

Client Report No. 321/06



**For
HGBP LTD
NGR NY 406 555
Planning Application No.
1/03/1305**

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CONTENTS

	page number
Acknowledgements	vii
Non- Technical Summary`	viii
1 INTRODUCTION AND LOCATION	9
1.1 Introduction	9
1.2 Location	9
2. AIMS AND METHODOLOGY	10
2.1 Introduction	10
2.2 Project Design	10
2.3 Desk-based Assessment	10
2.4 Visual Site Inspection	11
2.5 Field Evaluation	11
2.6 Mitigation Excavation	11
2.7 Project Archive	12
3. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND	13
3.1 Historical Background	13
3.2 Previous Archaeological Work	19
3.3 Geology and hydrology.....	20
4. PUBLICATION, ARCHIVE AND THE CONTRACTOR	21
4.1 Publication	21
4.2 Archive, Ownership and Storage of Finds	21
4.3 The Contractor	21
5. 2006 EVALUATION TRENCHING RESULTS	22
5.1 Trench 1	22
5.2 Trench 2	22
5.3 Trench 3	22
5.4 Trench 4	23
5.5 Trench 5	23
5.6 Evaluation Finds	23
6. 2006 MITIGATION EXCAVATION RESULTS	24
6.1 Project Management and Staff	24
6.2 Methodology	24
6.3 Area A – Description of Building Remains	24
6.3.1 <i>Overview</i>	24
6.3.2 <i>Well (Post-medieval)</i>	24
6.3.3 <i>Mill Race Western Edge</i>	25
6.3.4 <i>Medieval Soil Remnants</i>	25
6.3.5 <i>Cottage #1</i>	26
6.3.6 <i>Building #2</i>	27

CONTENTS

6.3.7	<i>Rolling Mill Extension and Alley</i>	33
6.3.8	<i>Cart Shed</i>	33
6.3.9	<i>Chimney Stack and associated drain</i>	29
6.4	Area A – List of Associated Contexts	29
6.5	Area B – Description of Building Remains	29
7.	ENVIRONMENTAL AND BONE REPORT	46
7.1	<i>Introduction – Environmental Remains</i>	46
7.2	<i>Sample Analysis</i>	46
7.3	<i>Discussion</i>	57
7.4	<i>Dating</i>	57
7.5	<i>Vertebrate Remains</i>	57
7.6	<i>Mollusc Remains</i>	57
7.7	<i>Conclusion and Recommendations</i>	57
8.	THE FINDS	52
9.	CONCLUSIONS AND RECOMMENDATIONS	58
8.1	Conclusions	58
8.2	Recommendations	
10.	Updated Project Design	63
	BIBLIOGRAPHY	65
	APPENDIX 1: THE CONTEXT INDEX	67
	APPENDIX 2: THE FIGURES	71
	APPENDIX 3: DRAWING INDEX	72
	APPENDIX 4: PHOTO INDEX	73

LIST OF FIGURES

	Page	
Figure 1	Site Location Maps	APPENDIX 2
Figure 2	Excavation Area Location Plan	
Figure 3	Evaluation Area Location Plan	
Figure 4	"A true plotte of y Citic of Carlifle, together with the Castle and lands belonging. 1620"	
Figure 5	Tithe Maps, 1842 and 1847	
Figure 6	First Edition Ordnance Survey, c.1860	
Figure 7	Boiler House and Chimney Elevation, c.1890	
Figure 8	Store Section and Yard Plan, c.1890	
Figure 9	Second Edition Ordnance Survey, 1901	
Figure 10	1905 Extension Plans	
Figure 11	Elevation and Section, 1910	
Figure 12	Ground Floor and Warehouse Plans, 1910	
Figure 13	Third Edition Ordnance Survey, c.1919	
Figure 14	1959 Plan	
Figure 15	Plan of the West Cumberland Farmers' Depot, Harraby Green Road, Carlisle, 1967	
Figure 16	Harraby Green House Site Plan 1972	
Figure 17	Overall plan of Excavation Area.	
Figure 18	Detail of original cottages	
Figure 19	Detail of corn drying kilns	

