

THE BRIGANTIA ARCHAEOLOGICAL PRACTICE



WEIRS on the RIVER LOXLEY, BRADFIELD, SHEFFIELD, SOUTH YORKSHIRE: HERITAGE STATEMENT

A report to the Don Catchment Rivers Trust



Stacey Bank Wheel in 1836.

7th November 2012

THE BRIGANTIA ARCHAEOLOGICAL PRACTICE

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BAP/12/472

Percival Turnbull

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HERITAGE STATEMENT***

EPITOME

On instructions from the Don Catchment Rivers Trust, this Heritage Statement has been prepared in support of applications for planning consent and Ancient Monument consent for works on eight weirs on the River Loxley, on the west side of Sheffield. The proposed works involve the creation of fish passes to allow the passage of migratory fish, including eels.

The eight weirs are:

Stacey Weir	SK 287 903
Loxley Old Wheel	SK 291 901
Olive Weir	SK 301 895
Low Matlock Weir	SK 306 893
Green Wheel	SK 310 893
Wisewood Forge Weir	SK 317 896
Limbrick Weir	SK 330 894
Hillsborough Weir	SK 332 895

A description is given of the River Loxley, and the historical background to the development of Sheffield and its cutlery and other ferrous industries discussed. The history and development of the sites associated with each of the eight weirs is then described in turn. The importance of the weirs is discussed, and it is concluded that *the Wheels of the Loxley Valley must be seen to be of far more than local or regional significance: their importance is European, if not more widely international*. Possible forms of fish pass are briefly discussed, and basic principles for the protection of the heritage asset are suggested.

***WEIRS on the RIVER LOXLEY,
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HERITAGE STATEMENT***

INTRODUCTION

1. On instructions from the Don Catchment Rivers Trust, this Heritage Statement has been prepared in support of applications for planning consent and Ancient Monument consent for works on eight weirs on the River Locksley, on the west side of Sheffield. The proposed works involve the creation of fish passes to allow the passage of migratory fish, including eels.
2. Work was carried out between 1st October and 7th November 2012, by Percival Turnbull, of this Practice. Thanks are due to Karen Eynon of the Don Catchment Rivers Trust, to Ben Lamb of the Tees Rivers Trust, to Alistair Maltby of the Association of Rivers Trusts, to Jim McNeil of the South Yorkshire Archaeology Service, and to the staff of Sheffield Archives and of Sheffield Central Library.

THE RIVER LOXLEY

3. The Loxley (Fig. 1) is fed by small streams which arise on Bradfield Moors, some 16 kilometres west of Sheffield, joining at Low Bradfield corn mill, which is the effective start of the Loxley. There is a total fall of 84 metres from the head at Low Bradfield to the river's outflow into the Don. The Loxley flows to the east and is joined by the Rivelin at Malin Bridge. The Loxley has, at various times, powered a total of 24 known wheels, forges and mills in its course of *circa* 9.6 kilometres, the earliest of which was the corn mill at Low Bradfield, by the confluence of the Dale Dyke and Agden streams: this is known to have existed by 1219 when Gerard de Furnivall transferred one third part of the mills in Bradfield to the Priory of Worksop.
4. Writing in 1819 (when the complex of Wheels was already well-established), Hunter described the valley of the Loxley: *...It rises near the village of Bradfield and flows along a thinly-peopled country, which in the memory of man was wholly unenclosed and uncultivated, called Loxley-Chase; a district which seems to have the fairest pretensions to be the Locksley of our old ballads, where was born that redoubtable hero Robin Hood.*
5. There are now three reservoirs on the Loxley tributaries above Low Bradfield: below this point is Damflask Reservoir, which was completed in 1896 as a 'compensation reservoir' to ensure constant flow to the Loxley. It covers the remains of Dam Flask corn mill and Dam Flask Wheel.
6. **The flood of 1864.** The most dramatic event in the history of the Loxley is without doubt the catastrophic flood of 1864. This was the result of the bursting of the newly-constructed Dale Dyke dam, which held back a large reservoir constructed by the Sheffield Waterworks Company to serve the needs of the growing city. The story of the enormous destruction and loss of life which swept down the Loxley valley is described in detail by a contemporary source (Harrison, 1864) and has again been discussed more recently

(Amey,1974): the former writer summed up the disaster in a sentence: *an overwhelming flood swept down from an enormous reservoir at Bradfield, carrying away houses, mills, bridges, and manufactories, destroying property estimated at half a million sterling in value, and causing the loss of about two hundred and forty human lives.* 415 dwelling houses, 106 factories and shops, 64 other buildings, 20 bridges and 4,478 cottage- and market-gardens were wholly or partly destroyed.

THE HISTORICAL BACKGROUND

7. The historical development of Hallamshire and the Sheffield area has been chronicled exhaustively by Hunter (1819) and, more recently and more accessibly by Hey (1998). Sheffield, which derives its name from the River Sheaf, lay within the mediaeval manor of Hallam, the boundaries of which are not exactly fixed but which appears to have been more or less coterminous with the parish of St Peter, Sheffield: most, if not all, of the Loxley valley (much of which falls within the parish of Bradfield) also fell within the Hallam estate. At the time of the Norman conquest the area belonged to several Saxon magnates of whom one, Waltheof, was permitted to keep his estates. He married Judith, a niece of William I, but was executed for treason in 1075 and the estate was thereafter held by a succession of tenants under Judith; one of these, William de Lovetot, built a castle, a church and an *hospitium* at Sheffield, establishing it as the chief place of Hallamshire. On his death the estate passed to Thomas de Furnival, whose family endured for long enough for another Thomas *de Furnivall* to be recorded as owner of Owlerton mill, by the Hillsborough weir, in 1332. The Furnivals appear to have been, by the light of the times, relatively benign overlords, granting the town its charter in 1297. The last Furnival lord died in 1383 and ownership of the Hallam lands passed through marriage to Thomas de Neville, brother of Ralph, Earl of Westmorland (and of Raby in County Durham) who was (somewhat confusingly) summoned to Parliament as Lord Furnival. On his death the manor was warded to the doughty John Talbot, who was made Earl of Shrewsbury before his death at the battle of Chatillon in 1453. When Gilbert, seventh Earl of Shrewsbury, died in 1616 the manor descended, through the marriage of one of Gilbert's daughters, to Thomas Howard, Earl of Arundel and Surrey and a member of the family of the Dukes of Norfolk, who continued as owners of Hallamshire thereafter: it is from the Arundel, Shrewsbury and Norfolk estates that most of the tenancies of the various Wheels on the Loxley were granted.

8. During the Civil Wars Sheffield espoused the Parliamentary cause but was taken by the Royalist forces in 1643: after a siege in 1644 the Castle was retaken, and subsequently demolished. The manor house was abandoned as a residence by Thomas, Duke of Norfolk, in 1706, and its extensive park divided between a number of farms.

9. **The cutlery industry.** The Sheffield area was already established as a centre of the cutlery industry by the high Middle Ages: its only serious rival was the German city of Solingen. In 1340 a Sheffield knife was among the possessions of Edward III, inventorised in the Tower of London. Chaucer refers in his Reeve's Tale (probably of the 1380s) to a Sheffield *Thwytel* or *Whittel*, a form of large knife (*...a Sheffeld thwytel baar he in his hose...*). According to Lewis (1848), Sheffield already had a reputation for the production of arrow-heads. Abundant local supplies of ironstone made the area ideal for the industry; the presence of coal deposits may also have been a factor, as undoubtedly was the availability of water power supplied by the fast rivers, Sheaf, Rivelin and Loxley, which debouched into the Don. Leland, writing about 1540, records the presence of *many smiths and cutlers* in Hallamshire. In 1570 the workforce was augmented by artisans from the Netherlands,

refugees from the Duke d'Alva settled in the area by the Earl of Shrewsbury who was Elizabeth I's Chamberlain. By the 16th century the cutlery trade was under the control of twelve master cutlers, appointed by a court leet and entrusted with the regulation of the trade. In 1624 the cutlers were incorporated by Act of Parliament *for the good order and government of the makers of knives, scissors, shears, sickles and other cutlery wares, in Hallamshire*. The guild was governed by a master, two wardens, six searchers and twenty-four assistants, all being freemen, appointed by the Corporation, their jurisdiction the whole of Hallamshire and six miles beyond it. Subsequent amendments to the Act were considered restrictive and were unpopular, until in 1814 an Act was passed granting permission to all persons, freemen or *strangers*, to carry on any trade within Hallamshire.

10. The cutlery trade in Sheffield continued to be in large part a cottage industry in Sheffield until well into the 20th century, dominated by the *little mesters* who had flourished after the Act of 1814. The area was liberally scattered with small workshops and, increasingly, with the Wheels or mills at which the grinding stage of manufacture was carried out. This may have been a local innovation: Defoe noted in 1727 that *...here the only mill of the sort, which was in use in England for some time was set up, (viz.) for turning their grindstones, though now 'tis grown more common* (this may be a reference to Ashton Carr Wheel on the Loxley, which was in existence by 1549). Further impetus was given to local metal industries by Benjamin Huntsman's invention in the 1740s of an improved crucible steel process; by Thomas Bolsover's patent of Sheffield silver-plate at much the same time; and by Brearly's invention in 1912 of stainless steel.

THE WHEELS SYSTEM

11. The method of working of the water-powered mills or 'wheels' in the Sheffield area is simple, though note should be taken of some specifically local terms. A head of water was stored in a pond, known as the *dam*, created by the damming of the river by a *weir*: there were often arrangements for the overflow of excess water, controlled by *sluices* or *shuttles*. From the dam (usually from one end of the weir) water was led into a leat, the *head goit* (also controlled by shuttles), which carried it parallel to the river towards the mill; here the water would enter a small reservoir, the *fore-bay*, before being carried in an iron or wooden *pentrough* to the top of the *overshot wheel*. After turning the wheel, the water would enter the *tail goit* to be returned to the river downstream of the mill. The wheel could provide power to several *ends*, each of which might be leased by a separate tenant. In the case of a grinding mill the ends would be connected by belts to the grinders' wheels, each of which was associated with a trough at which the worker sat or squatted at the *horsing*. From an early date it had become usual to refer to the whole complex of buildings, which could include stables, storage buildings and dwellings, as well as the mill building itself, as the *Wheel*.

12. The Loxley Wheels are known primarily as grinder wheels, for the finishing of knives, scissors, *etc.*, but in fact had a variety of uses at different times. Once the infrastructure of a water powered mill is in place, the power may be harnessed to divers uses and we may see on the Loxley, at various times, different Wheels used as corn mills, grinding mills, rolling mills, snuff mills, paper mills, wire mills, and as forges and tilts.

