Misc 7

DOGDYKE PUMPING STATION

TATTERSHALL BRIDGE LINCOLNSHIRE

A Survey

Industrial Archaeology Section
University of the Third Age (Sleaford Branch)
July 2002

ELI 7829 SLI 11416 PRN 43558

Dogdyke Pumping Station – Tattershall Lincs.

The following notes and sketches were made in June 2001 and relate to a building housing a boiler, beam engine and scoop wheel which is sited on the north bank of the river Witham south of Tattershall Lincs (map reference TF205558) and known as Dogdyke Pumping Station. The notes are the result of a cursory survey of the building carried out on 23rd May 2001 by the Industrial Archaeology section of Sleaford U3A with the help of Mr J G Porter Bridge Farm Tattershall Lincs.

This Steam Pumping Engine House was erected circa 1855 stands on land currently belonging to J. G. Porter and is flanked by a smaller building to the east (circa 1940 and housing a Ruston diesel engine and Gywnnes pump) and to the west by the site of an earlier wind pump, of which there are no visible remains, *see early drawing in appendix*. Nearby is a near derelict two-storey cottage contemporary with the Steam Pumping House. This would have been occupied by the engine master (and later by the engineer in charge of the diesel pump)

Detail on an ordnance map dated 1904, *see fig 1*, showing the Steam Pumping Engine House and cottage along with other features and buildings. There is a sluice and a number of other buildings that have since been demolished. Adjacent to the north of the site was a brick makers cottage and workshop associated with the nearby clay pit. The bricks made are understood to have been "soft" and were not used for building the Steam Pumping Engine House or the Cottage. Also shown on the map is the line of an over spill dyke which runs from the pond adjacent to the Steam Pumping House into the River Bain to the south west. Traces of this dyke still remain, as does the embankment to the now defunct GNR rail line, which crossed the River Bain at the same point.

The Steam Pumping Engine House Building is in a reasonable state of preservation although the chimney was demolished early in the Second World War, as it was considered a danger to aircraft using the nearby Coningsby Airfield and could be used as a marker for enemy aircraft attacking the Airfield. The height of the chimney was said to have been 100 ft, of square section to the eve level of the building and then circular and tapered. There are scattered on the site a number of semi-circular capstones from the chimney but the other details are anecdotal. A painting by a local artist, Karl Wood, shows the engine house and chimney; although this is the only known record and cannot be relied on for accuracy in respect to the height.

The construction of the Steam Pumping Engine House is red brick garden wall bond with stone coping and lead flashing. The building roof is of slate tiles with a slate ridge and has cast iron gutters and down pipes. Two large windows have cast metal frames and the others have wooden frames. All the windows have stone sills. The main doorways have stone lintels and the Engine House lintel clearly was removable to facilitate the installation of the Beam Engine. None of the doors themselves are thought to be original other than the "valve" doors/ gates from the Scoop Wheel.

The levels around the Steam Pumping Engine House have changed considerably since the building was erected. The raising of the banks of the River Witham destroyed the exit culvert from the scoop wheel to the river and altered the ground level around the main doorways. Similarly the construction of the diesel pump house necessitated the extending of the "pond" and an elevated walkway to give access to the Scoop Wheel. In circa 1940, as a wartime expedient, an underground tank for the storage of diesel oil was sunk along side the west wall of the Pump House, which partly buried a side door. (Nb - the feed pipe for the underground tank runs to the side of the nearby cottage)

The ground plan of the Steam Pumping Engine House, *see fig* 2, shows three separate rooms.

The westerly room is the Boiler House. It houses the remains of a 6ft x 16ft Lancashire boiler manufactured by Fosters of Lincoln. This Boiler replaced the original in 1909. Most of the flue system has been dismantled; *see typical flue drawing in appendix*, presumably this took place when the chimney was demolished and perhaps more recently when a small vertical boiler was introduced to steam the engine after refurbishment. On the outside wall is the Lancashire boilers safety valve and the remains of part of the damper system can be seen above the rear door. A hole has been cut in the slate roof of the Boiler House to accommodate a metal chimney from the small Vertical Boiler.

The central room is the Engine House containing the original beam engine, *see sketch in appendix*. The engine was built by Bradley and Craven of Wakefield circa 1855 is on an A frame with a beam length of 14 feet. It has a bore of 23 inches and a stroke length of 4 feet and the flywheel is believed to have run at 27 rpm. (The engine, which is owned by the Witham Third Internal Drainage Board and leased to the Dogdyke Pumping Station Trust set up in 1969, was restored to working and "steamed"; photographs taken during the restoration of the engine in the 1970's are held in Lincoln by the Museum of Lincolnshire Life. The vertical boiler has since been condemned and the engine can at present only be turned by hand) Above the engine are the original lifting beams used for mounting the engine in place over a pit dug into the floor of the room.

From the flywheel a shaft runs through the wall into the third room to drive the scoop wheel. From the north wall of this Scoop Wheel House room extends a tunnel leading to the "pond". Water flows from the "pond", through a metal grill to the base of the scoop wheel, which is 28 feet in diameter. The scoop wheel is mounted on bearing blocks carried on brick abutments built from below the water level of the "pond" to the level of the room access door. In the south wall is an arch over the exit culvert, from which water would have flowed into the river Witham, although the culvert has now been blocked a few feet beyond the building. The bottom level of the exit culvert is some 4 feet higher than the level at the bottom of the scoop wheel; this being the distance water was lifted to drain the adjacent land via the drains leading to the "pond". Set just inside the arch are two outward opening gates/doors counterweighted to keep them closed. These act as a one way valve, allowing water lifted by the

scoop wheel to flow out whilst preventing water from flowing back into the Scoop Wheel House. The exit culvert is open adjacent to the building but would have been covered with boarding at what would then have been ground level to the point were the exit culvert becomes a tunnel through the embankment into the river. On the outer wall above the arch are the remains of hinges to what would have been two small inspection doors.

The scoop wheel is driven from the engine flywheel via a 3 to1 ratio gear train. It is estimated that the wooden paddles on the scoop wheel could have lifted and discharged into the River Witham over 5,600 gallons per minute (25 tons) of water from the surrounding fen.

Fig 3 Shows the front of the building looking north from the riverbank. The central door leads into the Engine House, the door on the left is the main access to the Boiler House and the arch on the right is the top of the exit culvert from the Scoop House.

Fig 4 Showing the rear of the building. The large window in this wall is the same size and construction as that on the front of the building but is set somewhat lower. The arched doorway gives access to the Boiler House although it is unclear whether this was originally an access door or whether the arch was a part of the flue linking the boiler with the chimney. There is on this wall all that remains of a damper chain, pulley and the damper itself *see photograph in appendix.* Additionally the brickwork to the left of the arch is badly heat eroded, either by flue gasses or some form of steam release. The floor of the Boiler House is lower at the back of the boiler than at the front and again this is thought to be related to the original construction of the flue.

Fig 5 shows the west wall of the Boiler House. The door in this wall into the Boiler House, which presumably gave access to a coal heap, has a wooden lintel. The window above and to the left of this door has a wooden frame that can be slid open to give ventilation to the Boiler House. The original boiler safety valve is on this wall *see photograph in appendix.* It is noted that the original pipe was not set "squarely" through the wall and has been corrected by a large tapered flange washer at the junction of the pipe to the valve.

Fig 6 shows the east wall to the Scoop Wheel House. The entry to the Scoop Wheel House is now from an elevated walkway but would originally have been reached directly from ground level.

Fig 7
Shows schematically how the water was lifted by the Scoop Wheel and discharged via the exit culvert into the River Witham.

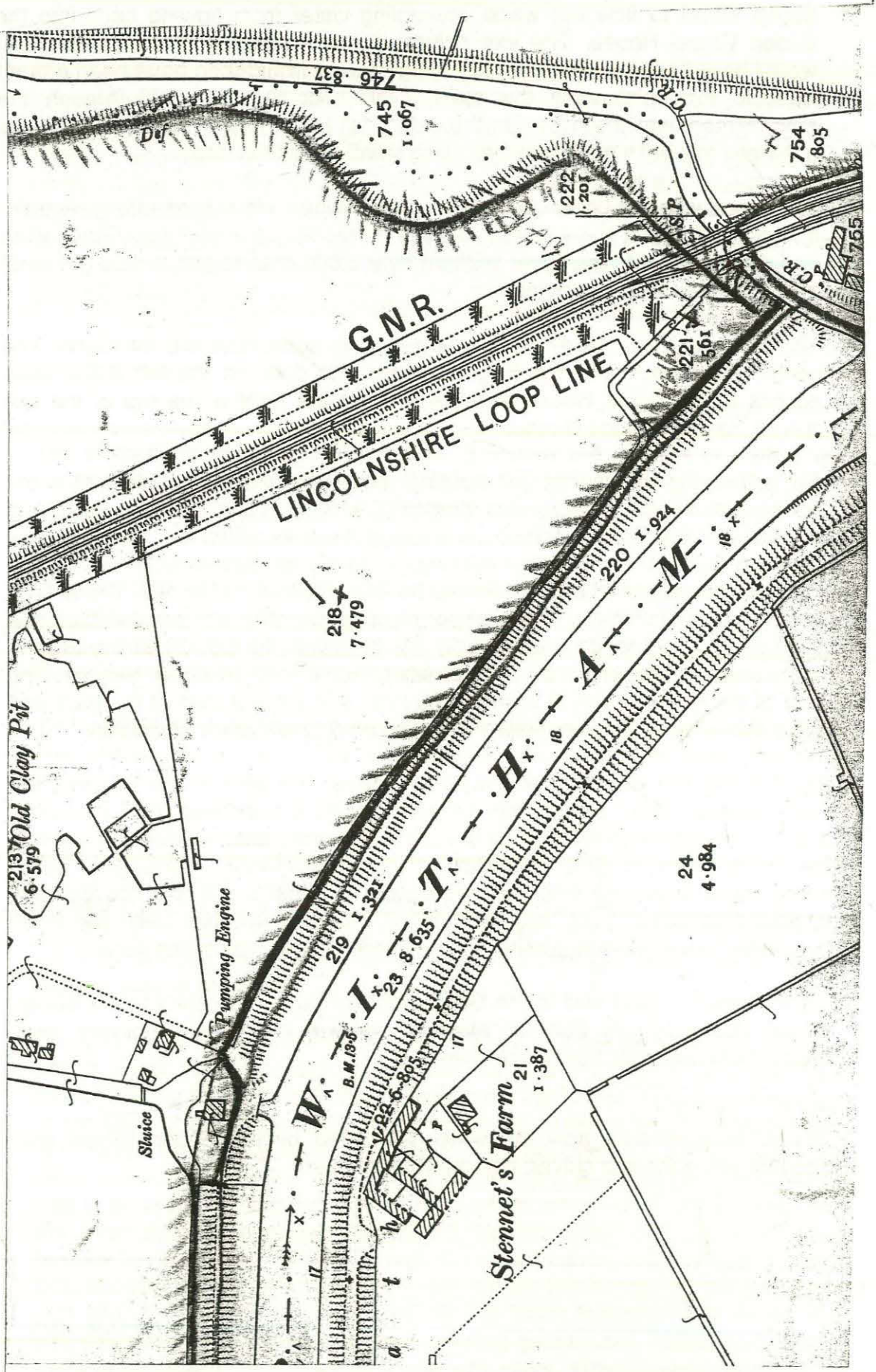
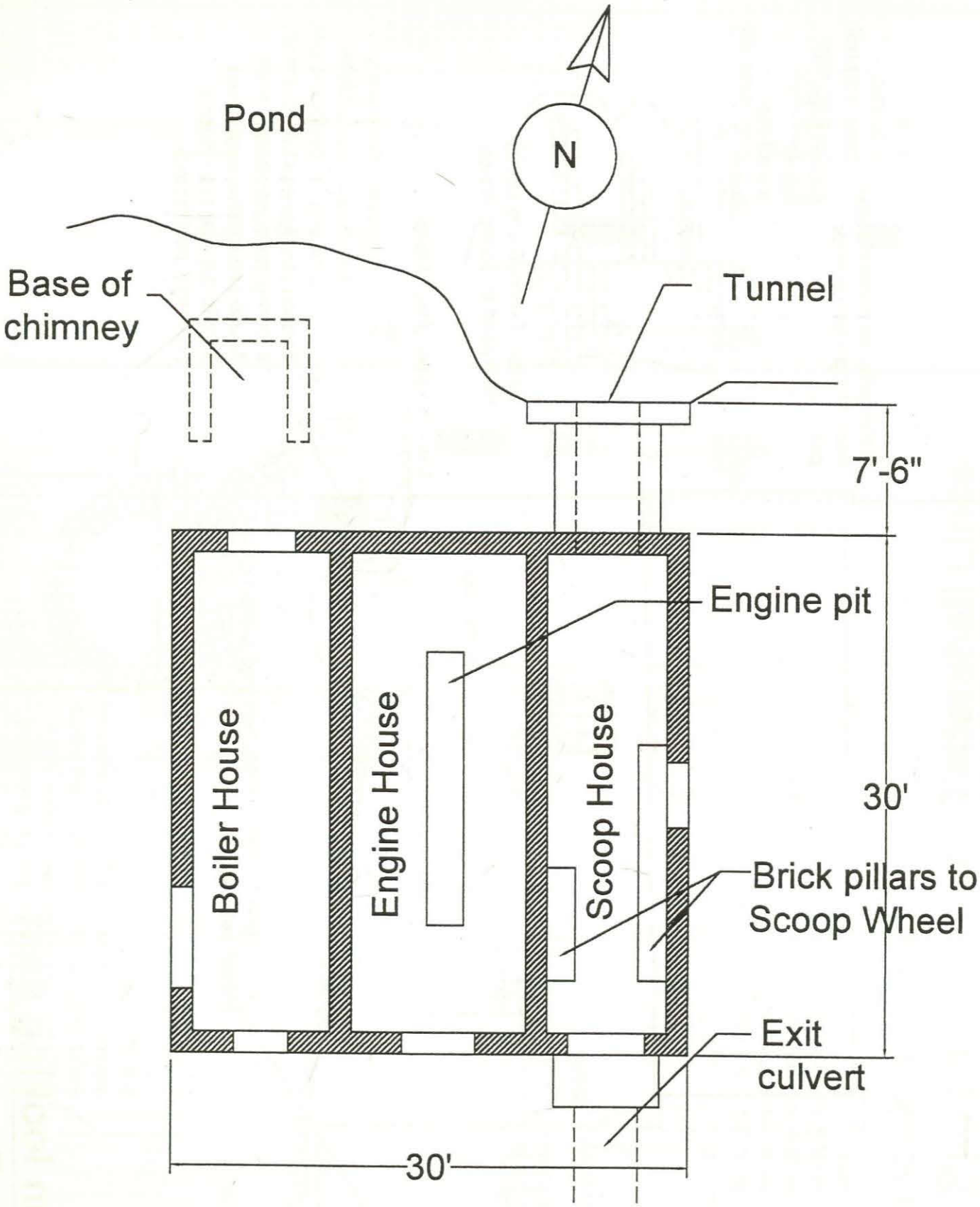