LIST OF FIGURES

- Figure 19a Early wall foundation and pits
- Figure 20 Detail of wheel pit
- Figure 21 The power supply from the water wheel
- Figure 22 Detail of the engine house and condenser chamber
- Figure 23 The rolling mill and extension
- Figure 24 Wheel pit figure
- Figure 25 Wheel pit elevation showing wheel dimensions
- Figure 26 Phase 1, medieval features.
- Figure 27 Phase 2, the pre-Victorian complex
- Figure 28 Phase 3, features, circa 1860
- Figure 29 Phase 4, Mill complex circa 1901
- Figure 30 Phase 5, Mill complex circa 1919
- Figure 31 Phase 6, the mill complex in 1959
- Figure 32 Phase 7, the mill complex in 1967
- Figure 33 Phase 8, the Highgrove Dairy plant in 2002

LIST OF PLATES

		<i>Page</i>
Plate 1	Harraby Mill shortly before closing in 1957	17
Plate 2	The mill room at Harraby mill in 1957	18
Plate 3	Wheel Pit and Overflow, looking south	24
Plate 4	Wheel Pit and Overflow, looking north	25
Plate 5	Masonry wall 207, looking north-west	26
Plate 6	Masonry wall 226, west wall of mill race, looking north	27
Plate 7	Trench 3, archaeological features	28
Plate 8	Trench 3, detail of wall (313) and square brick structure (314)	28
Plate 9	The condenser chamber	30
Plate 10	Wall 129 with top of arched culvert exposed at base of trench	31
Plate 11	Engine mounting block in situ within remains of engine house	32
Plate 12	Detail of southern limit of engine house	32
Plate 13	The south east corner of the Rolling mill	33
Plate 14	Wheel pit A, facing south east	35
Plate 15	Scarring on the west side of wall 298	35
Plate 16	The brick arched tunnel leading from Wheel Pit B to condenser chamber	37
Plate 17	Brick archway 265 with fragment of later extension in foreground	38
Plate 18	View of floor surface 104 and 113 and mounting block 105	39
Plate 19	Detail of pit wheel and mounting arrangement at Warwick Mill	40

LIST OF PLATES

Plate 20	Drive pit showing detail of both mounting plates	41
Plate 21	Drive pit showing detail of both mounting plates	42
Plate 22	View of southern kiln and small “coal store	44
Plate 23	View of probable 18 th century wall foundation	45

LIST OF TABLES

	<i>Page</i>
Table 1: Sites, Monuments data	20
Table 2: Environmental data - sample details and volumes recovered	48
Table 3: Contents of flot and retent residues from samples	48
Table 4: Environmental data - retent sample analysis	49
Table 5: Finds From Harraby Green Mill	62
Table 6 :. List of Contexts in the Evaluation Area.	63
Table 7: Associated Contexts of Note within Area A	64
Table 8. Associated Contexts of Note within Area B	66

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NON-TECHNICAL SUMMARY

Between the 24th of April and the 9th of June 2006, North Pennines Archaeology undertook an archaeological excavation and evaluation of land on the site of Highgrove Dairy, Harraby Green Business Park, Harraby Green, Carlisle. This fieldwork was undertaken in accordance with a brief prepared by Cumbria County Council Archaeology Service, following a planning application for a residential development.

The site lies to the south of the historic City of Carlisle, close to the London Road, which approaches the city from the south. The site of Highgrove Dairy stands on the course of a mill leat associated with Harraby Corn Mill. The excavation of the remains of the mill complex has allowed for the most extensive study of a post medieval corn mill with medieval roots to as yet be carried out in Cumbria. Although the site had been badly truncated by major redevelopment work in the late 20th century enough of the evidence survived on the ground and in documentary sources to trace the development of the site from the 12th century to the closure of the mill in the late 1950s.

1. INTRODUCTION AND LOCATION

1.1 Introduction

1.1.1 Between the 24th of April and the 9th of June 2006, North Pennines Archaeology undertook an archaeological excavation and evaluation of land on the site of Highgrove Dairy, Harraby Green Business Park, Harraby Green, Carlisle. This fieldwork was undertaken in accordance with a brief prepared by Cumbria County Council Archaeology Service, following a planning application for a residential development (Planning Application No. 1/03/1305).

1.2 Location

1.2.1 The site lies to the south of the historic City of Carlisle, close to the London Road, which approaches the city from the south. The site of Highgrove Dairy (NGR NY 4133 5446, see *Figures 1 and 2*) stands on the course of a mill leat associated with Harraby Corn mill, with a recorded sequence of activity extending back to the 12th century.

