Brymbo Ironworks, Wrexham

Archaeological and Historical Background

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1 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

1.1 Introduction

1.1.1 This historic overview has been undertaken from a range of readily available material from the National Library of Wales, the RCAHMW, and published and unpublished sources.

1.1.2 The core of the Former Brymbo Ironworks is designated a Scheduled Monument (**DE202**), which consists of No. 1 Blast Furnace, the Cast House, Foundry and Carpenters and Patternmakers Workshop, and as such has Statutory Protection. The Agent's House, overlooking the monument, is a Grade II* Listed Building.

1.1.3 This historical background is concerned with the area affected by the Brymbo Heritage project and, as a result, it does not detail the history of the larger steel plant.

1.2 Archaeology and History



Fig. 1 – Cartouche of the Plan of the Brymbo Estate, 1798
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1.2.1 In 1792 John 'Iron Mad' Wilkinson purchased the 500-acre estate of Brymbo Hall for the sum of £14,000, with the intention of developing an iron works using the mineral and coal deposits that were known to exist on the site. With the invention and development of the steam engine Wilkinson was able to found an iron works away from running water as steam power could provide blast for blast furnaces.

1.2.2 Brymbo Hall became Wilkinson's primary residence, where he spends considerable money to upgrade the house, including new panelling, windows, and carpets (likely referring to rugs) for

the chambers and principal rooms.

1.2.3 A letter sent by James Watt Jr. soon after Wilkinson's acquisition of the Brymbo estate states that Wilkinson has spent £20,000 on levelling the site, constructing parapet walls and building a puddling furnace (Soldon 1998: 73). An estate map produced in 1798, though likely surveyed circa 1796-8 by T. Williams, names the site as Plasnewydd Works and demonstrates the extent of the site during this early period; the Puddling Forge can be seen at the east of the site and a blast furnace with attached Cast House, Blowing Engine House and Charge House, which post-dates Watts account, located west of the Puddling Forge he describes; whilst there appears to be several other buildings on site at this time they do not represent what remains today. By circa 1796 the core of the site; Blast Furnace (original dem.), Casting House, Blowing Engine House (dem.), Charge House (dem.) and Coke Ovens (dem.); had been completed, with the first output of iron recorded as 884 tonnes (Riden & Owen 1995: 49), thus commencing Brymbo's one hundred and ninety-four year association with metalworking. The cartouche in the lower right corner of the Estate Plan shows the ironworks as it appeared when the map was completed in 1798. Within this initial development the site Wilkinson's blast furnace is depicted in both plan and cartouche form as being cylindrical.

1.2.4 Further development under Wilkinson's management saw the construction of the Agent's House and No.2 Blast Furnace, with associated Cast House, sometime between 1800 and 1809. The Agent's House, although not depicted on the Estate Plan of 1798, was certainly in its present form by the time it was depicted on the Longitudinal Section of the Strata at Brymbo Colliery of 1809.

1.2.5 In the years between 1792 and 1798 Wilkinson had begun sinking mines near to the site to provide coal and ironstone for his planned works, with a total 8 reported by 1808. A plan of the Brymbo Colliery, dated 1809 and produced by William Rowe, shows the expansion of mining in the Brymbo area, but importantly shows the ironworks as it is in 1809, clearly showing the addition of a second blast furnace.

1.2.6 During his management of the Brymbo Hall estate Wilkinson expanded it to almost 800 acres, to include new farmlands and mineral deposits.

1.2.7 When Wilkinson died in 1808 at the age of 83, the works passed into trusteeship for the next two decades under the guidance of Ann Lewis (his mistress and mother to his only children), William Smith of Birmingham, James Adams and Samuel Foreday of Ettingshall. To survey the wealth of coal seams at Brymbo the trustees commissioned plans of Brymbo Colliery in 1809, then again in 1812, when a long section was also produced, all showing the contemporary ironworks.