THE ‘WHEELS’: HISTORY and DEVELOPMENT

13. The eight individual weirs which are the subject of this statement must be considered in the context of the industrial plant which each of them served: though some of the works are at different times referred to as ‘mills’, it is more useful to look at the weirs as they relate to the ‘Wheels’ which might at different times provide power for several various industrial processes. The sites will be considered one at a time, in descending order from Stacey Wheel, a little way below Dam Flask, to the complex of wheels associated with the Hillsborough Weir at Owlerton. SMR numbers refer to the South Yorkshire Sites and Monuments Record.

14. The documentation for the individual sites has been distilled by Ball *et al.*, whose account remains definitive: unless otherwise stated, details are derived from that source.

15. **N.B.** National Grid references given with the accounts below are for the weirs themselves, and differ from the locations given by Ball *et al.*, which are for the ‘Wheels’. To avoid confusion, the references for the Wheels are as follow:

Stacey Wheel	SK 286 905
Old Wheel	SK 295 898
Olive Wheel	SK 304 895
Low Matlock Wheel	SK 309 894
Green Wheel	SK 314 897
Wisewood Forge Wheel	SK 324 895
Limbrick Wheel	SK 331 894
Owlerton (Hillsborough) Wheels	SK 330 890 (approx.)

16. **STACEY WHEEL** **SK 287 903**

Bradfield Parish. Figs 2&3.

Miller (1949) rather noncommittally suggests a possible origin for this toponym: *Malyn Stacey...was a person of note in the district in 1624, and his descendants probably held this wheel. Possibly, however, the name is derived from Stacey Bank nearby, or, of course, the converse may be true...*

1749: the first lease was taken from the Norfolk estate by Thomas Stacey of Handsworth, cutler, to erect *a cutlery wheel on land between the upper cutler’s wheel on the Loxley [i.e., Storrs Bridge Wheel] and Witham’s corn mill [Dam Flask].*

1774: the premises were advertised to be let by *Thomas Stacey*.

1785: The executors of Thomas Stacey leased the site, of 10 acres, to Anthony Lax Maynard of Chesterfield, with three freehold cutlers wheels, successively occupied by George Barrett, Edmund Barrett, Abraham Wragg, Joseph Cooke and George Carr, a sawmaker.

1787: William Brightmore took out a lease of 63 years.

1794: The list of wheels records a fall of 15' powering ten troughs, at which 12 men were employed.

1797: Brightmore's will refers again to two freehold grinding wheels (Ball *et al.* point out that there is confusion here: there were indeed two wheels, but one was leasehold). The Brightmore family continued in occupation until they died out in 1865.

1864: Claimants in the aftermath of the flood included a cutler, razor grinders and saw makers. The mortgagors were awarded £1,600 for structural damage.

Ball *et al.* describe the present situation of the site: *The former position of this wheel is clear...it was the only dam on the south side of the upper Loxley. Dam Flask Reservoir covers part of the Stacey Dam but the buildings were to the east, in an area now landscaped, shown on the 1903 OS as a gravel pit. Immediately to the east of the site of the wheel there are earthworks relating to a later pumping scheme, but a short line of alders shows the line of the Stacey tail goit, whose outfall was opposite the head goit of Storrs Bridge Wheel. No signs remain of the relief tail goit which the map of 1836 shows entering the river further to the east.* Miller (1949, but written in 1936) notes that *the remains of Stacey Wheel were visible at the foot of the embankment for Sam Flask Reservoir until the small service reservoir was built a few years ago.*

17. **LOXLEY OLD WHEEL** *alias* **LOXLEY PLANE WHEEL** **SK 291 901**

SMR no 1648. Bradfield Parish. Figs 4&5.

1690: The earliest reference to the site is a Norfolk Estate lease to William Ibbotson and John Dungworth, who are named in a later rental as the builders of the Wheel.

1710: The lessees were William Ibbotson and Christopher Broomhead.

1737: Thomas Mitchell had the lease.

1758: The lease was held by Robert and William Greaves, local cutlers. The wheel at this time had two ends.

1784: Jonathon Pitchford, razorsmith of Upper Hallam, and John Greaves of Renishaw took out a joint lease. Pitchford was dead by 1789, when his probate inventory valued his share at £100.

1790: Greaves's nephew William, razorsmith of Sheffield, had a 63-year lease. The other half of the wheel was occupied by the late Pitchford's mortgagee Michael Shaw esq., of Dronfield.

1794: The Old Wheel had a fall of 15' 4", powering 27 grinding troughs at which were employed 33 hands. At this time there were two water wheels working from one fore-bay: the widow Pitchford's wheel was 9 ft in diameter and 4ft wide, deep-bucketed, running troughs for saws, pocket knives, razors and edge tools.

1803-1807: The widow Pitchford re-leased and then bought her share: her son then sold it with *land newly added to the dam* to Samuel Newbould, edge tool manufacturer of Little Sheffield. By 1809 Newbould was developing the works.

1811: A valuation showed the site as having two tilt hammers and two forge hammers, with four saw troughs and three edge-tool troughs: the whole was valued at £3,000. Six houses were built in the 1820s, with stables, cow-houses, barns, *etc.* Further additions later included another house with coach-house and stable.

1825: The surveyor Fairburn listed two overshot wheels and a narrow overshot 'blow' wheels to power the bellows. At about this time Newbould was involved in a dispute with the Rowel Bridge Company, owners of Derwent Wheel, who had raised their dam to a level which caused the tail goit of the Old Wheel to back up. According to Ball *et al.*, *some solution appears to have been found.*

1845: The Dentons, tilters and forgers, were tenants, although Newbould continued as owner until 1884.

1864: The great flood affected the Old Wheel badly: an apprentice was drowned (he was 14-year old Joseph Denton, son of Thomas Denton, one of the occupiers of the Wheel). A claim was made for £3,396/12s/10d for renewal of blowing equipment, walls and plantations, setting right the dam and goits, *etc.* The claim refers to work on *half of the weir*. Several smaller claims, chiefly for loss of work, were also made.

1884: Newboulds sold the Old Wheel and their other properties in the area and moved to the eastern side of Sheffield. The Wheel was acquired by Thomas Wragg and was still at work, crushing refractory clay, until 1956.

Ball *et al.* describe the state of the site in 2006: *The dam, which holds water for fishing, is supplied by a lengthy head goit fed either by Storrs bridge wheel or the adjacent weir: the two shuttles are in good condition. The Old Wheel buildings were demolished in the 1960s and the wheel pit gradually filled in with silt from the dam, burying a water wheel which remained visible until circa 1972. Still to be seen are the curved bay of the bye-shuttle, the forebays to the tilt and forge wheels, the iron pentrough for the tilt, and the restored overflow which takes water into a culvert beneath the road. The tail goit, silted since 1980, is indicated by a short length of stagnant water. The outfall of a tail goit overflow to the river is marked by fragments of stonework set in the river.*

A marker stone set on the footpath from Marshalls' to Wraggs' works, between the river and the goit, bears the inscription *MARK BELOW TWO FEET ABOVE WEIR AS AGREED 1825*. This must relate to the settlement of the dispute in that year over water levels, as described above.

18. Archaeological history.

(1) Desk-based assessment (MAP, 2006). This survey covers the area between Storrs Bridge and Rowel Bridge. Most of the historical information is taken from Ball *et al.*, 2006. The report notes that *Documentary evidence suggests that much of the Old Wheel mill site may have been backfilled and therefore substantial and significant archaeological remains of regional importance could survive...*

(2) Field evaluation (MAP, 2010). Trenches 2 and 3 examined a row of cottages shown on a map of 1822: they are recorded as having been destroyed in the flood of 1864, though later OS maps show dwellings on the same site until 1980. Walls survived to a height of 12 courses and a backfilled, vaulted cellar was recorded. Construction was of hand-made bricks bound with lime mortar. The remains were thought to represent post-flood rebuilding, though no earlier structure was found. Trench 11 allowed the inspection of a stone wall to the south of the dam: it revealed an outfall or sluice at 113.14 m.a.O.D., interpreted as an outfall from the dam to the river, still running though apparently controlled by a sluice involving an iron plate.

19. OLIVE WHEEL SK 301 895

SMR no 1652. Bradfield Parish. Figs 6&7.

1714: George and Joshua Hoyland, their mother Rebecca, and one John Yates, all formerly tenants of the lower wheel on Stors Brook (at SK 299 895), built a double wheel with two ends, and four troughs to each end, on land belonging to the Norfolk estate.

1724: Anne Hoyland and John Darwent paid rent on the site. Their tenancy continued until 1782 when John Hibbert and John Goodison took a 63-year lease on the south side and Matthew Ibbotson, a glazier of Hathersage, took the same on the north. Ibbotson is one of several local names which repeatedly occur in the histories of the Loxley sites: in 1864 Jonathon Ibbotson kept the Barrel Inn at Damflask, and Joseph Ibbotson ran the corn mill in Bradfield. Many of the families involved with the various Loxley sites are chronicled by Tweedale, 2010.

1794: There were 25 grinding troughs at the site, powered by a fall of 14' 10".

1806: The tenants bought *the water mill on the north side of Loxley in Holdsworth*. Thomas Goodison and George Hibberd bought that on the south side.

1807: The sale was notified of 'Loxley Wheel', believed to be Olive Wheel.

1810-1817: The south end was leased to Francis Wood, farmer of Bradfield, while Matthew Ibbotson continued to hold the north end.

1818: The southern end was advertised for auction.

1825: The surveyor Fairbank lists one overshot wheel powering thirty grinding troughs.

1827: Ibbotson's half of the site was in ruins.

(By 1832): John and Abraham Webster built a paper mill which in 1834 was worth £1,374. This was one of two paper mills on the Loxley, the other being at Hillsborough (*q.v.*): the industry is discussed in detail by Schmoller, 1992.

1835: The mill was bought by Henry Morley and Co., who are also listed in the 1838 Directory. They were succeeded by Joshua Woodward, who built the house by the dam; then (in 1864) by Joseph Woodward. At about this time the millwright German Wilson noted *Mr Woodward's Ruols to Pollish Paper*.

1864: Following the great flood, the sum of £5,666/2s/7d (assessed by agreement at £4,641/4s) was claimed by Joshua Woodward, paper manufacturer, for damage to his house, paper mill and other possessions. A separate claim for £2,151/18s/1¼ d (reduced to £1,300) was entered by Joshua Woodward, Thomas Goodison, George Shaw Goodison, Samuel Bark, and Margaret his Wife, mill owners, for damage to the Olive Grinding Wheel. Eight workmen were awarded small sums for loss of wages and employment. The paper mill was at this time a multi-storeyed building, as is made clear by the terms of the claim. Contemporary accounts describe large quantities of paper strewn over the river valley downstream of Olive Mill.

