

BRIXTON WINDMILL

London Borough of Lambeth

An Historic Building Survey



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Abstract / Non-Technical Summary

An historic building survey of Brixton Windmill, in the London Borough of Lambeth, was undertaken in April - May 2012, as part of a Postgraduate Masters course.

The building is a Grade II listed tower mill and was constructed in 1816. It was a working windmill until 1862, when the sails were removed and it was used for storage. In 1902, a steam (and later gas) provender mill was installed in the mill, and was used until 1934. Since this date the mill has been restored to its wind-powered days and opened to the public, with two major phases of restoration occurring in 1964 and 2010-11.*

This study included research into the structure's history, utilising documentary, cartographic and pictorial sources, followed by field-visits to record the structural and technical elements of the building. Ground-plans, plus a cross-sectional view of the elevation of the structure, were compiled, and photographs taken.

Features from various phases of the mill's history were identified - including, from its wind-powered days, the structure itself, some door and window openings, the central shaft, and remnants of the chutes through which grain passed. This has helped ascertain what the original structure looked like and how it functioned, suggesting that there were originally two pairs of millstones.

Other features, from later changes to the structure, were identified. This included the provender mill (inserted in 1902), the sails and much of the wind-powered machinery (inserted during the 1964 restoration works), and many of the floorboards, ladders, and trapdoors, inserted and repaired during the two restoration phases.

This work has enabled an understanding of how the mill functioned to be gained; and has contributed to the discussion of a number of wider issues.

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1. Introduction

- 1.1 Brixton Windmill is a Grade II* listed structure, owned by Lambeth Council, with the 'Friends of Windmill Gardens' group conserving it and opening it to the public.
- 1.2 The windmill is located in South London, within the Borough of Lambeth, just to the south of Brixton town centre and west of Brixton Hill (site centre at TQ 303 737).

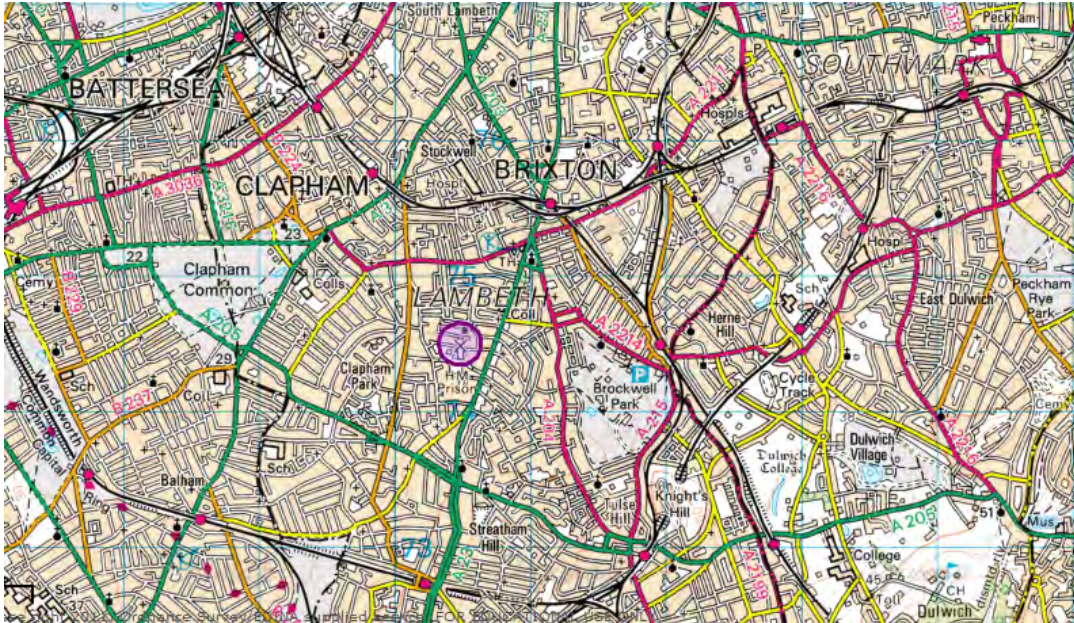


Fig. 1: Location map, with Brixton Windmill circled (EDINA Digimap).



Fig. 2: Close-up location map of Brixton Windmill (EDINA Digimap).

- 1.3 The mill was constructed in 1816, as a tower mill, and was run by the Ashby family. It continued in use until 1862, when the Ashby milling business moved to Mitcham and the Brixton mill was used for storage. In 1902 a steam, and later gas, engine was installed in the Brixton mill to grind grain. This continued until 1934, when the mill closed. Since then it has been restored, particularly in 1964 and 2010-11, and is open to the public.
- 1.4 The only surviving structure is the tower mill, however it was once part of a complex which included the Mill Cottage, Mill House, bakery, and other outbuildings. It currently stands within 'Windmill Gardens', an area of open land created in 1964.
- 1.5 This historic building survey aimed to study the windmill's existing structure and interior features. This involved research (utilising documentary, cartographic, and pictorial sources), and physical examination of the structure (involving photography, the compilation of plans and elevations, and note-taking). This was undertaken to an English Heritage 'Level 3' standard.
- 1.6 This work was undertaken to gain a greater understanding of the structure - its phasing, building materials, and how it functioned. Identifying which features survive from each phase of the mill's life was crucial. A functional interpretation of the structure (how it worked), typological interpretation (how far it is 'typical' of its type), and analysis of it from other perspectives was also undertaken.
- 1.7 The fieldwork was undertaken on the 7th and 12th May 2012.
- 1.8 Thanks to Jean Kerrigan (Chair of the Friends of Windmill Gardens), and Lisa Rigg (Lambeth Council) for allowing me to undertake this study. Further thanks to Compass Archaeology for their equipment, and to my parents for their assistance on site.

2. Research Aims / Questions

This project is an academic one which aims to study Brixton Windmill in terms of its contribution to wider discussions, rather than being part of the planning process / pre-demolition. The following research aims are, therefore, based on this academic agenda.

- 2.1 The features associated with the different phases of the windmill's life must be identified, including those which are 'original' and those inserted during the restoration works.
- 2.2 From a functional perspective, study of Brixton Windmill can illuminate how windmills functioned and how they were improved over time, particularly important because few functioning windmills survive.
- 2.3 The mill can be studied from a typological perspective, i.e. how typical a 'tower mill' it is.
- 2.4 The development of Brixton Windmill over time can also be studied from an economic perspective, in terms of the effect of industrialisation on such traditional

production methods. The insertion of a steam, then gas, machine into the windmill is unusual, as most windmills became obsolete with the onset of industrialisation.

- 2.5** The windmill's later life, during the restoration works, reflects the recent interest in heritage. It is, therefore, interesting to consider why certain features have been restored in the way they have.

3. Methodology

- 3.1** Research into Brixton Windmill was carried out at Lambeth Archives, the London Metropolitan Archive, the Guildhall Library, and Surrey Archaeological Society's Library. This included the study of maps, pictorial sources, trade directories, newspaper articles, pamphlets, and general books and articles.

- 3.2** The fieldwork began with an initial 'walk-round' survey of the whole structure (exterior and interior), to gain an overall understanding of it and highlight specific features of interest.

- 3.3** Detailed written notes were made. A 'single context' recording system was not used, because the basic structural and mechanical features within the windmill were already understood. A more flexible approach, noting interesting features which helped answer the research questions, was considered more sensible.

- 3.4** Digital colour photography, general and specific shots, was undertaken.

- 3.5** The structure was measured and planned using hand-tapes.

Plans were made of each floor, noting room sizes, wall thicknesses, and features (machinery, doors, window apertures, ladders). These were measured from the central post on each floor.

Floor to ceiling heights, plus the relative positions of features within this, were taken, to enable an interior elevation of the structure to be compiled.

- 3.6** It was not felt necessary to create a site plan or take levels, as it is a single structure well-recorded on modern OS maps, and levels would not aid in its understanding.

- 3.7** The fieldwork was undertaken following health and safety procedures - only entering safe areas and not working alone. It was constrained in terms of time and access (as it could only be undertaken when the windmill was open to the public), and in terms of equipment (as sophisticated digital equipment - laser scanners, etc - were not available).

- 3.8** The report was compiled following completion of the fieldwork, involving the analysis of all information gathered and digitisation of drawings.

- 3.9** No provision for further work (publication, etc) was made.

- 3.10** The standards set out in English Heritage's 'Understanding Historic Buildings: A Guide to Good Recording Practice' (2006), and the Institute for Archaeologist's 'Standard and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures' (2008) were followed throughout the project.

4. The History of Brixton Windmill, using documentary, cartographic, and pictorial sources

4.1 The Early Mill (1816 - 1862)

Brixton itself, although an Anglo-Saxon settlement, was largely undeveloped until the beginning of the 19th Century, when the Manor of Stockwell was auctioned off, with Christopher Chryssell Hall buying the land on which Brixton Windmill now stands (Friends of Windmill Gardens, <http://www.brixtonwindmill.org>).

The windmill was constructed in 1816, and was leased in November 1817 to John Ashby. From this date 'Ashby & Sons' operated from it (Friends of Windmill Gardens, <http://www.brixtonwindmill.org>).

Useful documentary sources for the mill's early history are found within the ledgers of William Ashby, a millwright in Westerham (Kent). This includes the 1826 records of new machinery being installed, and 1827 records about the conversion of one pair of sails into patent sails (Short, 1971, 58).

Four images of the 'early' mill (pre-1862) exist, although their exact date is unknown. These generally depict the sails, wheels-and-chains used to rotate the cap and operate the patent sails, and doors and windows in the mill body (figs.3-6).



Fig. 3: Pre-1862 watercolour image of Ashby's Mill, Brixton Hill (Lambeth Archives).



Fig. 4: Pre-1862 image of Brixton Windmill (LMA).

Fig. 5: Pre-1862 pencil sketch of Brixton Windmill (Lambeth Archives).





*Fig. 6: Pre-1862
photograph of Brixton
Windmill (from Greater
London Council 1967
pamphlet).*

The earliest cartographic depiction of the mill is the 1841 Lambeth Wards Map (not illustrated), which depicts it plus ancillary buildings. Stanford's 1862 Map also depicts the mill in its early form (with ancillary buildings around it), alongside development along Cornwall Road and Brixton Hill (fig.7).

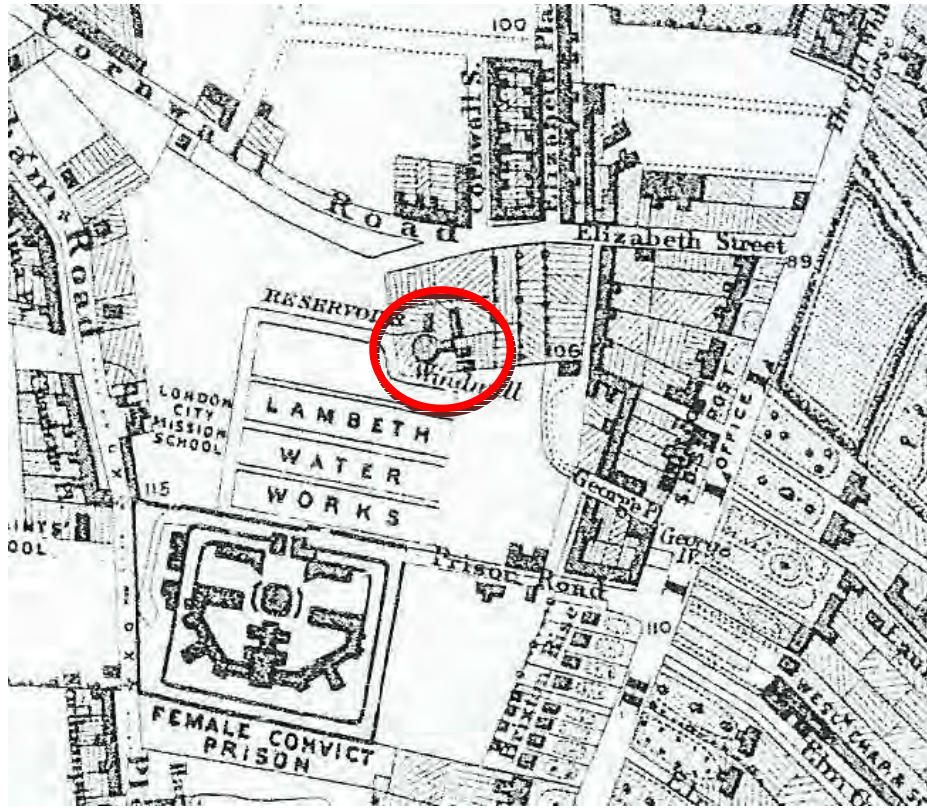


Fig. 7: Extract from Stanford's 1862 Map, depicting the windmill.