1.2.8 In the period following the Battle of Waterloo in 1815, the ironworks saw a slump in its production, resulting from the declining need for weaponry and the continued disputes over Wilkinson's Will. The decision was made to lease the ironworks for a 10-year period and by 1818 John and James Thompson were renting the iron works for a yearly sum of £1,500, with the Wilkinson estate taking in a total of £9,758.16.8d from rents and lets (Brymbo Steel Works Ltd, 1975: 5). In 1820 the original blast furnace was decommissioned by the Thompson brothers and a new furnace commissioned on the same footings, remaining in situ to this day.

This rebuilding, recorded in the company history, is confirmed by the Estate Plan of 1798 and Colliery Plans of 1809 and 1812, all of which show the original Wilkinson furnace as cylindrical.

1.2.9 By the late 1827 the Ironworks was in receivership, a two-year period passing with minimal production taking place. Several years of financial instability and mounting legal costs from the disputed Will led the Chancery to insist that Wilkinson's estate should be sold in order to meet claims. In 1829 a public auction was held at the Wynnstay Arms in Wrexham over the 23rd and 24th April, with all Wilkinson's land acquisitions being sold until the Brymbo Hall estate was back at its 1792 size of 500 acres. John Wilkinson Jr. remained in residence at Brymbo Hall and in late 1829 decided to restart the works using the money gained from the sale of estate lands earlier that year. However, lacking the production and business abilities of his father, the works were again in financial trouble by 1837, when Wilkinson Jr. went overseas. The works continued under the trusteeship of William Rowe until a buyer was found in 1840, a Scotsman by the name of Robert Roy, being financially backed a Scottish bank.

1.2.10 In 1840 'The Brymbo Company' was formed, with William and Charles Darby, descendants of Abram Darby, taking over the site's management. Charged with managing and developing the ironworks, the Darby brothers, commissioned a new Foundry and Machine Shop (now the Carpenters and Patternmakers Workshop) in 1843, which remain today. This work made material alterations to the Cast House, removing the gabled south elevation and inserting new archways onto the east and west walls. In 1847 a new blowing engine was installed, raising the output of the blast furnace from 50 to 84 tonnes per week.

1.2.11 In 1842 the highly recommended Henry Robertson was appointed by Robert Roy to undertake an appraisal of the works, concluding that a railway was essential for continued development. In the same year Robertson, along with Robert Roy, Alexander Ross and William Betts formed the Brymbo Mineral and Railway Company, with the 1844 North Wales Mineral Railway Act being passed to allow construction. Initially this section of the railway was powered by horses, but by 1850, with the desire for greater output, a locomotive was purchased.

1.2.12 In 1856 new hot air stoves were built to preheat the blast, with bell-tops added to the furnace to reuse the hot gasses to heat the boilers and stoves, therefore making savings on the amounts of coal required. A note in the company records states that No. 1 Blast Furnace was, at one time, in continuous blast for 32 years with the same firebrick lining. By 1880, bell tops were added to the furnaces, alterations were undertaken to the foundry and in 1872 No. 3 blast furnace was erected with a Haigh Blowing Engine to increase iron output.

1.2.13 Continued expansion from the mid-19th century, saw the requirement for expansion of the Machine Shop to supply parts to and maintain the new steel plant. A new brick extension was added to the south-east corner of the Machine Shop commissioned by the Darby brothers in 1843.

1.2.14 On 13th April 1880, the fuel consumption No. 1 Blast Furnace is recorded as 10.22 cwts (hundredweight) of coal and 26.6 cwts of coal per ton of iron, making a weekly consumption of 134 tons. The same month, on 30th April, the proportions of materials used to charge the furnace were recorded as: Coal 10.22%, Coke 26.60%, Native Mine (ore) 27.84%, Northampton (ore) 0%, Desada (ore) 9.34%, Guton (Spanish) (ore) 4.60%, Bilbao (ore) 4.60%,

Irish (ore) 0%, and Limestone (flux) 16.80%. A month later, on 28th May 1880, the blast temperatures at the tuyeres were recorded as North 1020°F, East 1110°F, South 980°F, and West 1080°F.

