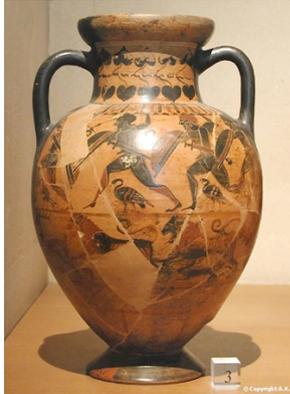
This courtyard form of factory development was established very early in the history of the Six Towns. By the late 18th C this form of potworks (colloquially: *potbank*) layout had become the norm. Its early advocate was Josiah Wedgwood who, between 1767 and 1773, built what could be described as the first planned industrial community in The Potteries. This was at the new settlement of Etruria in the mid-west of the area between the towns of Hanley and Newcastle-under-Lyme.



Fig.3.2 Wedgwood Etruria Factory and *Roundhouse* with typical formal frontage and set forward entrance. The Trent & Mersey canal is in the foreground with a moored narrow boat. Excepting the roundhouse the buildings were demolished in 1966 and the site subsequently developed as a local newspaper printing works in the 1980s. Recently vacated the site has since been redevelopment as offices.

The village included the construction of workers housing immediately alongside the *potbank*. This was primarily for the convenience of the manufacturers so that the workforce had a minimum travel distance to get to work. No public transport then!

Such tied rented housing arrangement had the advantage of ensuring that skilled workers stayed with the manufacturer.



This new village of Etruria was named after the northern Italian *Etruscan* region (populated by Greek colonists) where a form of ceramic art based on painting of pots to produce allegorical and other socially commemorative art was adopted.

Fig.3.3 Etruscan pottery designs influencing Wedgwood's Jasper ware

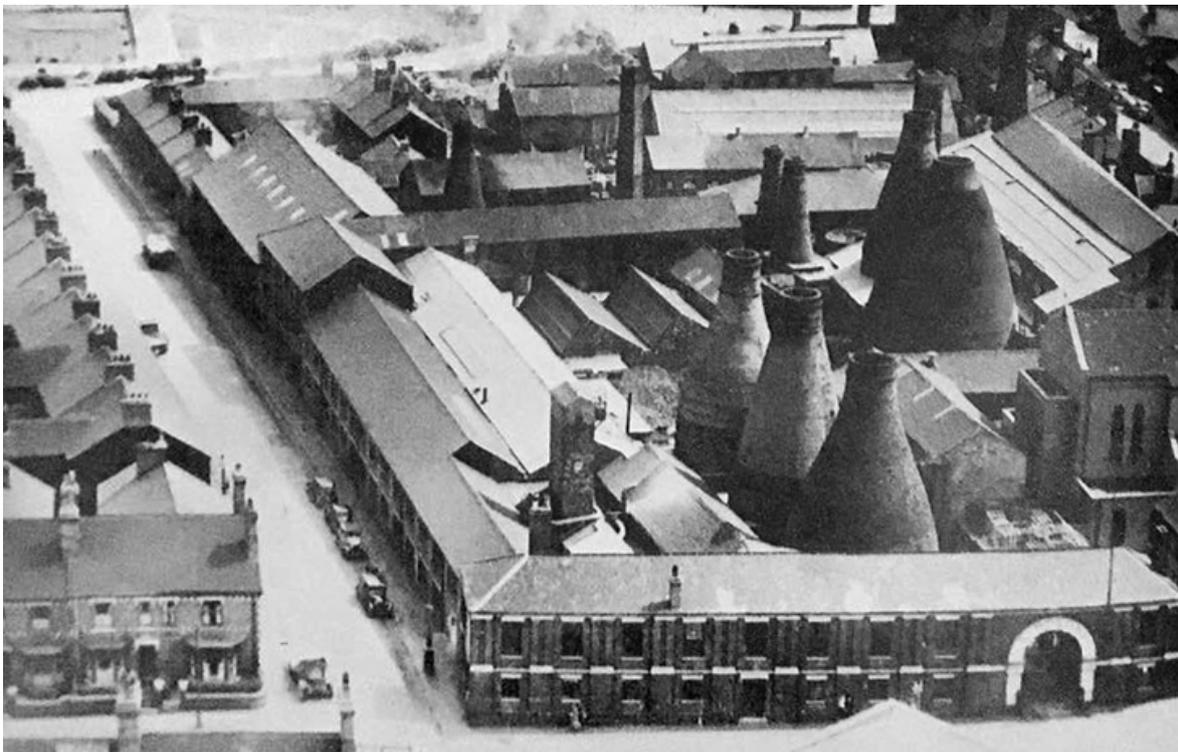


Fig.3.4 Aerial view of a typical courtyard pottery factory with formal street fronts and the close proximity of workers housing. This c1926 view is of the Simpson factory © Stoke-on-Trent City archive, Bert Bentley.

Behind the formal facade, the courtyard housed separated workshops and ovens/kilns the consequence being the creation of a tightly packed site with buildings that occupied every available space. To help prevent industrial espionage, the separated workshops were designed to maintain secrecy of the individual manufacturer's processes. This was achieved via an absence or avoidance of too much internal and inter communication across the various processes that were involved.



Fig.3.5 The remains of the original Wedgwood Etruria Factory Roundhouse *

The close physical relationship between the individual factories and their workers' housing is a particular feature of The Potteries.

Appreciating this symbiotic association offers a distinctive clue when trying to understand why the area developed in the way that it did. In a broader context, and mostly emanating from the Quaker Society of Friends movement, the adopted attitude sits at variance with the different approaches of the other altruistic social engineers of the late 18th and early 19th centuries: such as at:

- New Lanark [Owen family]
- Port Sunlight [Lever family]
- Bourneville [Cadbury family]

But their altruistic approaches were less prevalent in The Potteries where profit and economics were the primary drivers!



Fig.3.6 Typical external access stairs between workshops to allow for the manual movement of the wares between various workshops and processes. Wedgwood factory, Etruria © E.J.D.Warrillow 1952



Fig. 3.7 Close links were essential between factories and canals, such as here on the Caldon © Stoke-on-Trent City archive

Such processes, particularly methods of glazing, were closely guarded manufacturing secrets; hence the separation of the individual stages of pottery production into various independent workshops and areas. Most upper floor access within the courtyard and

between the operational workshops was via external staircases; this in order to reduce communications between the workers and, thereby, potential loss of secrecy - not too safe in winter! Separation of the processes was also to reduce contamination of the materials.