G.N.R.
LINCOLNSHIRE LOOP LINE
Old Clay Pit
Pumping Engine
Sluice
Stennet's Farm
W I T H A M
Def
C.R.
B.M.13·5
746 ·837
745 1·067
754 ·805
222 ·201
221 ·561
220 1·924
218 7·479
219 1·321
23 8·635
22 6·805
21 1·387
24 4·984
213 6·579

Fig 1



Dogdyke Pumping Station - Tattershall Lincs.

Plan of Steam Pumping Engine House.

Fig 2

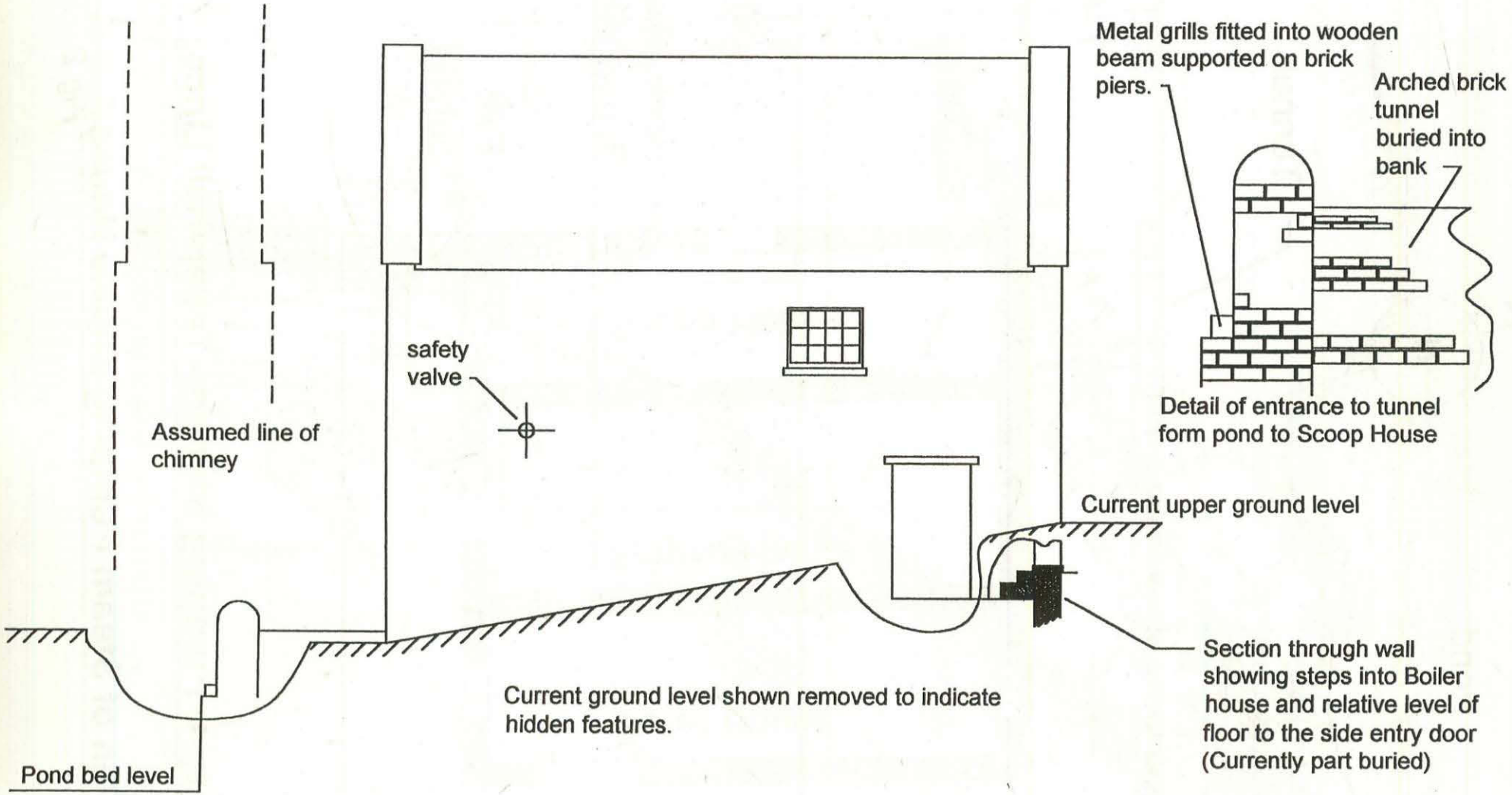
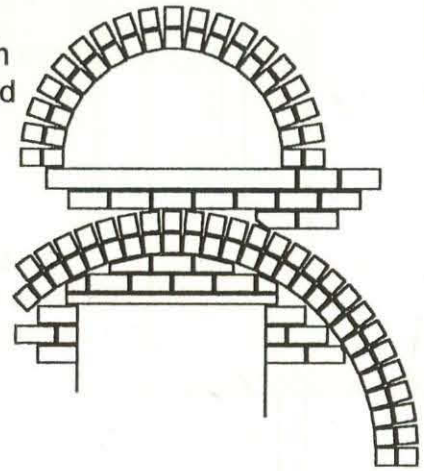


Fig 5

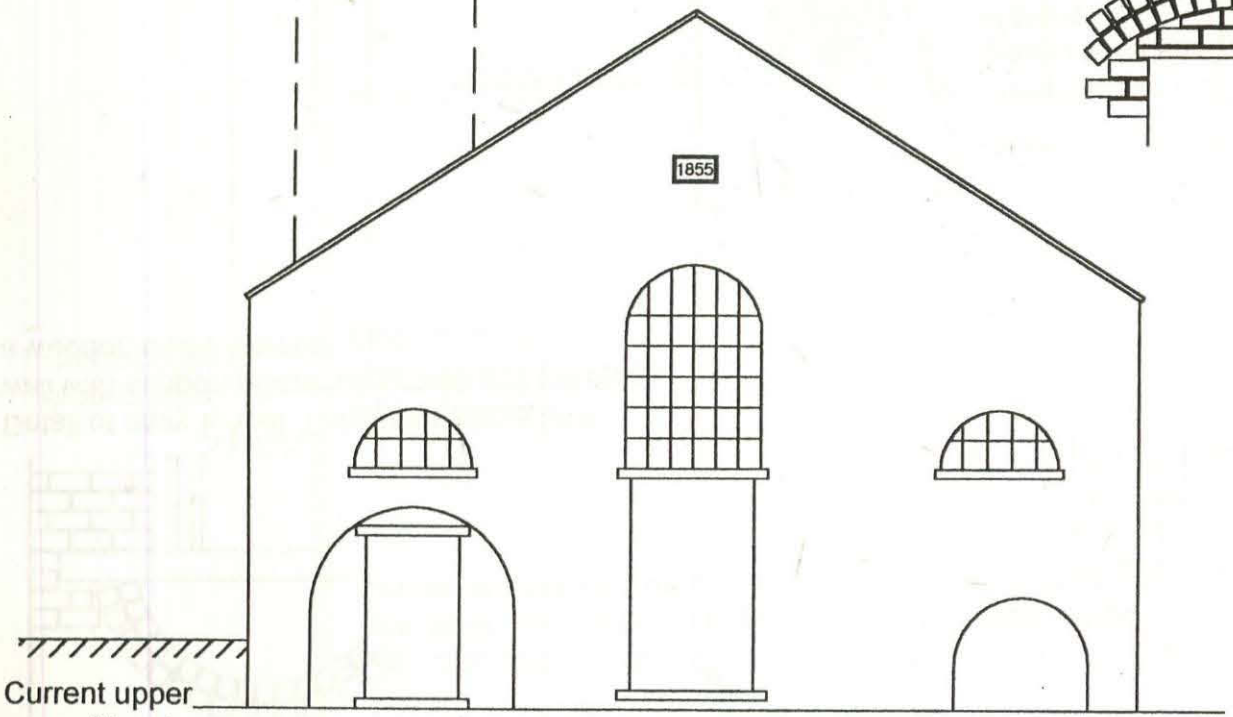
Elevation looking east

Dogdyke Pumping Station - Tattershall Lincs

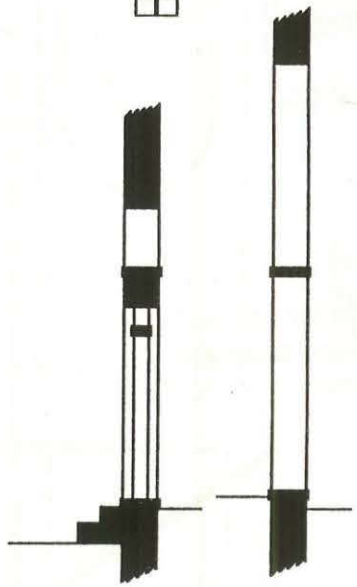
Typical arch construction for doors and windows. The Boiler House door has a single brick infill and wooden lintel which would have been added after boilers had been installed.