4.2 The Mill used for storage, 1862 - 1902

The area around Brixton Windmill was heavily built up in the mid-19th Century, reducing the wind reaching the mill and thereby reducing its efficiency. This meant that the Ashby milling business moved to a water-mill at Mitcham, and the Brixton Windmill ceased operation. The sails were removed in 1864 and the building used for storage, partly because of its convenient location between London and Mitcham (Friends of Windmill Gardens, <http://www.brixtonwindmill.org>).

The First Edition 25inch OS Map (surveyed 1869-70; fig.8) provides the first detailed picture of the windmill and its surrounding buildings. The windmill is approached by a track from Cromwell Road, into a yard surrounded by buildings. The 1893-4 OS Map provides a similar picture (fig.9).

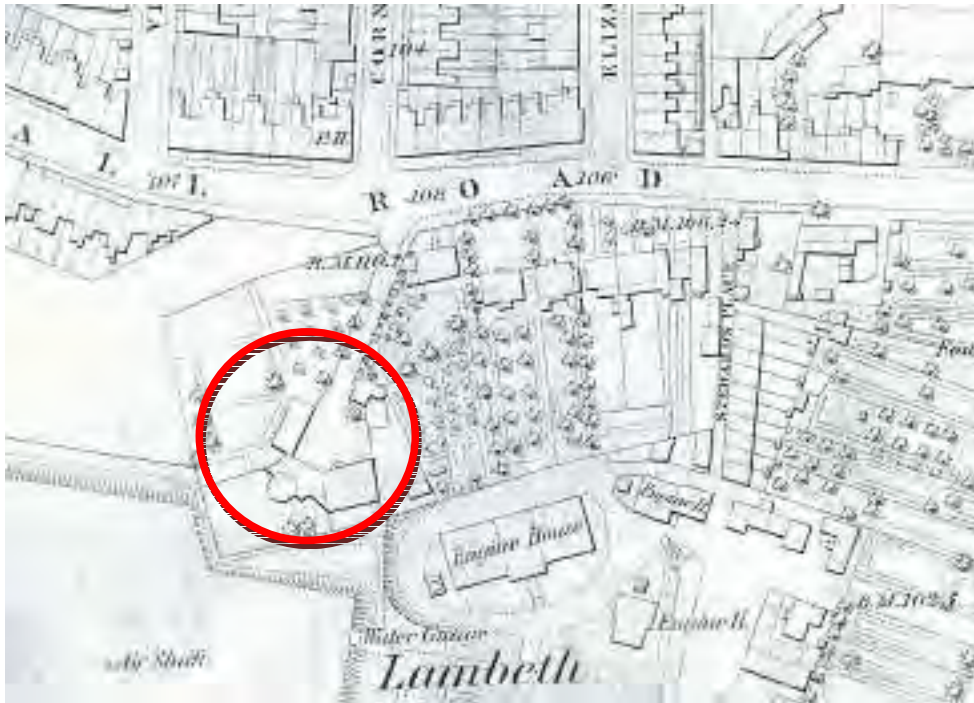


Fig. 8: Extract from the 1869-70 OS Map, depicting the windmill and associated buildings.



Fig. 9: Extract from the 1893-4 OS Map, depicting the windmill and associated buildings.

Two sketches of the mill in this period exist - one dated to c.1880 (fig.10) depicts the sails, however these had been removed by this date and were just added for aesthetic appeal. The second sketch, dated to c.1893 (fig.11) is similar to the 1880 image (minus the sails). Both images depict the gallery around the cap, added after the sails were removed.



Fig. 10: c.1880 image of Brixton Windmill (Lambeth Archives, Landmark).

Fig. 11: c.1893 image of Brixton Windmill (Lambeth Archives, Landmark).



4.3 The Mill back in action, 1902 - 1934

In 1902 the Ashby firm transferred their milling activities back to Brixton, after the water-supply at Mitcham failed. A steam-driven provender mill (later replaced by gas) was installed to drive the stones, and flour was produced once again (Friends of Windmill Gardens, <http://www.brixtonwindmill.org>).

1913 articles in the Daily News and Daily Chronicle describe Brixton Windmill (with a gas engine), with a 1914 advert for stone-ground flour and wheat meal showing the type of products being produced (fig.12). A 1927 deed is also useful as contains a detailed schedule of the machinery in the mill, associated with the gas engine (Short, 1971, 61).



FLOUR, ETC.

We produce by our own Machinery the following
Stone-Grated Flour and Wheat Meal in such quanti-
ties as may be ordered and in the Milling Process
to-day

Our Flour and Household Goods are of the best
quality.

Have you tried our Self-Raising Flour? Our Pastry
is unequalled.

	12 lbs.	7 lb.	5 lb.	2 1/2 lb.
Stone-Grated Flour	—	0/6	1/9	2/6
Pasty Flour	—	5/-	1/9	3/6
Best Household 1 1/2 lb. ad	—	8/6	1/9	1/6
Cheerful Supper	—	5/3	1/2	1/4
Self-Raising Flour (white) per 1 1/2 lb. ad	—	2/-	1/9	1/6
"Special" 2 1/2 lb. ad	—	—	—	—
Wheat Meal	—	1/6	1/4	—
Rice, Fine quality	—	—	—	10
Excellent quality	—	—	—	14
Pekin	—	—	—	12
Common	—	—	—	14
Tapioca, Best	—	—	—	10
Pekin	—	—	—	12
Fine	—	—	—	14
Lent-Pean	—	—	—	12
Sago	—	—	—	12
Schottin	—	—	—	12
Melrose	—	—	—	12
Lentils	—	—	—	12
Harris Beans	—	—	—	12
Oatmeal	—	—	—	12
Spelt Flour	—	—	—	12
Green Peas	—	—	—	12
Peas Harby	—	—	—	12
Flour White Flax Harvest	—	—	—	12
Best Scotch Oatmeal (Fine Melrose)	—	—	—	12
and Gristle	—	—	—	12
Ackley's Best Raising Powder	—	—	—	12
Water (Fresh Trade)	—	—	—	12

Fig. 12: 1914 advert for the products produced by the Brixton Windmill.

A couple of images exist of the mill at this date, including those in the 1913 articles (figs.13-14), and a detailed photograph in Smith's book (Smith, 1932, 93) (fig.15). These depict the mill's body, cap with gallery, windows, and outbuildings.

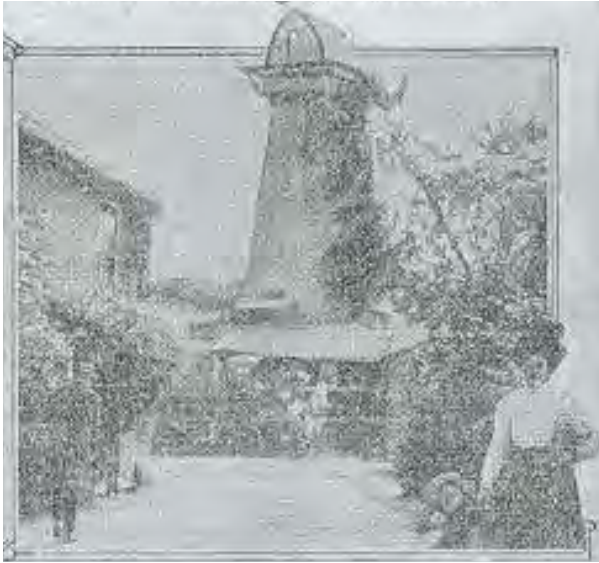


Fig. 13: Image of Brixton Windmill from the Daily Chronicle, 1913.



Fig. 14: Image of Brixton Windmill from the Daily News, 1913.



Fig. 15: Photograph of Brixton Windmill, from Smith's 1932 Book.

4.4 The Mill stops functioning, 1934 onwards

In 1934 the Brixton Windmill ceased to function, although the structure has survived, with it being listed in 1951, bought by the London County Council in 1957, and restored in 1964 and 2010-11 (Friends of Windmill Gardens, <http://www.brixtonwindmill.org>).

A 1934 report, made by the Honorary Technical Adviser to SPAB, described the structure as it was, needing repairs to the cap, floors, and windows, (Brixton Windmill, Blenheim Gardens, Lambeth: Statutory Planning File (1934-71), LMA). The 1956 Survey of London includes an elevation through the mill and floor plans, depicting it before restoration (Sheppard, 1956, 43) (fig.16). A series of photographs also depict the structure before the 1964 restoration works - broadly similar to how it was in 1902-34, but with some degradation (LMA photographs - SC/PHL/02/1140) (figs.17-20). The 1951 OS Map (fig.21) also depicts the mill before restoration and before the outbuildings were destroyed in 1960 (fig.21).

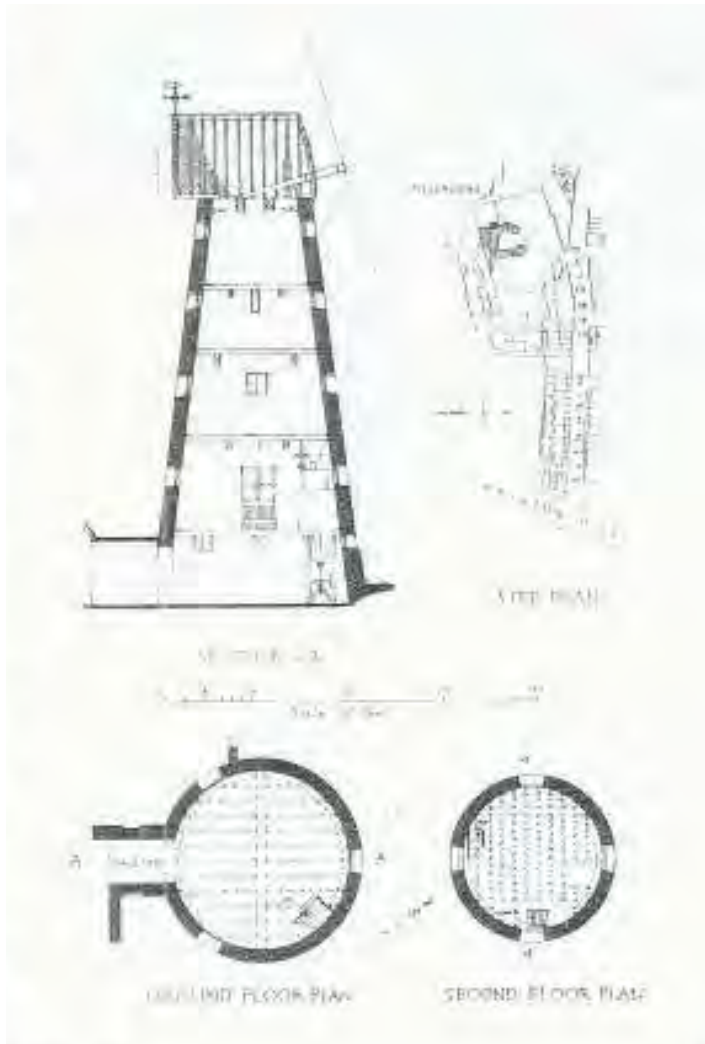


Fig. 16: Elevation and ground plans of Brixton Windmill from The 1956 Survey of London.



Fig. 17: 1934 photograph of Brixton Windmill (LMA).



Fig. 18: 1951 photograph of Brixton Windmill (LMA).



Fig. 19: 1958 photograph of Brixton Windmill (LMA).



Fig. 20: 1962 photograph of Brixton Windmill (LMA).



Fig. 21: Extract from the 1951 OS Map depicting the windmill and associated buildings.