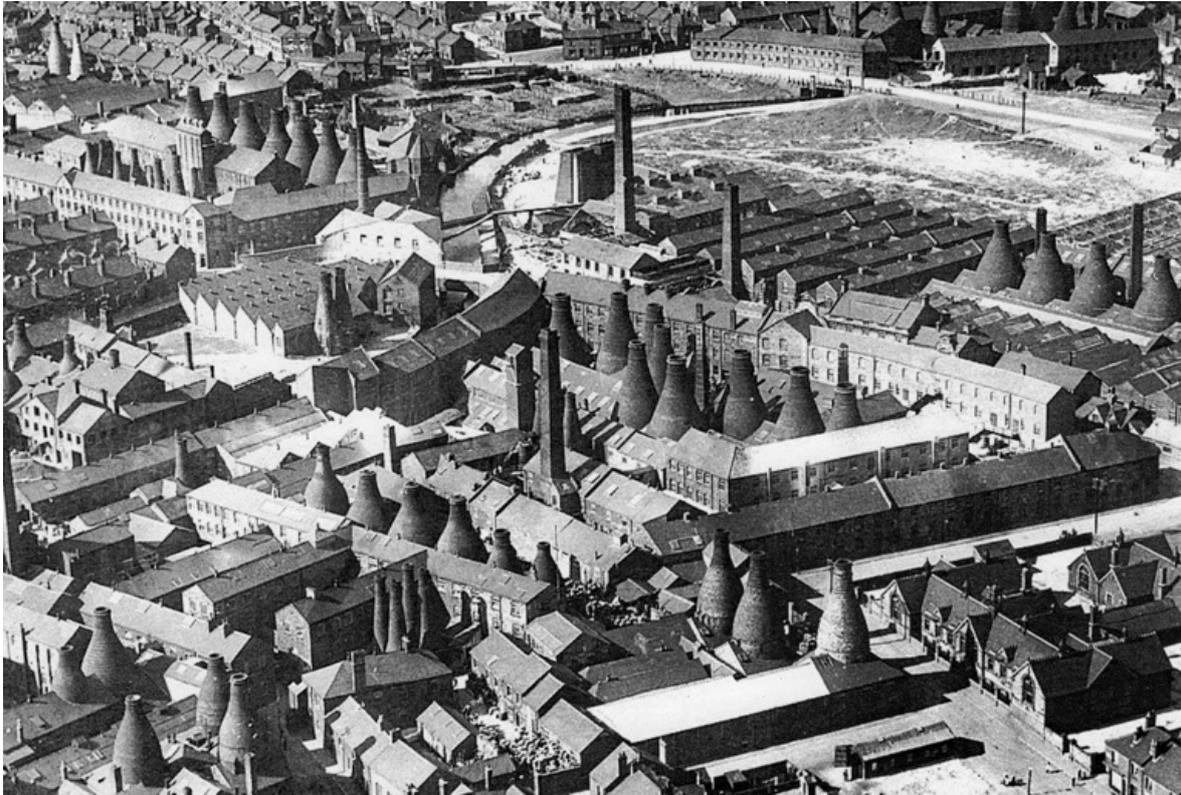


Fig.3.8 1934 aerial view of Hanley potbanks with the Caldon Canal curving top centre and exiting mid left of image through the pottery factories. The current Emma Bridgewater Pottery that is still in production is at top left

The photograph above clearly shows the many and varied shapes of bottle kilns/ovens and the density of development during the hey-day of The Potteries together with its close link to early methods of transportation – canals

4 Getting to know the Surroundings

The map of The Potteries (Fig.1.0) shows that the layout of the area has a broadly north-south linear alignment. This directly follows the geological seams of clay and coal that were essential materials in pottery and brick and tile manufacturing processes. As a result, the impact of mining and digging for these two raw materials has had a major impact on the landscape of the area.

Anecdote: the term 'pothole' – describing a hole in road surfaces in need of repair – originated from the early pottery practice of digging for clay for pot manufacture at the side of and, often, on the surface of road and track ways.

Mining of the local red/brown clay was essential to the production of *earthenware* pottery, bricks and tiles. Removal of the local clay or *marl* left major scars.

Earthenware: was pottery made from the raw ground sourced local red/brown clay as opposed to the later and slightly more refined cream ware [still based on the red/brown local clays along with calcined and crushed flint] and later still bone china produced using imported white clays [kaolin] and stone from Cornwall etc along with the use of calcined

and crushed animal bone to whiten and strengthen ware. Bone china, incorporating calcined and crushed animal bone, was much more delicate than its coarser earthenware cousin. It was fired at higher temperatures in the process becoming vitreous, more translucent and stronger than earthenware.



Fig.4.0 Daisy Bank brickworks *marl hole* Longton. This open cast mine supplied clay for its adjacent brick and tile works showing the central image track for transporting the clay directly into the works above the pit. To the left, pottery waste or *shraff* is being tipped as backfill. The site has since been completely backfilled and built over as a small industrial estate. Shraff tips were also locally known as *shard rucks*
Photo by William Blake c1900: © Stoke-on-Trent Potteries Museum & Art Galleries

Subsequent mining subsidence has led to the loss of many important buildings in Stoke-on-Trent, including churches, pottery factories and housing. The consequences of use of coal for firing ovens/kilns had a major impact on the appearance of the landscape, with its associated machinery, slag heaps and underground workings. Long term land stability caused by on-going subsidence continues to blight The Potteries. Even relatively modern buildings have been affected by the use of mining by-products such as excavated mining waste materials used as under-floor hardcore. Slag heap material [red ash – high sulphate

content] used for this purpose has been found to cause sulphate attack in ground bearing concrete floors.



Fig.4.1 Daisy Bank aerial photograph, with the brickworks to the right of the hole and some backfilling already taking place

Stoke-on-Trent and its Social Identities

By the end of the 19th C, the six regional centres of population had developed into a sprawling conurbation that collectively became known as *The Potteries*; also recognised as *The Six Towns* of Stoke-on-Trent. But local author Arnold Bennet from Hanley, only recognised five towns (Tunstall/*Turnhill*; Burslem/*Bursley*; Hanley/*Hanbridge*; Stoke/*Knype*, and Longton/*Longshaw*) in his various fictional books, omitting Fenton.

Whilst the individual settlements have always held a fiercely competitive and separate identity their common industries were those of pottery and coal production. Even after the Federation Act of 1910, to form the Borough of Stoke-on-Trent and the granting of Stoke-on-Trent with City status in 1925, the individual towns still retained their feeling of independence. Each had its own market and/or Town Hall; Tunstall has had two, Burslem and Hanley three, Stoke-Upon-Trent and Longton two, whilst Fenton had only one. Each also strived to establish its own library, educational institute, public baths and Victorian park.

It might be noted for clarity that the township of Stoke-Upon-Trent is an individual settlement and is not to be confused with the City of Stoke-on-Trent, which encompasses the other five towns as well as Stoke-Upon-Trent.



Fig.4.2 Hanley Town Hall. Hanley is the largest commercial/shopping centre in Stoke-on-Trent *



Fig.4.3 Longton Town Hall and market hall (Recently cleaned and going green) *



Fig.4.4 Burslem Old Town Hall (now a sixth form centre) with Wedgwood Big House in the background. Burslem is known as the Potteries *Mother Town* *



Fig.4.5 Tunstall Town Hall (Subject to current restoration: 2019). To the rear is a covered market *



Fig.4.6 Stoke-Upon-Trent Town Hall *



Fig.4.7 Fenton Town Hall (Pending enterprise and community use:2019) The War Memorial is Grade II listed *

Chapel Culture and The Potteries

During the mid 19th C the area became very much aligned with the Dissenter/Nonconformist/Congregational Protestant movement and the Methodists, Wesleyans and Ranters built numerous chapels. John Wesley was a regular orator in Hanley.