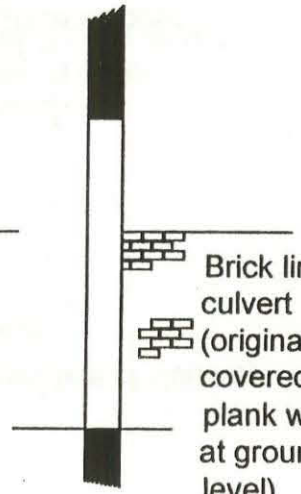


Assumed line of chimney



Section through wall showing reletive levels:- Boiler House floor is 22" Lower than Engine House floor and the bottom of the exit culvert is ???" below the Engine House Floor





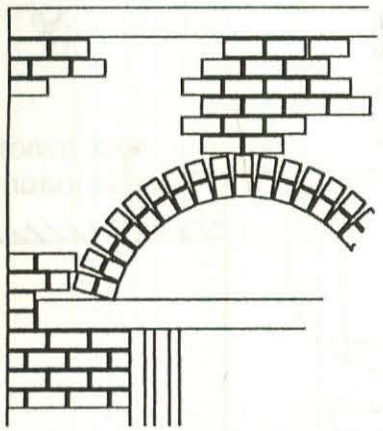
Current upper ground level

Boiler House entry (with single brick wall removed) 6'6" high x 7' wide.
Engine House entry (without door lintel and window frame removed) 14'6" high x 4'3" wide

Brick lined exit culvert (originally covered with plank walkway at ground level)

Fig 3

Elevation looking north
Dogdyke Pumping Station - Tattershall Lincs



Detail of entry tunnel. The tunnel has a face wall with support pillars for a metal grill set into a wooden cross member.

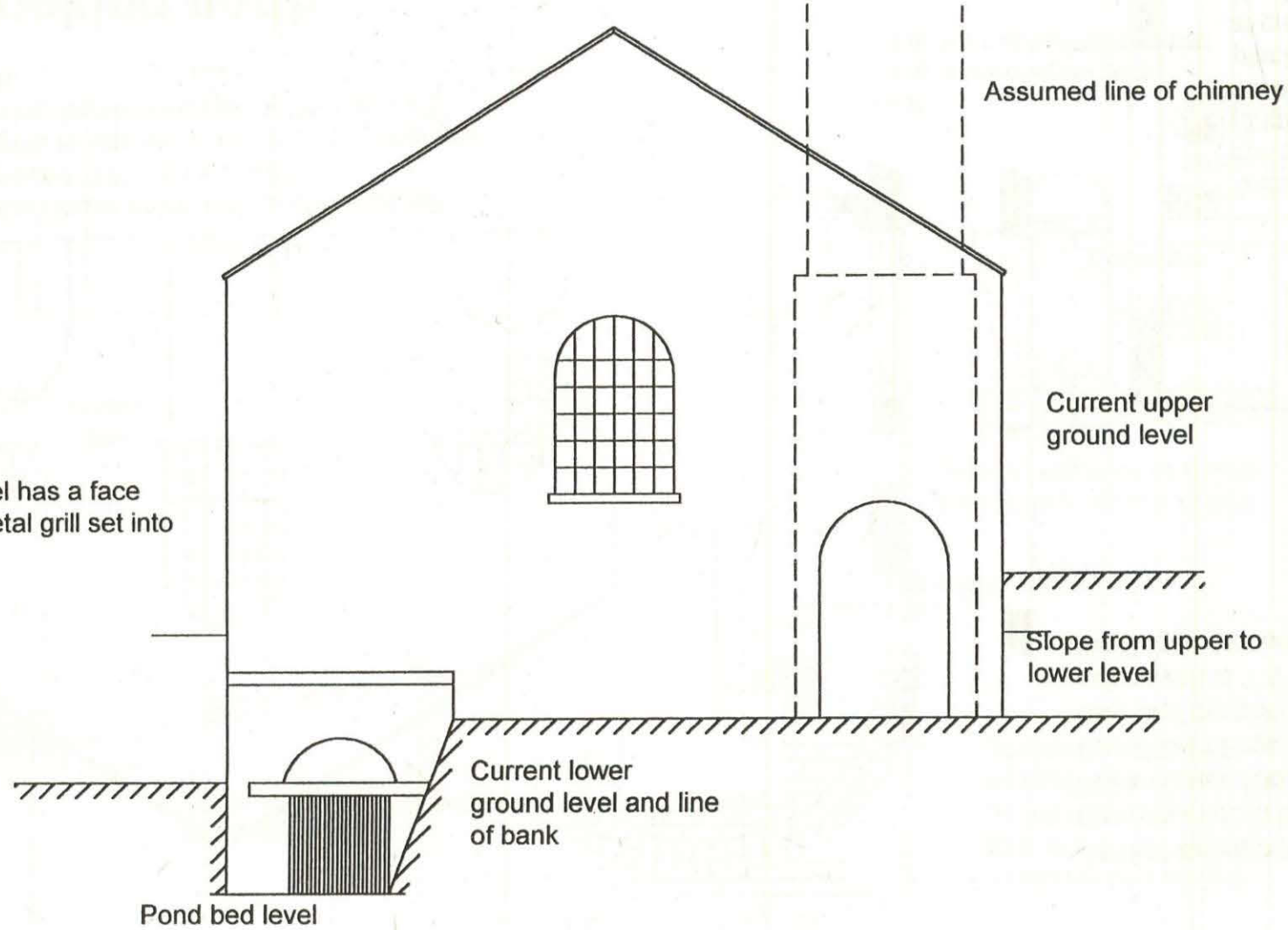


Fig 4

Elevation looking south
Dogdyke Pumping Station - Tattershall Lincs

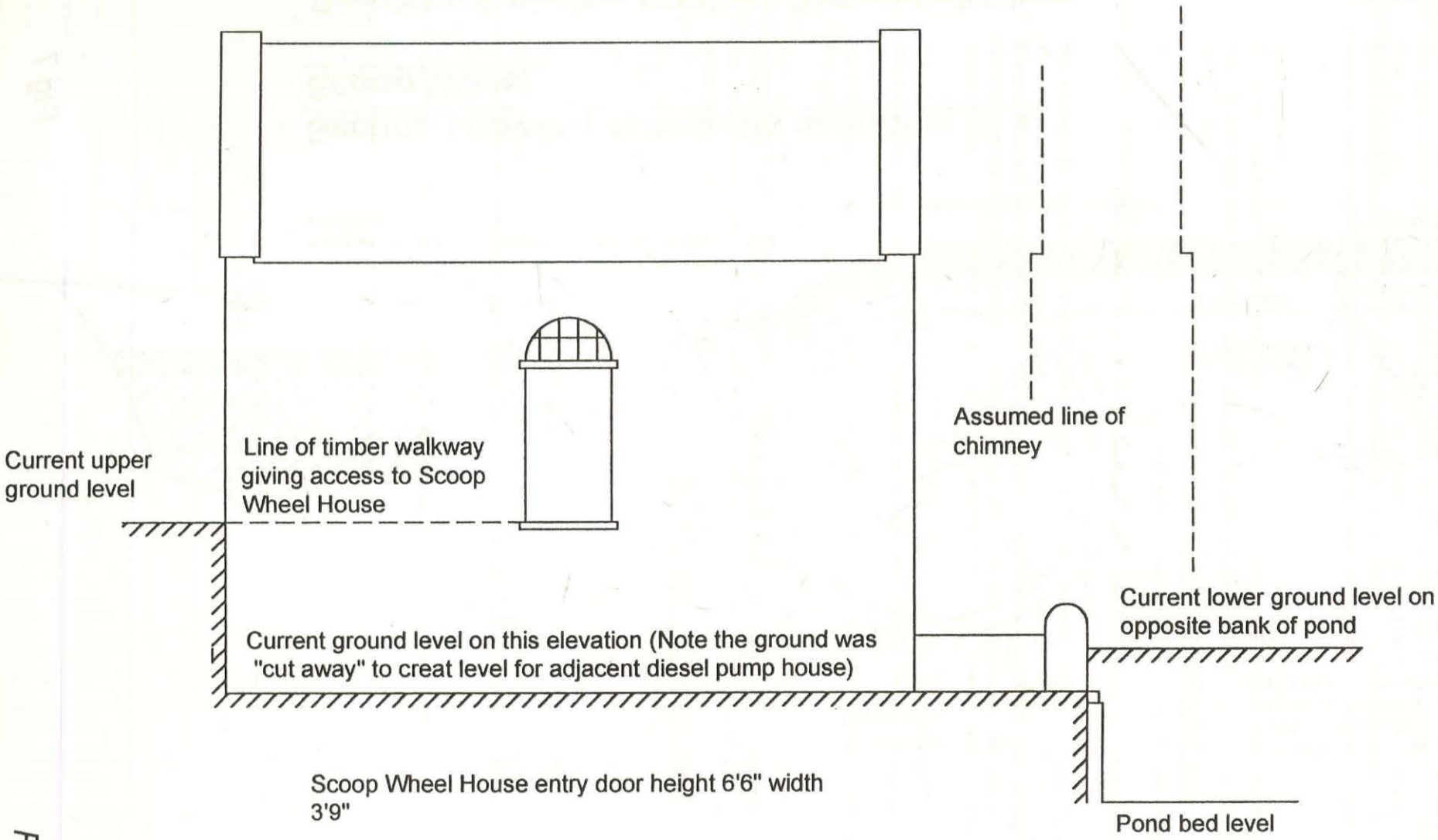
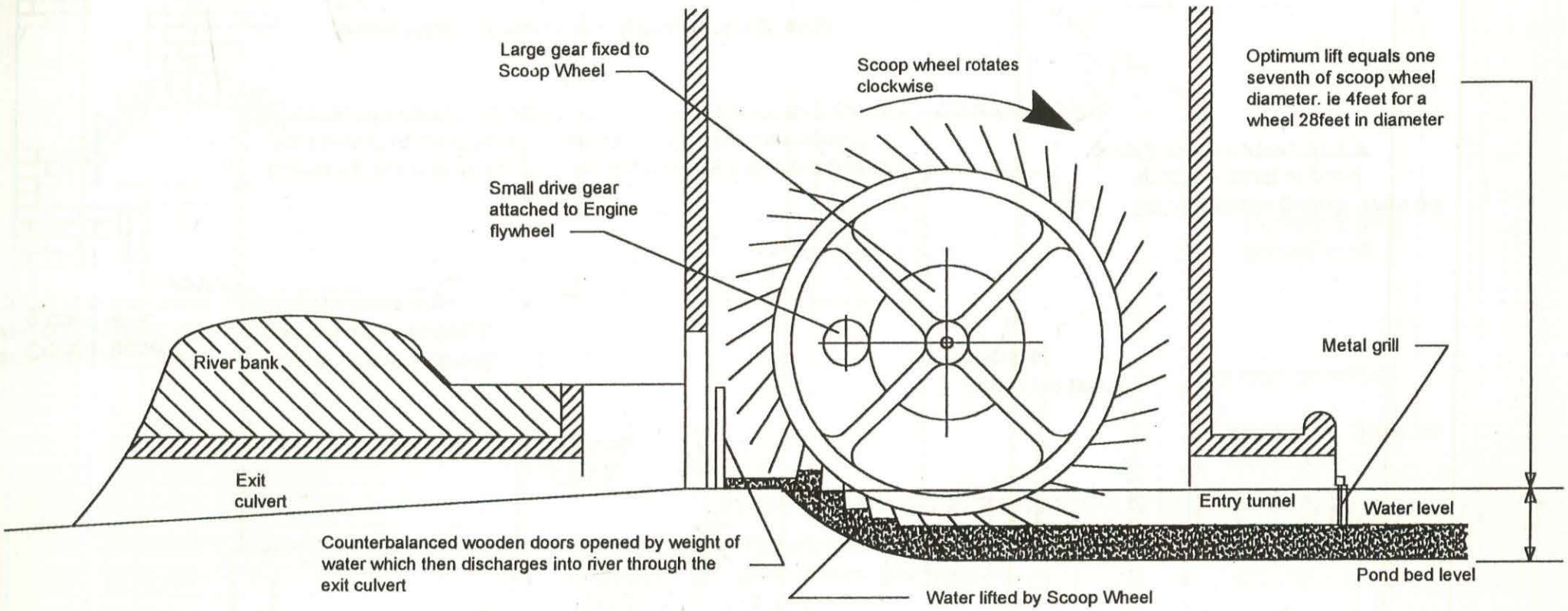


Fig 6

Elevation looking west
Dogdyke Pumping Station - Tattershall Lincs



Section showing schematic operation of a Scoop Wheel

Dogdyke Pumping Station - Tattershall Lincs

Fig 7

Appendix

Item one – Copy of a drawing dated 1843 showing the Wind pump that was superseded by the steam pump in 1855, viewed looking north from the opposite bank of the River Witham. Note the position of the Castle and Church relative to the wind pump and the position of the Castle and Church relative to the Steam Pump House shown on the photograph appendix item four. This supports the premise that the Wind Pump was to the west of the Steam Pump House.