Suggestions for the 1964 restoration work are provided in Rex Wailes' 1958 report, including the addition of new sails and machinery, and repair of floors and joists (Brixton Windmill, Blenheim Gardens, Lambeth: Statutory Planning File (1934-71), LMA). This describes the mill at this date, and suggests what the restoration may have involved, although these suggestions may not have been followed. The restoration works did include the addition of new sails and machinery from Burgh le Marsh mill in Lincolnshire to take the mill back to its wind-powered days. The mill was then opened to the public (Friends of Windmill Gardens, <http://www.brixtonwindmill.org>). Evidence about this is provided in photographs of the restoration being undertaken (figs.22-23), and some of the mill after it had been restored (LMA photographs - SC/PHL/02/1140) (figs.24-28).



Fig. 22: Photograph of the 1964 restoration works (restoring the millstone frame) (LMA).



Fig. 23: Photograph of the 1964 restoration works (removing a corn sifter) (LMA).



Fig. 24: 1965 photograph of Brixton Windmill (LMA).



Fig. 25: 1965 photograph of Brixton Windmill (Lambeth Archives, Landmark).



Fig. 26: Photograph of the provender mill, post-1964 restoration works (LMA).



Fig. 27: Photograph of the spur wheel, stone nut, and vat, post-1964 restoration works (LMA).



Fig. 28: Photograph of the cap, with windshaft and brake wheel, post-1964 restoration works (LMA).

The most recent work on the windmill took place in 2010-11, and included the restoration of brickwork, replacement of the cap's weatherboarding and some of the floors and joists, and refurbishment of the sails and some of the interior machinery (Friends of Windmill Gardens, <http://www.brixtonwindmill.org>).

5. The Exterior

5.1 The Tower Mill Body

Brixton Windmill is a tower mill, conical in shape, and 14.94m high. It has a diameter of 6.6m at its base, tapering to 3.65m at the top. This tapering shape, battering out towards the base, gives it greater stability.



Fig. 29: Photograph of the exterior of Brixton Windmill, looking north-east.



Fig. 30: Photograph of the exterior of Brixton Windmill, looking west.

The thickness of the wall was measured through door and window openings (4th floor western window, 2nd floor western window, 1st floor eastern window, and ground-floor door). These all measured 0.45m in thickness.

It is constructed of bricks laid in 'Flemish bond'. The brickwork is believed to be original, although parts were repaired during the 2010-11 restoration works (see section 6.1).

A layer of black tar has been coated over the brickwork to protect it from adverse weather. This was re-coated during the 2010-11 restoration works, although reflects the original mill's coating, as is depicted on the pre-1862 photograph (fig.6).

The base of the structure projects out (by 50mm from the main mill body). This is covered by a thicker layer of tar (c.150mm thick). This covers two steps out in the brickwork, one at the level of the present door threshold, and one c.1.5m above this. This additional layer of tar may have been added during the restoration works to protect the structure's base. The step-outs in the brickwork are presumably original, and help support the structure.



Fig. 31: Photograph of the bottom part of the mill structure (around the present door), showing the additional protective layer of tar, covering two 'steps out' in the base.

5.2 The Mill's Setting

The ground-level around the mill undulates a lot, being lowest on the south-eastern side (2.15m below the top of the projecting base of the structure), and highest on the western side (1.35m to the top of the projecting base).

None of the original buildings that surrounded the mill, including the Mill Cottage, Mill House, and bakery, survive. They were all destroyed in the early 1960s when the site was laid out as an open space. No evidence for these earlier outbuildings survive, with the c.16m line of frogged yellow stock bricks leading east from the windmill (fig.32) being the wall depicted on the 1971 OS Map rather than being related to the earlier outbuildings (fig.33).



Fig. 32: Line of frogged yellow stock bricks leading to the east from the windmill.

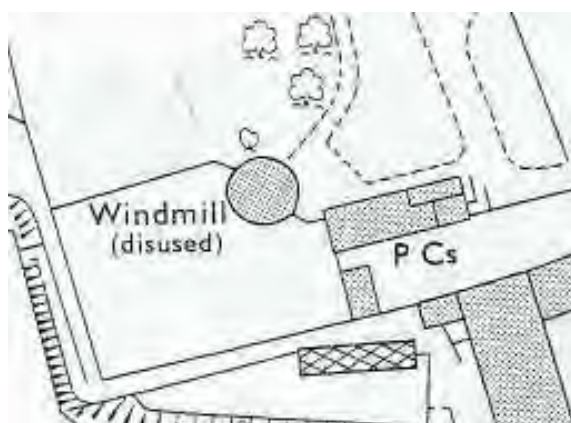


Fig. 33: Extract from the 1971 OS Map, depicting the wall heading out to the east of the windmill.

5.3 Doors into the mill at ground-floor level

The present front door is not original, as it is made of modern wood and surrounded by modern patched brickwork. It measures 1.05m in width by 2.15m in height.



Fig. 34: Photograph of the present door into the mill.

It is unclear how many doors into the mill there were originally, and where these were, particularly because they are not depicted on historic maps or on historic images (which tend to picture the upper levels). The 1957 Survey of London ground-floor plan appears to show a 'vaulted' door on the south-western side of the structure which is attached to another building (fig.35), whereas Rex Wailes' 1958 report mentions the need to repair **two** ground-floor doors.



Fig. 35: 1956 Survey of London ground-floor plan, depicting a vaulted entrance into the structure at ground-floor level.

Field observations identified one blocked door on the northern side of the structure (*c.*3m north-west of the present door) (fig.36). It measured 0.95m in width and *c.*2.2m in height, including a soldier course of brickwork. Another possible door was observed on the south-eastern side, just to the south of the present doorway, where an indented arch (measuring 0.9m in width, 0.38m in height, and indenting into the structure for *c.*0.3m) was observed (fig.37). This was positioned *c.*1.87m above ground-surface, and had a soldier course on top (making the door *c.*2.25m in total height). Alternatively, the present door may be located in the same position as an earlier door, as the remnant of an older soldier course (0.22m in height) was observed above the door (fig.34). The modifications to the structure over the years means that it is tricky to provide a definitive answer as to where the original door, or doors, were.



Fig. 36: Photograph of the blocked-up doorway on the northern side of the mill, at ground-floor level.



Fig. 37: Photograph of the indented arch (possibly an earlier doorway), on the south-eastern side of the structure.

5.4 Doors into the mill at first-floor level (onto the stage)

Although the first-floor door on the southern side of the structure is replaced, the doorway is original, with no indication of patched brickwork or it being cut through at a later date. The original overlying soldier course is also visible (fig.38).



Fig. 38: Photograph of the southern door at first-floor level.

There would have been a corresponding door at this level on the northern side. This was clear from the interior (see section 6.5). From the exterior, an area of patched bulging brickwork was observed in this area (fig.39).



Fig. 39: Photograph of the patched-up brickwork indicating the location of the blocked-up doorway at first-floor level on the northern side of the structure.

These doors accessed a stage, which encircled the mill at first-floor level. From here, the two wheel-and-chain mechanisms (attached to the cap) could be accessed, to rotate the cap and operate the patent sails. This stage, and door out to it, is depicted in an early pencil sketch of the mill (fig.40).

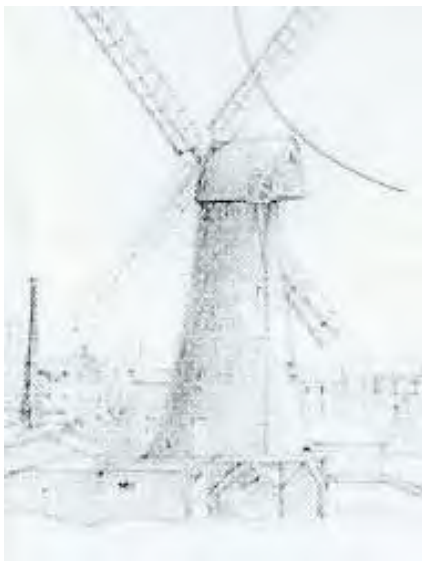


Fig. 40: Extract from a pre-1862 pencil sketch of the windmill, depicting a stage at first-floor level with a door leading out to it (Lambeth Archives).

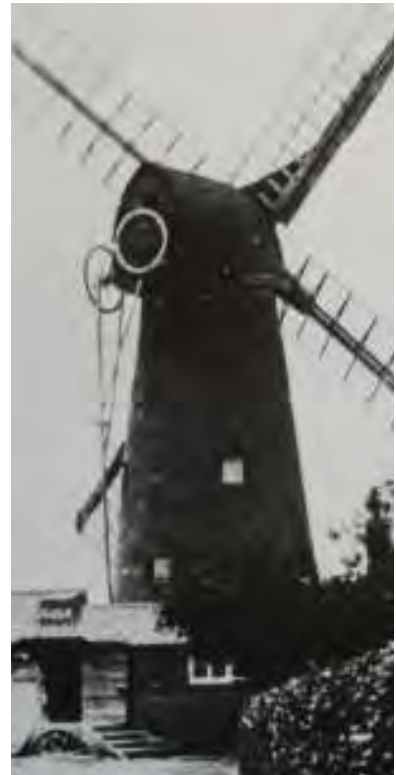
5.5 Windows

The windows are all replaced, however historic images show that they are in their original openings, with two on the first-floor (on the eastern and western sides); four on the second floor (on the south-eastern, south-western, north-eastern, and north-western sides); plus two each on the third and fourth floors (on the south-eastern and north-western sides, positioned directly above each-other) (fig.41).



Fig. 41: Photograph of the windows, showing one on the first-floor (on the eastern side, above the present door), and one on the second, third, and fourth floors (on the south-eastern sides of the structure).

Fig. 42: Extract from the pre-1862 photograph, showing a window on the first and second floor. Some indication of further windows on the second, third, and fourth floors is seen on the far left-hand side of the structure (from Greater London Council 1967 pamphlet).



5.6 The Cap

The cap is a brick structure, timber-framed and weather-boarded, which sits on top of the main mill body. It was not possible to measure it, however is believed to be *c.* 3m high. It was removed and repaired in 2010, with the weatherboarding (visible from the exterior) being completely replaced at this date.



Fig. 43: Photograph of the cap today.

The cap contains the windshaft, which brings the drive from the sails into the mill, and the brake wheel. These are discussed in section 6.2.

The cap (to which the sails are attached) can rotate, to make the sails face into the wind. This is the difference between a post-mill (where the whole mill rotated), and a tower-mill (where only the cap rotated). This was achieved, at Brixton, using a wheel-and-chain arrangement, not a fan-tail. A wheel (positioned on the side exterior of the cap) was attached to a chain, which led to the first-floor stage, from where the cap could be rotated. This is depicted in historic images, such as the pre-1862 photograph (fig.45). This wheel was removed in 1864, alongside the sails.

Early images, such as the pre-1862 photograph (fig.45), depict another wheel at the rear of the cap. This controlled the patent sails (opening or closing the shutters dependent on the wind - see section 5.7). The striking rod system, attached to the patent sails, passed through the windshaft and emerged at the rear of the cap, where it was attached to the wheel, from which a chain hung down to the first-floor stage. A replica version of this wheel was added during the 1964 restoration works (fig.44).



Fig. 44: Photograph of the rear of the cap today, depicting the (replica) wheel which helped operate the patent sails.



Fig. 45: Extract from a pre-1862 photograph, clearly showing the two wheels which could be operated from the first-floor stage. The one directly at the rear of the cap operated the patent sails (through the striking rod system taken through the windshaft), and the one to the left of this rotated the cap (from Greater London Council 1967 pamphlet).

When the sails were removed, a gallery, running around the base of the cap, was added. This is depicted in images from this period (fig.46). It was, however, removed during the 1964 renovation works, and no evidence for it survives.



Fig. 46: Extract from a c.1880 image of Brixton Windmill, clearly showing the gallery inserted around the base of the cap (Lambeth Archives, Landmark).

5.7 The Sails

Brixton Windmill has four sails - two patent sails and two common sails. These are, however, replicas installed during the 1964 renovation works (the originals were removed in 1864). They are made from imported pine timber, and their design is based on pictorial depictions of the original sails (fig.48). Unfortunately it was not possible to measure them, however they are believed to be c.15m long.



Fig. 47: Photograph of the sails today.



Fig. 48: Extract from a pre-1862 photograph showing the two different types of sails. The top right sail is a patent sail; the top left and bottom right sails being common sails (from Greater London Council 1967 pamphlet).