A great many chapels and non-conformist churches were built during the 19th C and The Potteries, along with its neighbour Wales, has many examples of the architecture of the Methodist and Congregationalist Movements.



Fig.4.8 St. John's Community Church, Burslem with original church tower *



Fig.4.9 Former St. John's Church 1870, Hanley, now an antiques centre *

One of the principal Dissenter churches, the listed Grade II* Bethesda Chapel, Bethesda Street in Hanley opened in 1887 and could accommodate up to 3,000 congregants. But with a diminishing congregation it fell into steady decline prior to closing in the 1980's.



Fig.4.10 Bethesda Chapel, Hanley. Italianate renaissance revival frontage *



Fig.4.11 Bethesda Chapel rear Apse of Flemish bond brickwork *



Fig.4.12 Bethesda Chapel interior after Phase I repair and restoration work

Being one of the largest Nonconformist chapels outside London, the building has been known as the Cathedral of the Potteries and as one of the largest and most ornate Methodist town chapels surviving in the UK. Following valiant local efforts to save the building it passed into the ownership of the Historic Chapels Trust in 2002 who have since sourced grant-aided financial support to undertake remedial work. Spanning three operational phases work on repairing and restoring the building and its interior got underway with the initial phase being completed in 2007, and the second stage in 2011.

Industrial Architectural Styles

The adoption of formal, classically influenced, architectural street facades was further developed later during the late 18th and until the late 19th centuries. Most, if not all, included a slightly set forward entrance with an entry arch. Designs above the arch often incorporated a Venetian window and/or Diocletian or Tripartite window set below a triangular pediment upper part: All of these later buildings tended to follow the Wedgwood model first built at Etruria.



Fig.4.13 Formal frontage at Hudson and Middleton Pottery, Longton. This factory was the site of the last bottle oven firing in 1978 *



Fig.4.14 Long formal front of the Emma Bridgewater Factory, Lichfield Street, Hanley * See also Fig.3.8 for an aerial view from 1934



Fig.4.15 Sydney Pottery, Longton with advanced entrance frontage *



Fig. 4.16 Formal fronted factory building of Middleport Pottery and Heritage Centre * (Burgess and Leigh, Burleigh Ware factory)



Fig.4.17 Former Enoch Wood Factory, Burslem (1789) * Even corner sites were adopted to create a formal frontage and entrance statement, restored to original appearance in the mid 1990's – Grade 2 listed



Fig.4.18 Pottery factories street frontage in Normacot, Longton *

So, from these remaining examples of factory designs, which adopted classically influenced street frontages, it can be shown that this architectural style was very much the norm when factories were designed and built during the 18th and 19th centuries.

Functionally, the factories also tended to be built to a two/three storey format with clean, finishing and decorating operations being carried out in the upper storeys and messy raw-clay operations being performed on the ground floor.



Fig.4.19 Typical street frontage of a potbank, Normacot, Longton *

The Result of Industrialisation

From the 19th C the use of coal as the fuel to *fire* ceramic ware led to The Potteries becoming heavily polluted. After the Clean Air Acts of 1956, gas or electricity was used in the new tunnel kilns replacing the familiar and iconic brick-built bottle ovens [and kilns]. But the pollution and smoke emitted by the factories and ovens had resulted in discolouration of the buildings.



Fig.4.20 Burslem Town Hall in the 1950s



Fig.4.21 Burslem Town Hall, clean in its early state

5 Remaining Issues at the Heart of the Area

The use of brick has dominated the local architecture of The Potteries. It was invariably used in construction of the factories, bottle ovens/kilns, housing and other structures, although decorative tiling and local stonework (Hollington Stone) was also used. All of the buildings were particularly affected by sulphurous smoke pollution and this caused extensive discolouration (blackening) and erosion of the buildings. As a result, the Six Towns became black by the end of the 19th and into the early 20th C.



Fig.5.0 Air quality in Barlow Street, Longton 1946 © William Blake

The combination of pollution and blackening of the buildings of Stoke-on-Trent is an ongoing issue especially with local people interested in maintaining and protecting these buildings as examples of their history. Many stone buildings have not been cleaned but others that have has resulted in them rapidly turning green from new biological growth on their surface. Is the blackening a reminder of the industrial past or, is it better to improve the appearance of such building simply because they look better?

The potential hazards of cleaning need to be fully understood prior to intervention as, in some cases, the blackened carapace might be offering some protection and its removal along with the top surface of the stone, may create an erosion situation potentially worse than had the cleaning not taken place. Detailed investigation is a requirement to determine the exact nature of the discolouration and how cleaning might expose the surface to a different form of discolouration and potential future damage.

Subsidence was, and remains, a major problem. The mining industry ended during the 1970's-80's after which underground shafts and workings were no longer maintained leading to subsidence across the area as props and supports rotted or decayed: Space

satellite-based land surveys between 1993-1995 suggests that a large proportion of the ground that The Potteries sits on has settled by some 80mm overall.

Recent construction of the A50 and A500 major roads has cut a massive swathe through The Potteries, resulting in the loss of many buildings and isolating some communities, separating the south western third of the City from the remainder. See map Fig.1.0

Photographic Archives

Some of the best visual records of history and development of an area can be seen via the many image archives that have been collected and stored. Such visual examples of a pre-existing state can provide invaluable clues as to how change has affected a place, building, street, area and region.



Fig.5.1 1950s Shelton Bar Steelworks landscape from Basford Bank as revealed in the Bert Bentley photographic studies © Hanley Museum archives



Figs.5.2 Use of 1950s photographic archive to compare early and current state street scenes, revealing differences in the curved frontage window, signage and adjacent structures