1.2.2 There is a millrace visible on the early Ordnance Survey 1st, 2nd and 3rd edition maps, visible well into the second half of the 20th century. This provided power for Harraby Corn Mill and is said to date back to the later medieval period. Furthermore, a section of the river Petteril northwest of the development site appears to have been canalised and a weir constructed during the later part of the 19th century. This is evidenced by the changing character of a section of river visible on the 1st and 2nd Edition Ordnance Survey maps.

1.2.3 A field evaluation undertaken in January-February 2003, revealed extensive archaeological remains including those of the water powered corn mill including the wheel pit, mill race, chimney base, and stone and brick built footings for the mill buildings. The evaluation also revealed a number of features of 13th to 15th century in date including a foundation wall and a number of sherds of later medieval pottery (Jones and Miller, D. 2004). As a result, Cumbria County Council Archaeology Service requires an open excavation of an area 2950m² in order to preserve by record the remains prior to development commencing. The evaluation of a parcel of land to the south of the main site has also been specified by the County Archaeology Service.

1.2.4 The site of Harraby Green is situated on low-lying ground between the eastern bank of the River Petteril and London Road at approximately 19m AOD, there is little topographic variation across the site.

2. AIMS AND METHODOLOGY

2.1 Introduction

- 2.1.1 The work undertaken consisted of a desk-based assessment, inspection and field evaluation and field excavation.

2.2 Project Design

- 2.2.1 A project design was prepared in response to a brief prepared by Cumbria County Council Archaeology Service. This included a detailed specification of works to be carried out, which involved the full excavation of the mill area and evaluation of land to the south of the mill site.

2.3 Desk-Based Assessment

- 2.3.1 The desk-based assessment was carried out prior to the initial evaluation of the site in consultation of the County Sites and Monuments Record in Kendal and County Record Office, Carlisle in the first instance. This involved the assessment of all readily available primary and secondary documentary and cartographic material and all available aerial photographs. Consultation of this material allowed a comprehensive understanding of the geographical, topographical, archaeological and historical context of the site.
- 2.3.2 The desk-based assessment was undertaken in accordance with the Institute of Field Archaeologists *Standards and Guidance for Archaeological Desk-Based Assessments* (IFA 2002).

2.4 Visual Site Inspection

- 2.4.1 A visual site inspection was undertaken in order to note any surface features of potential archaeological interest and to identify any potential hazards to health and safety, such as the presence of live services or constraints to undertaking archaeological fieldwork, such as Tree Preservation Orders and public footpaths.
- 2.4.2 The presence of two large spoil heaps formed from the rubble of the newly demolished dairy buildings and the use of part of the site as storage for a nearby building site were identified as potential hazardous situations. There were also a number of services crossing the site, which were identified using both accurate service plans, and by the use of a CAT scanner prior to the opening of evaluation trenches.

2.5 Field Evaluation

2.5.1 This consisted of the excavation of 6 linear trial trenches in order to produce a predictive model of surviving archaeological remains detailing zones of relevant importance against known development proposals.

2.5.2 In summary, the main objectives of the evaluation were:

- to establish the presence/absence, nature, extent and state of preservation of archaeological remains and to record these were they were observed;
- to establish the character of those features in terms of cuts, soil matrices and interfaces;
- to recover artefactual material, especially that useful for dating purposes;
- to recover paleoenvironmental material where it survives in order to understand site and landscape formation processes.

2.5.3 Each trench was mechanically excavated by a tracked 360° tracked excavator equipped with a toothless ditching bucket to the top of archaeological deposits, or the natural substrate, whichever was encountered first. Each trench was then manually cleaned and all features investigated and recorded according to the North Pennines Archaeology Ltd standard procedure as set out in the North Pennines Archaeology Ltd Excavation Manual. Photography was undertaken using a Canon EOS 100 Single Lens Reflex (SLR) manual camera. A photographic record was made using 400 ISO colour print film.

2.5.4 All work was undertaken in accordance with the Institute of Field Archaeologists *Standards and Guidance for Archaeological Field Evaluations* (IFA 1994).

2.6 Mitigation Excavation

2.6.1 The primary aim of the excavation was to preserve by record the structural remains of Harraby corn mill by record and to contribute to an understanding of the origin and development of the mill from the earliest evidence on site, through to its closure in the 20th century. The area of excavation measured approximately 2950m², although the total area that was excavated measured slightly less, as live services and a substation were situated within the area of excavation.