1.2.15 Communications were improved in 1877 with the installation of a Wheatstone Telegraph and by 1880 telephones had made their way to the iron works.

1.2.16 In the last decades of the 19th century, steel started becoming a production priority and in 1883 an experimental Open-Hearth steel furnace was erected, the results being so successful that Robertson made the decision to found a steel plant. On June 4th 1884, The Brymbo Steel Company was incorporated and its operations began the following year.

1.2.17 In 1894, No. 4 blast furnace was constructed to replace No. 3, and was equipped with three Cowper stoves, a dust catcher and three Lancashire boilers blown by a Davy Engine. It was at this time that the large Charging Wall to the north of the site was built. It was constructed to enable the development of No. 4 by providing a new level area of ground for the placement of a charging house. In the same year, No. 1 blast furnace was blown out for the last time after 74 years of work and retained as a sand hopper for the Cast House.

1.2.18 In the late 19th century, the Foundry was upgraded, with the addition of two cupola furnace, although not at same time.

1.2.19 April 1902 saw the commissioning of the new Power House, which brought 3 phase electric generation to Brymbo. Power was produced by an electric alternator powered by a 125hp Westinghouse Gas Engine. In the following year, 1903, a Theissen Gas Washer was installed to wash the blast furnace gas, which in turn was used to drive turbines in the Power House.

1.2.20 In 1908, No. 5 Blast Furnace was commissioned, which would be the last of the iron furnaces built at Brymbo. In October 1908, the new furnace was lit by Peter Williams, the recently appointed General Manager of the works, who had taken over from J. H. Darby earlier that same year. With the construction of No.5 a new, sunken iron line was built to carry molten iron from the furnace to the Casting Shop to the east.

1.2.21 In 1910 bosh tuyeres were used for the first time at Brymbo in an attempt to increase output from No. 5 by starting reduction of ore higher up the furnace. However, the results proved this not to be the case. In the same year refrigeration units were installed for the testing of 'dry blast' in an attempt to improve the iron to a grade containing less than 1% silicon, which could be used in basic open-hearth steel furnaces. After 2 years of trials, this was also abandoned. From 1912, No. 5 will be the only operational blast furnace at the plant.

1.2.22 With increased steel production and the requirement for constant maintenance and upgrades, combined with continued investment in the plant since the WWI, a new machine shop was commissioned and built in 1921. Integral to the build was the installation of the large overhead Travelling Crane by the Vaughan Crane Co. It has SWL (safe working load) of 7½ Tons and was electronically driven and operated, which was usual for new machinery and tools at the works during this period.

1.2.23 In the post-war period the steelworks were upgraded from gas to electric furnaces, with demand driving the increased production of silicon steel for transformer cores. For part of the

1920s, silicone steel becomes a major output from the plant during a time of national electrification.

1.2.24 By the 1930's the demand for iron had decreased sufficiently that it became a minor part of the works at Brymbo, which were now focused on the production of steel.

1.2.25 Little is recorded of the earliest part of the site from 1912, with steel being the primary concern. The only noted development in the first half of the 20th century, since the development of No. 5, was the refitting of the Foundry. This came at the height of WWII, when in 1943 new overhead travelling cranes from Joseph Adamson & Co. Ltd. were installed to carry crucibles for heavier pours from the cupolas.