Fig.5.3 Street scene and social record, Piccadilly, Hanley 1947

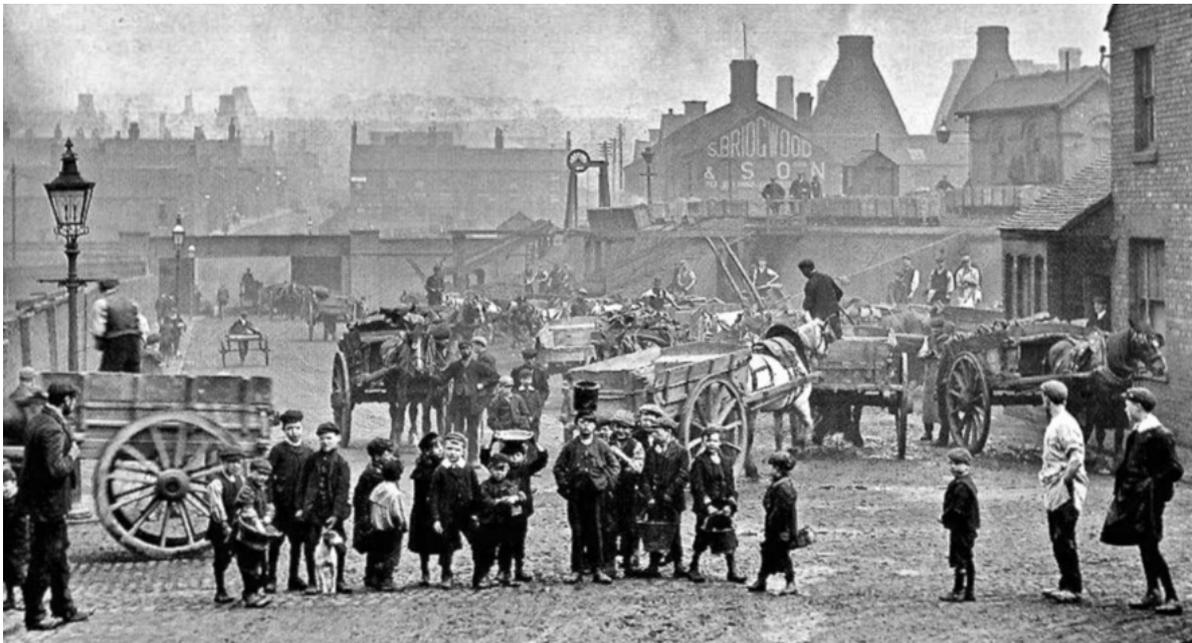


Fig.5.4 An archive photograph of Wharf Street, Longton. Illustrating the local architecture and social history. The children are picking up pieces of coal dropped from the carters' wagons. Photo by William Blake c.1905 © Staffordshire Past Track

Many of these archives are readily accessible for research. Those held at the City of Stoke-on-Trent Museum, Keele University Library and local press office as well as local records offices can be useful sources for researchers.

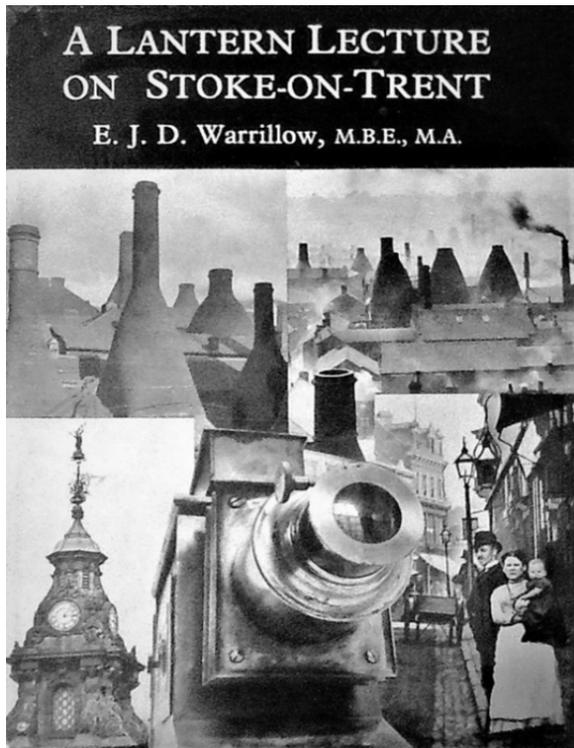


Fig.5.5 A Lantern Lecture book cover, E.J.D Warrillow publication*

As an example of such an approach to record the local history of the time, Ernest Warrillow, MBE was a photographer employed by the local newspaper *The Sentinel* and, as a result of his many working years, recorded a mass of photographs of the area, its architecture, people and manufacturing processes, including local social events.

Such a record provides a wealth of pictorial information that is valuable for future reference. His archive was published in several books including *A Lantern Lecture on Stoke-on-Trent*, *A Sociological History of Stoke-on-Trent* and *A History of Etruria*.

Warrillow's entire collection of photographs and associated documents is housed and can be accessed at the City of Stoke-on-Trent Museum and Art Gallery.

Another photographic archive is that compiled by William Blake during the late 19th and early 20th centuries. Ditto Bert Bentley for the City of Stoke-on-Trent archive and RCHME. The official Stoke-on-Trent City archive is held at The Potteries Museum and Art Gallery. Amongst those with the greatest depth of material are:

- Bert Bentley Collection – held at the City Museum
- Ernest Warrillow Collection – held at The City of Stoke-on-Trent Library
- William Blake Collection
- Ted Stringer, local press photographer
- Images of historic Staffordshire – held by Staffordshire Past Tracks

6 The Legacy and what might be done

The way in which the pottery industry and the areas associated industries developed was particularly haphazard and piecemeal during the 19th and 20th centuries. At that time the primary aim was to produce goods as quickly and economically as possible; this was done with little or no regard to the protection of heritage.

The early approach to building factories was to adopt a classically influenced design of street frontages; although this was the norm during the late 18th and early 19th centuries the style was abandoned during the early part of the 20th C when a more disjointed approach was adopted, expanding and developing into what limited space might be available within the established boundaries.



Fig.6.0 Typical courtyard clutter of buildings as factories developed and expanded with at least four different types of ovens/kilns and a more formal external street frontage

Whilst it is this legacy of the emerging haphazard form of development that made it difficult to deal with in operational terms many factories also fell into decline as a result of changing demands for the manufactured goods, stricter legislative requirements and a flood of foreign imports.

But, not all redundant factory buildings have been cleared away! Some have gained useful re-use as centres for the advancement of knowledge and understanding of the pottery processes and/or converted to useful community facilities such as: Gladstone Pottery Museum and Middleport Pottery and Heritage Centre or the Dudson Community Centre, Hanley.

Old buildings are rarely totally beyond redemption! Appropriate re-use can return an otherwise redundant structure back into effective and economic use; at the same time retaining a semblance of how an area and its industry were constructed and functioned. Within this re-use principle there should always be the accepted tenets of conservation philosophy: this to protect and explain the history of a heritage building and its contained information about the past.

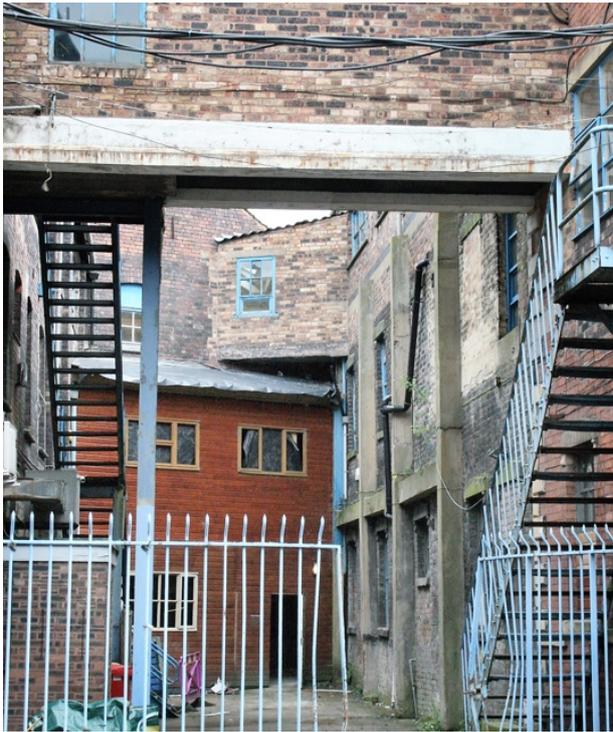


Fig.6.1 Typical haphazard additions and development in original factory courtyard, Longton *



Fig.6.2 Anderton Building, Middleport, used to load/un-load pottery ware and raw materials from narrow boats, poses challenges for reuse *

7 What can help make the best decisions?

Clarity of understanding of how and why an area developed is an essential skill for anyone interested in pursuit of understanding about local heritage.