1892: A sale plan for the site shows the paper mill as disused. The grinding mill, however, was still working, with 26 troughs. Workers were accommodated in eight stone cottages.

1907: Swift Brothers installed a rolling mill using water power. This was disused by 1931. Ball *et al.* describe the present state of the Olive Wheel site thus:

The fine five-bay weir has paving in the river bed above and below. The shuttle limits flow into the stone-walled goit, but the dam is kept full despite the seepage, and the south side has been cleared of vegetation (2006). The two-bay overflow with washboard slots has fragments of the ratchet and roller for the deep-level drain shuttle: this drain runs beneath the footpath, reaching the river by an iron pipe. Two iron pentroughs survive, over two deteriorating iron overshot wheels. North of the pit, the paper mill wall has filled-in window apertures and parts of the penstock control. A building straddles the tail goit arch. . The southern range, the former grinding hall, is roofless, window apertures are blocked, and dumping hides the floor. A half-buried gear wheel and two hearths remain. The tail goit emerges from the culvert east of the buildings and footpath: stone-walled and largely dry, it runs parallel with the river to an outfall near the Low Matlock weir.

The Olive Wheel complex is discussed by MAP, 2006: historical information included therein is drawn mostly from Ball *et al.*, but the useful point is made that *documentary evidence suggests that much of the Old Wheel mill site may have been backfilled and therefore substantial and significant archaeological remains of regional importance could survive.*

20. Olive wheel listing description

SK38NW BRADFIELD BLACK LANE
(south side)

14/11 Olive Wheel Mill
15/10/76

GV II

Mill. Mid C19. Coursed, squared gritstone, Welsh slate roofs. 3 parallel ranges with another shorter range to left rear, all attached. To left another attached range of buildings roofed at right angles, the rear part derelict. Single storey. Entrance elevation has large boarded doors to left with 3 boarded-up windows to right with lintels cut to resemble voussoirs and keystones. Another large doorway to far right with 3-centred, 2-piece keyed arch.

Rear : two medium-sized cast iron overshot waterwheels on separate off-set axles, each with cast iron pentrough above. In the mill wall behind a massive gritstone door surround, with relieving arch over, allowed access to wheel from inside the works. Derelict part of building, formerly grinding mill, retains drive gear but is without any roof structure. Dam survives, brick-arched tailrace passes beneath mill buildings. Originally built as a paper mill and grinding mill.

Listing NGR: SK3045489451

21. **LOW MATLOCK WHEEL *alias* BUGGEY WHEEL *alias* LOWER CLIFFE WHEEL SK 306 893**

SMR no 1654. Bradfield Parish. Scheduled Ancient Monument no 29989. Figs 8, 9 & 10.

The place-name Low Matlock or Little Matlock (the terms were interchangeable until recently) was devised in the late 18th century by Thomas Halliday, esq., who owned a residence at Cliffe-Rocher: he embellished the grounds with steep woodland walks in the emerging Romantic style, and named the place because of a supposed resemblance to the then fashionable resort of Matlock Bath.

1732: The Norfolk estate records include a lease to James Balguy of Stannington of ground to build a cutler's wheel the size of which, with the number of troughs, was to be left to the tenant's discretion. Balguy continued to pay rent on the site until 1743, the halves of the wheel being divided between a complex series of tenants and subtenants. Balguy was followed as chief tenant by Tobias Andrews, who was in turn succeeded by the family of Hawley.

1772: John Hawley granted to his father a mortgage of £100 in respect of a wheel, which appears to have been the Low Matlock wheel.

1775: John Hawley appears as partner in a new lease with J.W. Armitage and J. Shaw.

1785-1798: the rent was paid by James Colley. The list of 1794, however, shows the partnership of Newbould, Ridge and Wilde running the *Buggey Wheel*, which had a fall of 12' 6" driving eight troughs.

1806: By this time the premises had been bought by Arnold Wilde. By 1811 the establishment comprised three 'works': one of two tilt hammers; one of two forge hammers and two tilt hammers; and one of a plating hammer. There is no mention of a grinding wheel, so the entire nature of the site seems to have been transformed and the works, presumably, entirely re-fitted.

1825: The surveyor Fairbank describes two overshot wheels powering tilt and forge hammers, on one pentrough, and a third overshot wheel working two tilt hammers.

1864: The Burgoyne family were still freehold owners, but after the flood of this year their successors the Cadmans claimed over £5,000 for damage to tilts, forges, dam banking, weir and cottages. The Malin Bridge millright, Wilson, estimated £445 in rebuilding and £82/2s/8d in roofing.

1873: A sale plan mentions a head and fall of water of 26', and a hammer, a tilt and a store of building materials, which were presumably on site for the repairs still undone after the 1864 flood (the present buildings have a date-stone of 1882).

Water power was still used at the site, by Kenyons, until 1956: it is, therefore, the last water-powered rolling mill in the country. Steam power was also used: the brick boiler house is of early 20th century construction: the chimney bears the painted date, 1939 (RCHM, 1999).

The weir and dam arrangements as they survive are described in some detail by Ball *et al.*:

The weir is built in four bays with a massive side wall on the north bank embodying a footbridge over the double sluice, which is now blocked. The stone-sided head goit widens into the water-filled pond which replaced the Cliffe and Low Matlock dams after the flood [of 1864]....The dam has an overflow 23 ft wide which crosses the line of the pre-flood pond. This overflow has grooved side-stones and a stone tunnel, built into the upper steps, to drain the dam. The forebay survives, faced with iron, leading to the cast-iron pentrough, which contains water. The overshot iron water wheel, now off its bearings, has a diameter of 18' 6" and width of 11' 8".....The tail goit has steep, stone-faced sides: in the river upstream from the outfall there is a shallow wooden weir, creating a fall in the riverbed into which water discharges from the tail goit....The site, including the cottages which predate the 1864 flood, were [sic.] acquired for conversion and development in 1999, but the rolling mill was sold to Pre-Roll Ltd.

22. Low Matlock Wheel Listing description

SK 28 NW BRADFIELD LOW MATLOCK LANE
(South side), Little Matlock
564/14/48
Rolling Mill

24.6.76 II*

Steel rolling mill. Dated 1882, rebuilt on existing foundation after flood of 1864. Coursed, squared gritstone, slate roof. Large rectangular building incorporated within later brick extensions. End gable has projecting quoins and round-headed window with keystone now obscured by lean-to roof. Central date plaque with band above. Right return: 3 sets of paired windows with square-faced surrounds and projecting sills, mostly unglazed. To right: a large overshot water wheel, now immobile, with 8 cast-iron spokes to each side and 42 buckets. Above it, a sectional cast-iron pentrough supported by a cast-iron stanchion. In the adjacent wall a blocked shouldered-lintel opening formerly allowed access to the wheel from inside the works. Wheel used until c1956. Dam and tail-race survive. Interior: massive flywheel now powered by electric motor. C19 4-stand in-line rolling mill still in use. The wheel is the largest example of its type to survive in Sheffield.

Listing NGR: SK3095189419

23. Low Matlock Wheel Ancient Monument description

Reasons for Designation

Iron has been produced in England from at least 500 BC. The iron industry, spurred on by a succession of technological developments, has played a major part in the history of the country, its production and overall importance peaking with the Industrial Revolution. Iron ores occur in a variety of forms across England, giving rise to several different extraction techniques, including open casting, seam-based mining similar to coal mining, and underground quarrying, and resulting in a range of different structures and features at extraction sites. Ore was originally smelted into iron in small, relatively low-temperature furnaces known as bloomeries. These were replaced from the 16th century by blast furnaces which were larger and operated at a higher temperature to produce molten metal for cast iron. Cast iron is brittle, and to convert it into malleable wrought iron or steel it needs to be remelted. This was originally conducted in an open hearth in a finery forge, but technological developments, especially with steel production, gave rise to more sophisticated types of furnace. Once produced, steel was used for a variety of purposes. Rolling mills appeared in the 18th century for the production of metal bars and were essential for Henry Cort's puddling and rolling process. The use of rolling mills for the manufacture of tin plate also became reliable early in the 18th century. Little Matlock rolling mill is a well-preserved complex which demonstrates the growth and development of the iron and steel industry in this part of the country. Although much of the 18th century mill was destroyed in the flood of 1864 remains of this period will survive beneath the present mill. The survival of the later 19th century industrial complex, including the buildings, machinery and the water management system is rare. The water wheel is the largest example of its type to survive in Sheffield; the rolling mill itself being the best preserved 19th century example, with original machinery, in the area. The physical remains combine with the historical documentation to provide a very detailed picture of the form and development of the industrial hamlet. The survival of the associated buildings provide evidence for the administrative side of the industry and the domestic arrangement of those who worked within it.

Details

The monument includes earthwork, buried and some standing remains of Little Matlock rolling mill, and its associated water management system. Remains of an earlier mill lying beneath the present mill and the site of a tilt hammer works to the north are also included. The mill, which is a Listed Building Grade II*, is situated on the north side of the River Loxley, to the north west of Sheffield city centre. The water management system extends to the east and west of the mill buildings and feeds from and into the adjacent river. The site at Little Matlock was leased in 1732 from the Norfolk estate to James Balguy who built a cutlers wheel. A valuation in 1811 describes the site as having three works, two tilt, two forge and tilt hammers, and a plating hammer in the old grinding shop. Following a flood in 1864, the mill was seriously damaged which led to an insurance claim of 5,000 pounds. The site was rebuilt in 1882 as a water powered rolling mill and a steam mill was added in the early 20th century so that both water and steam power could be used. Both water and steam continued to be used until the 1950s. Since the early 19th century the mill has also been known as Boggey Wheel and Lower Cliffe Wheel. Prior to the flood, Little Matlock was one of a series of mills which were located next to the River Loxley so that it could be exploited as a power source. The exact nature of the water management system which provided power to these mills is unclear but involved leats and ponds not dissimilar to those surviving today. The density of mills on this stretch of the river during the 18th and 19th century is demonstrated by the fact that Cliffe Wheel was situated only about 150m west of Little Matlock Mill and another, Ashton Carr Wheel, 200m to the east. The monument survives as a series of buried, standing and earthwork remains which follow the line of the river for approximately 500m on an east to west alignment. A weir at the western end of the monument serves to divert water from the river to the head goit, a channel which supplies water to the mill wheel. The head goit sits above the level of the river and drops less steeply so that by the time it reaches the mill buildings, approximately 300m to the east, the goit is several metres higher than the river. At its western end the head goit is approximately 8m wide with a grass covered, stone revetted bank lying approximately 2m from its southern edge. The distance between the waters edge and the stone revetted bank increases to approximately 5m closer to the mill buildings. A footpath leading to the mill runs between the waters edge and the revetted bank. Approximately 150m east of the weir the head goit widens to form a long, narrow mill pond (sometimes referred to as a dam) which replaced the earlier Cliffe and Low Matlock dams after the 1864 flood. Approximately 160m further east a weir, just over 7m wide, acts as an overflow to the dam and runs to the south across the line of the pre-flood mill pond, to meet the river. The overflow weir has grooved side stones and a stone tunnel built into the upper steps to drain the dam. The forebay (a sheltered bay immediately behind the water wheel) links the mill pond with the north west corner of the mill building. This is faced with iron and terminates at a cast-iron pentrough (water tank) which supplied water directly to the mill wheel. The overshot (fed from the top), iron, water wheel has a diameter of just over 5.5m, a width of just over 3.6m and although still in place is now off its bearings. A photograph taken after the 1864 flood shows two pentroughs, the second wheel probably working in