1.2.26 The next period of major development in the production of iron comes in November 1964, when the decision was taken to modernise No. 5. At this time the furnace was still being charged by hand, using a system of barrows. This upgrade introduced a winched mechanism for loading the furnace, with the Winch House built for this purpose. A new double bell top, fume emission system, gas cleaning was introduced to No. 5, with the replacement of the old Blast Engine of 1894 for a turbo-blower unit installed to increase efficiency. In February 1965, the furnace was relit by Mrs. E Davies, wife of the Managing Director of the plant. In 1966, a gas cleaning installation was completed, with a scrubbing tower to remove dust from the gas, a thickening plant to settle the dust in water, and a cooling tower to enable the waste water to be reused. On 28th June 1967, No. 5 set a new weekly record with an output of 2,123 tons produced. In 1969, further upgrades were made to No. 5, with new hot blast stoves, gas cleaning plant, new boiler and new turbo-blower. These additions increased the output to 3,000 tons per week. 1970 saw the decommissioning and removal of the Davy Blowing Engine, which had been operational at the site for the last 70 years. On 15th July 1971, No. 5 was blown out for relining and was relit on 15th September the same year. Four years later, No. 5 was blown out at the end of May 1975 for relining and general maintenance works, being relit by the wife of the Technical Director, Mrs. O. Harris, on 3rd May 1976. The record weekly output for a blast furnace at Brymbo was held by No. 5, which produced 3,349 tons during the week of 1st December 1973.

1.2.27 In the 1970s, new cupola furnaces were installed to the Foundry, in conjunction with the fabrication of a new façade and roof in steel frame. The new furnaces were designed by Walter Salisbury and a colleague and were then manufactured at the works. When in operation, each furnace was producing 2 tonnes per week.

1.2.28 In 1973, Brymbo Hall was demolished to make way for an open cast mining operation.

1.2.29 The works closed in 1990, with the loss of all jobs and a rich industrial heritage.

1.3 Cartographic Sources

1.3.1 One of the most significant pieces of evidence for the early development of the Brymbo Ironworks is the Brymbo Estate Plan of 1798. The plan was commissioned by Wilkinson and produced by T. Williams. The plan is likely to have been surveyed sometime between 1796-8, as it shows the works complete with blast furnace with the blast engine house, charging house and cast house. At this time the ironworks are labelled as the 'Plasnewydd Works'. Latterly, the estate plan was updated to reflect the addition of No. 2 Blast Furnace. This has been drawn onto the map in black ink, with hatching to the new buildings, which is unlike the pink shading to the original.

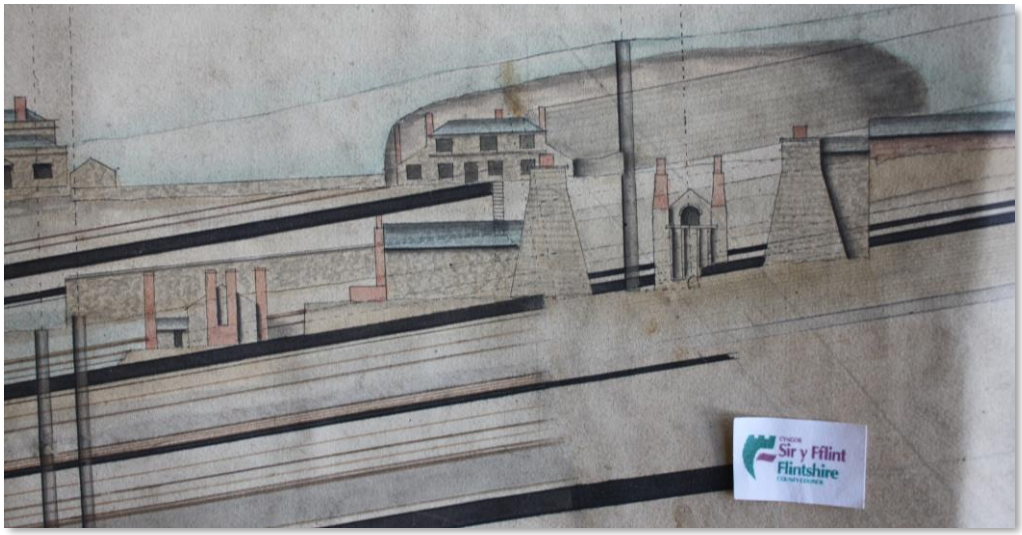


Fig. 2 – Longitudinal Section of the Strata at the Brymbo Colliery. Dec. 1812. Flint Archives.