A clear understanding of how The Potteries was formed and developed as a focused centre for ceramics is therefore fundamental to being able to appreciate its architecture and social and cultural development. Failure to grasp this can result in making inappropriate responses to conservation and heritage issues. An overall grasp and understanding of how and why an area or region has developed is an essential skill if conservation work is to be properly addressed, informed and implemented.

This can only be achieved via research, prior to intervention together with a comprehensive understanding of the factors that have influenced an area's history and development alongside patterns of social and architectural and environmental change. This coupled with a clear understanding of the principles and ethics centred on conservation work.

Seeking information and know where to go to get the best advice

Within any local area or region, inevitably, there will be facilities set up specifically to record and provide information about an area or region. These might include museums, information centres, demonstration facilities and archives specific to manufacturing processes alongside local history information centres including local press archives and public records offices. Such sources become invaluable when researching to gain a comprehensive understanding of how an area has developed. Working museum and archive centres, such as Cheddleton Flint Mill and Shirley's Bone and Flint Mill (Etruria Industrial Museum) are useful sources relating to processes and materials used as well as

the history of why these facilities developed where they did. Shirley's Bone and Flint Mill was sited at the junction of the Caldon and Trent & Mersey canals and at Cheddleton the original corn mills were sited on the fast-flowing River Churnet.

An essential skill of those seeking relevant information is to be able to source appropriate advice and research material about how and why an area has developed and how to interact with it to avoid damage to a whole package of contained information.

This fundamental research philosophy will underpin all decisions made in order to appropriately intervene without damage to historical record, fabric and embedded patterns reflecting (in this case) industrial development and social change. Local archives and records along with local and focused interest groups and museums/archives can provide a wealth of information and understanding that informs potential change. This to ensure that proposed change does not damage record and heritage.

As an example: The knowledge of the bricklaying skills used during the construction of bottle ovens and kilns has long since died out with the demise of the work force who originally constructed them. This is why it is essential that they be repaired and maintained as they cannot easily be re-constructed. Much of the work involved in their creation would have been achieved using experience gained, good hand eye co-ordination and handed down skills – no architect or drawings would have been involved. However, information/museum centres such as at the Gladstone Pottery Museum in Longton hold archival information about the pottery industry its buildings and architecture. Such resource centres will provide valuable information that will help to inform what work might be required.

8 Achieving an Understanding

Local archives provide sources of knowledge and explanation to help local groups understand their area. In so doing, this approach also encourages local interest simply because it is centred on their immediate surroundings and identity. In The Potteries area there are several social media groups whose focus and remit is the perpetuation of local heritage and culture. These local groups and societies are also an invaluable source of interest and information and can become useful pressure groups to stimulate interest in the long-term protection and survival of their heritage and history [e.g.1986 Longton Town Hall Protest March].

In The Potteries two accessible and excellent websites are maintained under the headings of the Local history of Stoke-on-Trent, England and The Potteries Heritage Society. Also of interest is the emergence of inspired local closed Facebook groups such as:

- Stoke-on-Trent Past and Present
- Burslem, Tunstall & surrounding areas Photos & Stories
- Staffordshire Past Tracks

Open-air Museums and Information Centres

Many local open-air museums and pottery process archives are located in several sites across The Potteries. The following are good examples of public information boards placed on-site for easy access. Similar methods are adopted at other open-air museums such as those at Moorcroft Pottery at Burslem and Middleport Pottery and Heritage Centre.

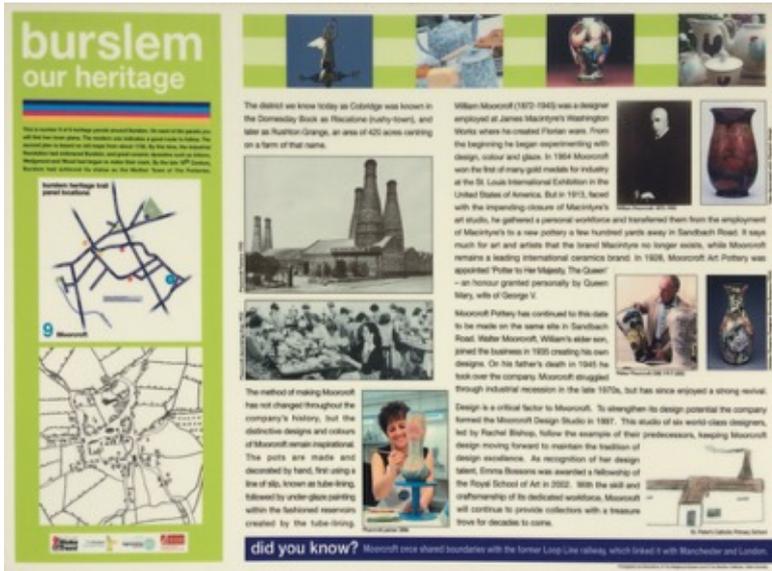


Fig.8.0 A site information board at Moorcroft Pottery *



Fig.8.1 CoRE on-site information board *



Fig.8.2 A visitor information display model at the Middleport Pottery and Heritage Centre *