the same wheel pit. The tail goit directs water away from the wheel and is deep with steep stone faced sides. It continues to the west for approximately 110m, under a footbridge until it meets again with the river. A small weir at the eastern end of the monument creates a fall in the river bed into which water flows from the tail goit. The present mill building is situated approximately 100m west of the eastern weir and occupies the site of earlier mill buildings as shown on both pre- and post-flood maps. The arrangement of the buildings have changed over time but the different phases have been clearly documented on maps dating from the late 18th century to the present day. The present building is single storey and built of sandstone with the brick built, steam powered mill added onto the south side. The chimney stack of the steam mill has a painted date of 1939. Inside the mill building much of the machinery, particularly the gear-train to the steel rolling-stands survives, adapted for use with electric power. The flywheel, which was driven by the external water wheel, is set against the northern wall, and the trains are arranged in a row across the building, running north to south. The water mill also houses a 20th century gas furnace which is positioned against the western gable wall. The floor throughout is covered in heat-resisting, fireproof, metal plates, which allowed hot metal to be moved around easily. The steam powered mill was similar in layout with the row of trains arranged across the building. The exact position of machinery which has now been removed, is also indicated by various fixtures and fittings within the building. To the north west of the mill building, and north of the tail goit, is an area of hard standing. It is clear from both pre- and post-flood maps that this was once the site of a building believed to have been a tilt hammer works. The sub-rectangular building abutted the northern edge of the tail goit and was supplied with water by a small pond situated immediately to its north west. The position of the pond and its associated sluices are recorded on late 20th century 1:10,000 Ordnance Survey maps suggesting that it survived at least until the 1970s. Although neither the building or the pond are now evident from the surface it is thought that remains of these will survive beneath the ground surface. To the east of the tilt hammer site there are some areas of a contemporary refuse tip shown on maps. These are included as they will preserve important information about the site and the products that were made there. A number of other buildings are also associated with the mill complex and together combine to form Little Matlock Hamlet, a community which built up around its industrial core. The surviving buildings include a short terrace of cottages, known as Riverdale Cottages, which are believed to be the oldest buildings in the hamlet dating from the late 18th century. The cottages, which are Listed Buildings Grade II, were used as workers cottages and are survivors of the pre-flood mill complex. A stone built building, immediately north of the mill and tail goit, is thought to have been used as a stable or barn. The counting house, which lies approximately 40m north east of the mill building, may be a post-flood addition but a building is shown in this position on a map of 1864. The available mapped evidence indicates that a number of smaller buildings also formed part of the hamlet but their function is unknown and traces of their exact position are not apparent on the ground surface. The cottages, stable, and counting house all lie outside the area of protection to the north and are not therefore included in the scheduling. The mill building and the machinery contained within it, all modern fences, gates, walls, road and path surfaces are excluded from the scheduling although the ground beneath all these features is included. The north wall of the mill, which forms part of the southern wall of the tail goit, is included below the internal floor level of the mill.

24. **Archaeological History**

- (1) Survey (RCHM, 1999). This comprises a detailed survey of the buildings, but not of the weir.
- (2) Desk-based assessment (ARCUS, 2001, 1). A very detailed account is given of the whole site and its development.
- (3) Building recording (ARCUS, 2001, 2). This comprises a full drawn and photographic record of the barns and cottages, the Counting House, and the Dam House *alias* the Stable.
- (4) Field evaluation (ARCUS, 2001, 3). Two trenches were excavated, amounting to 104 m² in total: only post-1864 dumped material was recorded.
- (5) Field evaluation (ARCUS, 2002). The mill pond ('dam') wall was recorded, at an angle to the reservoir; it consisted of four surviving courses of 'brick-sized' sandstone blocks, without bonding material. There was no investigation of the weir.

25. **GREEN WHEEL****SK 310 893**

SMR no 1656. Bradfield Parish. Figs 11 & 12.

1778: The earliest reference to the site is a lease and release by which Anne Bamford mortgaged part of the manor of Owlerton, including *the upper wheel next Robert Holmes's farm*, for £18.

1794: Another mortgage indenture, this time of the whole manor, and from Sir Roger Montague and Lady Catherine Burgoyne to Richard Debarge of London, repeats the same reference to the Wheel.

1777: A map of Owlerton manor and its accompanying schedule shows the dam and wheel to be rented by John Hawkesley: an amendment to the schedule shows that he was paying stream rent for a snuff mill. These facts are reiterated in a rental of 1793, but the wheel is not mentioned in an associated schedule of 1794, when Hawksley is located at 'Glass Mill'.

1815: Sketches made by the surveyor Fairbank in connection with the Wisewood enclosure show the wheel's dam fed from the tail goit of Low Matlock Wheel. This arrangement was altered after the flood of 1864.

1862: Edwin Denton paid rent to G.M. Burgoyne for a tilt and stables at Green Wheel.

1864: The Wheel seems to have escaped serious flood damage, perhaps because of the height of the dam above the river (Ball *et al.*). A claim for £9/5s for the loss of five weeks' work was submitted by John Denton, steel forgerman, but was later withdrawn: a similar claim of £9 by Thomas West, tilter, was dismissed.

1870: The rates for the tilt and stables were paid by the owner (now called Jackson): Denton was still the tenant. By 1883 the owner was C.V. Bunting.

1883: The site was known as Green Steel Works and possessed a helve hammer and three tail hammers, all installed by Denton, powered from a reservoir newly built after the flood. Green Wheel also received compensation water from the Sheffield Water Company.

1897: Green Wheel Tilt was occupied by Mr Bunting. In 1907 it had two water wheels, and no steam power. The works were disused by 1931, and the forge had been reduced to a shell by 1955.

Ball *et al.* have described the present (2006) state of the site: *Water has been taken from the Ashton Carr Dam in two parallel channels, the northerly now silted, the southern widening into a cleared dam. A double outlet overflow survives, with a stone sill, and slots in the stone ends and in the central pillar. A low-level central drain culvert carries water to the head goit of Glass Tilt through a pipe set in dumped rubble. Nothing remains of the tilt building. The tail goit, which is no longer visible, fed water to Glass Tilt. The house marked on the 1805 OS map remains, to the east of the site of the wheel.*

26. WISEWOOD FORGE WHEEL

SK 317 896

SMR no 1659. Sheffield Parish. Figs 13 & 14.

This site is referred to by some sources as Bradshaw Wheel.

The 17th century: Four scythe wheels existed at Wisewood: Ball *et al.* consider that two of them were probably located at this site.

The 18th century: Two wheels were let by the Bamforth estate to a series of tenants. George Turner worked one wheel in 1709 and in 1731; he was succeeded by John Ibbotson and John Bradshaw, who jointly held *the nether scythe wheel*. Daniel Taylor and his widow seem successively to have held the other wheel.

1777: John Bradshaw had *both ends* of the wheel. There follows a rapid and complicated series of tenancies.

1792: William Armitage paid rent on a tenancy *late Bradshaw and Savage*. He still had it in 1794, when a fall of 14' 8" powered 21 grinding troughs, at which 28 men were employed.

1813: The evaluation of the Burgoyne estate mentions new buildings and machinery. The site has by this time been converted to a forge, and the new work was probably undertaken as part of the conversion.

1814: The Directory lists Armitage and Co at the *New Forge*, which was built over the end of the dam.

1833: The lease was taken over by W.I. Horn and Co., and the forge converted to a rolling mill. The rate book of 1845 shows however that there was also a grinding wheel.

1864: The insurance claim after the great flood includes sums for the loss to Armitage and Co. of the work of seven men and three boys, chiefly employed in anvil making. Otherwise, the claim does not distinguish between the separate Wisewood concerns: the large initial claim of £10,848/17s/6d was assessed down to £8,750.

1870-1873: The freehold passed from the Burgoyne estate to the family of Horn. The works consisted at this time of a forge, tilt and rolling mill, with a head and fall of water and some cottages. All were apparently of post-1864 construction. Both premises at Wisewood were subsequently purchased by the Wood family, who were still there in 1958. Both water and steam power were in use in 1907.

According to Ball *et al.*, the dam, of over 2 acres (0.8 hectares) is supplied by two goits from Wisewood Forge. The dam has been filled in except for a small area through which there is a *flow, from the hillside, towards the fine ashlar double overflow, with grooved sides for washboards*. It is also stated that *management proposals for the site (2006) include the conservation of these remaining features*.

27. **LIMBRICK WHEEL****SK 330 894**

SMR no 1663. Sheffield Parish. Figs 15 & 16.

This is referred to by some sources as ‘Limerick Wheel’, apparently an early rendering of the name.

1723: the original building lease from the Norfolk estate made to John Justis. By 1727 there was a wheel with two ends on the Nether Hallam (south) side of the Loxley. Justis’s will of 1732 refers to his stones (that is, grinding stones) and tools at the Wheel, though in 1731 John Nodder and William Ellis had taken a lease which also included a second wheel with one end, a little downstream.

1741: Ellis assigned the remainder of his lease to Joseph Broadbent. Broadbent’s widow later took out a further lease, which was backdated by ten years, of *those cutler’s wheels commonly called Limerick Wheels consisting of four ends [or two double ends] containing each six troughs and also two messuages or tenements for workmen near the said wheels...the premises to be let for ten years in consideration of Joseph Broadbent rebuilding the said wheels which he did at £100 expense*. This rebuilding had been detailed in the Field Books of the surveyor Fairbank in 1758 and 1760.