1.3.2 Colliery plans made in 1809 and 1812, commissioned by the executors and trustees of the Wilkinson estate, show the ironworks at the same level of development as those shown on the 1798 Estate Plan. It may be at this time that the earlier estate plan was updated to reflect the addition of No. 2 Blast Furnace. Importantly, a section of the coal strata (**Fig. 2**), shows the works in section, with clear depictions of the blast furnaces, puddling furnaces and the Agent's House.

1.3.3 The later Tithe Map of 1845 shows the ironworks at the same level of development as the updated 1798 Estate Plan, with the ironworks again labelled 'Plasnewydd Works'. At this date the Agent's House is labelled as 'Field Number 210; 'Agents Office', owned by 'Robert Roy Esquire and Others', in use by 'Self and Others'. The Tithe Map does not show the Foundry and Machine Shop (Carpenters and Patternmakers Workshop), which are known to have been built in 1843, which gives two possibilities; 1) the Tithe Map was surveyed before 1843; or 2) it has been based on the earlier Estate Plan of 1798.

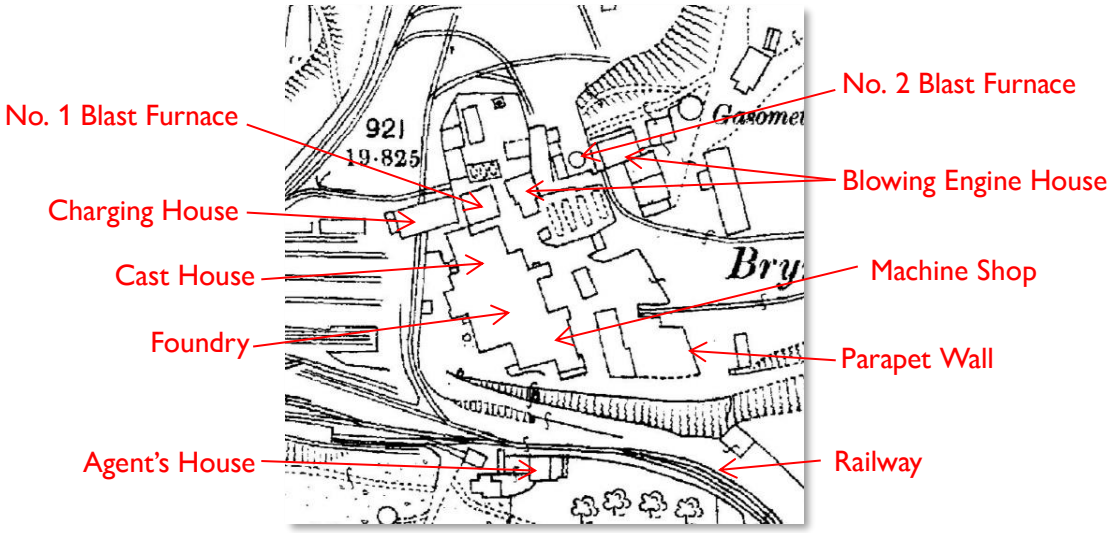


Fig. 4 – 1873 25 Inch to One Mile, OS.
© Landmark Information Group Limited 2024.

1.3.4 The First Edition 25 Inch to One Mile Map of Brymbo was published in 1873 (Denbighshire XXVIII.2). By this time, the works had undergone large amounts of development under the Darby brothers' management. It is also the first time we see a formal plan of the plant's railway infrastructure, largely developed thanks to Robertson and the 'North Wales Mineral Railway Act' of 1844. It is also the last time that the ironworks are depicted as being focused around the blast furnace bank and before the foundation of the steelworks at Brymbo. The map demonstrates the existence of buildings within the modern footprint of the 1921 Machine Shop and within the yard to its north, and the extent of workings to the north of the works. To the immediate south-west of the Agent's House, a small quarry to its south is shown in work.