2.6.2 In summary, the main objectives of the excavation were:

- to record all archaeological deposits;
- to establish, wherever possible, the depth of archaeological remains;
- to establish, wherever possible, the condition and importance of the remains;
- to recover artefactual material, especially that useful for dating purposes;
- to recover paleoenvironmental material where it survives;
- to define the extent of the corn mill;
- to contribute to the wider understanding of the development of water powered corn mills;

- to contribute to wider local, regional and national research frameworks.
 - to prepare an assessment report for the Client setting out the salient conclusions and detailed recommendations on any further work required.
- 2.6.3 Topsoil was removed by a 360° tracked excavator equipped with a toothless ditching bucket, under strict archaeological supervision. Modern demolition layers were also removed by machine.
- 2.6.4 Archaeological deposits were cleaned by hand and a detailed pre-excavation plan was produced at a scale of 1:20 in relation to a local grid established with reference to the OS national grid. All archaeological features were then excavated by hand to the depth of natural deposits. In accordance with the aims of the excavation, all archaeological features were fully excavated and recorded in plan and section. The walls of the wheel pit and mill race were left in situ due to the size and depths of these features.
- 2.6.5 Discrete features were subject to a minimum 50% sample and linear features a minimum of 25%. All work will be undertaken in accordance with standards and guidance set by English Heritage and the Institute of Field Archaeologists.
- 2.6.6 All written records utilised NPA Ltd pro-forma record sheets and was produced in accordance with the guidance set out in the company's excavation manual (Giecco 2001).
- 2.6.7 Plans and sections were drawn on water resistant permatrace. Plans were drawn at a scale of 1:20 and sections at 1:10. A combination of single and multiple context planning were utilised. All electronic survey was undertaken using a Geodimeter 440 TST working with a Sokkia SDR38 data logger. The subsequent raw data will be processed in a CAD environment.

2.7 *Project Archive*

- 2.7.1 The full archive has been produced to a professional standard in accordance with the current English Heritage guidelines set out in the *Management of Archaeological Projects* (English Heritage, 2nd Ed. 1991). The archive will be deposited within an appropriate repository, and a copy of the report given to the County Historic Environment Record, where viewing will be available on request. The archive can be accessed under the unique project identifier NPA 06 HGM-B and HGM-C.

3. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

3.1 Historical Background

- 3.1.1 Nothing is known of the presence or extent of prehistoric settlement within the Harraby Green area. However, recent archaeological projects around Carlisle have disclosed a number of new sites containing evidence of prehistoric occupation. These include a settlement of Early Bronze Age origin continuing until the Iron Age at Scotby Road (approximately 2700 BC – 1 AD), a later Bronze Age burnt stone mound at Garlands and evidence for Neolithic and Bronze Age (4000 BC – 700 AD) activity at Botcherby (Giecco, pers. Comm.). There has been a stray find of a polished perforated stone hammer of likely Bronze Age date (SMR No. 537) found at Harraby House in 1849.
- 3.1.2 Harraby Green is situated close to a known Roman road and located to the south of an area containing a number of significant Roman remains. Present day Carlisle is built on the Roman settlement of *Luguvalium* and there is extensive evidence for complex Roman activity to the south of the core settlement at Botchergate (Giecco 2001), King Street (Reeves 2000), Cecil Street (McCarthy and Flynn 1994) and St Nicholas Yard (Howard-Davis and Leah 1999). Botchergate, a short distance to the north of Harraby, has long been known to contain Roman remains, including 39 burials recovered during building works in the 19th century (Reeves and McCarthy 2000, Giecco 2001). At St Nicholas Yard traces of a small Roman settlement, thought to be a farmstead were found (Howard-Davis and Leah 1999). The presence of known settlement activity and a major road close to the area of Harraby Green may indicate the potential for further, as yet unknown, settlement activity within the site itself.
- 3.1.3 Following the Union of the English and Scottish Crowns with the accession of James I to the English throne in 1603, a programme of pacification of the borderlands began. This saw a modernisation of tenureships of great benefit to northern landowners and a breakdown of the traditional forms of Border service (Spence 1984; 64). This process of modernisation led to the undertaking of two detailed surveys of the Socage or manorial lands of Carlisle, by Thomas Johnson in 1608 and Aaron Rathbone in 1611 (Ibid, 67). Figure 4 shows the site of the mill within an area known as ‘Paradice’, an area 19 acres in extent (Ibid.)
- 3.1.4 The precise date of the mill and millrace complex at Harraby (SMR No. 10630. NGR NY 34132 – 55442) is unknown. A reference in a Directory of 1829 describes Harraby as:
- “ ...A hamlet and township 1.5 miles south by east of Carlisle. Harraby Grange, formerly called the Manor of Henderbye, belongs to the Dean and Chapter, as part of the Manor of Botchardgate.”* - (Parson and White 1829, 170)
- 3.1.5 The mill was situated on the edge of the Royal Forest of Englewood. In Nicholson and Burns History of Cumberland, 1770, they refer to grants given by Henry the second, (1154-1189) “by the gift of Radulph Engaine and his heirs, all Henrickby, with the mill, and other things pertaining to the said village.” The second known reference to the mill appears to be related to the same family and it relates to a confirmation of privileges and lands given to Carlisle Cathedral. The document