1782: Thomas Broadbent (presumably Joseph’s son) was declared bankrupt. John Sutcliffe, one of his creditors, took out a 63-year lease of the Limbrick Wheel, but by 1786 the tenants are listed as Greene, Hoults and Hoole. The number of grinders employed had risen from six to ten.

1794: 48 men were employed at 48 grinding troughs, powered by a fall of water of 12’ 4”. A contemporary valuation shows four overshot waterwheels.

1801: Resentment was expressed in the Parish at *the low rates paid by such a large establishment*. Clearly, the rateable value had not kept pace with the growth of the Limbrick grinding mill.

1805: The Wheels were offered for sale by the Norfolk estate, but were not sold until 1812. John Hoults, merchant; Joseph Hoole, grinder; and John Green, edge tool maker, each bought a one-third part. Hoole was dead by 1816: his trustees mortgaged his share, consisting of two double ends and 25 troughs, to Luke Palfreyman, hosier. In 1819 the executors and widow of one of the trustees leased half of that share to Malin Shepherd, ironmonger. Green, Hoole and Company were still in possession of the site in 1832. A Hoults (actually, ‘Holt’) was still there in 1844 and again, in partnership with Greaves and Neale, in 1850.

In 1845 the Limbrick site became an object of the practice of *rattening*: a series of attacks on ‘blackleg’ establishments by a militant faction among the emerging Trade Unions: collectively stigmatised as ‘The Sheffield Outrages’, the attacks generally involved the removal of essential tools or items of equipment (often the driving bands of the grindstones) but in some cases escalated to arson and machine-breaking (see Pollard, 1971). The Limbrick case seems to have been a fairly severe one: boards and horsings (on which the grinders sat at their troughs) were burned and the grinding stones broken.

1862: By this time the site had undergone a major transformation and had become the Limerick Crinoline Rolling Mill, involved in the production, among other things, of the wire cages which supported the then-fashionable crinoline skirt.

1863: Considerable work was carried out on the Limbrick site. An estimate refers to ...*one Metall Water Wheel...and one Deal pentrough...* for £90, and ...*One New Water wheel 9 ft dia. and to the Other Water Wheel at Limerick Works for Mr Peese Put in All Com Pleet For the som of £70 and Putting 2 Gugeons in Altering Pentrough and setting to Worke the above Water Wheel to Johnson and Barker £5.*

1864: The great flood affected the Limbrick site sorely. The owners at this time were H.J. Johnson and S.J. Barker, rollers of steel and makers of crinoline wire. Barker was drowned in the flood and Johnson emigrated to Pittsburgh, though he returned to claim compensation of £3,000. The total insurance claim was for £5,922/19s/8d and was supported by a very detailed inventory, ranging from ...*2 Hats, Pilot Jacket, Coat, Cloak...* to four water wheels and two boilers (the latter suggesting some use of steam power). The particulars of the claim give a picture of the state of the business at the time: *The Limerick Mills consisted of two buildings one called "The Old Mill" and the other (the machinery in which was not quite completed) was called "The New Mill" The Old Mill was clearing £15 a week, The New Mill would have been completed and ready for work by the 13th April and it is estimated would in a short time have cleared £30 a week. The firm was carrying on a very good and increasing Trade as Rollers and Crinoline Steel and Wire Manufacturers. The whole of the Trade was stopped and lost, the Books were lost being washed away and Mr. Joseph Barker lost his life in the Flood.*

1865: The Limbrick site was bought by Messrs Ward and Payne, and rebuilt as a grinding mill. Estimates for the work of repair and putting into order survive and specify....(on the north side) *to Repair Water wheels and put them in working order and to put all the Geer in working order...about £53...* and (on the south side) ... *to put Pentrough back to its proper place...also 2 new Brest Shuttles and Lineings etc. about £130...* These figures might suggest that the devastation brought by the flood was not so catastrophic as the insurance claim might indicate.

Ball *et al.* describe the present state of the site thus:

Nothing remains of the pre-1864 site, whose weir lay just downstream from the Turner Wheel tail goit outflow, with the head goit, dam and wheels on the south side of the river. The 1864 flood shifted the course of the river southwards, destroying the original dam, incorporating an overflow weir and a wheel pit. Tipping has moved the river to a more northerly line, with housing on the site of the weir and dam. There is a weir which appears to be on the line of the dam: the position of the latter is shown by adjacent stonework and by a change of stonework among the houses. There are traces of an outfall in the south bank of the river east of the weir.

28. HILLSBROUGH WEIR**SK 332 895**

(No SMR no). Sheffield Parish. Figs 17 & 18.

Hillsbrough Weir, just above the discharge of the Loxley into the Don, is all that remains of a large complex of wheels and mills, which have a long history. It is not always easy from the historical sources to distinguish one component of the group from another: the site generally might best be considered under a number of heads.

29. The early mill.

1332: An *inquisition post mortem* on Thomas de Furnivall mentions six water mills in his ownership, collectively worth £51/6s/8d: one is named as *Ollerton* (*sc.* Owlerton) mill.

1383: The above information is repeated in an *inquisition* relating to William Furnival.

1386: a deed mentions a corn mill at *Ollerton*.

1441-1446: The Hallamshire Court Rolls record payment for two new wheels, and to rent of £2/8s/4d.

1548: Laurence Smyth of Attercliffe left his son, Hugh, property which included *the milns of Sheffield and Ollerton*, held of the Earl of Shrewsbury.

Throughout the 16th and 17th centuries the Shrewsbury estate records include numerous references to the mill at Owlerton and to a succession of tenants and millers, chiefly of the families of Wainwright, Cook and Girdler.

1696: Jonathan Wainwright had a fish pond at Owlerton mill: this is taken by Ball *et al.* to be the first evidence of subinfeudation or the division of the property.

1720: John Justis cutler, took out a 21-year lease to build a new grinding mill next to the corn mill. By 1722 he had three cutler wheels there, and permission for a polishing wheel within the corn mill. In 1726 he built another wheel at Owlerton.

1743: Justis leased Owlerton Mill and four cutler wheels to Joseph Broadbent. 1768: Broadbent's widow had three wheels with six troughs in each, and a snuff mill built *a few years since*.

After this date, the arrangements at the Owlerton mill site may be considered separately for the upper wheel, the lower wheel, and the snuff mill (converted to a paper mill).

30. The Upper Wheel

1783: John Sutcliffe, an assignee after the Broadbent bankruptcy, took out a lease of 63 years of Owlerton Wheel. By 1783 it had been taken over by T.J. and W. Law.

1794: the list of wheels on the Loxley records a fall of 7', driving 20 troughs (Ball *et al.* note that this figure was *considered an underestimate...in 1801*).

1801: John and William Law, silver platers, mortgaged to Richard Stanley, banker, three ends at Owlerton Upper Wheel. In 1810 they purchased the site from the Norfolk estate and remained in possession until 1825, when they sold it to Thomas Dunn (formerly of the Lower Wheel). At some time after 1851 it was again sold, to George Hawksley.

1864: At the time of the flood, the Wheel was worked by Joseph Wordsworth, wire manufacturer. He submitted a claim for £527/6s/4d, and was awarded £433/0s/3d for loss of stock and tools (over £300 of the claim). By this time the works were employing steam as well as water power, and £42/10s was claimed for *Compensation for difference between Engine and Water Power from 12th April to 12th September*. Some water power was however still used until at least 1907: the wheel was broken up in the 1930s, although the mill had been working in 1926.

31. The Lower Wheel

1722: Three cutler wheels (meaning three *ends*) were recorded at Owlerton at this time, apparently referring to the Lower Wheel.

1794: Mitchell & Partners had a fall of 6' 4" driving 24 troughs.

1811: A sale by the Norfolk estate sees Owlerton Lower Wheel and $\frac{3}{8}$ of the *Hill Bridge Weir* sold to John Jeffcock, collier, of Handsworth (he was probably in fact a 'coal owner'): another $\frac{3}{8}$ part of the weir went to the buyers of the Upper Wheel, and $\frac{1}{4}$ to those of the snuff mill. This is an interesting case of multiple ownership of and responsibility for a weir which might serve several different commercial enterprises.

1812: Thomas Dunn, cutler and coal owner (one assumes that he was an associate of Jeffcock) takes over the site which now consists of one wheel *formerly unemployed* and two others containing seven troughs each. In this year the site was damaged by rattening.

1817: A lease to John Sorby, edge tool maker, and Henry Hartop, ironmaster, describes the Wheel as having three ends, one unemployed and the others with seven troughs each.

1816-1875: During this period the rates were paid by the family of Dunn, associated with the Marshalls who had the paper mill (*olim* the snuff mill) at the lowest site: during this period the Lower Wheel may have become part of that same business (this is suggested by the lack of a separate insurance claim after the 1864 flood).

1900: The Wheel was bought by Samuel Laycock and Sons Ltd, manufacturers of hair seating. This long-established firm had also a large factory in Portobello Place; they may have wanted the Owlerton site for the provision of the wire, springs and other metalwork needed in their business. The firm was liquidated in 1934, when it had two mill dams and was partly responsible for the maintenance of the weir and shuttles.

32. The Snuff Mill

1760: The ubiquitous Sheffield surveyor William Fairbank recorded ashlar work at Owlerton snuff mill, for the widow Broadbent.

1786: The tenants were the partners Dickinson and Barker.

1815: By this time the works were known as *Widow [Anne] Bradley's Paper Mill*. The paper industry in Sheffield is discussed in detail by Schmoller, 1992.

1844: The mill was sold to William Marshall, who was advertising the next year best-quality rope paper made in *the newly refurbished premises*.

1864: Marshall's claim for flood damage compensation was amended from an initial £5,617/14s/5d to an agreed £2,673. The particulars of the claim note that: *No Claim is made in the above account for Contingencies in Repairs and Rebuilding nor for Increase of Business in bringing the "New Mill" into operation. Nor does it include the restoration of the Weir and Shuttles at Hillsbro' bridge and the cleaning out of the River which is a joint Expense of three works.*

1877: The Mill was bought by J.W. Thompson.

1900: The Mill was bought by Samuel Laycock and Sons Ltd, and incorporated into the works at the Lower Wheel site (if the two were indeed separately worked at this time).