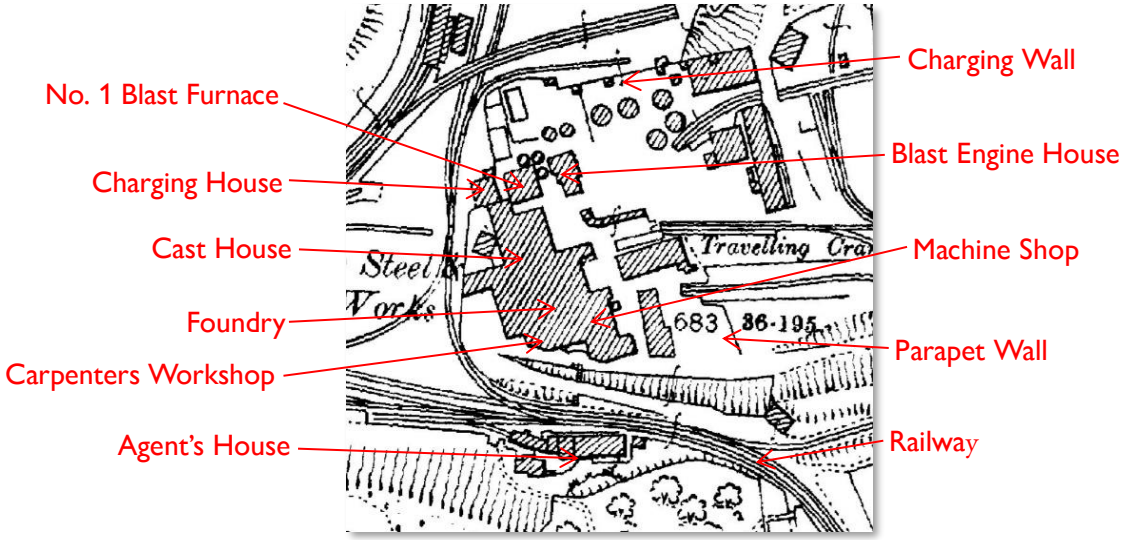


Fig. 3 – 1899 25 Inch to One Mile, OS.
© Landmark Information Group Limited 2024.

1.3.5 By 1899 (***Fig. 3***), the second edition map shows Brymbo Steelworks, incorporated in 1884, with its new mill developed on a large slag mound to the east of the ironworks. The map clearly demonstrates the addition of No. 4 Blast Furnace and the construction of the Charging Wall, which had been built just four years before its publication. The map is a little unclear, but shows the development of new stacks and buildings associated with the development of No. 4 Blast Furnace. No. 2 Blast Furnace survived this development and remains to the west of No. 4. Between the first and second editions, the railway had also expanded significantly with the addition of third and fourth lines to the northern and western approaches. The map also demonstrates that the Agent's House becomes linked with the railway at this time. At some point between the first and second editions the Carpenters Workshop was added to the rear of the Patternmakers Workshop (Machine Shop of 1843). The quarry shown on the First Edition map to the south-west of the Agent's House was already out of use by this time.