Common sails were more common (particularly in the 18th and early 19th Century), consisting of a wooden frame covered with cloth. This type of sail was simple and inexpensive, however each sail had to be stopped in turn when they needed to be adjusted (rolled up or out dependent on the wind). Patent sails (invented in 1807) eliminated this problem, as the wooden shutters could be opened and closed whilst the sails were turning. At Brixton, there were originally two pairs of common sails, but one pair was converted into patent sails in September 1827 through the addition of a striking rod system.

New versions of both types of sails have been made. The common sails do not have the attached cloth, although the fittings where it would have been attached are visible (fig.49). The patent sails have the wooden shutters (fig.50) which can still be opened and closed, using the long winding rod mechanism stored on the ground-floor, connected to a fixing at the end of the sails, as was seen in action (fig.51). The other method of operating the patent sails (the striking rod running out to the wheel-and-chain mechanism, which could be used whilst the sails were moving), is not operational today.



Fig. 49: Photograph of one of the 'common sails' today. The attachments to which the cloth could be attached to (the round fittings) can be seen.



Fig. 50: Photograph of one of the 'patent sails' today. The wooden shutters, which were opened and closed dependent on the wind, can be seen.

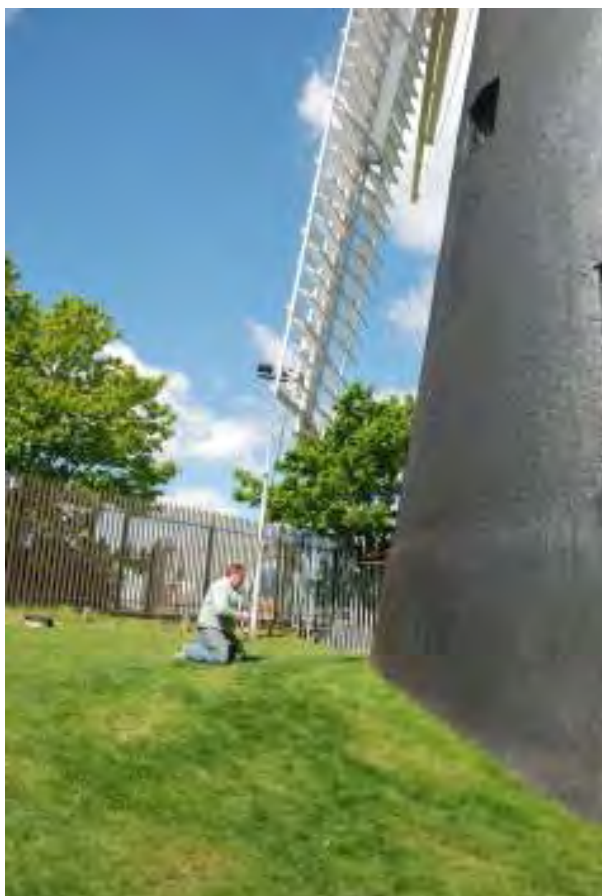


Fig. 51: Photograph of the patent sails being operated using the long winding mechanism.

The sails are fastened on to large timbers (called 'stocks') which pass through the iron frame (the 'canister' or 'poll-end') on the end of the windshaft, carrying the drive into the cap (fig.52). Clamps are currently attached to the stocks to ensure they can withstand the wind (these are not original).



Fig. 52: Photograph of the central part of the sails, showing the stocks and central 'canister'.

6. The Interior

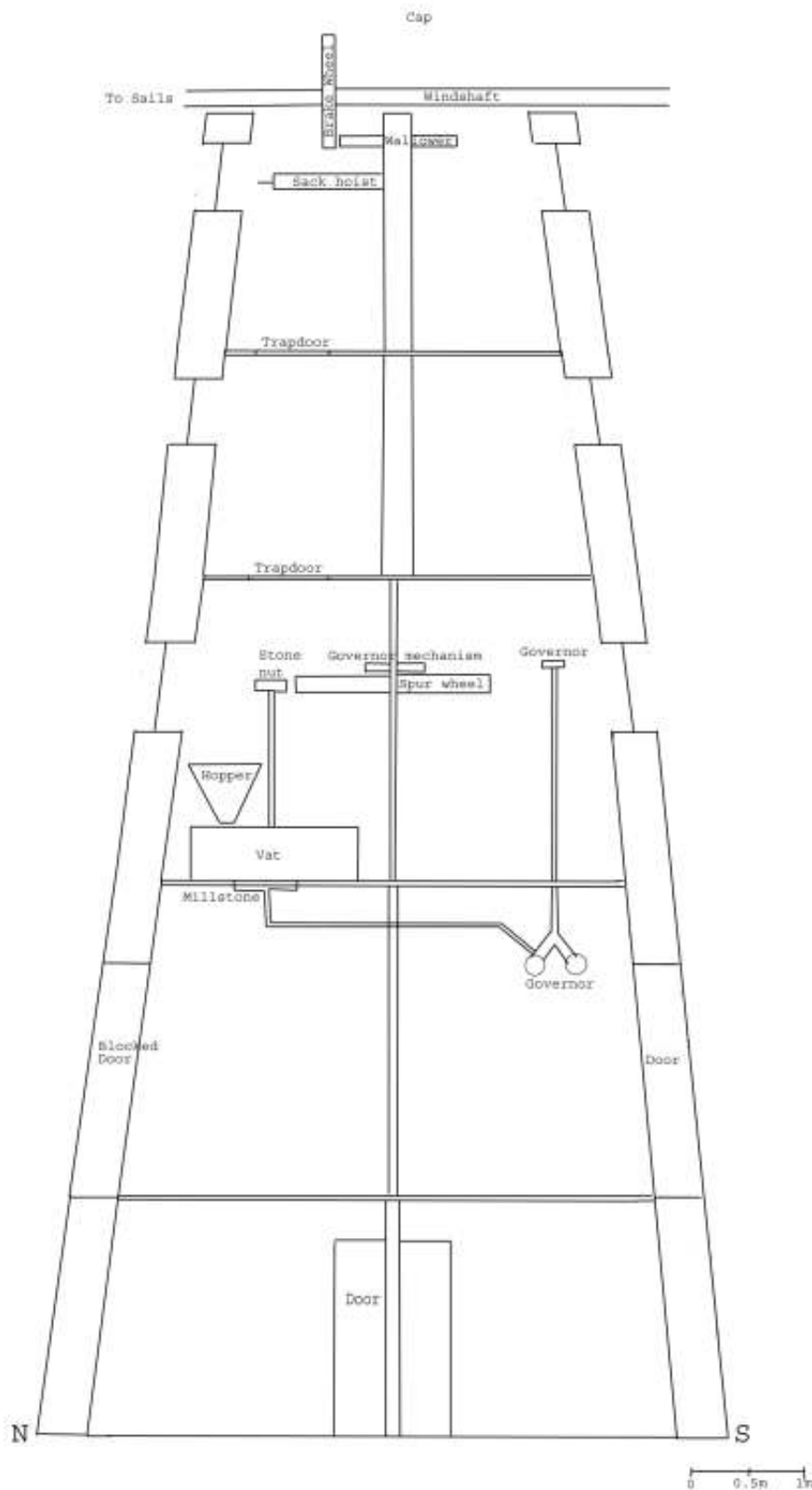


Fig. 53: Cross-section through Brixton Windmill today, showing the main features in elevation. The windshaft and brake wheel are not plotted accurately, as it was not possible to measure them.

6.1 General Interior Features

The interior walls were whitewashed during the 2010-11 restoration works, as discussed in the Southwark and Lambeth Archaeological Society Newsletter article. This was presumably for aesthetic reasons, however is patchy in places (fig.54).



Fig. 54: Photograph of the whitewashing of the interior of the walls, with the brickwork visible behind.

The brickwork has been restored in places, with some completely replaced bricks (fig.55). This was done during the 2010-11 restoration works, to further strengthen the structure.

Pieces of horizontal timber were observed on all floors (1-1.5m above floor levels), running the whole way round the structure, instead of a brick course (fig.55). These are original, and were presumably inserted to ensure the brickwork remained level.



Fig. 55: Photograph of the interior of the windmill, showing the horizontal pieces of timber (above the scale), and occasional replaced bricks.

Many of the floorboards have been replaced with modern machine-cut wood (some in 1964 and some in 2010) (fig.56). Many of the ceiling beams were also replaced, although some original beams do survive (they are mentioned in the discussion below).



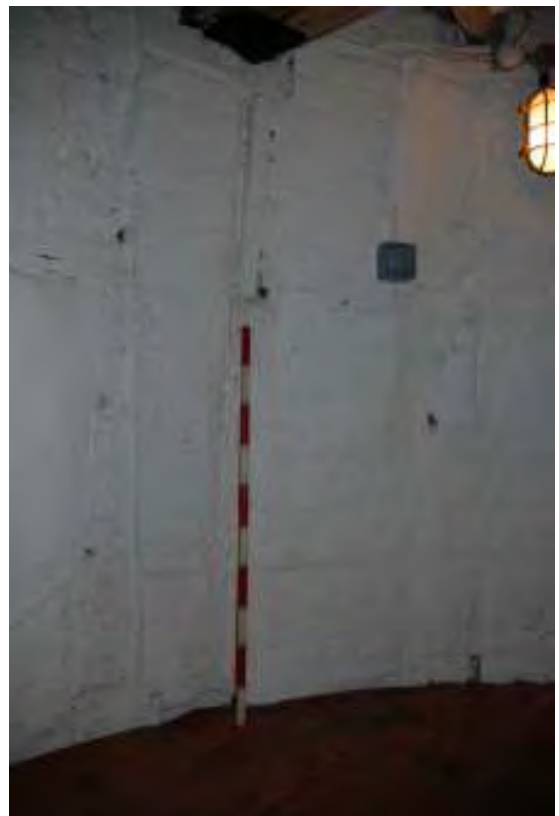
Fig. 56: Photograph of the ceiling beams and floorboards, looking up from the ground-floor. The beams and floorboards inserted during the 2010 renovation works are visible (orange coloured) plus those inserted in the 1960s (far end of frame).

The stairs and ladders are all later insertions (added in 1964), made of machine-cut wood and conforming to modern health and safety standards (fig.57). There must have been ladders of some description in the earliest mill (possibly simple rope-ladders), although it seems unlikely that these were in their present locations. This is particularly because the eastern (original) chute leading from the second to first floor is in the same place as the present ladder - this cannot be its original position as it would have obstructed the flow of the meal. There was a possible indication of where the original ladders may have been located on the third floor, where an upright piece of timber was observed in the north-east corner c.1.1m up the wall, with a similar horizontal indent in the wall c.0.5m to the east (fig.58). This is, however, only a suggestion, and the precise locations of the original ladders cannot be ascertained, with historic plans and images providing no information.



Fig. 57: Photograph of the modern stairs leading up from the ground-floor.

Fig. 58: Photograph of the vertical piece of timber observed in the wall on the third floor, possibly the remnant of an earlier ladder.



The trapdoors, found on all floors and measuring $c.0.8\text{m} \times 0.8\text{m}$, are also later insertions, built into the modern floorboards (fig.59). Further evidence for them not being original existed on the third floor, where empty mortice-holes were observed in the north-south timbers directly beneath the trapdoor, suggesting that an east-west beam must have originally been where the current trapdoor is (fig.60). Unfortunately, no evidence for the position of the original trapdoors was noted, mainly because the floorboards had been replaced. It seems likely that they would have been located away from the machinery and chutes - possibly towards the southern end of the structure?



Fig. 59: Photograph of the trapdoors on the third floor (one in the floor and one on the ceiling) - both replaced.



Fig. 60: Photograph of the trapdoor in the ceiling of the third floor, with the empty mortice hole directly beneath it, showing that there had once been an east-west beam here and that this was not the original location of the trapdoor.

Other modern features inserted during the 2010-11 restoration works were noted on all floors, including electric lights and burglar alarm.

6.2 Fourth Floor ('Dust Floor')

The fourth floor leads directly into the cap. The diameter of this floor is *c.* 3m, with a measurement from the floor to the top of the wall of 2.2m.