Ball et al. describe the present state of the site of the Owlerton Mills: *All that remains at Owlerton is the weir which served all three sites. This lies between Langsett Road and Walkley Lane, and is in good condition. The rear of the building which fronts onto Holme Lane respects the west bank of the head goit, which is culverted beneath Langsett Road and the shops on the north side. It has been filled in between Bradfield Road and the Loxley, an area occupied by recent shop developments and car parks, for which the late-19th century workshops associated with the wheel were demolished in 1984. The Lower Wheel dams have been covered by the Regents Court flats.*

ASSESSMENT OF IMPORTANCE

33. It is important in considering the historical and archaeological significance of the weirs under discussion to see them within their overall context, that of the system of Wheels driven by the Loxley, including the various mills, grinding shops, foundries and factories served by them. The weirs are easily overlooked in considering the industrial archaeology of the area; they are not specifically described in the Listing descriptions of the remains at Olive Wheel and Low Matlock Wheel (though in both cases it is recorded that the *dam* survives, which may refer to the weirs in disregard of local and historic usage, by which the dam is the mill-pond). The weir at Low Matlock is, however, included within the area of the scheduled Ancient Monument. The weirs are essential components of the system, and are also in each case well-preserved and impressive historic structures; they are part and parcel of the extensive historic landscape which the Loxley Valley (certainly, below Dam Flask Reservoir) represents.

34. A consequence of the long and continuous ownership of the Hallamshire lands by the Shrewsbury and Norfolk estates has been the scrupulous maintenance, and the happy survival, of records of leases, rents, grants and every kind of transaction. To those estate records must be added those of the manor court and of the cutlers' company, the voluminous papers of the Fairburn family of surveyors, the extensive archive generated by the flood of 1864 and the consequent insurance claims, the records of individual commercial concerns and municipal documents illustrating the social context of the industries. Together, this adds

up to a very extensive and detailed archive (extensively mined by Ball *et al.*) which must be seen as greatly augmenting the testimony of the physical, archaeological, remains and as considerably enhancing their importance by allowing an unusual depth of understanding to be reached. While there are admittedly gaps in the record, especially in the years before the 18th century, the historical sources are, on the whole, unusually comprehensive.

35. The potential for the survival of sub-surface archaeological remains, particularly of those earlier than 1864, is far from clear. At the Old Wheel site, at least, evaluation has shown structural survival on the site of buildings known before the flood, though it was not shown that the early periods of structure were present: results of evaluation at Low Matlock showed only post-1864 ‘dumped’ deposits. Much more evaluation is needed to achieve a proper understanding of the archaeological survival of early periods at most of the sites: the least that may be said is that there is a probability that such remains will in places still exist.

36. The importance of Hallamshire to the development of the ferrous metals industry, and in particular of the cutlery trade, is difficult to overstate: by the Middle Ages the name of Sheffield was already synonymous with cutlery, and by the 18th century Sheffield was supplying to the world every type of edged tool and weapon. Given this context, the Wheels of the Loxley Valley must be seen to be of far more than local or regional significance: their importance is European, if not more widely international. The individual sites, often converted from one use to another, and back again, have additional significance in illustrating the fluid and changing nature of industrial operations in the periods before and after the Industrial Revolution.

FISH PASSES

37. The various possible modes of construction of fish passes have been described in great detail by the Environment Agency (2010). The current legal situation regarding the installation of fish passes on existing weirs is summarised:

Section 10 [of the Salmon and Freshwater Fisheries Act 1975 as amended by Schedule 15 to the Environment Act 1995] allows the Agency to build or alter fish passes on dams at its own discretion and at its own expense. There is no longer a requirement for the relevant Minister to approve the form and dimensions of fish passes built under this section; this is now left to the Agency to determine - S 10(1). This section also allows the Agency to abolish, alter or restore to its former state of efficiency, any existing fish pass or free gap, or to substitute another fish pass or free gap. Again, there is no longer a need for Ministerial consent for such alterations - the Agency may make its own decisions in such matters - S10(2). Works carried out in this section should not jeopardise the operation of certain specified interests, which may be connected with structures altered by the Agency. The final subsection gives the Agency the power to recover costs incurred in repairing a damaged pass - S10(3). Unlike Section 9, this section contains no caveats referring to ‘waters frequented by salmon or migratory trout’. Arguably, therefore, it provides the Agency with the power to construct fish passes for any fish species in any waters.

38. A wide variety of fish pass designs are available, not all of which are suitable for all fish species. In selecting the appropriate solution, certain principles should be considered as important to protect the interests of the ‘heritage asset’ represented by the historic structure of the weir:

- A. Physical impingement on the historic structure should be minimised.
- B. The construction should be fully reversible so that the historic structure can be restored to its previous state.
- C. The construction process should be fully documented.
- D. Materials used should be sympathetic to the historic structure.

39. The Agency notes that *total removal, breaching or significant lowering of obstructions can be among the most cost-effective options for improving fish passage, and is often cited as the preferred option*. Clearly, however, this option can not be considered in the case of the Loxley, because of an unacceptable level of damage to heritage assets. A type of fish pass which might be suitable for the Loxley locations while fulfilling the above criteria is the 'rock ramp' type. *Typically they are installed at a slope of about 1:20, and comprise rocks set into a sloping bed, roughly in lines at about 1–2.5 m intervals, with slots between the rocks of the order of 150 to 300 mm. There is scope for using smaller rocks and less formalised design in small side channels where flood flows are carried via other routes* (Environment Agency, 2010). To permit the passage of eels, the rock ramp might be augmented by an anchored flexible substrate, of which several varieties are available.

40. Consideration might also be given on most of the Loxley sites to the use of river-bypass fish passes, utilizing the head- and tail-goits to bypass the weir. Such arrangements would, of course, need to make up the difference in height between the pentrough and the head of the tail goit, but the problem should not be insuperable: more difficult might be questions of ownership and accessibility.

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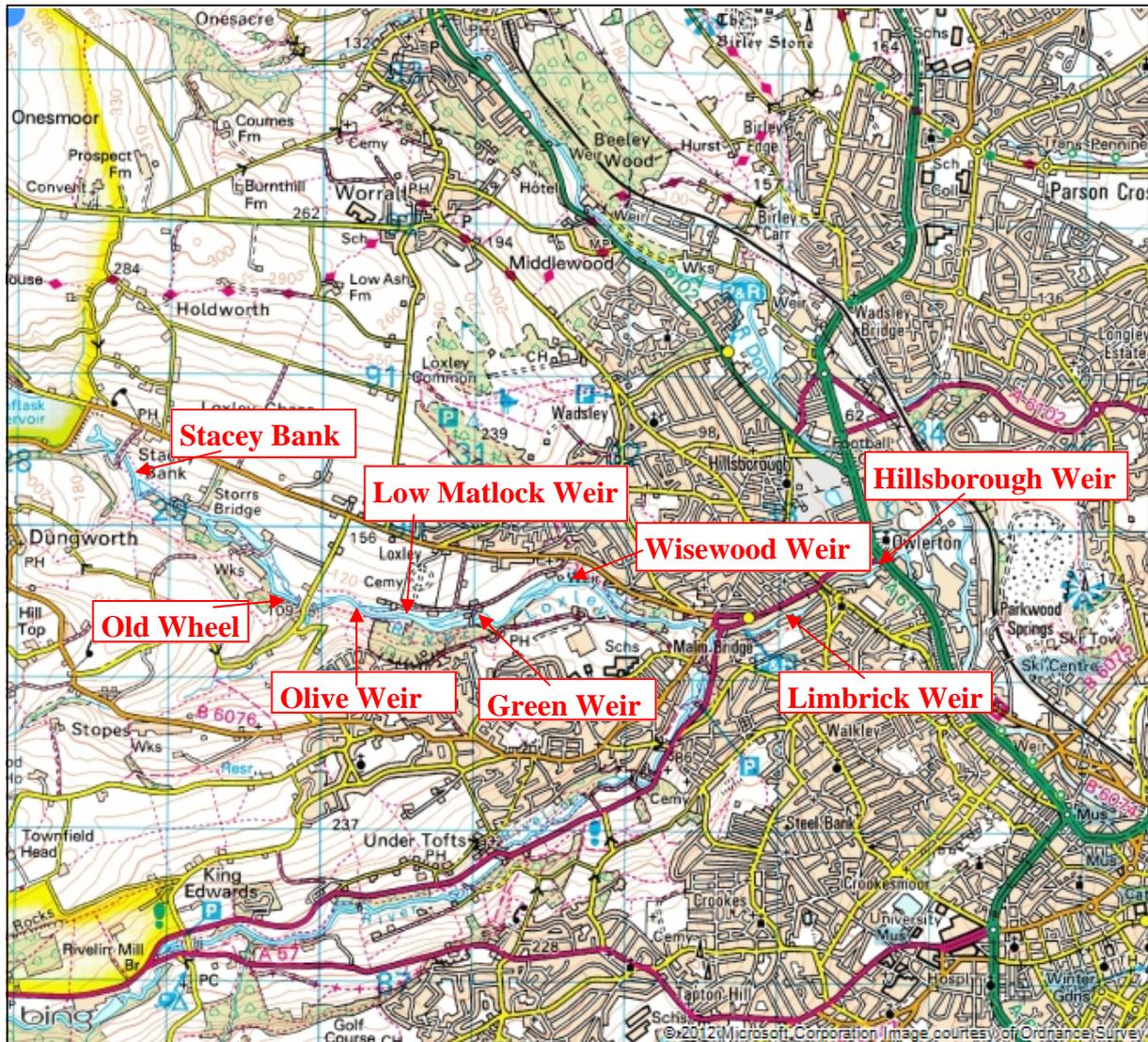
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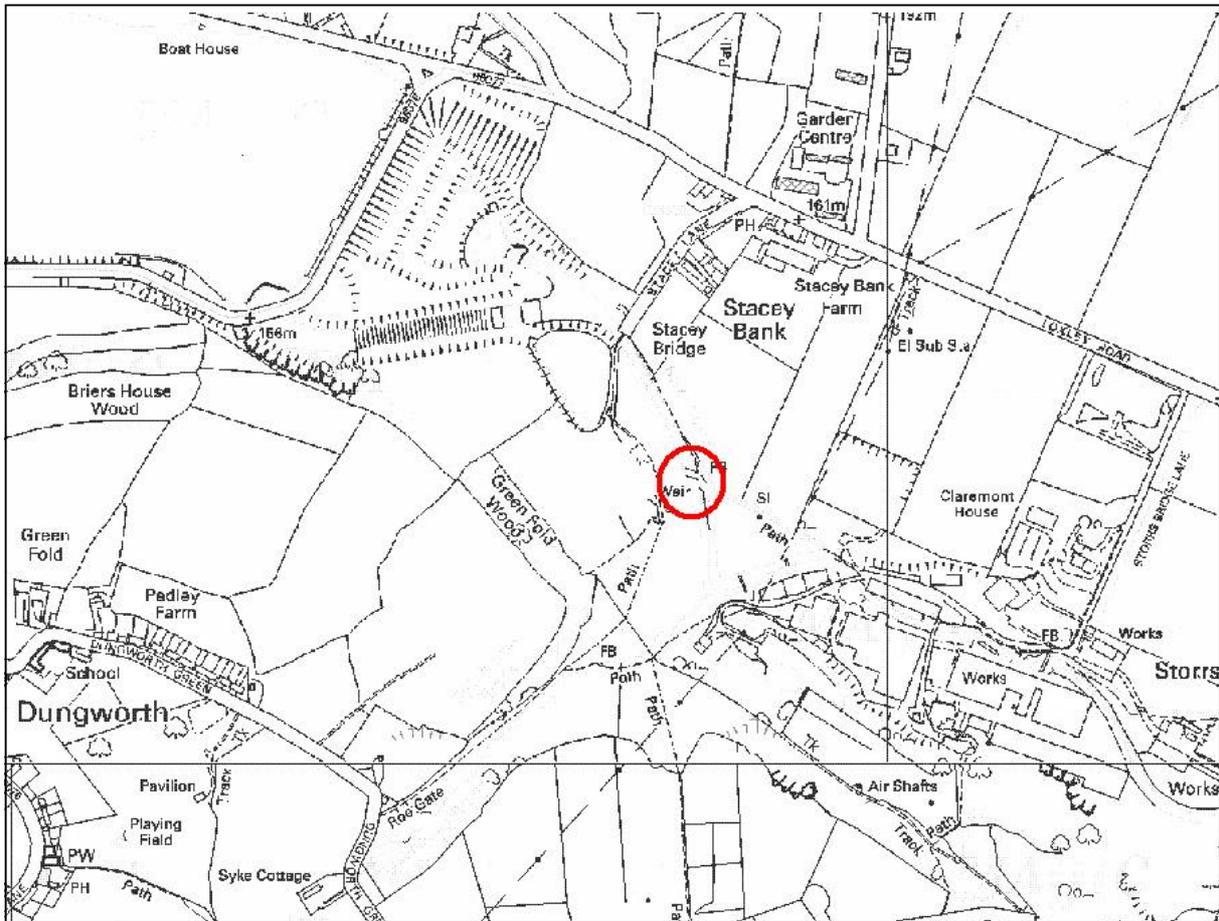
Loxley Weirs