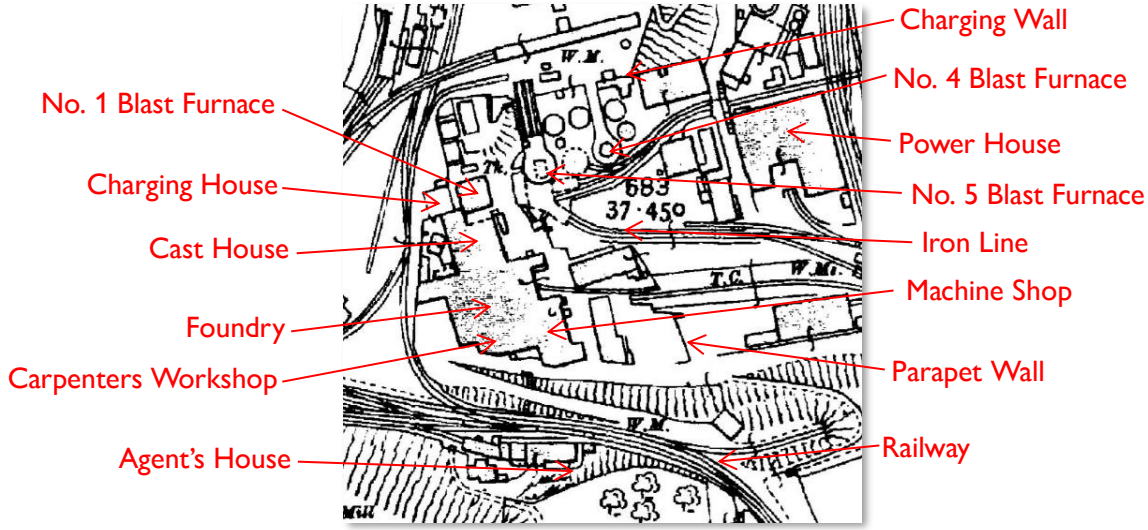


Fig. 5 – 1912 25 Inch to One Mile, OS.
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1.3.6 The 1912 (***Fig. 5***) map demonstrates the continued expansion of the works, most notable being the demolition of No. 2 Blast Furnace and the building of No. 5 and its infrastructure. This included the new sunken iron lines, which took molten iron direct to the Casting Shop via rail. The charging bridges are shown for the and span from the Charging Wall to the tops of No. 4 and 5 blast furnaces, something omitted from the 1899 map. The Power House also appears drawn for the first time. The railway is altered with the new works, with the Agent's House becoming further developed with additions of extensions to its western end.



Fig. 6 – 1963 1:2,500 map, OS.
© Landmark Information Group Limited 2024.

1.3.7 The next edition of the 25 Inch to One Mile, by now referred to as the 1:2,500 scale, is produced in 1963 (***Fig. 6***). This map shows large developments within the historic ironworks site including the demolition of No. 4 Blast Furnace, the covering of the sunken iron line with a cast house, construction of the 1921 Machine Shop, the Smithy to its immediate north, and tanks and chimneys to the face of the Charging Wall. By this time, the additions to the Agent's House have been demolished, returning the property to the size shown on the section of 1812. A range of new, small buildings are built to the immediate west of the Power House, likely incorporating some elements of the buildings shown on the 1912 map.