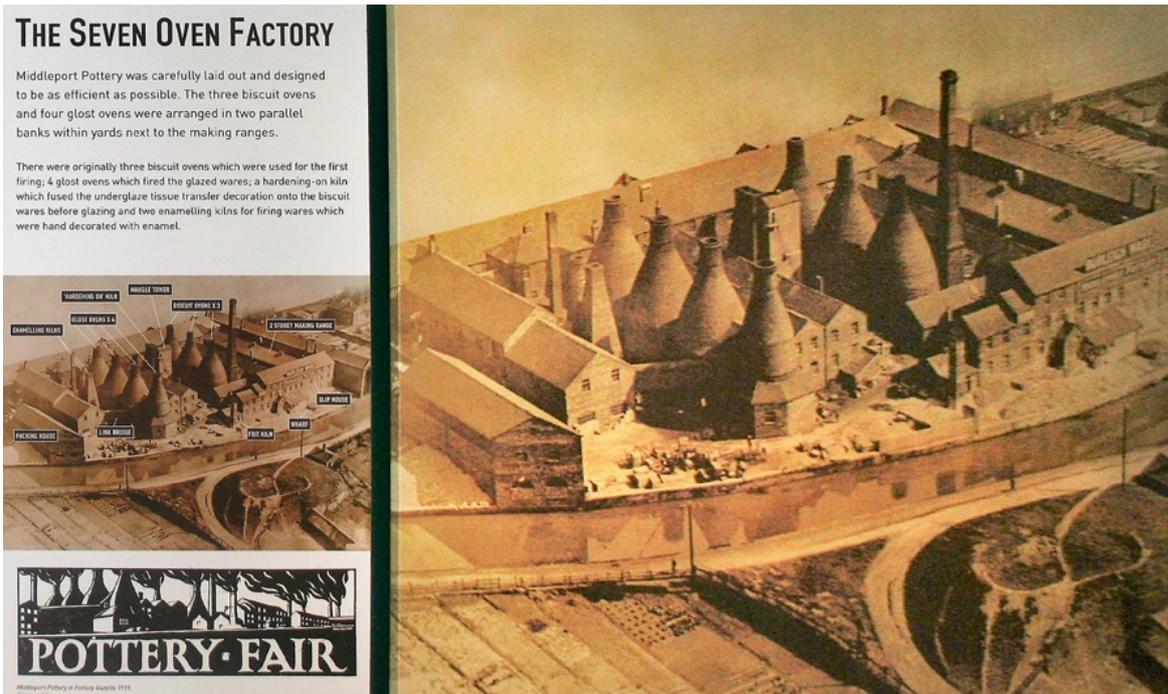


Fig.8.3 A display information board at Middleport Pottery and Heritage Centre *

With regard to developing a greater understanding of The Potteries and its surrounding area, local archival searches are essential in order to understand and perpetuate the memories of this former industry that is still in danger of being lost through present-day fast-paced change. Locations that can assist in the study process exist at the:

- City of Stoke-on-Trent Historic Environment Records (Planning Department Regional Archives)
- Gladstone Pottery Museum
- Middleport Pottery and Heritage Centre
- Shirley's Bone and Flint Mill (Etruria Industrial Museum)
- Cheddleton Flint Mill Museum
- Chatterley Whitfield Colliery

And, additional regional archives are also held at the:

- City of Stoke-on-Trent Museum
- Keele University Library
- City of Stoke-on-Trent Museum and Art Gallery

All offer relevant information, photographic records and explanatory materials to help achieve a greater awareness of the Victorian and later working and living conditions of The Potteries to present a fuller appreciation of what was previously common-place.

Stoke-on-Trent's www.thepotteries.org website is particularly valuable in providing comprehensive A-Z searchable lists offering access to a wide variety of map, buildings, and landscape resources in addition to salient information on relevant influential people of the era and the manufactured pottery wares. See also The Potteries Heritage Society. With over 200 listed building entries in the City of Stoke-on-Trent that are of special architectural or historic interest, a review of the list entries held on the official National Heritage List for England can also be rewarding.

Gladstone Pottery Museum, Longton

The Gladstone Pottery Museum is an invaluable resource centre focussing on the processes of pottery manufacture. It was saved from demolition by a group of enthusiastic pottery owners in 1971, restored and converted to an open-air museum providing information on pottery history and production methods to the general public and schools. It is operated by the City of Stoke-on-Trent Museum service.



Fig.8.4 Gladstone Pottery Museum with hovel ovens and courtyard buildings *



Fig.8.5 The Gladstone Pottery Museum range of buildings. Saved from demolition in 1971 it has been restored and is now operating as a pottery processes museum and information centre in Longton *

Cheddleton Flint Mill

The Cheddleton site has a history of corn milling from its earliest 13th C origins until the late 17th C. In the 18th C the site and its buildings were extended and converted into a complex for the processing of flint. The adjacent Caldon Canal supplied both basic raw flint and provided a transport link for delivery of material produced and used in the manufacture of earthenware and creamware pottery.



Fig.8.6 The original water-powered corn mill at Cheddleton on the River Churnet *



Fig.8.7 Cheddleton 4-storey flint processing mill and Overseer's Cottage *

To maintain this form of mill, specialist advice will be required regarding the purpose made grinding gears, associated machinery, and timber paddled external water wheels and early gear wheel construction, usually adopting Oak, Lignum Vitae and Greenheart. The craft of Millwright being the principle craft needed to construct and maintain such machinery. Greenheart timber was especially prized for its water and biological attack resistance as well as extremely hard-wearing qualities – this especially when used for gear wheel cogs. Such timbers were often set into cast iron gear wheels – as the cogs wore down they could be easily replaced with new ones.



Fig.8.8 Cheddleton cast iron internal bevelled drive gear *



Fig.8.9 The Caldron Canal adjacent to the Flint Mill at Cheddleton *

Shirley's Bone and Flint Mill, Etruria Industrial Museum

The Shirley's Bone and Flint Mill sits at the junction of the Caldon and Trent & Mersey canals. The site is a Scheduled Ancient Monument and an Industrial Museum, which displays excellent information on the processes previously carried out there. Formerly known as Shirley's Mill, Etruria, this was near Wedgwood's factory situated on the Trent & Mersey canal a half-mile further north.



Fig.8.10 Caldon Canal (on the left) brought materials from its upper reaches to Etruria for processing. The Trent & Mersey was used for distribution to the various factories. The summit lock connecting the two canals were particularly deep, with a total drop of some 20 feet (6m) *



Fig.8.11 The lower Trent & Mersey canal level at Etruria (Shirley's Mill) with a square-plan calcining kiln at the end of the main building. The beam engine is behind the large round-headed window and tub grinders are on the windowed upper floor *



Fig.8.12 Shirley's Mill square-plan calcining kiln, upper level tub grinders floor, ground floor drive shafts and steam powered beam engine housing with exhaust chimney *



Fig.8.13 Shirley's Mill calcining kiln filled with flints (chert) and coal ready for firing *



Fig.8.14 Shirley's Mill calcining kiln well in unfilled state *



Fig.8.15 Shirley's Mill tub grinders on floor above the bevel gears *



Fig.8.16 Shirley's Mill beam engine *



Fig.8.17 Shirley's Mill drive shaft bevel gears powered by the beam engine *

Middleport Pottery and Heritage Centre

The buildings at Middleport are both an operational factory and heritage centre open to visitors as a working pottery. The factory is sited on the Trent & Mersey Canal and offers an insight into the history of Burleigh Pottery and its production.

The Burgess and Leigh Pottery was formed under a partnership between William Burleigh and Frederick Rathbone Leigh in 1862 and moved to its current site in 1889.



Fig.8.18 Middleport Pottery and Heritage Centre from the Trent & Mersey Canal *



Fig.8.19 Middleport Pottery and Heritage Centre: One of the inner alley ways between workshops with cobbled yard surfacing (Burgess and Leigh, Burleigh Ware factory) *

The factory, alongside many in the area, fell into decline during the 1990s. It was granted financial assistance by The Princes Generation Trust to help keep production going. A condition of this help was that the factory should be made accessible to the general public as a pottery process heritage centre. During its hey-day it was known as The Seven Oven Factory because it operated seven hovel ovens - now only one exists as a reminder of its former coal-fired ovens. It remains a fully operational factory producing Burleigh pottery.