Fig. 1

Location of weirs



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Loxley Weirs

Fig. 2

Stacey Weir: location



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Loxley Weirs

Fig. 3

Stacey Weir: view



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Loxley Weirs

Fig. 4

Loxley Old Wheel: location



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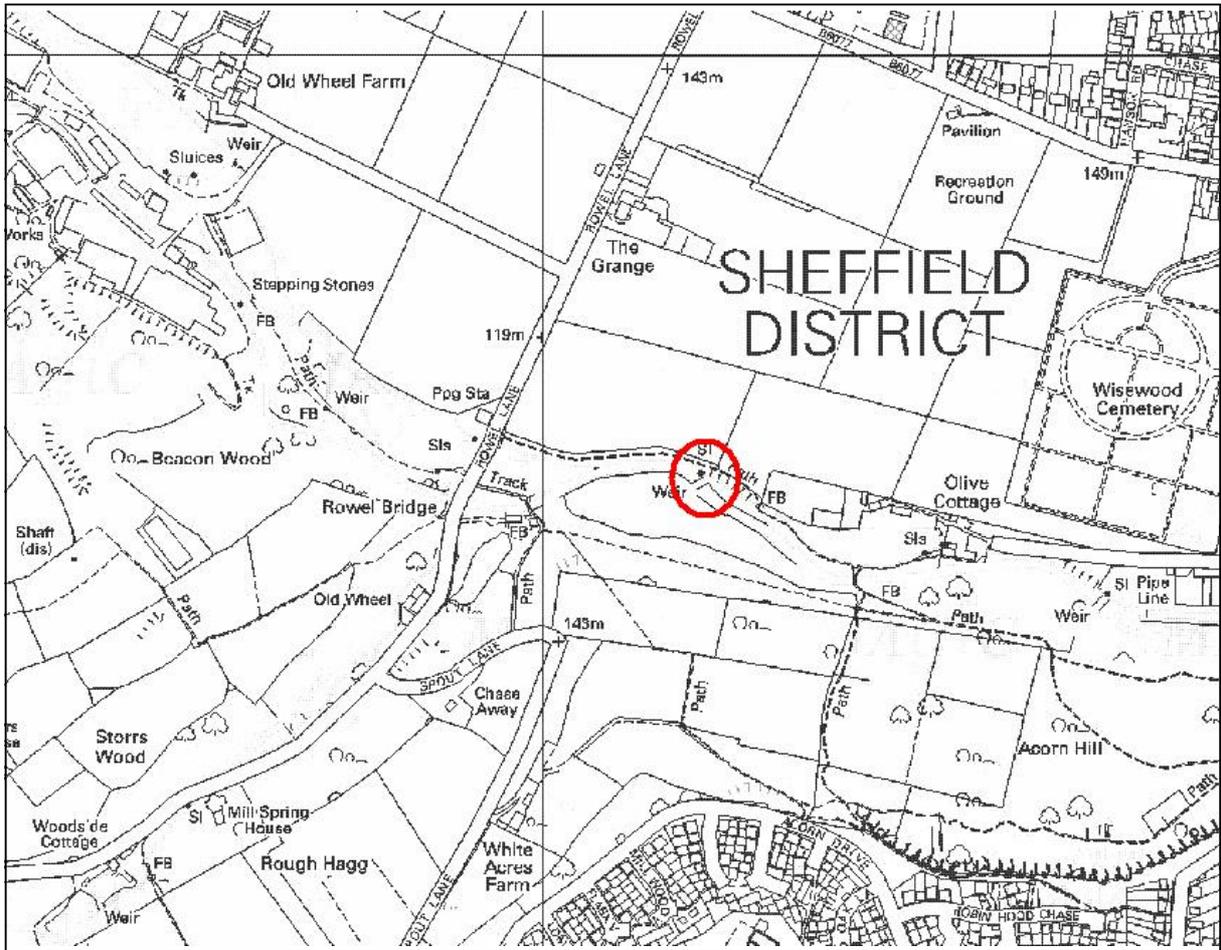
Loxley Weirs

Fig. 5

Loxley Old Wheel: view



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Loxley Weirs

Fig. 6

Olive Weir: location



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Loxley Weirs

Fig. 7

Olive Weir: view



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Loxley Weirs

Fig. 8

Low Matlock Weir: location



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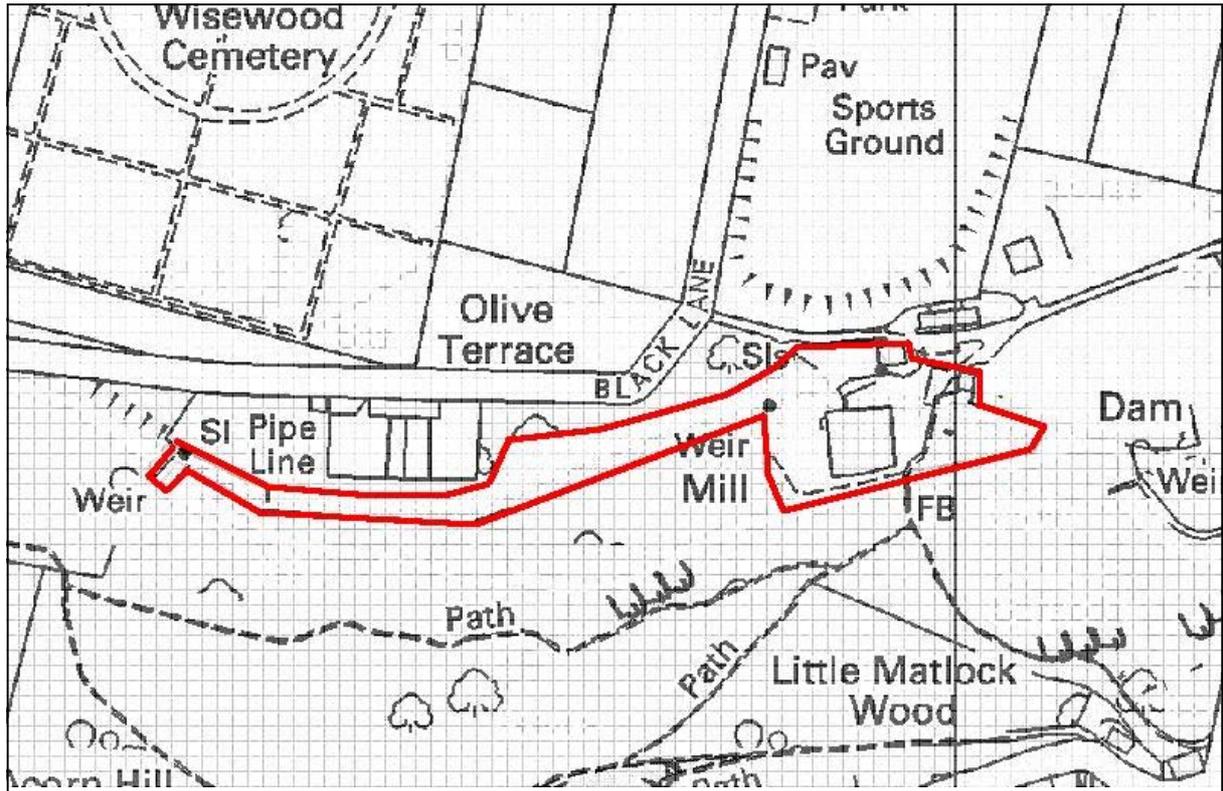
Loxley Weirs