Item two – Typical flue system for a Lancashire Boiler indicative as to how the rear of the Boiler House could have linked to the chimney. This supports the premise that there was no door at the rear and the "door" arch was part of the flue. See also the photograph appendix item seven.

Item three – Copy of the Dogdyke Pumping Station Trust publicity leaflet issued when the Steam Pump House was open to the public and regularly steamed.

Item four – Two photographs taken July 2001 of the front of the Steam Engine House. The first photograph is taken from the South Bank of the River Witham. This shows that the banks have been considerably raised since the Engine House was built. To the left (West) of the Engine house Tattershall Castle is visible and to the right (East) is seen the later Diesel Pump House and the "Engine Masters" cottage. The second is the same view, but taken from a closer point.

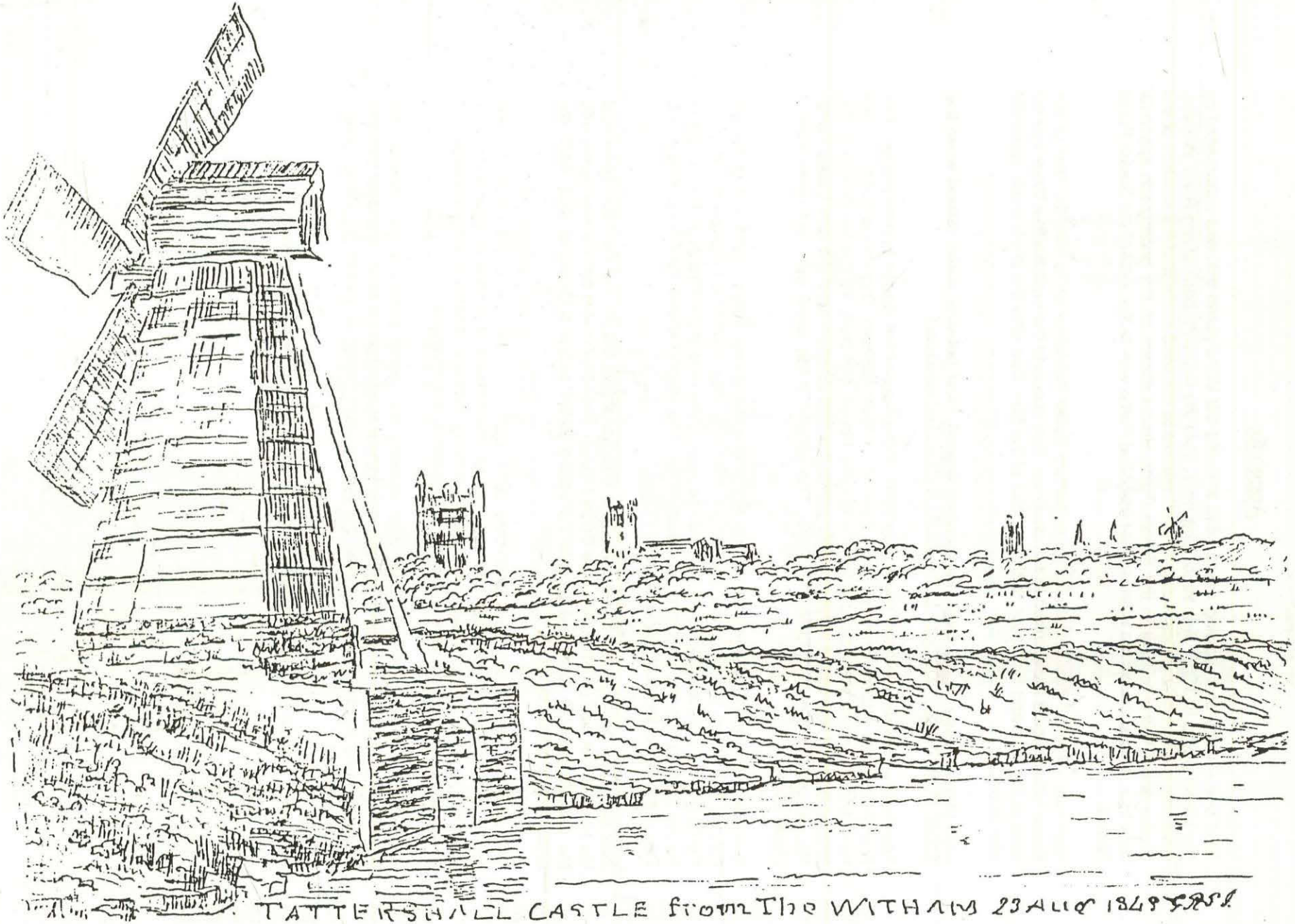
Item five – Two photographs taken in July 2001. The first shows details of the arch of the exit culvert. The Scoop Wheel can be seen above the "valve doors" and the hinge pivot and two of the hinges for the inspection door can also be seen. (The pipe in the foreground is thought to be the feed pipe to the underground diesel tanks) The second shows the Scoop Wheel and the gentleman in the doorway is Mr John Porter.

Item six – Two photographs taken July 2001. The first shows the front of the 1904 Boiler and the second, the side (West) wall of the Boiler House. The safety valve can be seen along with the part buried side door. The pipe in the centre of the wall is a "breather pipe" from the underground diesel tanks.

Item seven – Two photographs taken July 2001. Both show the rear of the Steam Engine house. The safety valve can again be seen, as can the remains of the flue damper and pulley wheels. It is thought that the damper would have hung central to what is now the doorway. To the left of the door can be seen signs of heat erosion to the brickwork.

Item eight – A photograph taken July 2001 showing the "pond" and the entry tunnel to the Scoop wheel. The entrance door to the Scoop Wheel House can be seen. It is clear that the original ground level was lowered (and the pond possibly extended) when the Diesel pump house was built.

Item nine – A copy of a 1931 photograph showing the Steam Engine in action.



With acknowledgements to Antony Jarvis Esq D.L. Doddington Hall, Lincoln for permission
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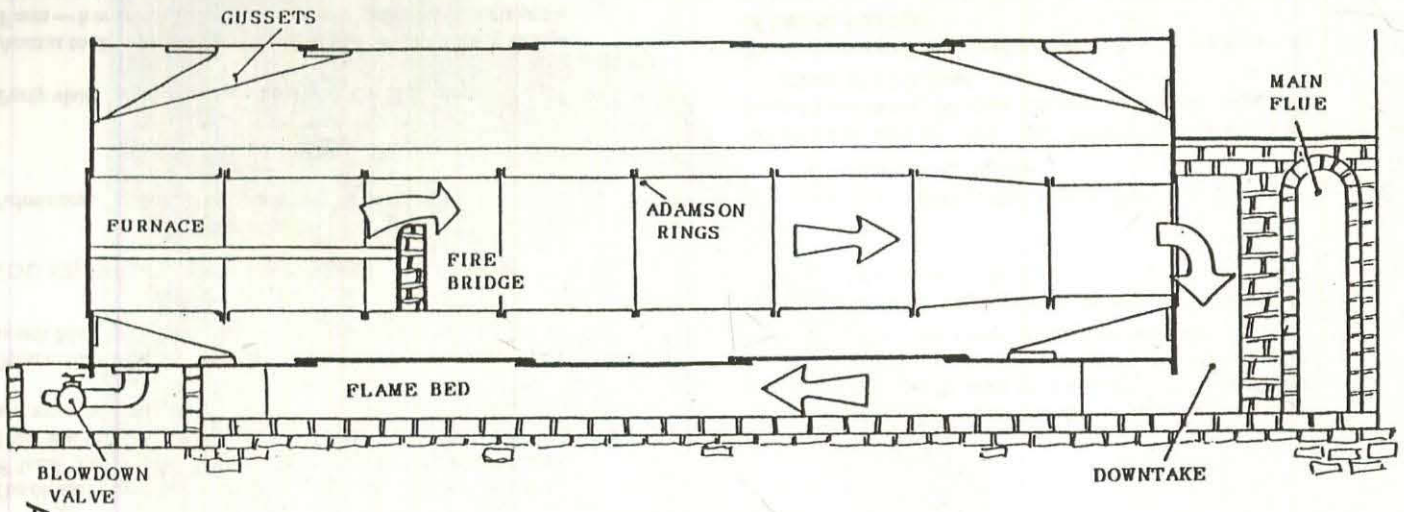
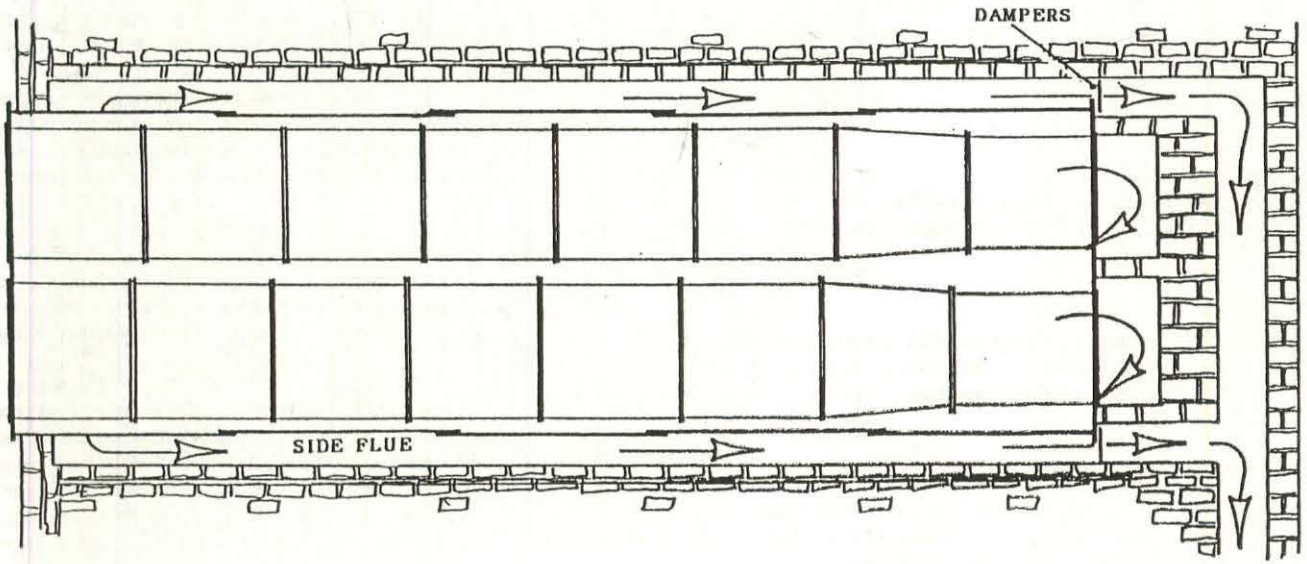
Appendix Item one

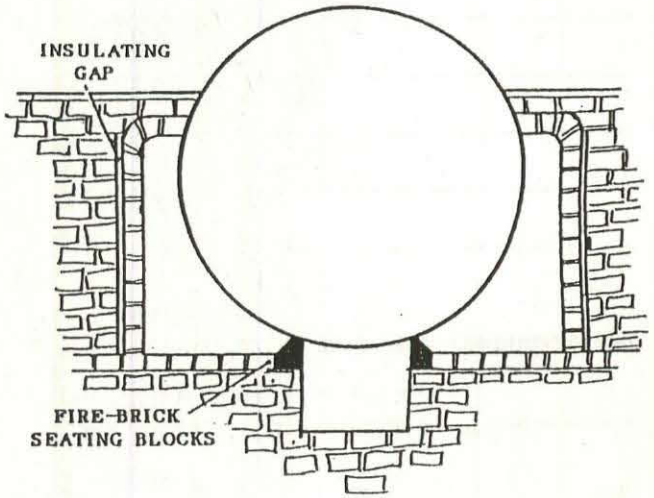


The flues are lined with firebrick and the boiler shell is placed on fire-brick seating blocks. There is a gap between the firebricks in the side-flues and the main brickwork to provide heat insulation. Dampers are installed in the side-flue exits to the main flue.