Dudson Centre – Community Resource Centre and Museum

The restored bottle oven hovel and factory at the Dudson Centre in Hanley was re-opened as a community resource centre, museum and cafe in 1999. In 2017 the oven hovel underwent a £48,000 facelift to repair long-term weathering damage.

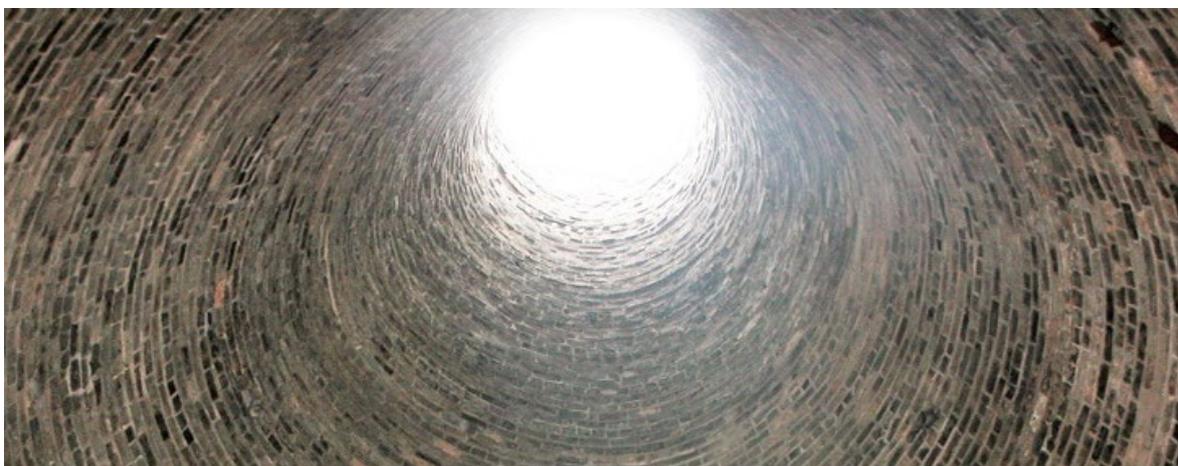


Fig.8.20 Dudson Centre restored bottle hovel interior *



Fig.8.21 Dudson Centre restored courtyard bottle hovel. A plaque records 1872 as the construction date *

Abseiling techniques were necessary in order to reach some elements of the structure and fabric as a result of the bottle hovel shape that made access to the upper parts difficult with conventional scaffolding. A cherry picker machine was also used.



Fig.8.22 Dudson Centre, Hanley *



Fig.8.23 Dudson Centre, courtyard and bottle hovel (housing gift shop and museum) with a modern external access stair reflecting previous working methods *

9 Working together

In 2018 Historic England granted a Heritage Action Zone (HAZ) initiative covering Longton High Street and the remaining 50 bottle ovens/kilns within the City of Stoke-on-Trent as a whole. The HAZ is, currently, (2019) being pursued by the City of Stoke-on-Trent Council whose remit is to respond to the initiative.



Fig.8.24 Grade 2 Listed bottle ovens and adjacent factory buildings, Longport needing care and attention *

No one can be an expert in all things, and it is essential that commissioned conservation specialists are able to recognise when their knowledge may be limited and the need to source additional specialist advice when that need arises. In the process there is also a need for such specialists to be able to clearly inform those involved in any project of the scale and extent of work required to achieve the desired results.

With on-going problems created by mining subsidence across The Potteries area specialist advice from pottery production historians and experts together with mining and structural engineers may also be required when working on projects in the area.

In the process there is a basic need to understand how a building was originally conceived, designed and built, and that the use of the materials creating it may require special attention, particularly where industrial pollution may have badly damaged it.

For example, on the Stoke-Upon-Trent Library the decorative frieze panels depicting local scenes subsequently faded due to pollution that has creating a particular issue should restoration work ever be considered.

Like many important buildings in The Potteries, this structure was previously considered for demolition, so it is a positive move that its value has been recognised despite the issues that still need to be addressed to keep it in good condition.



Fig.9.0 Stoke-Upon-Trent former Library and former Art School (right) by architect Charles Lynam, later a Mayor of Stoke *



Fig. 9.1 Stoke-Upon-Trent former Library decorative brickwork and tiles depicted local scenes, although the tiling is now extremely faded *

How best to keep a record of the past?

Within a small part of Normacot, some restoration/redevelopment has occurred using a derelict area of the former (Grade II listed) Enson pottery and the adjacent associated public house/hotel. Here the restoration work included 4 hovel ovens.

The original factory dates from about 1843. Factory workers might [consider here The Potteries Methodism movement and abstinence] gather at the pub at the end of their working day to flush out the dust of the factory!

Many potbanks had their associated pub, so it was, therefore, entirely appropriate that the restoration of the local pub ran hand in glove with the refurbishment of the factory into its contemporary use as a conference centre and delegates' hotel.

The scheme, originally, involved creation of a new training facility under its title of Centre of Refurbishment Excellence (CoRE): Its remit was to improve the training and knowledge of building trades personnel during restoration/repair/retrofit works to local heritage and other assets.

Unfortunately the training element of the scheme closed in 2013/14 due to lack of demand, but it remains a venue for courses and conferences. The centre, originally, was linked to the City of Stoke-on-Trent Technical College as an outreach training centre.

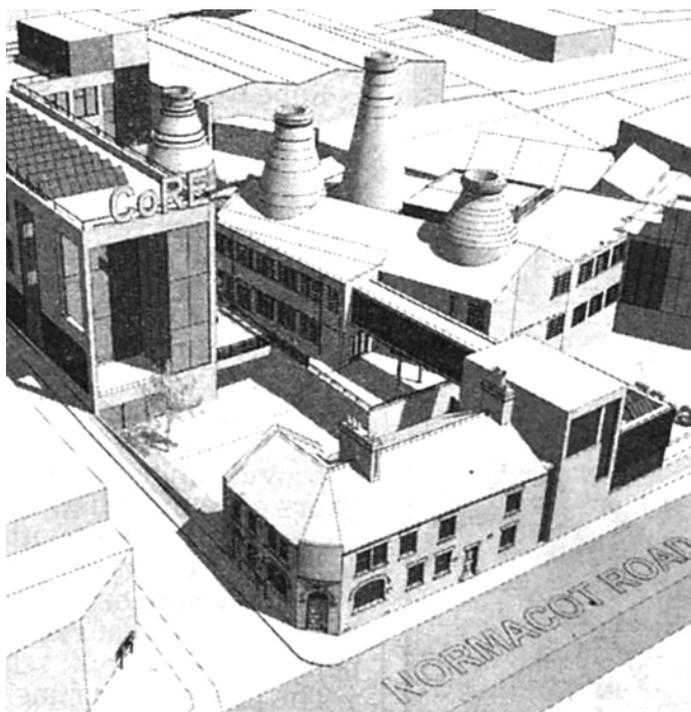


Fig.9.2 Project drawing of CoRE training facility, Longton, incorporating the site of the former Enson factory © CoRE