Fig. 9

Low Matlock Weir: view



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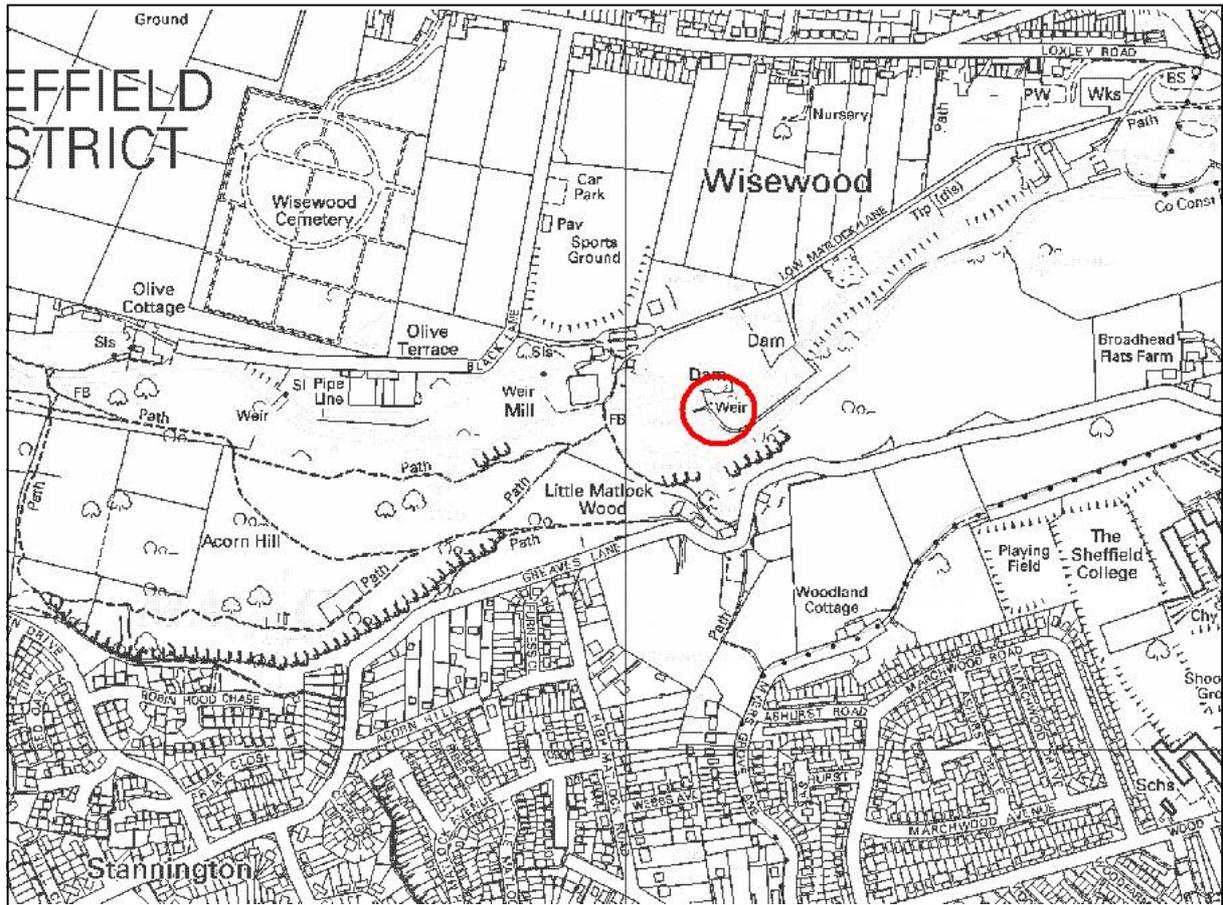
Loxley Weirs

Fig. 10

Low Matlock Wheel: extent of Ancient Monument



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Loxley Weirs

Fig. 11

Green Weir: location



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Loxley Weirs

Fig. 12

Green Weir: view



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Loxley Weirs

Fig. 13

Wisewood Forge Weir: location



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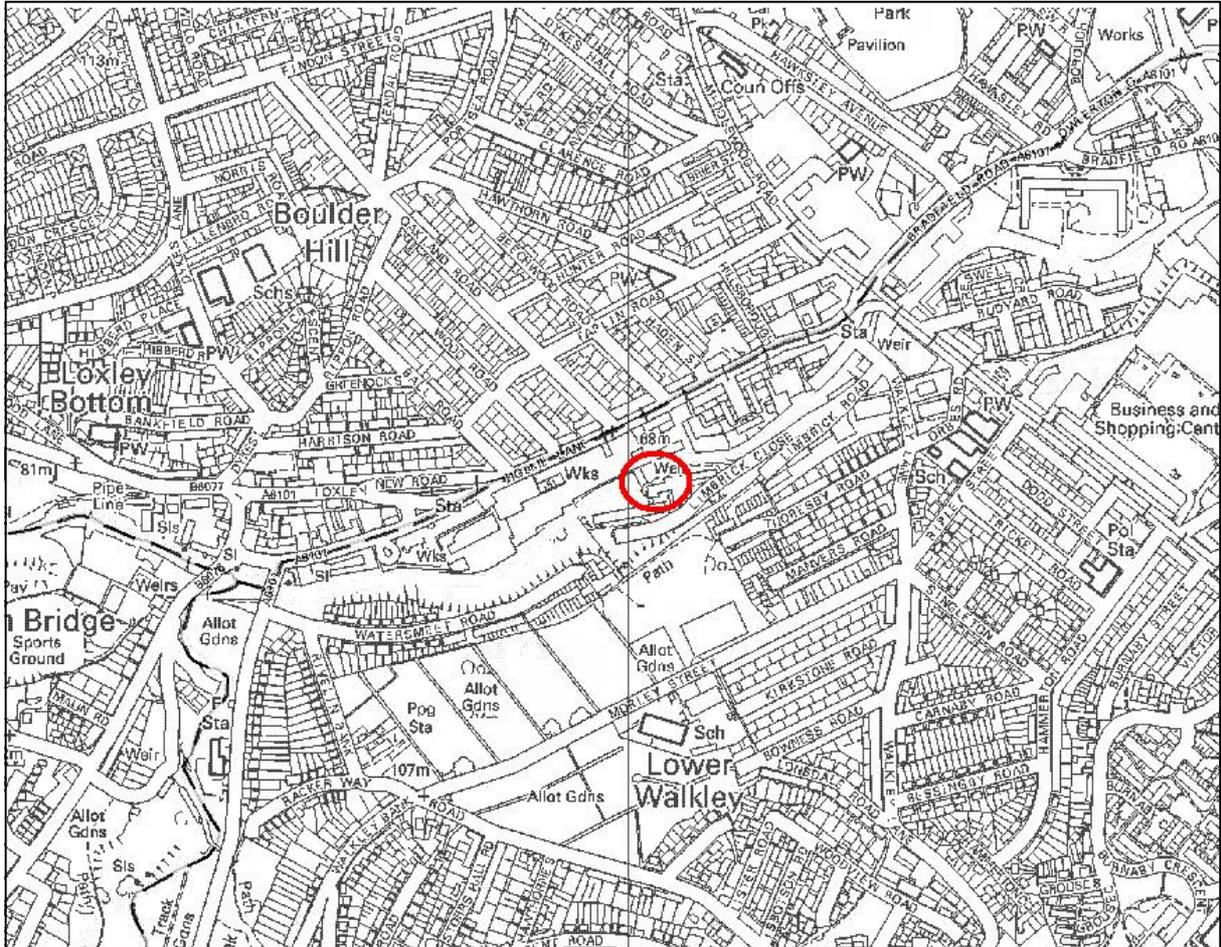
Loxley Weirs

Fig. 14

Wisewood Forge Weir: view



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Loxley Weirs

Fig. 15

Limbrick Weir: location



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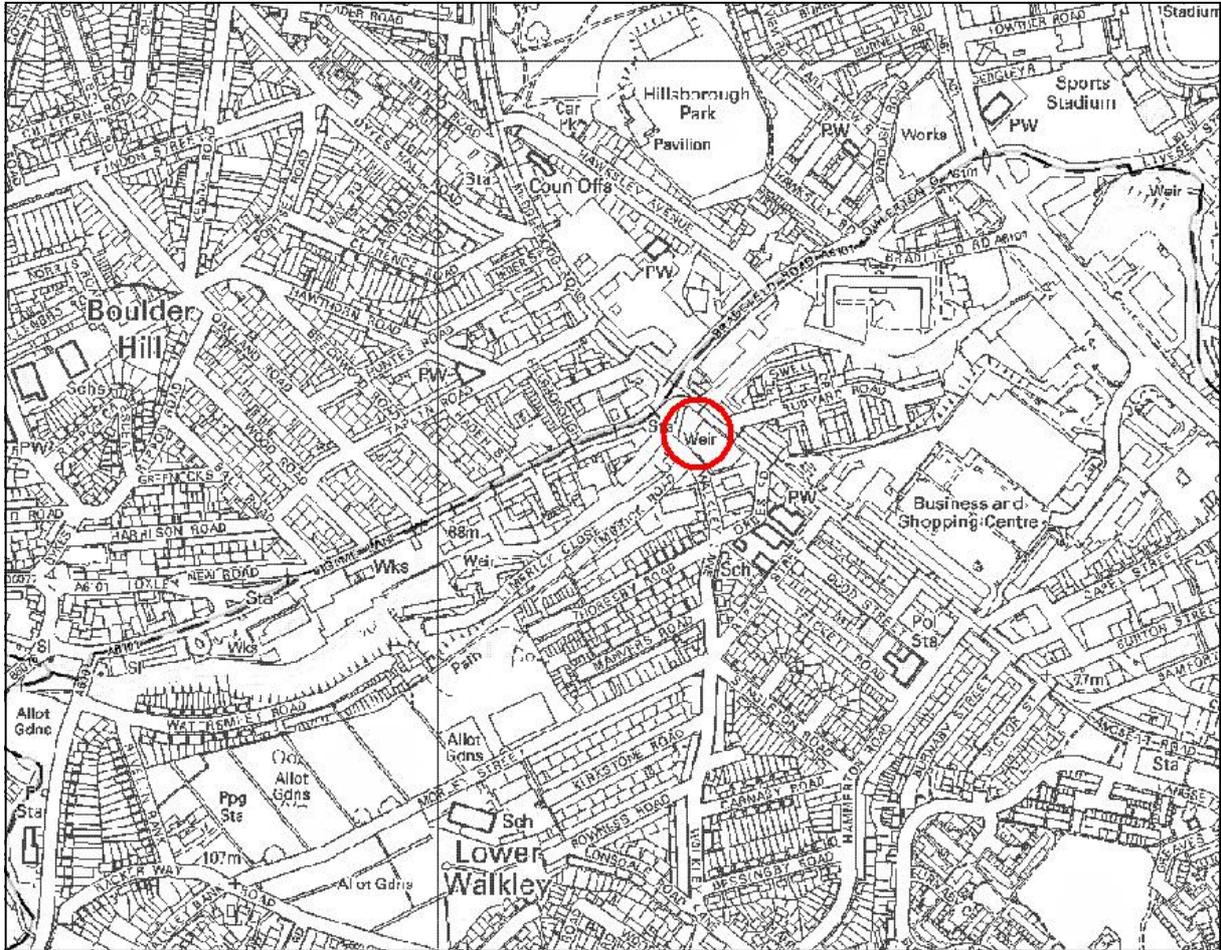
Loxley Weirs

Fig. 16

Limbrick Weir: view



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Loxley Weirs

Fig. 17

Hillsbrough Weir: location



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Loxley Weirs

Fig. 18

Hillsbrough Weir: view



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