appears to be an inspection of an inspection: the original privileges were given in 1314/15, and the re-inspection is dated 1331/32. On item 1/6/4/10 of the transcribed document, a grant by Ralph Engainne and his Heirs of “the whole of Henricheby (Harraby) with the mill” is recorded. It is impossible to state categorically that this mill referred to is was situated on the Harraby Mill site but without any other obvious mill sites in the vicinity, it has to be a strong possibility that this referring to a mill on this site.

- 3.1.6 The next reference to a mill at Harraby comes from Henry Summerson’s Medieval Carlisle” Volume 2 page 694. “In 1535, the Priory was said to have two mills, one below the city walls and the other at Harraby. In 1562 Thomas Stanwix acquired the mill, he is mentioned again in 1575 to maintain the weir. The lands on which the mill stood and the surrounding lands were named the “Paradice” in a soccage survey of 1610.
- 3.1.7 The plan which accompanied the survey showed the mill race but didn’t show the tannery or the corn mill. In the Carlisle Municipal records there are references to William Salkeld- Miller at Harraby in 1625, 1628, and 1633, he was only the tenant miller as the Stanwix family still owned the mill at this date, because in the Carlisle Cathedral leases book for 28th January 1676, a Mr Stanwix is recorded as having the lease for “Ye mill and ground at Harraby”.
- 3.1.8 By 1707/8 John Robinson was the tenant miller at Harraby mill as recorded when he married Mabel Ivinson of Crinkledike in that year. The Stanwix family still owned the mill because some time before 1780 William Brumell, a Calico printer of Carlisle, purchased the lands known as the “Paradice” from Thomas Conner, late of Vauxhall, Surrey, who was the Heir of John Stanwix.
- 3.1.9 By 1784 an article of agreement, indented, was made and entered between William Brumell of Carlisle, Calico printer, of the one part, and Joseph Lamb of Newcastle (Joseph Lamb was an important figure in the growth of the textile industry in Carlisle being involved in calico printing and credited with introducing Calico printing into Carlisle in 1761), merchant, messuages, lands, tenements situated and being at or near Harraby mill, also all that his water com mill and parcel of grazing ground and other premises situated and being or arising at or near Harraby mill and Upperby.
- 3.1.10 Although Joseph Lamb purchased the lands and the mill, he kept the mill as a going concern with a tenant miller. In the following year 1785, he entered into a partnership with William Scott, John Forster, Robert Ormston and Robert Waldie and leased the Harraby mill along with the closes of ground, (paradice), Christy banks, Ellers under Christy banks. This area became known as the Old Harraby Print-Works, although no printing took place there, it was the bleaching grounds for the Partners’ other print-works below the city walls off the Corporation Dam. By early 1809, the partners advertised their properties at Carlisle and Harraby for sale (Carlisle Journal July 8th 1809) and the advert gives information about what they had built on the land since 1785;-

“A pleasant and commodious dwelling house with out offices and a garden, two fulling Mills, two dye-houses, two Callendarse, extensive, warehouses and offices, and 30 acres of Bleaching ground”. A foot note on the advert states *“The purchaser may have the option of taking the machinery and utensils, and the company’s Leasehold water corn mill, and other premises adjoining.”* - (Carlisle Journal July 8th 1809)