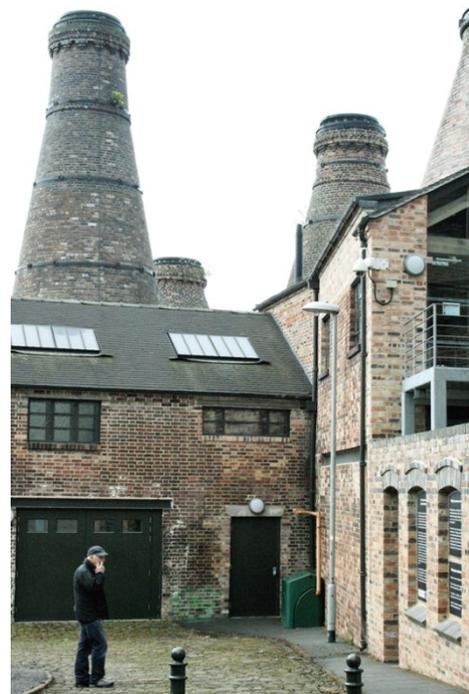


Fig.9.3 Former Enson pottery hovel ovens, now the CoRE Centre, Normacot *



Fig.9.4 A CoRE scheme before repair and restoration work, Normacot © Anthony Williams



Fig.9.5 A CoRE scheme after repair and restoration work, Normacot. Originally, the pub was called The American, not The America Hotel *



Fig.9.6 Pottery and pub in close proximity, Longton *

Once work has been completed it is the responsibility of those in charge of them to be able to accurately record what was done; then to place that record in a safe and accessible place to help ensure that in the future, people can be made aware of what was done and how it was achieved. It is vital that the knowledge of where these records are stored is kept alive and current.

Recording the outcomes of renovation/restoration projects is an essential element within the overall concept of conservation work. Public access to such records is part of necessary operations to ensure that the work that has been undertaken is properly recorded and stored within accessible archives. The public need to be alerted to and educated about the work done, what it involved and why it was necessary to implement. They should also be able, easily, to access these records in public archives and information centres.

Selective Websites Related to the Study (Accessed: 8 September 2018)

Council on Training in Architectural Conservation	www.cotac.global
National Library of Scotland	https://maps.nls.uk/geo/explore/side-by-side/#zoom=12.409999999999988&lat=53.0235&lon=-2.1622&layers=1&right=osm
Canal and River Trust	https://canalrivertrust.org.uk/
The Potteries Loop Line	www.thepotteries.org/loop_line/index.htm
The Churnet Valley	www.churnet.co.uk
The Bottleoven blog	http://bottleoven.blogspot.co.uk/p/construction.html
Potteries buildings	http://www.thepotteries.org/buildings/th.htm
Historic Chapels Trust	http://www.bethesda-stoke.info/index.php/restoration/progress/
Potteries Churches and Chapels	http://www.thepotteries.org/church/index.htm
Keele University Library Warrillow Collection	www.keele.ac.uk/library/specarc/collections/warrillowcollection
local history of Stoke-on-Trent	www.thepotteries.org
Potteries Heritage Society	www.potteries.org.uk
Moorcroft heritage visitor centre	www.moorcroft.com/
Gladstone Pottery Museum	www.stokemuseums.org.uk/gpm/
Middleport Pottery and Heritage Centre	www.middleportpottery.org/
Etruria Flint Mill and Industrial Museum	www.etruriamuseum.org.uk/
Cheddleton Flint Mill Museum	www.cheddletonflintmill.com/
Shirley's Flint Mill, Etruria	www.thepotteries.org/buildings/shirly_flint_mill.htm
Dudson Centre	https://dudsoncentre.org.uk/
Chatterley Whitfield Colliery	http://www.chatterleywhitfieldfriends.org.uk/

Mill Meece Pumping Station, Stone	http://millmeecepumpingstation.co.uk
Centre of Refurbishment Excellence (CoRE):	http://www.conferencestaffordshire.co.uk/venues/unusual-venues/core-centre-of-refurbishment-excellence/
English Heritage Teachers Kit (Ceramics)	www.heritage-explorer.co.uk/file/he/content/upload/11796.pdf
Historic England National Heritage List	https://historicengland.org.uk/listing/the-list/
Creative Commons	https://creativecommons.org/licenses/by-nc-sa/4.0/
City of Stoke-on-Trent Technical Services: (Archaeology/HER) Historic Environment Record information	https://www.stoke.gov.uk/info/20005/planning_and_building/225/request_information_from_the_historic_environment_record

Further Reading

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List of Hovel Ovens and Kilns in The Potteries
Extracted from the National Heritage List for England (March 2019)

Hovel Ovens and Kilns Asset	NHL Entry Reference	No. of Ovens	No. of Kilns
Falcon Pottery occ. J.H.Weatherby & Sons, Old Town Road, Hanley.	1297938	1	1
Johnson Brothers Pottery, Hanley.	1291067		2
Former Smithfield Pottery and Bottle Oven, Warner Street, Hanley.	1210835	1	
Pottery Works (Formerly Dudson Brothers Ltd), Hanover Street, Hanley.	1195798	1	
Pot Bank In Occupation Of Allied Insulators Ltd	1290918	1	
Three Bottle Ovens at Former Acme Marls Ltd., Bournes Bank, Burslem	1220118	3	
Moorland Pottery Range & Bottle Oven, 72 Moorland Road, Burslem.	1297965		1
Pottery Mineral Mill & Two Bottle Ovens, Furlong Lane, Burslem.	1291014		2
Price & Kensington Teapot Works, Newcastle Street, Longport.	1290799	1	
Former Calcining Works and Square Kiln, Milvale Street, Middleport.	1220736		1
Middleport Pottery Works & Bottle Oven, Port Street, Middleport.	1297939	1	
Former calcining works, Newport Lane	1297928		2
Warren Street, Normacot Road, Longton.	1220876	1	
Sutherland Works, Normacot Road, Longton.	1195814	3	
120 Uttoxeter Road, Longton.	1297907		1
Commerce Works, Longton.	1220277	2	
Albion Works (Phoenix Works), Longton	1195804	2	
Gladstone & Park Place (Roslyn) Works	1195854	6	1
Enson Works, Longton.	1195827	4	
Former Spode Pottery Factory	1392359	1	
Bottle Oven (at formerly Dolby Pottery), Lytton Street, Stoke.	1220666		1
Falcon Works, Sturgess St., Stoke	1210472	2	
Etruscan Bone Mill	1195818		1
Heron Cross Pottery Range, Chilton Street, Heron Cross, Fenton.	1220240	1	
Three Calcining Kilns occ.James Kent (Ceramic Materials)Ltd.	1195832		3
Former Cliffe Vale Pottery & Calcining Kilns	1195842		2
Pottery Works occ. W. Moorcroft Ltd., Sandbach Road, Cobridge.	1297942	1	
	Totals	32	18
See https://historicengland.org.uk/listing/the-list/			