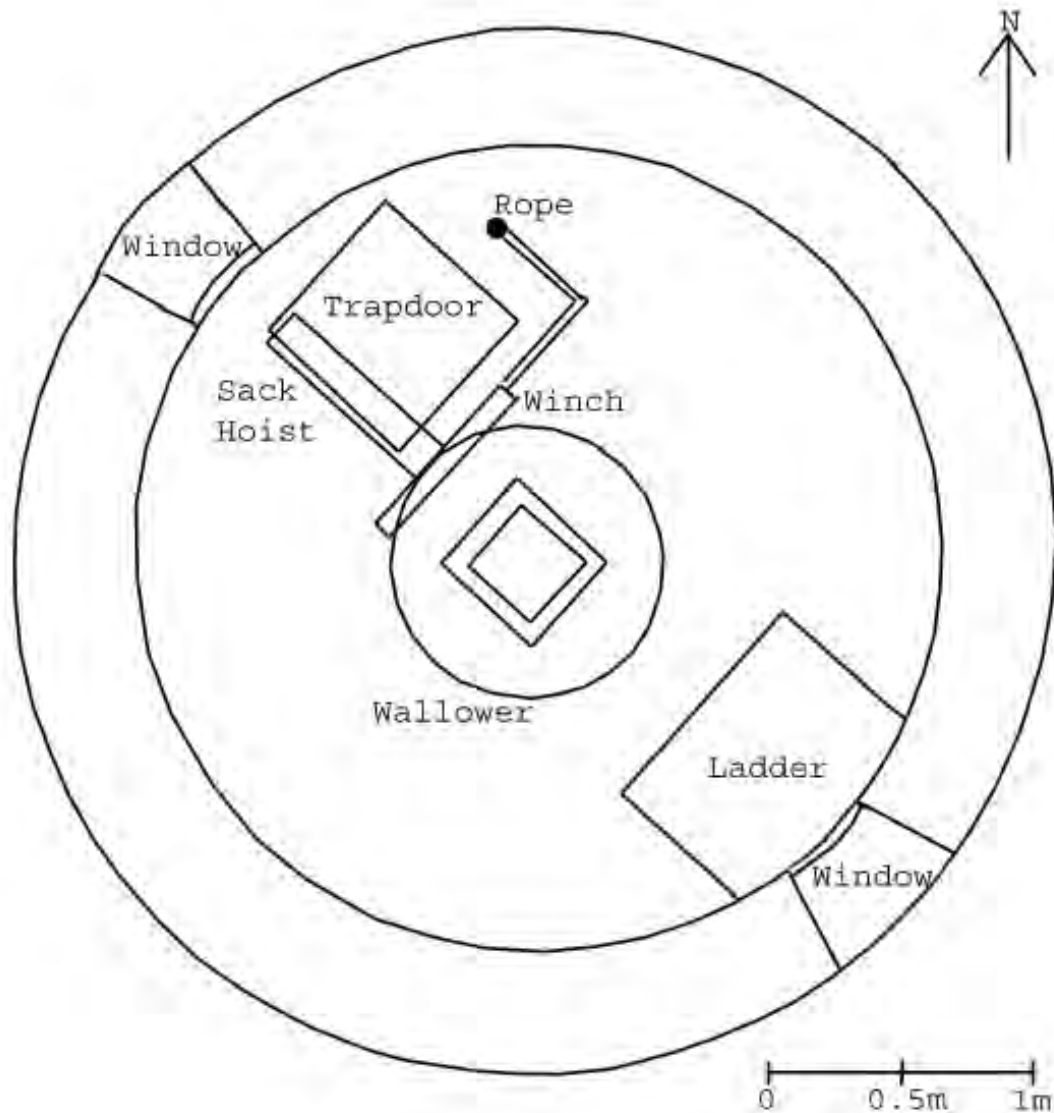


Fig. 61: Plan of the fourth floor, depicting the main features that are found there today.

The machinery on this floor is new (inserted during the 1964 renovation works, from Burgh-le-Marsh mill in Lincolnshire), but reflects what would have been here originally. The windshaft (the horizontal cast-iron shaft that runs across the base of the cap) was visible. This is attached to the sails, and carried the drive in from them.

It is attached to the brake wheel (the vertical gear wheel), which would have been attached to the 'wallower' (the gear wheel set horizontally on the central vertical shaft), although it is disengaged from this today. The current 'wallower' wheel has a diameter of 1.03m and is positioned 1.95m above the floor level. This transferred the drive from the windshaft to the vertical shaft and down to the stones.



Fig. 62: Photograph looking into the cap. The wallower (the smaller horizontal wheel), brake wheel (larger vertical wheel), and windshaft (horizontal shaft at the top) can all be seen.

The central vertical shaft on this floor (0.32m x 0.32m) is original (as it looks older than much of the other timber, and is the same shaft as that on the floor below, which is original because of the date on it, see discussion below). This shaft carried the drive down from the sails to the millstones below. Incised graffiti marks were visible on it - reading 'Z W B'. This is a graffiti mark, not a carpenters' mark, as it contains no indications about construction.



Fig. 63: Photograph of the graffiti on the central vertical shaft.

The sack hoist is also positioned on this floor. It was inserted during the renovation works, although reflects what would have been positioned here when the mill was wind-powered. The rope (seen on all floors) is located just to the north of the hoist, and is attached to it via a wooden mechanism. Pulling on the rope raises the wooden winch (0.55m diameter) to come into contact with the wallower, and it turns by friction from the wallower. This turns the iron drum (attached to the winch, 0.65m in length), which has the iron chain attached to it (used to pull the sacks up through the trapdoors). Once the sacks have been raised, the rope is released, the wheel disengaged, and the sack hoist stops.



Fig. 64: Photograph of the sack-hoist. The wooden wheel (the 'winch') is visible directly beneath the wallower, with the iron drum leading off this, and the rope and wooden pulley-system behind it.

The inside of the cap is attached to the mill body via a ring of metal teeth, with six centring wheels keeping it in position horizontally. The cap would have rotated (to enable the sails to face the wind), by a wheel-and-chain mechanism driven from the first-floor stage (see section 5.6), with the mill body remaining stationary.



Fig. 65: Photograph of the iron teeth connecting the mill to the cap, and the horizontal wheels which kept the cap in position.

6.3 Third Floor (Bin Floor)

The third floor contains little of interest today, apart from a few possible original features. It would have been used to store grain in large bins, and has a diameter of *c.*3.5m, with a floor to ceiling height of *c.*2m.

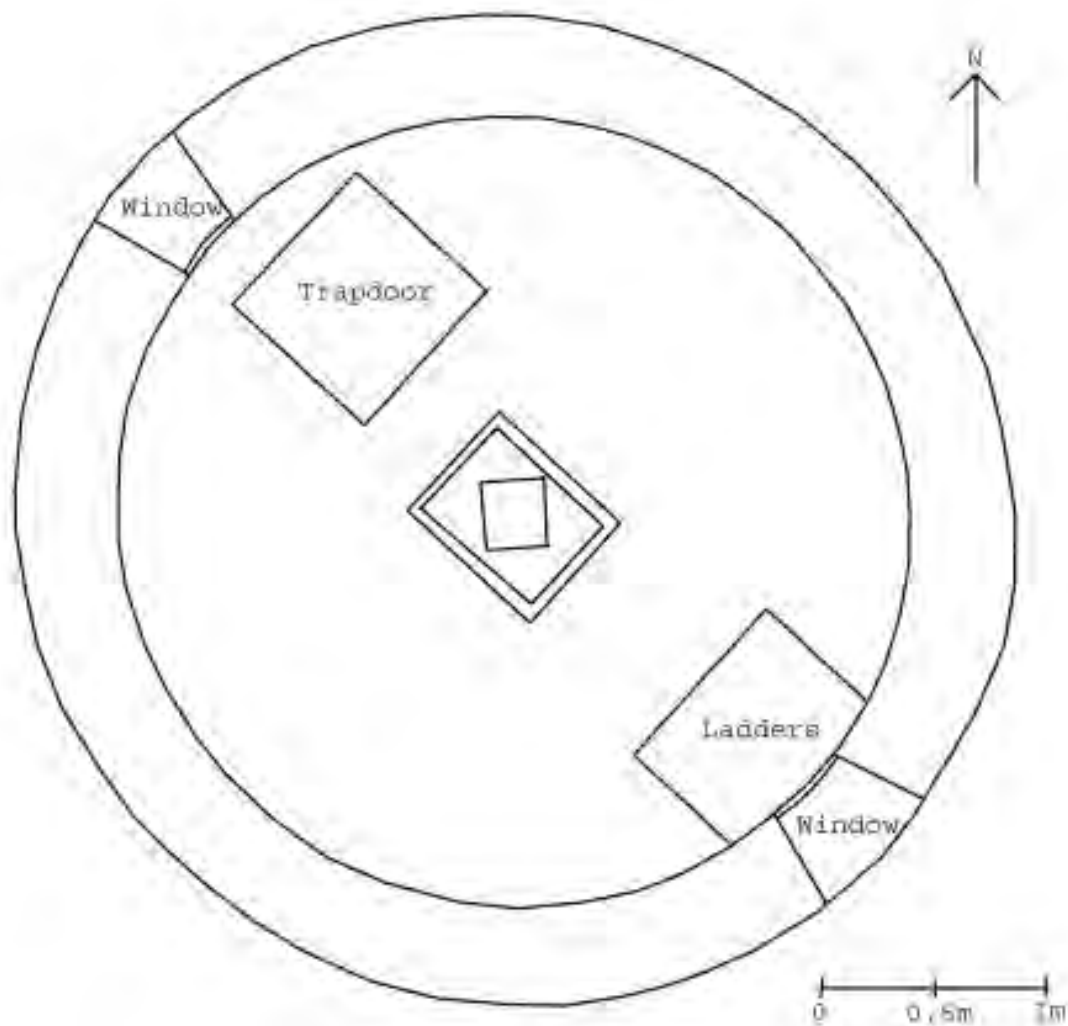


Fig. 66: Plan of the third floor, depicting the main features that are found there today.

The central timber post (0.33m x 0.33m) is original (although positioned in a later machine-cut wooden box, and currently supported by iron brackets). Graffiti on it reads 'IWH 1876 1883' (dated to when the mill was being used for storage) (fig.68). This suggests that the post is original to the earliest mill, as it would not have been inserted when the mill was just being used for storage. This is a continuation of the post observed on the floor above, used to transfer the drive from the sails to the machinery below.



Fig. 67: Photograph of the central vertical shaft, used to transfer the drive down from the sails.

Fig. 68: Photograph of the whitewashed graffiti observed on the central vertical shaft, proving that this shaft was original to the mill.



6.4 Second Floor (Stone Floor)

Many of the features on this floor were inserted during the restoration works, to present the mill as it was in its wind-powered days. Some original features were, however, observed, and which suggest that there were originally two pairs of millstones. The diameter of this floor measures *c.*4.2m, with a floor to ceiling height of *c.*2.64m.