Hot gasses travel from the furnaces, through the boiler tubes to the downtake, then down and along the flame bed to the front of the boiler where the gasses divide to pass back along the side flues to the main flue and, eventually, to the chimney.

Appendix Item two





FLUE SYSTEM - LANCASHIRE BOILER

The livelihood of many Lincolnshire people depends on the efficient drainage of the Fens. There is evidence that the Romans first attempted to drain this area, but it was the Dutch drainage engineers of the 17th century who began the drainage system we know today.

They started by straightening and embanking the existing rivers in the hope that this would provide enough 'fall' to drain the area by gravity but as water was taken from the Fens, the peat of which the Fens are composed began to shrink thus making the surface of the land lower than the water in the rivers. The only way to proceed was to pump the water up from the low-lying land into the rivers, and thence to the sea.

The earliest forms of pumping engines were powered by the wind, being simple windmills, which drove a scoop-wheel to lift the water. Many hundreds were erected and it was with one such engine that fen drainage began at Dogdyke in 1796, draining land in Tattershall and Tattershall Thorpe parishes.

The development of steam engines provided a more reliable source of power and the windmills were gradually replaced. The wind-powered engine at Dogdyke survived until 1856 when it was replaced by the still surviving beam engine.

The beam engine operated until 1940 when with land shrinkage and sinkage at the far ends of the pumped area and improved standards of drainage generally it was replaced by a Ruston and Hornsby diesel engine housed in an adjacent building.

The disused engine was then left to deteriorate until with a revival of local interest, the Dogdyke Pumping Station Preservation Trust was formed in 1973 and after restoration the beam engine was steamed again in 1977.

Open to the public on Easter Sunday and the first Sunday of each month May to October, 2.00—5.00 p.m. in steam.

YOU ENTER AT YOUR OWN RISK.

Admission: Adults £1.00 inclusive of parking.
Motor cycles £1.00.
Senior Citizens and children half-price.

Party visits by prior arrangement with the Hon. Sec.

Access to the site is by private farm road — entrance at Bridge Farm — from the A153 one mile west of Tattershall Castle and is sign-posted on Open Days.

(We recommend you view in the order as listed)

1. VERTICAL BOILER

Housed in the rear of the boiler house in a space caused by the removal of a portion of the old boiler. Made in 1952 by Clayton Limited, Leeds, this cross-tube vertical boiler is used to operate the beam engine. Normal working pressure used is 40-60 p.s.i., through pressure reducer to 5.10 p.s.i. at engine.

2. BRICK CHIMNEY

Immediately to the rear of the boiler house was the site of the chimney. This stood on a square base, with an original height of 100 ft., shortened at some stage and finally felled in 1941.

3. BOILER HOUSE

Contains a Foster Horizontal Boiler of the Lancashire type. Not the 1855 original but installed in 1909. Declared beyond economic repair in 1975.

4. ENGINE HOUSE

Contains the original cast-iron beam engine. Made by Bradley and Craven of Wakefield in 1855/56, a low pressure double-acting separate condenser engine, of approximately 16 hp and capable of lifting about 25 tons of water per minute via the scoop wheel.

5. SCOOP WHEEL

Housed adjacent to the engine and driven, through gearing at 7 r.p.m. it has 36 wooden floats set at a raked angle to force water through the weight-loaded oaken mitre gates. These made to self close against the flood waters of the River Witham.

The brick arch tunnel originally used has been filled in and water now has to be returned to the drain.

6. RUSTON DIESEL ENGINE & GWYNNES CENTRIFUGAL PUMP

Commenced work in 1940. The Diesel Engine is of 40 hp, normally running at 300 r.p.m. The pump moves 40 tons of water per minute at 10 ft. head.

The Engineman's House nearby is used to house a small museum of fenland drainage.

Refreshments may also be obtained at the house.

I/We wish to join the Dogdyke Pumping Station Preservation Trust.

I/We enclose my/our subscription for £..... plus a donation of £.....

I/We would like to help with restoration/fund raising/open days.

NAME .....

ADDRESS .....

.....

.....

POSTCODE .....

TELEPHONE No. .....

SIGNATURE .....

DATE .....