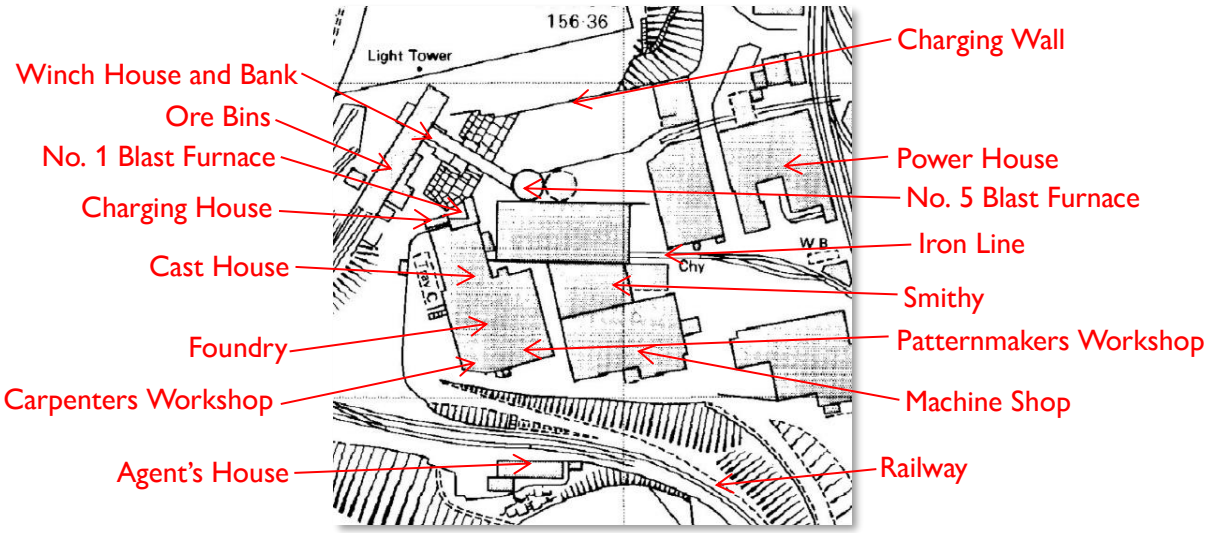


Fig. 7 - 1984 1:2,500 map, OS.
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1.3.8 The map of 1984 (***Fig. 7***) was the last to be produced before the closure of the works in 1990. As such, the map shows the plant in its most developed state. The most obvious changes are the upgrade works to No. 5 Blast Furnace, which came in the 1960s and 1970s, when the charging of the furnace was mechanised. This is clearly shown with a new charging ramp from the top of the Winch House to its north-west, with the associate ore bins. The small range of buildings to the west of the Power House have been demolished to make way for a new works

building. The tanks and chimneys seen to the south of the Charging wall have also gone.

1.4 Landscape Development

1.4.1 The landscape of the Brymbo iron and later steel works has seen a complicated development, having been transformed by heavy industry and the waste it produces. At Brymbo, as with any other large-scale metal producing operation, these changes can be attributed to two main elements. The first is the tipping of slag and spoil from the industries of Brymbo, namely iron, steel, and coal. The production of iron slag and coal spoil from industrial activity was disposed of by tipping in unutilised areas of the site, typically in locations that were quickly and easily accessible from the main works. This deposition of material, in time, supported the second which utilised waste material to level and landscape the site to enable the development and expansion of the late 19th century steelworks.

1.4.2 The earliest area of landscaping was that undertaken by Wilkinson between 1792-3, when part of the site was levelled an area for the siting of his new ironworks. Reference is given to this levelling, with the construction of a parapet wall, by James Watt Jr. in a letter to his father, where he notes Wilkinson has spent £20,000 on this landscaping (Soldon, 73). Today, this area forms the lower part of the site around the Scheduled Area. Importantly, some of this early landscaping works survive, including the parapet wall within the Machine Shop of 1921, elements of the Charging Wall to the rear of No. 1 Blast Furnace, and the retaining wall to the south of the site road (bounding the Machine Shop and Carpenters and Patternmakers Workshop).

1.4.3 From the beginning of industrial activity, waste from the ironworks and coal mining began the transformation of the site. Waste is known to have been deposited into the valley to the east and within a small vale to the west, with cartographic evidence and reclamation work by Brymbo Developments Ltd confirming this (pers. comms. Andrew Foster 2014). Waste to the east filled the valley, with enough deposited by the 1880s that the Brymbo steel plant was constructed newly levelled ground (1872-1899, Denbigh XXVIII). To the west, waste subsumed the original road through the site, causing the rear of the lower site to be filled (behind the Cast House, Foundry and Carpenters and Patternmakers Workshop) and a new roadway formed in the bank to the north of the Agent's House. This landscaping enables the laying of railway tracks to transport materials around upper site and for export.

1.4.4 With subsequent development and redevelopment of site infrastructure and buildings, it is probable that demolition material has been used as fill associated with landscaping. As such, the waste deposits and infill across the site may contain deposits and materials relating to the development of the site.

1.4.5 As a result of historic activity, the site has been subject to a complex landscape development and is likely to preserve historic land surfaces associated with the works early development, with potential for the survival of land surfaces, structures, and buildings.

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Yn rhan o'n hawydd i wella ansawdd ein gwasanaeth, rydym yn croesawu unrhyw adborth y gallwch ei ddarparu.

As part of our desire to improve our quality of service we welcome any feedback you are able to provide.

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