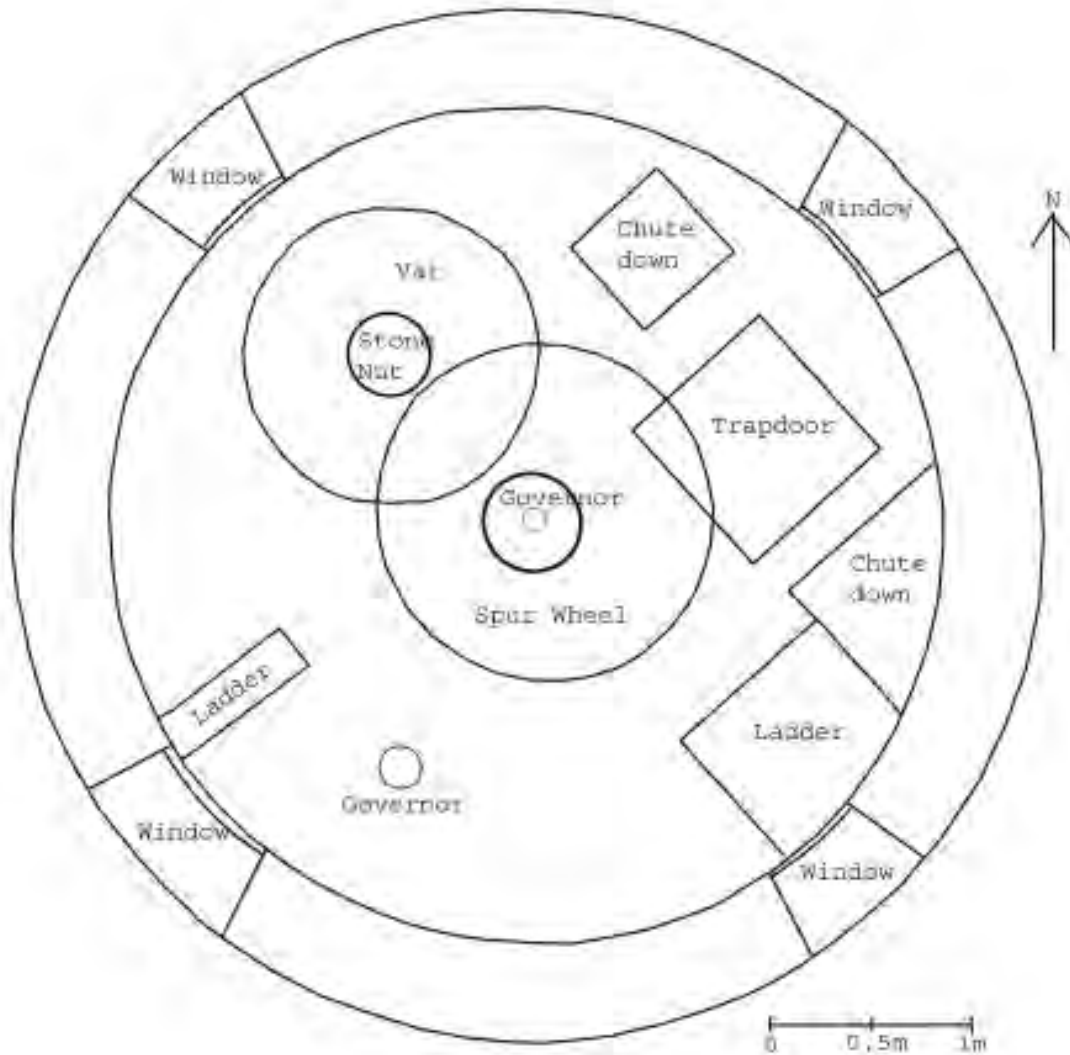


Fig. 69: Plan of the second floor, depicting the main features that are found there today.

The 'spur wheel' (the large cast-iron wheel on the main shaft), and 'stone nut' (the smaller wheel) are not original but, like most of the machinery, were inserted in 1964 and are of the type that would have originally existed. The spur wheel transferred the drive from the main shaft to the stone nut, which was attached to a shaft which turned the upper millstone (figs.70-71).



Fig. 70: Photograph of the spur wheel (the large wheel in the foreground) and stone nut (the smaller wheel in the background).



Fig. 71: Photograph of the spur wheel, stone nut, and vat (with millstones in), showing how they are connected.

The drive passed through these wheels to the millstones, situated within the circular wooden vat (inserted in 1964; 1.48m in diameter and 0.42m in height) (fig.72). It contains both millstones: the upper 'runstone', which rotated, and the lower 'bedstone' which remained stationary. The present stones are from Derbyshire, and have grooves on their inside faces to grind the grain. These stones are used for grinding barley, in contrast to French burr stones which were used for finer grinding. Above this is the wooden hopper (into which the grain was fed), which is 0.51m in height, 0.65m x 0.65m at its top, narrowing to 0.12m x 0.12m at its base. This fed the grain into the 'shoe', which shook the grain into the millstones at a steady pace (fig.73). The grain, once ground, would have exited the vat from one side - this area is currently latched up (fig.74).



Fig. 72: Photograph of the wooden vat, with the millstones inside, and hopper above.

Fig. 73: Photograph of the base of the hopper and the shoe (into which the grain was



fed), directly above the millstones.

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would have been open where the meal would have exited.

Associated with these millstones is the 'governor', which controlled the distance between the millstones, ensuring that consistent meal was produced. The main part of this was on the floor below (section 6.5), however the upper part, consisting of the wheel on the main central shaft (above the spur wheel), and the smaller wheel to the south of this, is on this floor (fig.75). The wheel on the central shaft rotated, and it was connected to the smaller wheel, which was connected to the vertical shaft which carried the rotation to the mechanism below.



Fig. 75: Photograph of the spur wheel (left of frame) with the smaller wooden wheel above this, which would have been connected to the governor wheel (right of frame).

Two chutes, leading to the floor below and both enclosed within modern wooden boxes, were observed in the north and north-east corners of this floor. The northern chute is modern (made of machine-cut wood), however the north-eastern one looks older, based on the type of wood (fig.76-77). These chutes transferred the ground meal to the floor below.



Fig. 76: Photograph of the wooden chute in the north-east corner of the second floor, possibly original.



Fig. 77: Photograph of the wooden chute in the northern side of the second floor, not original.

Some original features relating to the mill's wind-powered days were observed, and suggest that there may originally have been two pairs of millstones. A wooden chute was observed towards the north-eastern end of the structure, on the ceiling leading from the floor above. This was attached to a square wooden base-plate (measuring 0.23m x 0.4m), which was attached to the original east-west ceiling beam (fig.78). This chute is not currently attached to any other mechanism, suggesting that it is original and not inserted during the restoration works. No corresponding chute was observed on the opposite side of the structure, however a similar square wooden base-plate (measuring 0.22m x 0.38m) was observed on the north-eastern side, suggesting that there may have originally been a similar chute here (fig.79). This suggests that there may have been two sets of mill-machinery, either side of the mill, and that the two wooden chutes fed into one each. The fact that there are two chutes leading to the floor below (with the southern one looking original), supports this. It was relatively common for mills to have more than one set of millstones, as this was energy-efficient.



Fig. 78: Photograph of the wooden chute on the north-eastern side of the second floor, leading down from the third floor.



Fig. 79: Photograph of the square base-plate, on which a chute was presumably once attached, on the north-western side of the structure.

6.5 First Floor (Meal Floor)

Many of the features on the first floor have been heavily restored, with the only original features being structural. The diameter of this floor measures *c.*4.9m, with a floor to ceiling height of *c.*2.8m.

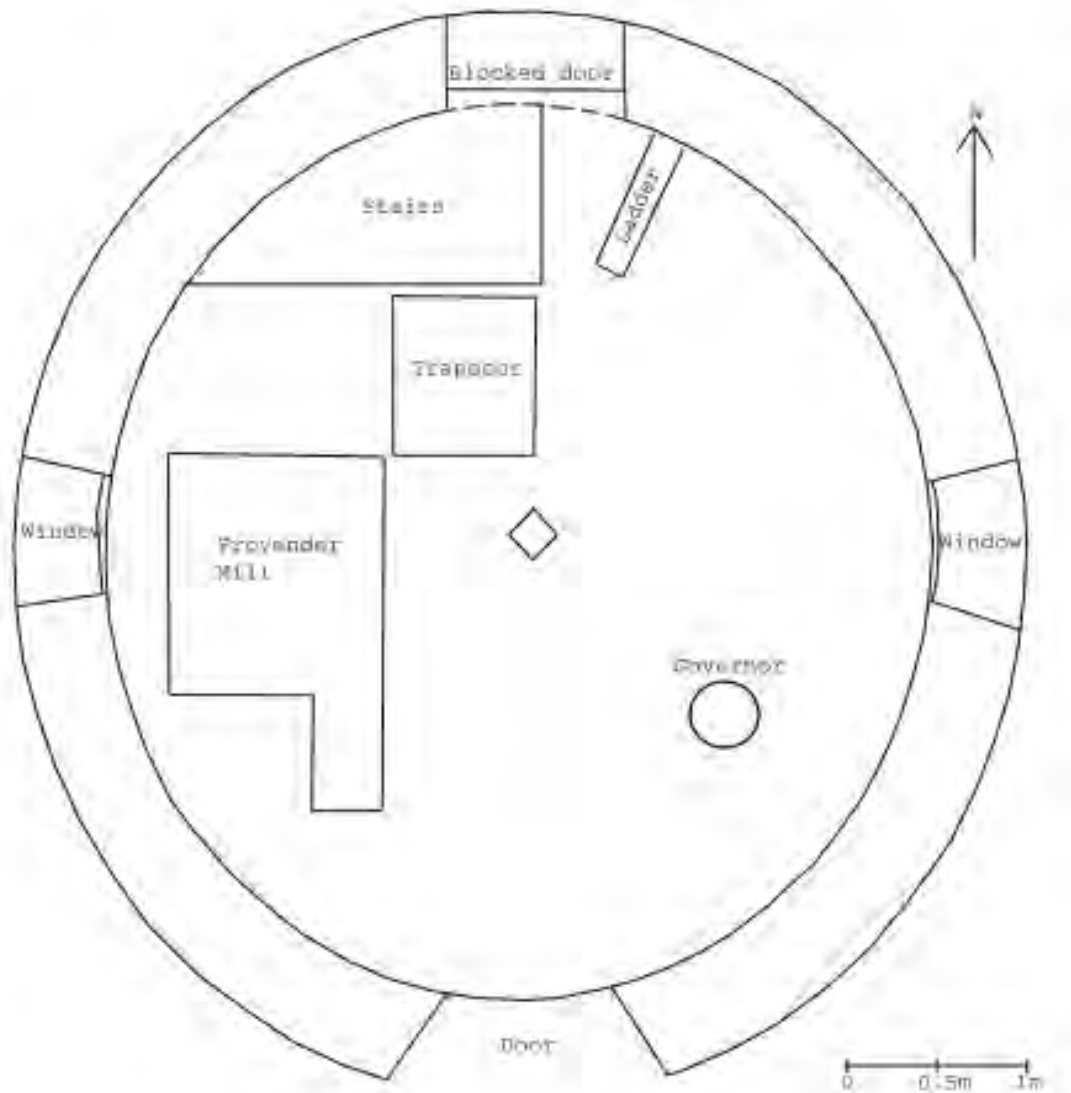


Fig. 80: Plan of the first floor, depicting the main features that are found there today.

The two doors on this floor (the functioning one on the southern side (fig.82) measuring 2.11m in height, by 0.86m in width; and the blocked one on the northern side (fig.81) measuring 2.18m in height by 0.86m in width) represent the location of the original doors which accessed the first-floor level stage (see section 5.4).



Fig. 81: Photograph of the blocked doorway on the northern side of the structure.

Fig. 82: Photograph of the door on the southern side of the structure.



The 'governor' was inserted in 1964, although it reflects what would have existed in the mill's wind-powered phase. It controlled the distance between the two millstones to ensure the consistency of the meal being produced, as the runner stone would typically rise whilst grinding. The governor rotated (driven from above, see section 6.4), which drove the balls outwards (by centrifugal force), which drove levers and gears which were connected to the runstone (figs.83-84).



Fig. 83: Photograph of the governor.



Fig. 84: Photograph showing the governor, and series of levers connecting this to the base of the millstones.

The bottom of the bedstone could be seen from this floor (fig.85). The wooden chute, coming from the floor above, through which the meal would have passed, was also observed (fig.86). This is all replaced (in 1964), but reflects what would have originally been here.



Fig. 85: Photograph of the bottom of the bedstone, viewed from the floor above, and the levers attached to the governor.



Fig. 86: Photograph of the (replica) wooden chute which would have brought the meal down from the floor above.

The provender mill (driven by steam / gas) is also on this floor (fig.87). This was inserted in 1902 when the mill became driven by steam (and then gas), however it was heavily renovated during the 1964 and 2010-11 works and is now driven by electricity. The metal 'chute' into which the grain was fed is visible, plus the metal drum (inside which the millstones could be seen), and the two gear-wheels which turn them (figs.89-90). These are driven from the fan-belt, currently powered by electricity.



Fig. 87: Photograph of the provender mill.



Fig. 88: Photograph of the restoration of the provender mill in 1964 (LMA).



Fig. 89: Photograph of the interior of the provender mill, showing the fan belt (right of image) which is currently driven by electricity, connected to two gear-wheels which rotate the millstones.



Fig. 90: Photograph of the interior of the provender mill, showing the two gear-wheels attached to the millstones.

6.6 Ground Floor

The ground-floor is used for educational purposes and visitors today, accounting for many of its features (inserted during the 2010-11 renovation works). The diameter is *c.*5.35m, with a floor to ceiling height of *c.*2.24m.