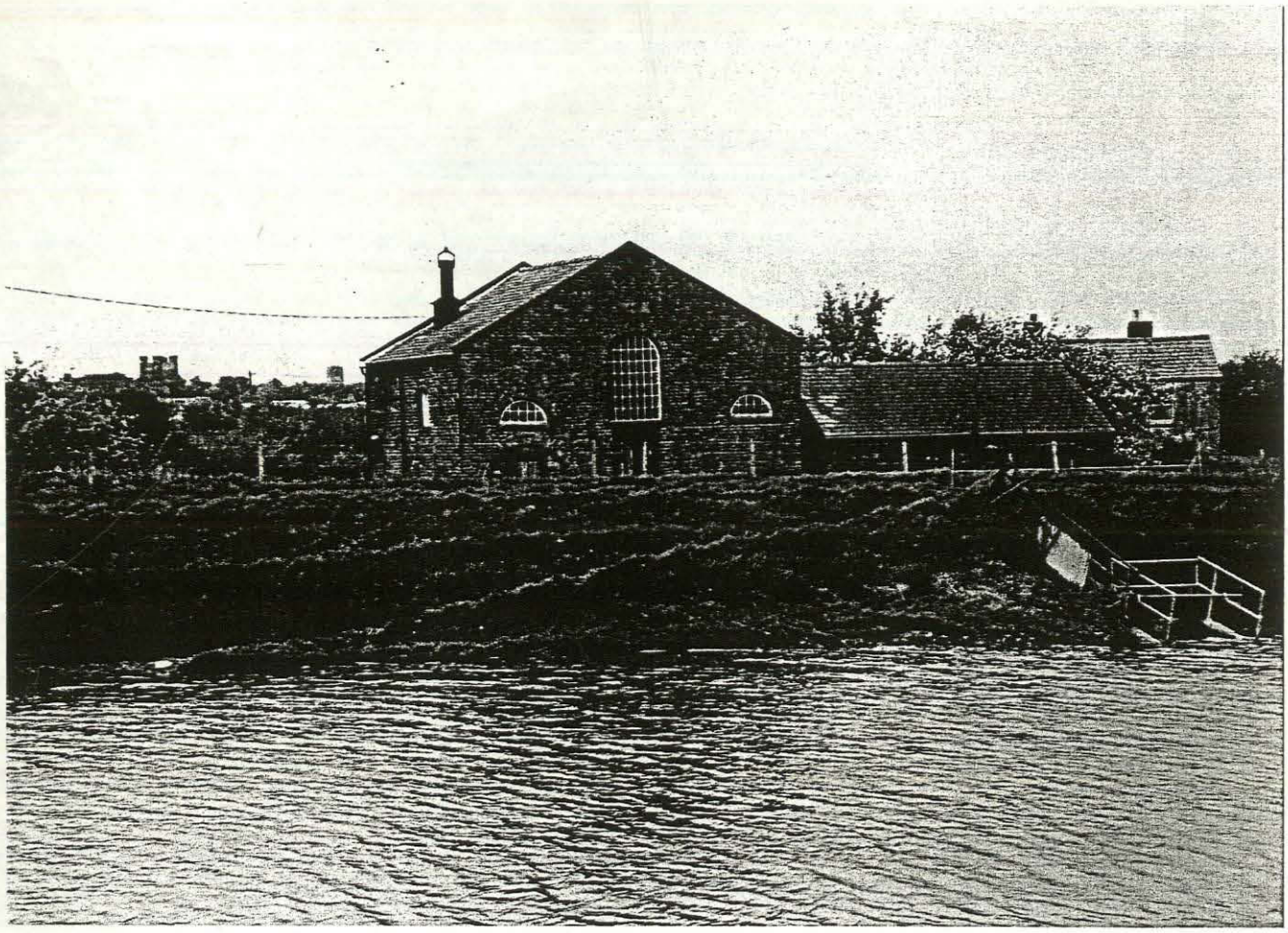
Current subscription rates are:—

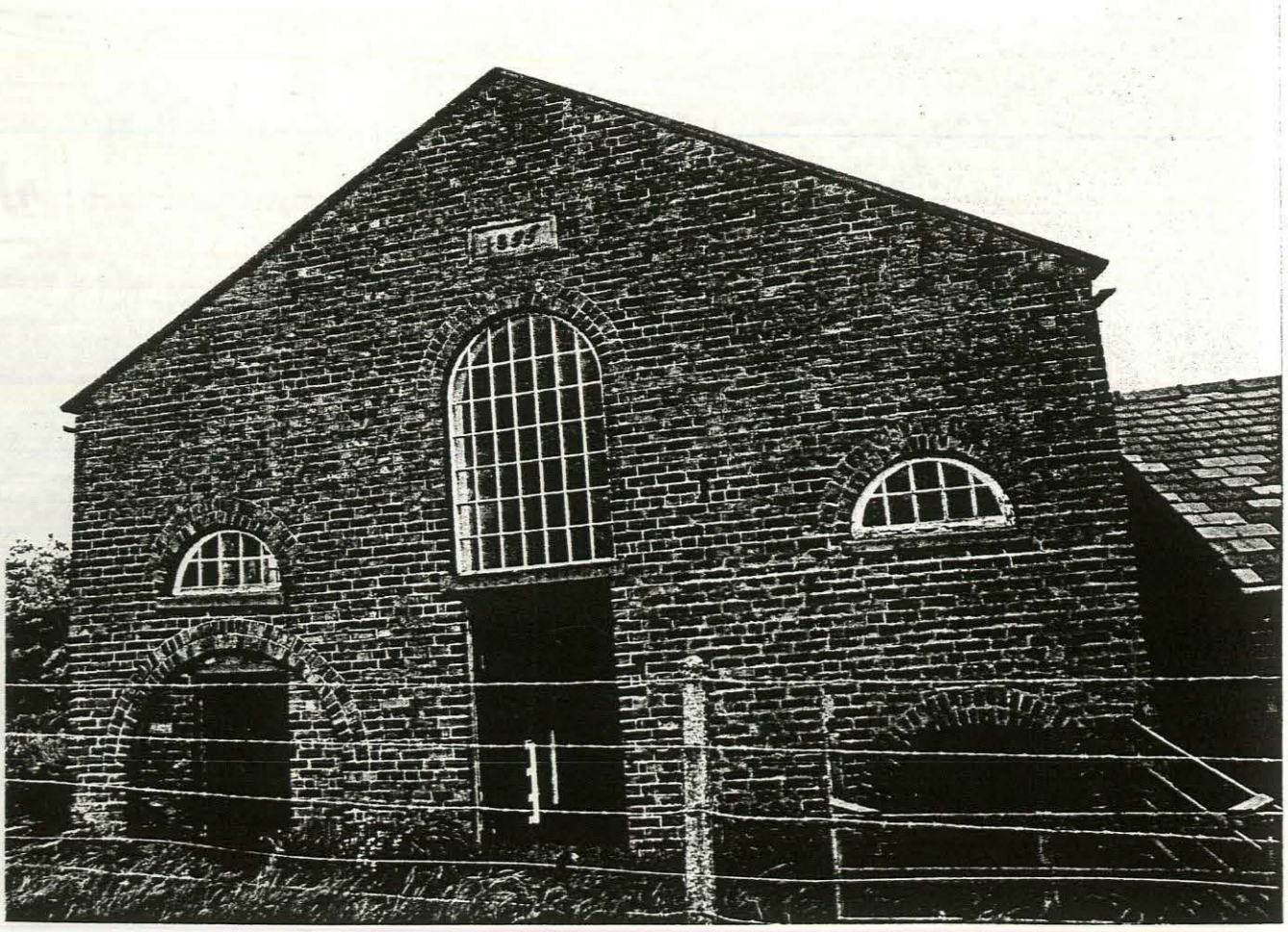
Annual Membership - £5.00

Please return to:—

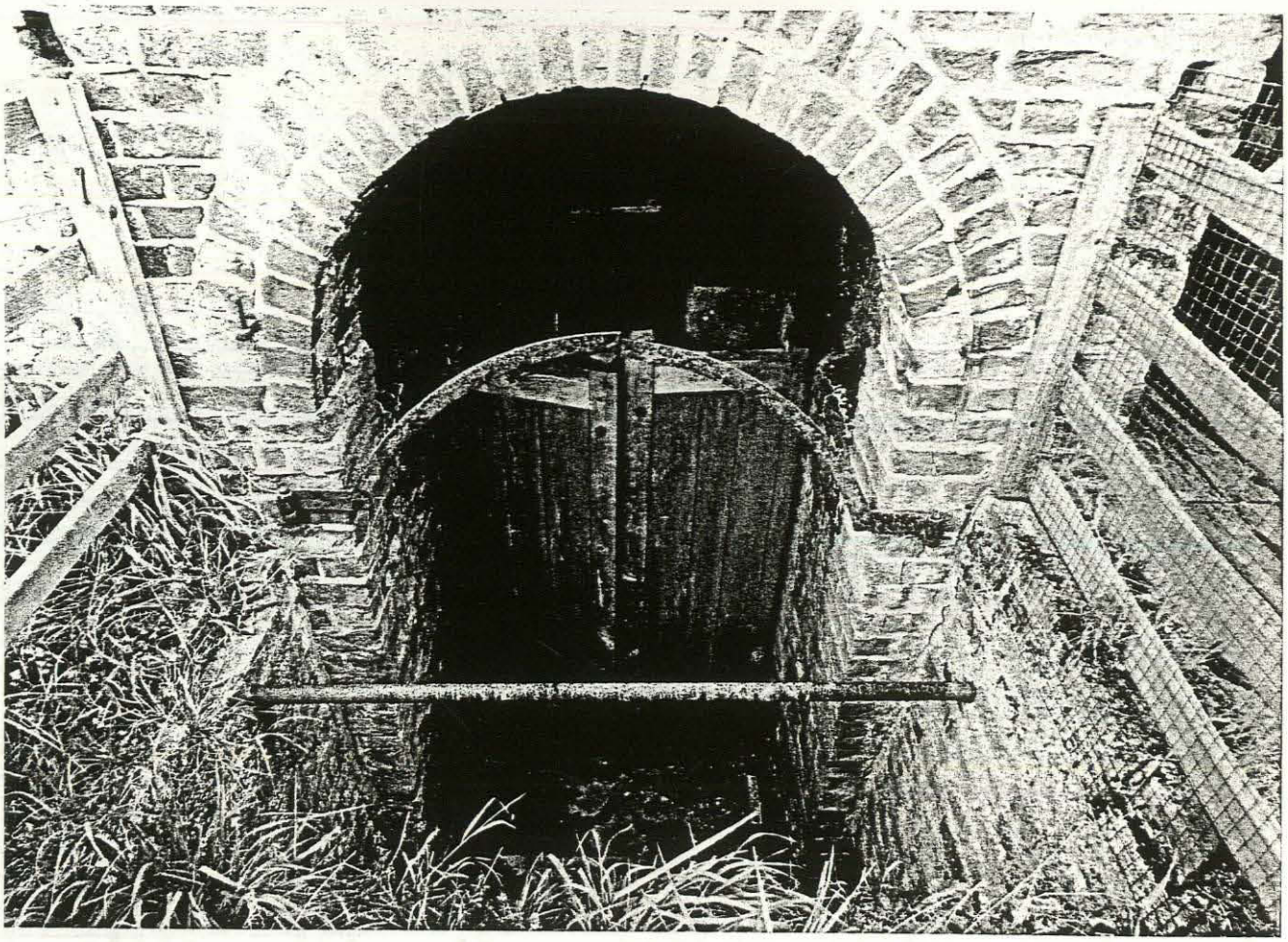
Hon. Sec., Dogdyke Pumping Station Preservation Trust,

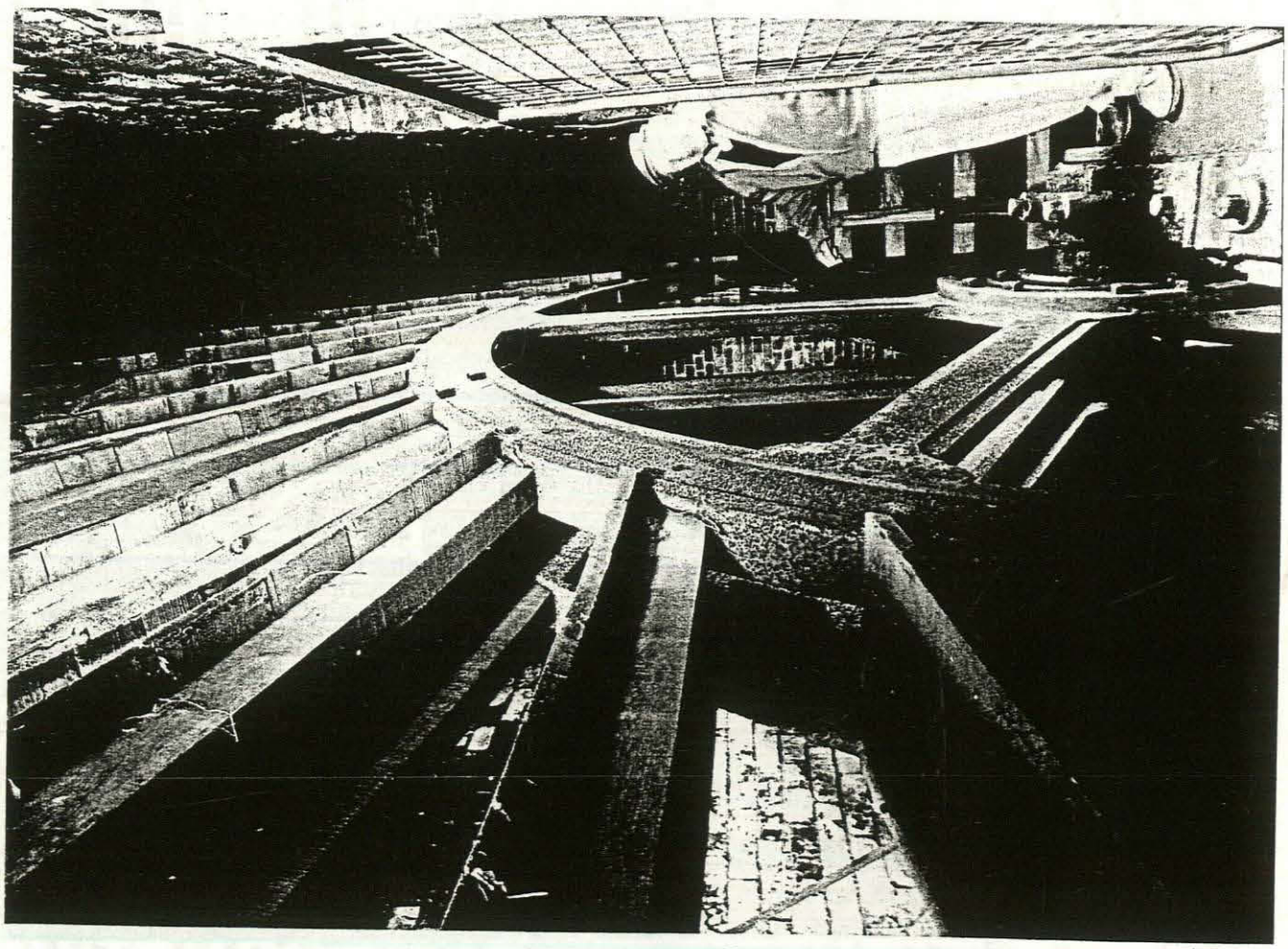
Mrs. Joan Roseveare
51 High Street,
Coningsby,
Lincoln, LN4 4RB
Tel. 0526 342352