- 3.1.11 The corn mill does not appear to have been a profitable business as no one seems to have taken up the properties because they were re-advertised in July of 1809 (Carlisle Journal August 8th 1809). By the end of August they had given up trying to sell the premises and re-advertised them to let. This advert gave additional information about the premises. The two fulling mills were detached from one another and on the dam race. A Dye-house and Bleaching house with Bleaching grounds of 30 acres were also part of the let. The owners were willing to let in parcels and if the fulling mills were not required by the tenants they were willing to let them for agricultural purposes.
- 3.1.12 By December of 1809, Messrs Beeby, Hough, and Co had taken over the works that were previously occupied by Lamb, Scott and Waldie and Co, and were now called the Harraby Bleach Works. The advert was to inform the public and manufacturers that from the 1st of January 1810 they would commence the business of Bleaching and Finishing of cottons and linen yarn, the premises having been fitted up in the most complete manner.
- 3.1.13 A second advertisement on the same page of the Journal gives notice, “That a concurrent lease of Harraby water corn mill with 9 acres of land will be sold early in February 1810, for a renewable term of twenty-one years to commence from the expiration of the present lease”, which was 23rd of November 1812. They also say that the powers and situation of the mill and grounds adjoining are extremely well calculated for carrying on an extensive print field or other manufactory. Persons wishing to purchase the leasehold premises had to apply to Mr Thomas Hudson the Dean and Chapters Agent at the Abbey in Carlisle.
- 3.1.14 Some time later, in February 1821, the mill was advertised to let (Carlisle Journal 11th January 1821). The advert gives us an insight into the workings of the mill. It contained four pairs of grinding stones;- one pair of French Burrs, one pair of Blues, and two pairs of Greys. There was also a Barley mill for shelling, Dressing machines, etc, and a good Drying Kiln, and other offices etc. With the mill was 8 acres of land. The mill had recently undergone a complete repair. There was a Dwelling house and some other offices went with the mill letting. Josh Schollick was the owner and miller at this date. The mill was advertised to let again in January the following year.
- 3.1.15 By November 1831, the mill was up for sale along with the dwelling house, stable, garden and 8 acres of land; the advert gives detail that the water wheel was 13 feet in diameter and was overshot. Thomas Waugh was the tenant miller and the property was leasehold under the Dean and Chapter of Carlisle. The mill was still for sale the following March. There was additional information about the mill given in this advert (Carlisle Journal 31st March 1832) with the advert stating that the mill had a constant supply of water even in the driest of seasons, with a fall of 15 feet, and it was never affected with back water.
- 3.1.16 By 1843 the mill was once more to let and Thomas Waugh who had been the tenant Miller in previous years was now the owner of the mill (Carlisle Journal 29th April 1843). The mill only had 3 grinding stones in 1843, and piggeries had been added to the complex. Some time after 1843, probably from this letting, Mr. John Rushton took over the tenancy of the premises which were still owned by Thomas Waugh and converted the mill for the manufacture of gypsum, heavy crushing equipment was installed into the premises for this purpose. The water wheel dimensions were given

as 14 foot in diameter and 5 feet wide. There was also split and spur wheels to drive all description of machinery. The ovens for baking the crushed alabaster were situated at Long Island in Carlisle.