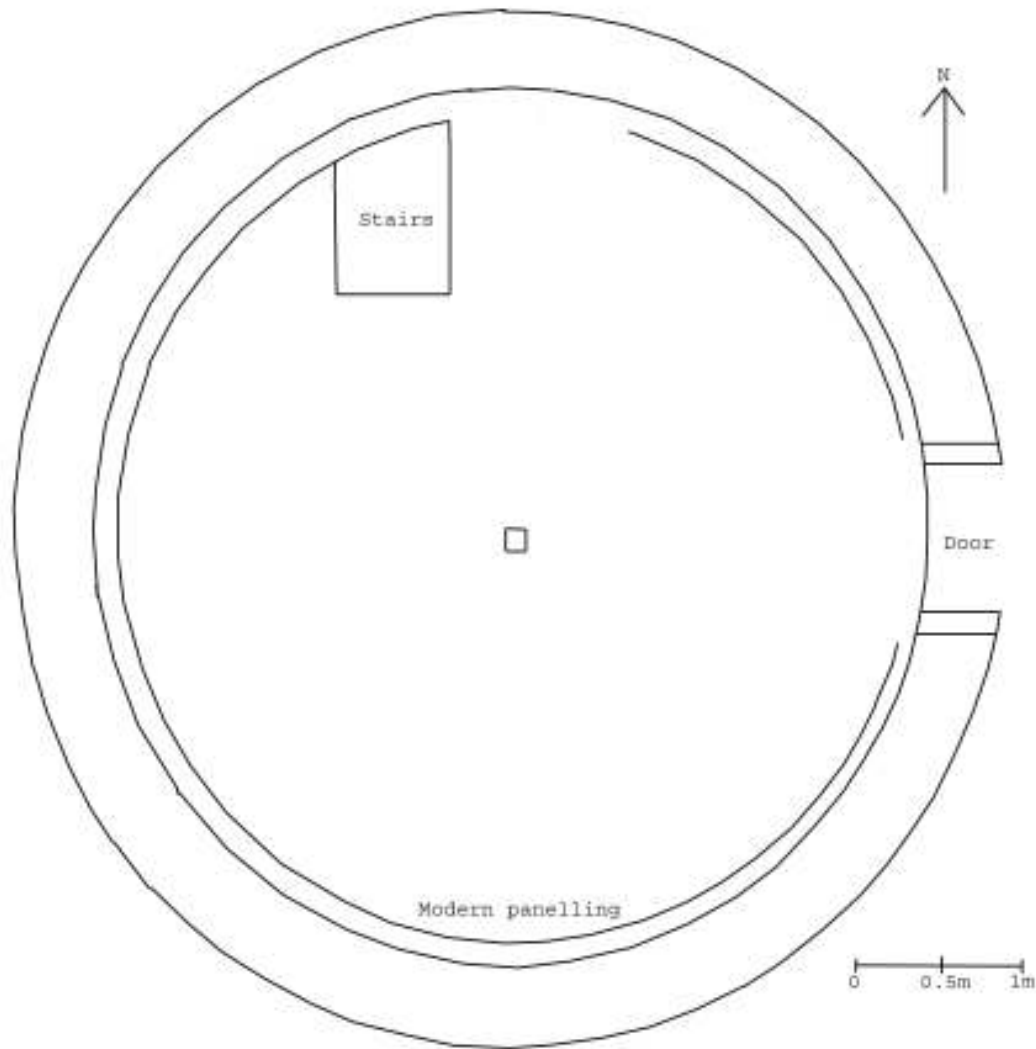


Fig. 91: Plan of the ground floor, depicting the main features that are found there today.

Most of the room is covered by modern white timber panelling (2.10m in height and 0.18m in thickness). Displays and signs cover these, plus lighting and alarm controls (fig.92).



Fig. 92: Photograph of the ground-floor of the mill today, showing the modern plasterboard and signs.

Although many of the ceiling timbers are modern (as is the central wooden post), the main north-south beam (4.92m in length) may be original, as looks older than many of the other timbers. Furthermore, empty mortice-holes were observed along its eastern and western sides, suggesting that it may be an earlier timber which was reused in the mill's construction (fig.93). It has been suggested that some of the mill's timbers may be older ships timbers.



Fig. 93: Photograph of the main east-west beam on the ground-floor, with an empty mortice hole suggesting that this may be a reused beam.

An iron hook was observed hanging off one of the older beams just to the north of the door (fig.94). This is presumably an older feature, not inserted during the renovation works, as it is hidden out of the way. Sacks of grain presumably hung off this, either when the mill was first working or when it was used for storage. Similar hooks were probably once found all over this floor, as is suggested by Rex Wailes in his 1958 report.



Fig. 94: Photograph of the iron hook observed hanging off one of the ceiling beams on the ground-floor.

7. Discussion and Analysis

This section considers the research questions raised in section 2, using the information gained from background research and fieldwork.

7.1 Phasing / Development of Brixton Windmill?

A brief overview of the chronological development of the windmill will be made first, highlighting the surviving features from each period.

- **Initial construction of the windmill (1816) and its wind-powered days?**

The mill was constructed in 1816 as a traditional windmill, with two sets of sails driving millstones to produce flour. This continued in operation until 1862.

The structure itself is original (with the exception of some replaced brickwork). The window locations (but not the windows themselves) are also original, as are some of the ceiling beams, and the existing door opening and blocked doorway on the first-floor (these accessed the stage which encircled the first-floor). Internally, the central wooden shaft on the third and fourth floor is original. The remnants of two chutes leading down from the third to the second floor also date from this period, and indicate that there were probably once two pairs of millstones.

Many of the other features found within the windmill are designed to present the windmill as it was in its wind-powered days, particularly the sails and interior machinery, but are not original.

- **The windmill is used for storage?**

In 1862 the mill ceased to operate, the sails were removed, and a gallery added around the base of the cap. It was used for storage until 1902.

Few surviving features from this phase of the mill's life survive. The whitewashed graffiti observed on the central shaft on the third floor was added then, and it is possible, although not certain, that the iron hook on the ground-floor may also date from this period.

- **The provender mill?**

In 1902 a provender mill, driven initially by steam and then gas, was installed. This continued in operation until 1934.

The provender mill that is currently on the first-floor of the mill dates from this period (although it has been heavily renovated and is now driven by electricity).

- **The 1964 restoration works?**

In 1964 the first restoration works took place. This aimed to present the mill as it was in its wind-powered days.

Most of the features within the mill date from these restoration works, including the sails and most of the internal machinery (windshaft, brake wheel, wallower wheel, sack hoist, vat, spur wheel and stone nut, governor, etc). A number of the floorboards and beams were replaced then, and new windows and doors added.

- **The 2010-11 restoration works?**

The most recent phase of restoration involved the replacement of some of the floorboards, the weatherboarding on the cap, some of the brickwork, and the whitewashing of the interior. The ground-floor panelling, lighting, and burglar alarm, were also added.

7.2 Brixton Windmill as a Tower Mill?

A typological discussion of the windmill can be made, considering how 'typical' it is as a 'tower mill', and how it fits into the history of such windmills.

References to windmills in England exist from the 12th Century. These were generally 'Post Mills' (mounted on a post which rotated to face the wind). These developed into 'Smock Mills', which had wooden bodies where just the cap rotated, which later developed into 'Tower Mills', which were stronger brick constructions. They could therefore be taller and have longer sails, producing more power. Tower mills were popular in England throughout the late 18th and 19th Century, until the later 19th Century when industrialisation rendered wind-power obsolete.

Although the structure of windmills changed over time, their basic mechanism remained broadly unchanged - with the sails driving the windshaft, and the power from this being transferred down through the mill structure to drive the millstones.

Brixton Windmill is a typical tower mill in many respects - its brick construction, circular shape, height, four sails, and machinery. The date of its construction (the early 19th Century) is also typical, although its later use, particularly the installation of a provender engine, is not so typical (see section 6.4). One less typical feature is the lack of a fantail (to rotate the cap) - this was patented in 1745 and was a relatively common feature on windmills from this date.

7.3 Functional Interpretation of Brixton Windmill (in its wind-powered days)

A functional interpretation of the windmill, when it was wind-powered, can be made. The below schematic elevation (fig.95) shows how it worked and how it is believed to have looked in its wind-powered days.

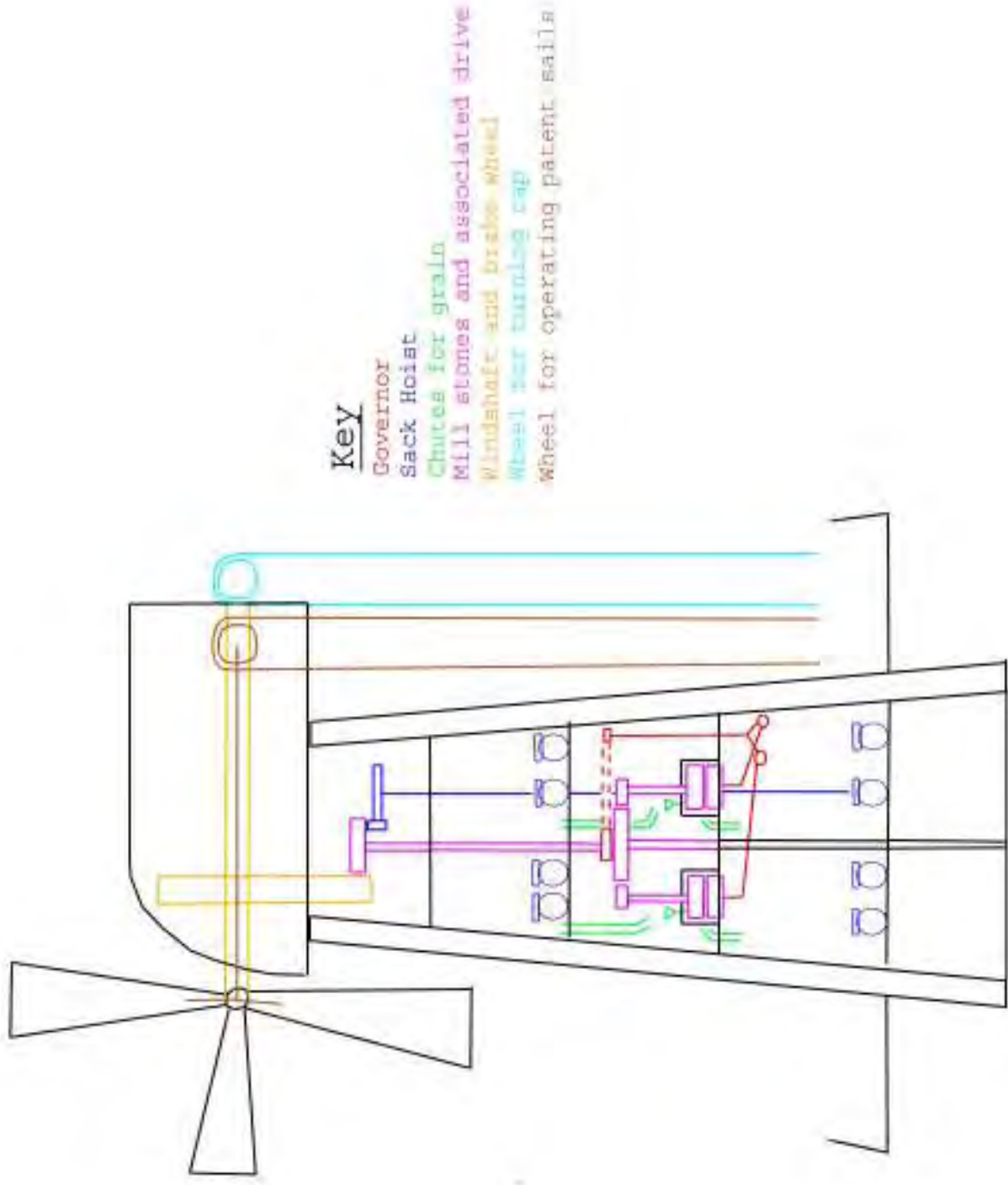


Fig. 95: Schematic elevation of Brixton Windmill, showing it as it is believed it looked in its original wind-powered days.