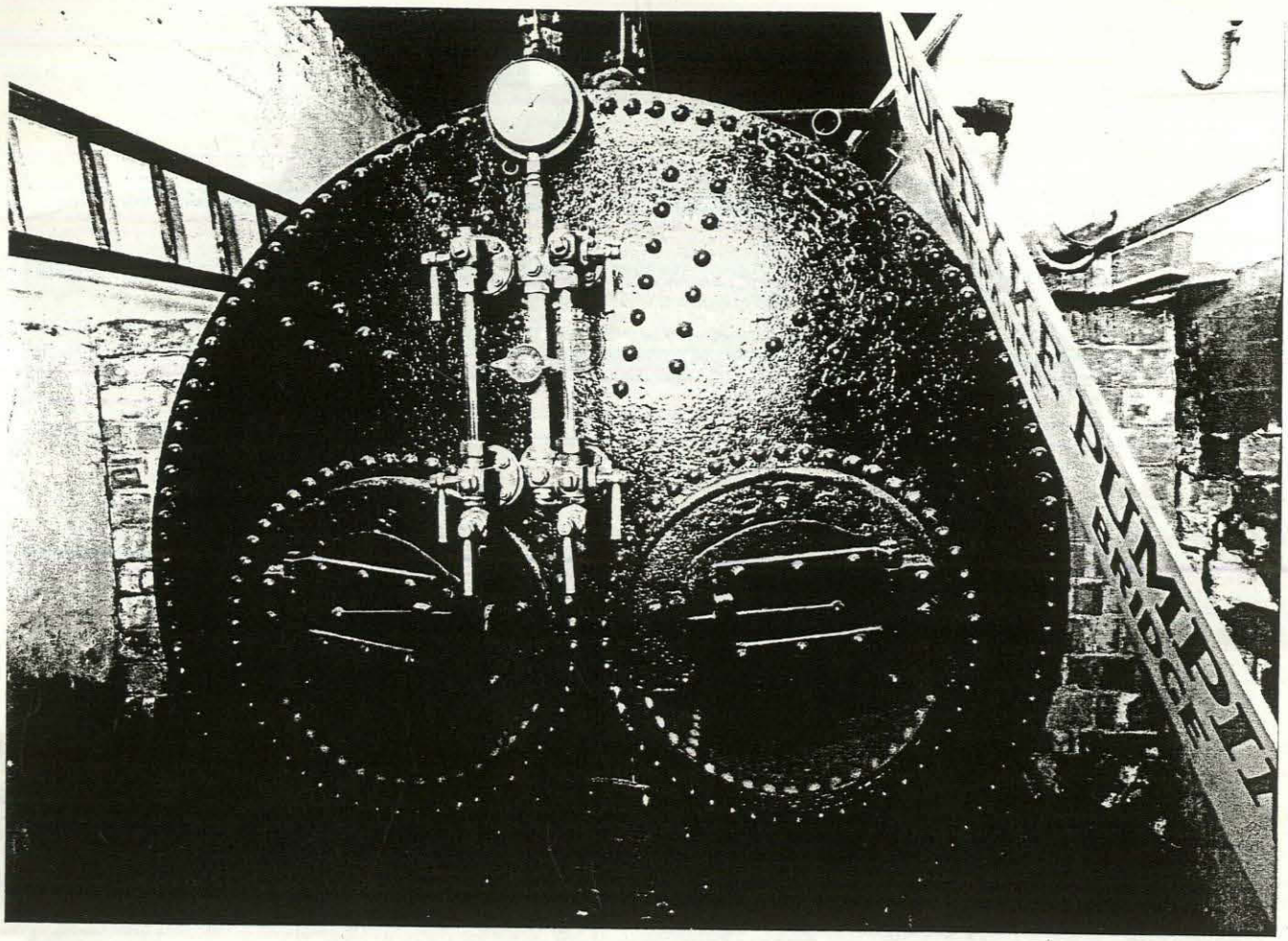


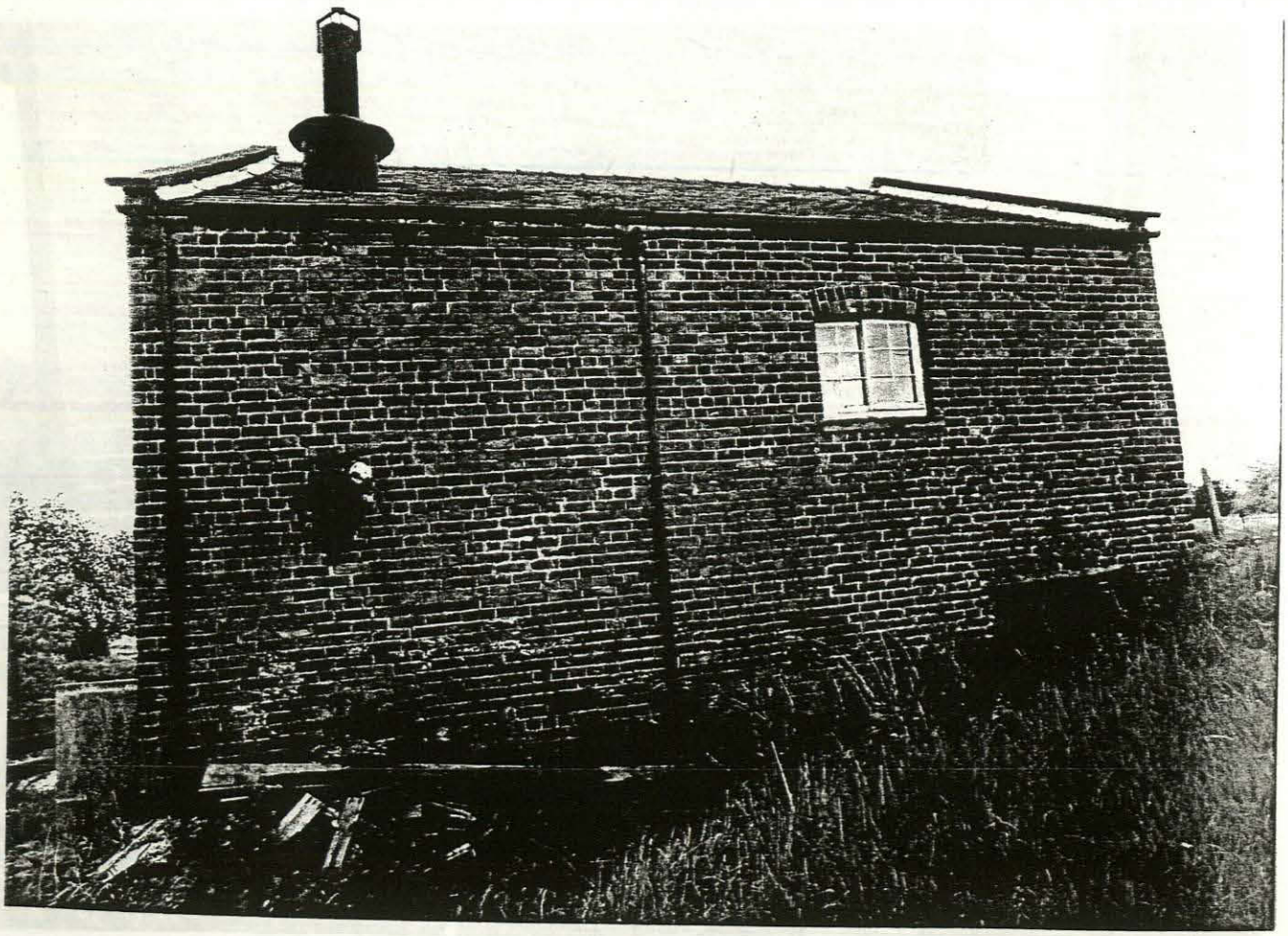
Appendix Item four





Appendix Item five





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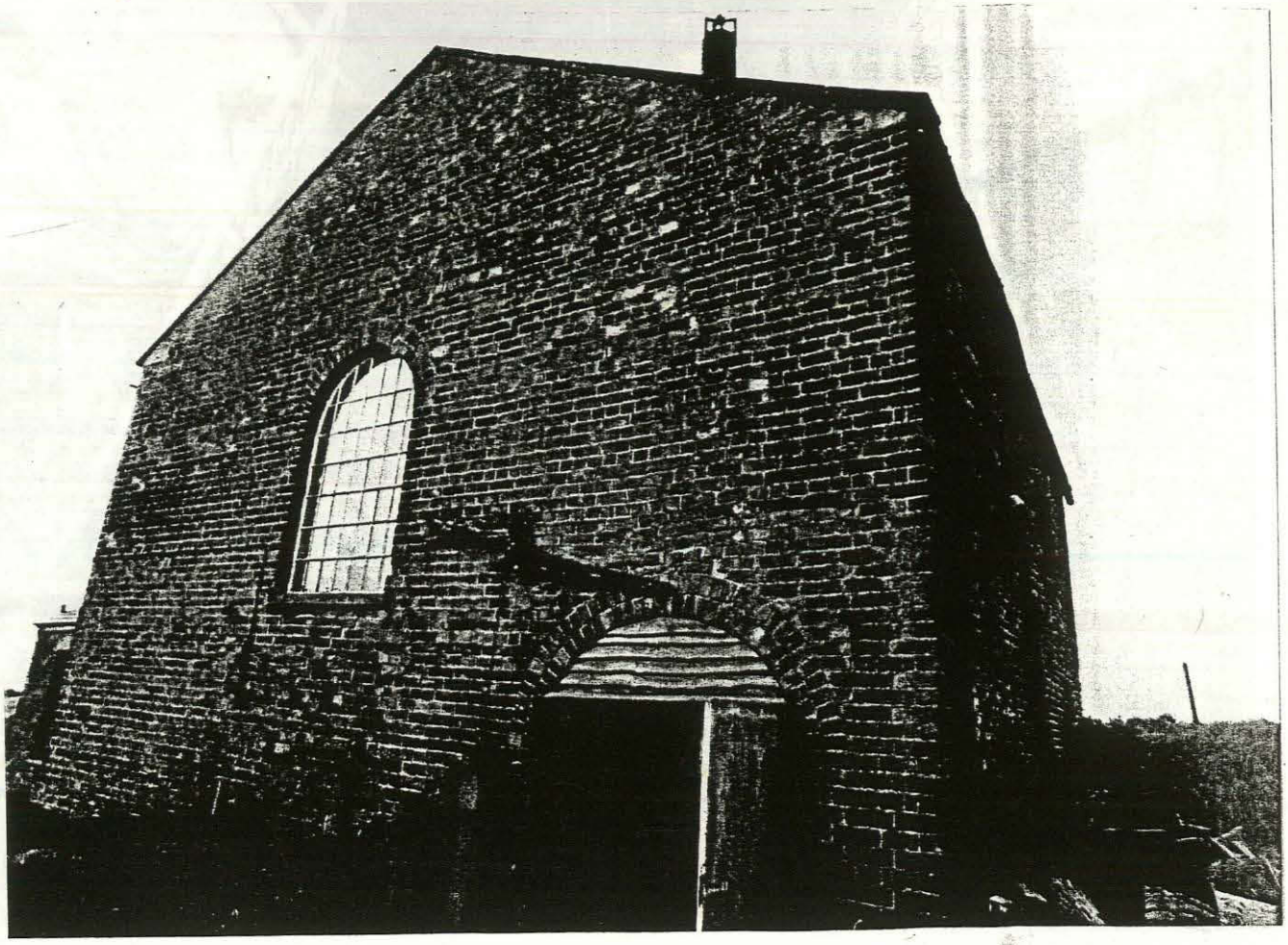
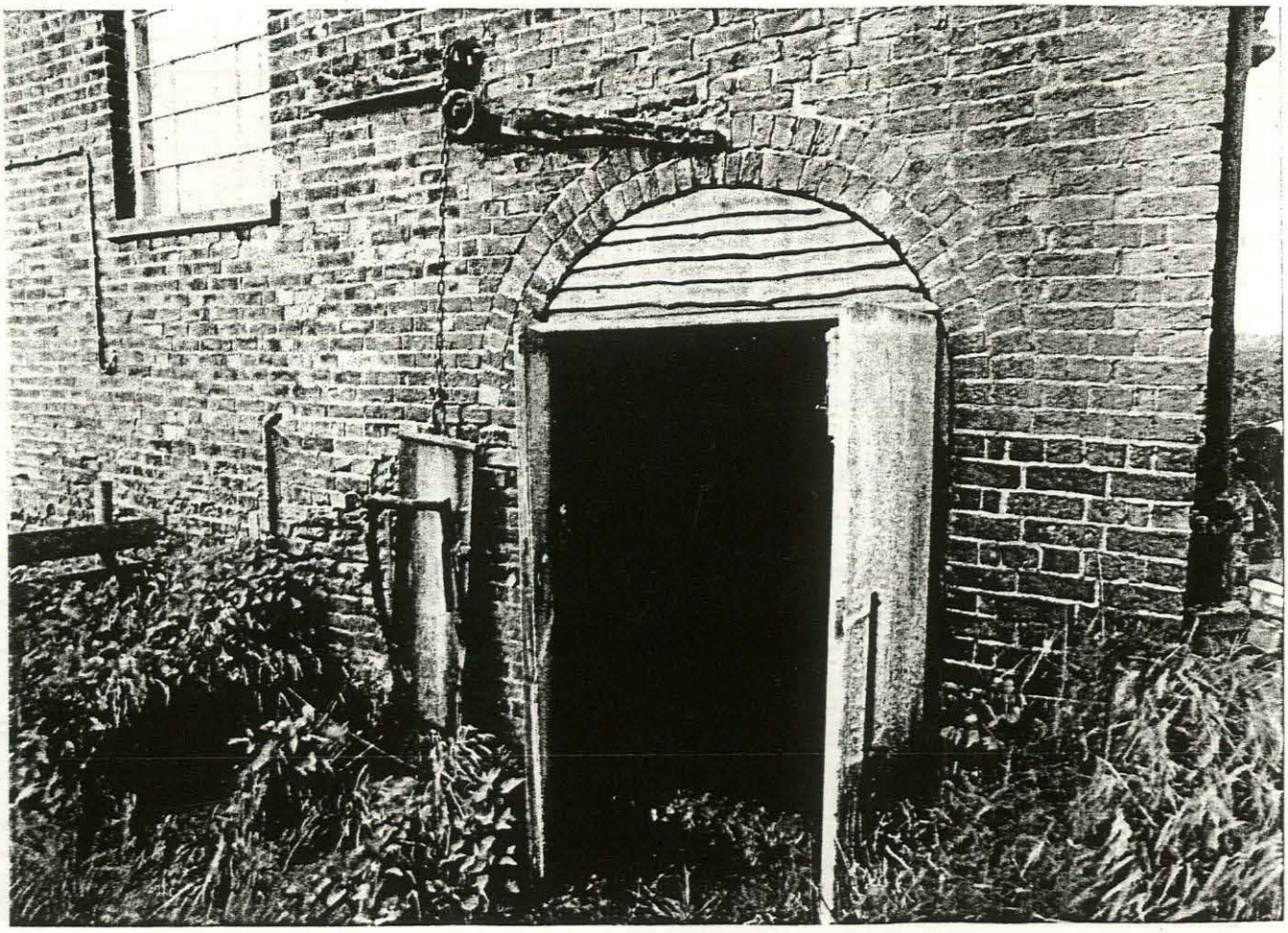
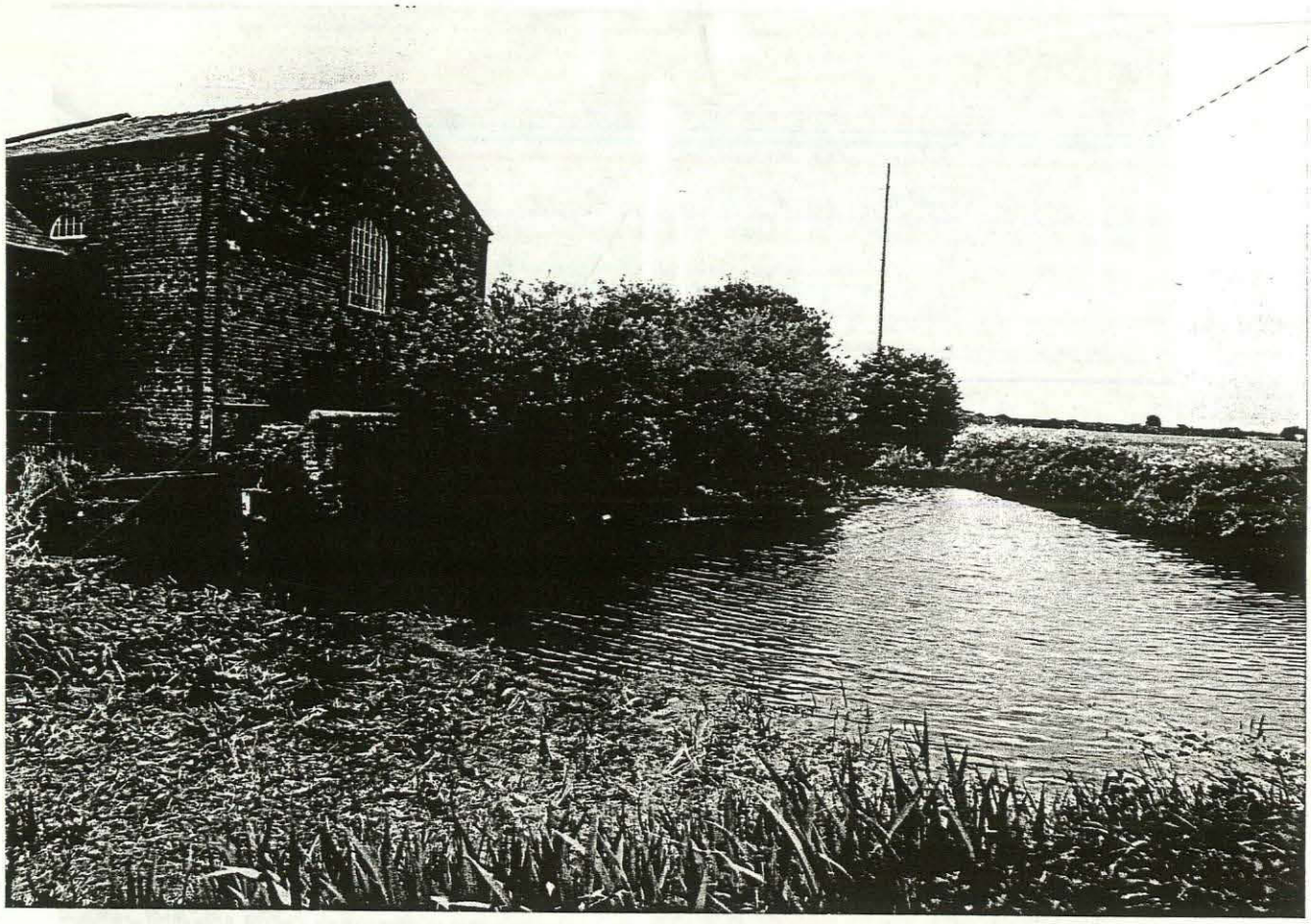
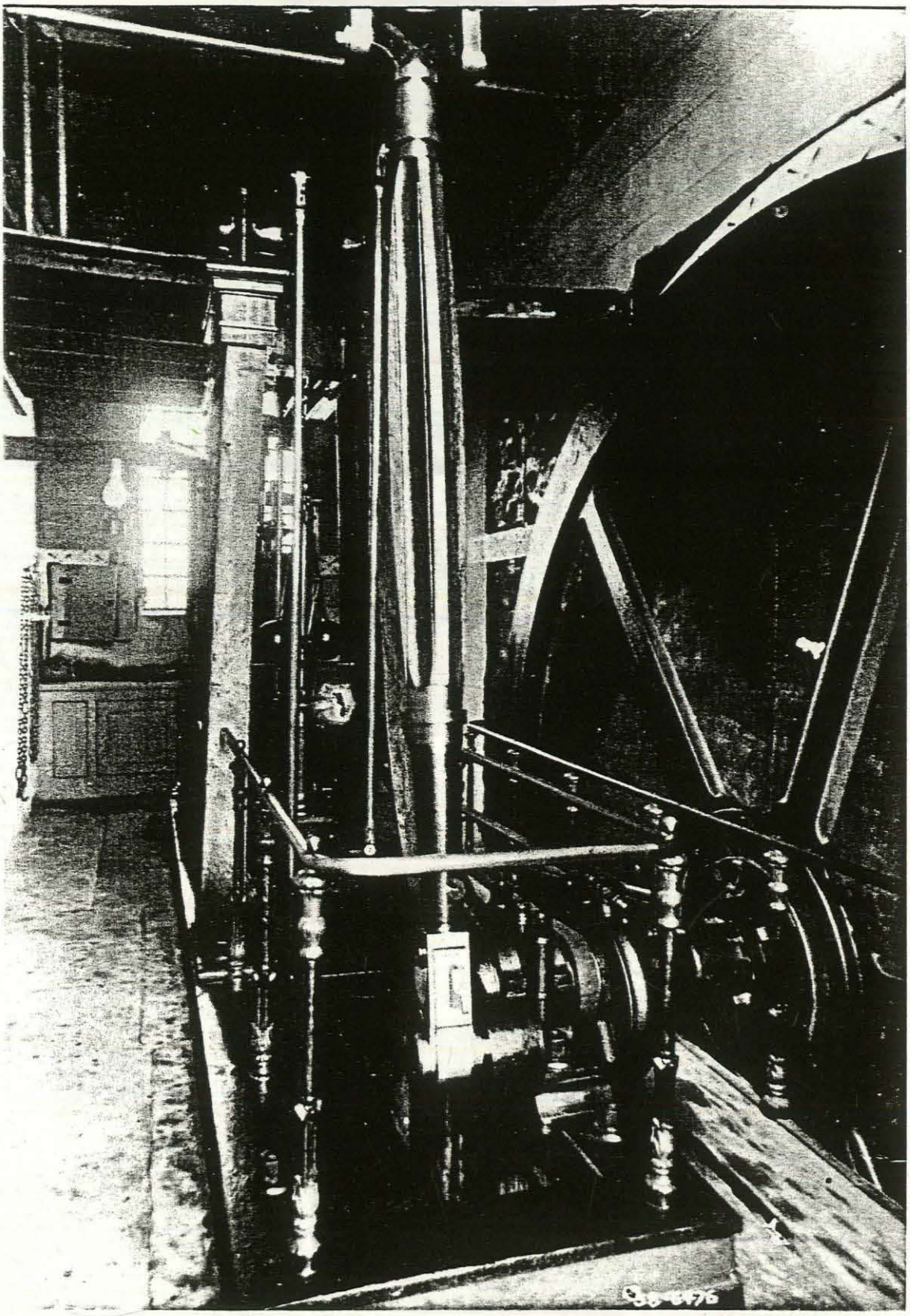