- 3.1.17 All the equipment, materials used for the manufacture of gypsum, along with the mill buildings were for sale in September 1855 following John Rushtons bankruptcy (Carlisle Journal 28th September 1855). The mill was to let again in January of 1856 (Carlisle Journal 18th March 1856) and Thomas Waugh was still the owner, his contact address was given as Warwick Bridge mill, which was owned by the Howards of Corby Castle. In 1859, Thomson and Crowther are recorded as the owners and millers at the mill.
- 3.1.18 This was a critical period in the development of the mill as the location and alignment of the mill were totally change with the demolition of Thomas Waugh's mill and the construction of a totally new mill. The date of this major rebuilding work is problematic as no documentary references could be found referring to this redevelopment. The only evidence for this repositioning of the mill comes from the map regression evidence, with both the 1842 Upperby tithe and 1847 Harraby tithe award maps (see figure 5) showing the mill complex along the eastern side of the mill race, with only two residential cottages and gardens listed on the west side. This picture had totally transformed by the first edition OS map of 1864 (see figure 6) which had the mill building astride the mill race just to the north of the earlier mill.
- 3.1.19 In 1869, William Wilson "miller and corn merchant" was either the Tenant or owner of the mill, which by this time had reverted to being a corn mill (Carlisle Journal 2nd April 1869). A David Harkness is recorded as occupying the mill in 1875. The next recorded reference of the mill dates to 1881 (Carlisle Journal 18th March 1881) when it was to be let again. The advert records that it had been in the occupation of Dalgliesh and Lamb, and that the mill now had two water wheels and 5 pairs of stones. The following year Nathan Rowntree was tenant of the mill. At an auction of the mill in 1888, Mr Christophe Ling purchased the mill for £2,005 (Carlisle Journal 24th August 1888).
- 3.1.20 From planning records in Carlisle Records Office we know that a boiler house was built for Christopher Ling in early 1891 with the planning application submitted to Carlisle Union Rural Sanitary Authority on the 3rd of November 1890, which would enable the mill to work with dual power (Christopher Ling the miller was elected Mayor of Carlisle in 1899/1900). The boiler house was fitted with a 90 foot chimney. The next major investment involved the construction of a rolling mill to produced rolled oats, the exact date for the construction of this building is unclear with no surviving planning records, however it is the rolling mill was does not appear on the second edition Ordnance Survey map of 1901.
- 3.1.21 However what is clear is that the building was in existence by 1910 as a planning application drawing (CRO Plan 14465), illustrates a northern extension to this rolling plant. A second undated building of similar curved corrugated iron roof design to the rolling plant housed the steam engines that were powered by the adjacent boiler plant. This building is shown on the second edition OS map and proves that the steam plant was originally used a back up to the water power of the corn mill prior to the construction of the rolling mill. A date stone of 1899 on the eastern wheel pit must indicate major remodeling work in this area and possibly relate works on a

condenser chamber associated with the steam plant which may have been upgraded with the imminent construction of the steam powered.

- 3.1.22 In March 1903 the river Petteril was at its highest in living memory and the Cofferdam at Harraby which diverted the water of the river into Mr. Ling's mill race was entirely washed away. The river flooded and a new channel was created which starved the mill stream of water which served and powered both the adjacent tannery and the corn mill. At some point Mr. Ling's son Christopher took over the mill. Ling and Sons made a number of further improvements to the mill, including the construction a new store and drying kiln in 1905.



Plate 1: The Harraby Mill Complex in its final phase (circa 1950).

- 3.1.23 The mill was producing an output of 400 tonnes of oatmeal in 1916, which reduced to 9 tonnes by September 1951 (ibid). Cowan and Sheldon's purchased the lands around the mill and West Cumberland Farmers Trading Society bought the mill and some of the lands in 1951 off Mr. Ling. Cavaghan and Gray subsequently purchased it from them some years later. The mill was closed in 1957, "the last of its kind in the city" (Cumberland News, October 18, 1957), by the West Cumberland Farmer's Trading Society, who took over the mill from Christopher Ling and Sons in 1951.
- 3.1.24 To the south of the development site, marked on the Ordnance Survey 1st, 2nd and 3rd Edition maps is a 'Skinners' (SMR No. 10140). There is a marked sequence of change in the number and size of buildings across the eighty years marked by the three different maps. Further development of the Skinners buildings occurred between the late 19th century and 1930. Following 1863, the buildings came into the possession of Lamb, Scott and Waldie.
- 3.1.25 In the years following the closure of the Corn mill, the West Cumberland Farmer's Trading Society built an egg packing plant on the site of the millrace. In 1967 Border Poultry Farms established a factory at Harraby Green and in 1990 a Dairy was built,

but later closed on 1991. The present site of the Corn mill and millrace complex is occupied by Harraby Green Business Park.



Plate 2: The Egg Packing Plant (circa 1965).

- 3.1.26 No residential housing existed at Harraby Green prior to the late 19th century. At this time a series of terraces were constructed on Lazonby Terrace, Herbert Street and Harraby Green Road. This housing development was extended in the 1920s by planned council housing along Harraby Green Road and Herbert Street, extending to the plot of land between the Corn mill and St John's Vicarage.
- 3.1.27 At present the site consists of a mixture of business, residential and derelict ground between the River Petteril and the Roman Road. Some buildings from the Skinnery complex have survived and have been sympathetically converted into office units, however, nothing of the corn mill complex itself has survived above ground with the exception of Harraby House which was constructed between 1850-1863 as the residence of the mill owner.
- 3.1.28 The following table contains the SMR References for this site:

SMR NO.	Description
537	Bronze Age Axe
538	Roman Carved stone human head
3811	Roman milestone
4537	Carlisle Gibbet
5076	Gallows Hill Coin Hoard
10139	Harraby Hill Workhouse
10140	Harraby Skinnery

10630	Harraby Mill Complex
18931	Sestertius of Julia Domna (AD 211-217)

Table 1: Sites, Monuments and Findspots archived in the County Sites and Monuments Record.