The first stage of the process involved the turning of the sails, driven by the wind. There were two pairs of sails - initially both were common sails until 1827 when one pair was converted to patent sails (William Ashby's ledgers record this). These patent sails were operated via a wheel-and-chain mechanism (brown in fig.95), which led to a stage, from where they could be operated. Another wheel-and-chain mechanism turned the cap (turquoise in fig.95), to move the sails into the wind.

The sails were attached to, and turned, the windshaft (the large horizontal shaft leading off from the sails into the mill itself) (orange in fig.95). This was attached to the brake-wheel (orange in fig.95), which engaged with the wallower to transfer the drive from the sails to the vertical shaft. The drive from the wind was thereby transferred down the mill structure via this vertical shaft, to the second floor (purple in fig.95).

On the second floor two gear-wheels (the spur wheel and stone nut) drove the millstones, with the upper stone (the runstone) rotating, whilst the lower stone (the bedstone) remained stationary (purple in fig.95). The grain was fed to the stones via the hopper and shoe, was ground by the stones, and exited the vat through one of its sides and down chutes to the floor below (green in fig.95). The distance between the millstones was controlled by the governor, which used levers to lower the runstone when necessary (red in fig.95).

It is believed that there were originally two pairs of millstones. This is based on the evidence for two original chutes leading down from the third floor, plus two chutes leading from the second to first-floor (although one of these is not original). Two stone nut wheels would have been connected to the central spur wheel, and would both have been driven by this.

Many other tower mills in the UK had two sets of millstones, such as Wimbledon, Upminster, and Cromer. Having two sets made economical sense, as they could both be driven from the same power source - the sails - with this drive being transferred down the mill in the same way as it would be for one set of stones, and two stone nut wheels simply being connected to the spur wheel (see fig.95). Double the amount of grain could therefore be ground from the same amount of power.



Fig. 96: Photograph of Moulton Windmill in Lincolnshire (<http://4.bp.blogspot.com/-pOOk7O7hptc/T5KoIHPtf4I/AAAAAAAAADmA/XXFPIEjE5TE/s1600/Millstones,-Moulton-Windmill,-Lincolnshire.jpg>), showing two sets of millstones being driven from the same spur wheel. the two stone nuts connected to this single spur wheel can be seen.

The grain was stored in sacks on the ground-floor. This was raised up to the third-floor (through various trap doors) using the sack hoist (positioned on the fourth floor), which was driven by friction from the wallower wheel (blue in fig.95).

7.4 The Impact of Industrialisation?

During the Industrial Revolution, typical forms of power (such as wind-power) were replaced by steam and gas. Brixton Windmill is particularly interesting in this respect as reflects this transformation, with it being wind-powered during the early-mid-19th Century, with a provender mill being installed in the 20th Century. This is in contrast to most other windmills, which became obsolete with the onset of industrialisation.

Why Brixton Windmill embraced industrial forms of power, in contrast with many other windmills which simply ceased to function, is unknown. It may have been because of the family nature of the Ashby milling business and their desire to keep this going, such that when the water supply at Mitcham failed they were determined to find another way of continuing their business. Had the water supply at Mitcham

continued, moreover, the provender mill may never have been installed at Brixton. Such reasons can only be guessed at.

7.5 The Restoration Works?

Many of the features in the windmill today date from the 1964 or 2010-11 restoration works. The most notable features of this are the internal machinery, including the windshaft, wallower wheel, brake wheel, spur wheel, stone nut, governor, and vat; plus the sails.

It is notable that the decision was made to restore the windmill 'back' to its wind-powered days, rather than the period when it was driven by the provender mill (particularly considering that arguably one of the most interesting features of this mill is the fact that it embraced new forms of power). This may have been because of the interest in windmills, particularly as few similar windmills survived into the mid-20th Century.

The fact that such extensive restoration works have taken place mean that few 'original' features (aside from the structure itself) survive. This could be seen as a shame, but, equally, has enabled the mill to survive and be used for educational purposes.

8. Conclusions

8.1 History of the windmill

Brixton Windmill was constructed in 1816 as a typical tower mill, to grind grain into flour using two pairs of millstones and two pairs of sails (one of which was converted into patent sails in 1827). It continued in operation until 1862, when residential development effectively stole the wind from its sails. The mill was reduced to being used for storage and much of the equipment (including the sails) removed. In 1902, however, the mill gained a new lease of life, when a provender mill (driven initially by steam, then gas) was installed. This continued in use until 1934, when the mill permanently closed. The structure survived, and was restored in 1964 by 're-creating' it as it was in its wind-powered days (through the installation of new sails and wind-powered machinery). Since then, the mill has been carefully looked after, with further restoration works in 2010-11.

This historic building survey has identified features associated with each of these periods, and has arguably been of most interest in identifying remaining features from its original wind-powered days. This has led to the suggestion that there were probably originally two pairs of millstones, as two probable original chutes were observed leading from the third to second floor, which would have fed into two sets of millstones.

8.2 Limitations of the study

Crucially, the upper levels of the windmill (the cap and sails) could not be measured or fully investigated, because of a lack of access (no scaffolding, etc).

The study was also limited by time constraints as the fieldwork could only be carried out when the windmill was open to the public.

It is also possible that more technical equipment, such as a laser scanner, could have produced more accurate measurements at a quicker pace.

8.3 Recommendations for further work

Future work could consider further the theory that there were originally two sets of millstones operating in Brixton Windmill. Work could also focus on trying to ascertain where the original trapdoors and ladders were located.

Dendrochronological analysis of key timbers within the structure (particularly the north-south one on the ground-floor) could help ascertain whether they are older reused timbers, and help identify which beams are original.

Archaeological excavations around the windmill might identify the other ancillary buildings, and the mill's relationship with them.

8.4 Wider importance of this study?

Brixton Windmill is an important example of the type of windmill which once populated the English landscape with, for example, there being five windmills just in Lambeth in the early 19th Century. These were a crucial part of the pre-industrial economy, yet few of them survived the changes brought about by industrialisation. Brixton is a rarity in this respect, as embraced industrialisation rather than being destroyed by it. Its survival, and study of it, is therefore important in understanding such earlier industrial structures.

9. Bibliography

Brixton Windmill, Blenheim Gardens, Lambeth: Statutory Planning File (1934-71). In the London Metropolitan Archives (GLC/AR/HB/02/0265).

Cattell, J. 2008. *Complex Architectural Survey (Management of Research Projects in the Historic Environment PPN4).*

Daily Chronicle. 27.8.1913. *London Flour Mill's Coming Centenary.*

Daily News. 27.8.1913. *The Old Mill at Brixton.*

Dudman, J. 1995. *Brixton and Norwood in Old Photographs.*

English Heritage. 2006. *Understanding Historic Buildings. A guide to good recording practice.*

English Heritage. 2008. *Understanding Historic Buildings: Policy and Guidance for Local Planning Authorities.*

Farries, K.G. and Mason, M.T. 1966. *The Windmills of Surrey and Inner London.*

Friends of Windmill Gardens, *Brixton Windmill*, <http://www.brixtonwindmill.org/>
Viewed 16.04.2012.

Greater London Council. 1967. *Brixton Windmill.*

Greater London Historic Environment Record Online
(<http://www.heritagegateway.org.uk/gateway/>)

Henslowe, L. 1902, *Brixton: Its Story.*

ILEA 'Contact'. 30.9.1977. Issue 16. *The Brixton Windmill.*

Institute for Archaeologists. 2008. *Standard and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures.*

Lambeth Parks, *Brixton Windmill.*

Lambethan, 1964, No.8. *Curtain on History.*

Listing text, *The Brixton Windmill, Brixton*,
<http://www.britishlistedbuildings.co.uk/en-204004-the-brixton-windmill-brixton>
Viewed 16.04.2012.

Malden, H.E. 1912. *Victoria County History: A History of the County of Surrey, Volume 4: Brixton.* <http://www.british-history.ac.uk/report.aspx?compid=43023>.

Mannering. 1924. *Brixton Then and Now: An Illustrated Review of the past 100 years.*

- Norfolk Archaeological Unit. 2005. *A Photographic Survey and Observations at the Former Corn Windmill, Cooper's Mill, Walpole Highway, Walpole St Peter, Norfolk*.
- O'Flaherty, CJ. 2008. *Historic Building Recording: The (former) Craggs Row Windmill Mill, Craggs Row, Preston*.
- Palmer, M, and Neaverson, P.A. 1998. *Industrial Archaeology: Principles and Practice*.
- Palmer, M, et al. 2012. *Industrial Archaeology: A Handbook (CBA Practical Handbook 21)*.
- Pastscape, *Brixton Windmill*, http://www.pastscape.org.uk/hob.aspx?hob_id=404457 Viewed 18.04.2012.
- Photo Reflect*, <http://photorelect.blogspot.co.uk/2012/04/old-windmill-new-sails.html>, Viewed 16.5.2012.
- Piper, A. 1996. *A History of Brixton*.
- Planning Policy Statement 5: Planning for the Historic Environment*, 2010.
- RCHME. 1996. *Recording Historic Buildings: A Descriptive Specification*.
- RJB, 'A Dream Come True' - The Brixton Windmill', *Southwark and Lambeth Archaeology Society Newsletter*, 130, June 2012.
- Sheppard, F H W. 1956. *Survey of London: Volume 26, Part 2: St Mary Lambeth*.
- Short, M. 1971. *Windmills in Lambeth: An Historical Survey*.
- Smith, D. 1932. *English Windmills: Volume 2: Containing a Record of the Mills in Buckinghamshire, Essex, Hertfordshire, Middlesex, and London*.
- Swallow, P, Dallas, R, Jackson, S, and Watt, D. 2004. *Measurement and Recording of Historic Buildings*.
- Wikipedia, *Ashby's Mill*, http://en.wikipedia.org/wiki/Ashby's_Mill Viewed 24.04.2012.
- Wikipedia, *Tower Mill*, http://en.wikipedia.org/wiki/Tower_mill Viewed 28.04.2012.
- Wikipedia, *Windmills*, <http://en.wikipedia.org/wiki/Windmill> Viewed 28.04.2012.
- Windmill World, *History of Windmills*, <http://www.windmillworld.com/windmills/history.htm> Viewed 28.04.2012.
- Wailes, R. 11.12.1958. *Report on Brixton Windmill*.
- Watts, M. 2001. *The Archaeology of Mills and Milling*.

9.1 Cartographic Sources

EDINA Digimap (University of Edinburgh).

Lambeth Wards Map, 1841.

Ordnance Survey Maps, various dates and scales.

Rocque, J. 1746. *Survey of London, Westminster and Southwark*.

Stanford, E. 1862. *Library Map of London and the Suburbs*.

9.2 Pictorial Sources

London Borough of Lambeth, *Lambeth Landmark* (*Lambeth Archives Database collection*).

Various other images in the London Metropolitan Archive (SC/PHL/02/1140).

10. Appendix I - Listed Building Description

The Brixton Windmill, Brixton

Description: The Brixton Windmill

Grade: II*

Date Listed: 19 October 1951

English Heritage Building ID: 204004

OS Grid Reference: TQ3045874362

OS Grid Coordinates: 530458, 174362

Latitude/Longitude: 51.4532, -0.1238

Location: 108 Ramilles Close, Lambeth, Greater London SW2 5DQ

Locality: Brixton

Local Authority: Lambeth

County: Greater London

Country: England

Postcode: SW2 5DQ

BLLENHEIM GARDENS (off) SW2

1. (south side)

5023

The Brixton Windmill (formerly listed as Old Mill in Yard at No 51)

TQ 3074 22/43 19.10.51

II*

2.

1816. Conical brick structure with small segment-headed windows at 4 levels. Restored boat-shaped cap with replaced sails. Brick laid in Flemish bond and tarred.

Listing NGR: TQ3040174221

11. Appendix II - National Monuments Record ('Pastscape') Record

Brixton Windmill

County: Greater London Authority

District: LAMBETH

Monument Number: (TQ 37 SW 1)

POST MEDIEVAL **WINDMILL** 1817 - 1862

POST MEDIEVAL **TOWER MILL** 1862 - 1862

MID 20TH CENTURY **TOWER MILL** 1934 - 1934

A tower mill built in 1816. The mill ceased work with wind in 1862 and with its engines in 1934. It is built of brick in a Flemish bond and then tarred. The machinery in the mill came from Burgh le Marsh, West End Mill, Lincolnshire.