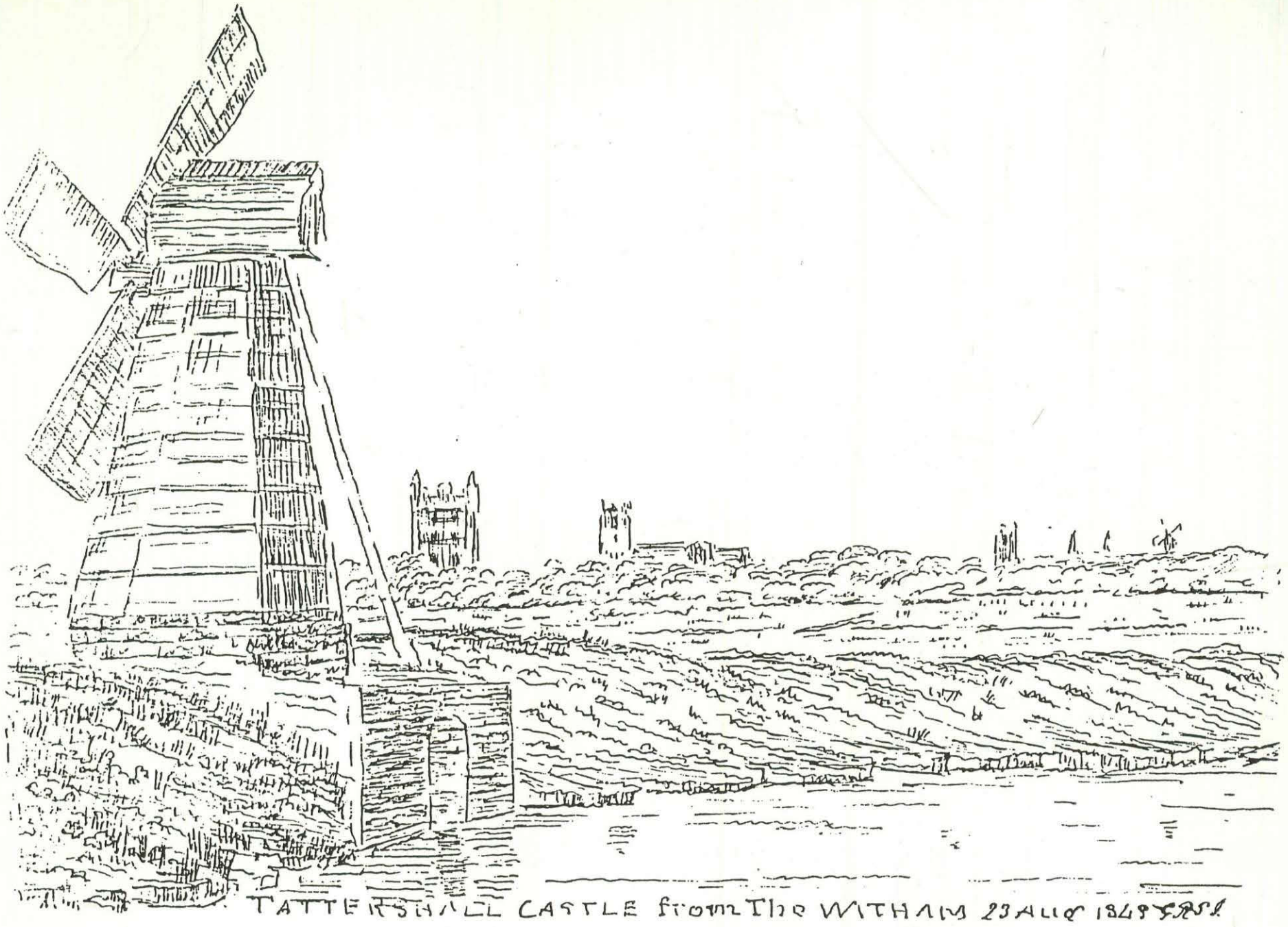
Appendix Item seven



Appendix Item eight



1856 BRADLEY & CRAVEN
BEAM ENGINE
DOGDYKE PUMPING STATION
TATTERSHALL, Lincs.
(SHOWN WORKING IN 1938)
Appendix Item nine



With acknowledgements to Antony Jarvis Esq D.L. Doddington Hall, Lincoln for permission to reproduce copy of sketch by George Ralph Payne Jarvis done in 1842

Appendix Item one