3.2 Previous Archaeological Work

- 3.2.1 In the late 19th century a considerable number of Roman burials were discovered on both sides of Botchergate, extending from Court Square to London Road and Gallows Hill. At least 39 burials are known to have been discovered at different times, these comprise cremations and inhumations, together with miscellaneous discoveries of Roman pottery and other items (Giecco 2001).
- 3.2.2 In 1997 traces of a small Roman settlement, possibly a farmstead, were found at St Nicholas Yard during an excavation by Lancaster University Archaeological Unit. The work revealed two broad, shallow ditches, which appeared to be separated by a metalled surface. Traces of possible burials and other features were also located. The excavations also revealed putative medieval features including an oven and the remains of walls, possibly associated with the former 12th century leper hospital (Howard-Davis and Leah 1999).
- 3.2.3 During July and August 1997, Carlisle Archaeological Unit undertook a rescue excavation on land at 40-78 Botchergate, revealing a complex sequence of Roman period activity, including part of a large linear earthwork (Zant and Giecco 1999).
- 3.2.4 A series of evaluations followed by large-scale excavations were carried out by Carlisle Archaeology during 1998 and 1999 between Tait Street and Mary Street on the eastern side of Botchergate, revealing Roman deposits including a number of cremation burials (Zant and Giecco 1999; Giecco 2001).
- 3.2.5 An evaluation was carried out in July 2000 by Carlisle Archaeology at King Street, revealing extensive archaeological deposits throughout the site, the vast majority of Roman date (Reeves 2000).
- 3.2.6 In 2003, North Pennines Heritage Trust undertook an archaeological evaluation on land previously the site of Highgrove Dairy, Harraby Green Business Park, Harraby Green, Carlisle (NGR NY 4133 5446).
- 3.2.7 The purpose of the evaluation was to establish the presence or absence, nature, extent and state of preservation of archaeological remains within the compound of the former Highgrove Dairy. In total twelve trenches of variable dimensions were excavated by machine and all archaeological features were cleaned and recorded by hand.
- 3.2.8 A number of archaeological structures and deposits were observed surviving below ground. These included the remains of the wheel pit, mill race and foundation walls belonging to the former Harraby Corn Mill. In addition to these structures, a probable medieval wall foundation was found, as well as medieval pottery.
- 3.2.9 Given the very strong probability that further archaeological remains were surviving below ground, the evaluation report recommended that further work be carried out in order to understand the function of the excavated remains and how they relate to each

other in addition to providing a chronological understanding of the archaeological remains where they occur.

3.3 Topography, Geology and Hydrology of the Study Area

- 3.3.1 The study area is situated on low-lying ground, which forms part of the Carlisle Plain approximately 30m AOD. It is located to the south of the Historic Centre of Carlisle within an area of mixed industrial and residential use, in the Harraby District.
- 3.3.2 The geology of the area consists of boulder clay interleaved with alluvial sand and gravels, which occurs along the rivers and merges into marine alluvium near the upper limits of tidal waters. The boulder clay has been deposited by ice and is derived from bedrock traversed by glacial movement and is heterogeneous (SSEW 1984).
- 3.3.3 The principal river within the study area is the River Petteril, a tributary of the Eden, which lies just to the west of the site. The site was crossed by a millrace, which had been diverted from the Petteril just to the south of Harraby Green, skirting the eastern side of the site and continuing its course northwards beyond the study area to rejoin the river Petteril at the London Road bridge. The River Petteril also formed the Parliamentary and Municipal Boundary and marked the extent of the medieval Socage Manor of Carlisle.

4. PUBLICATION, ARCHIVE AND THE CONTRACTOR

4.1 *Publication*

4.1.1 The findings of the evaluation will be published in summary form in the *Transactions of the Cumberland and Westmorland Antiquarian and Archaeological Society*.

4.2 *Archive, Ownership and Storage of Finds*

4.2.1 An archive has been prepared in accordance with the recommendations set out in the *Management of Archaeological Projects 2nd Edition* (English Heritage 1991).

4.2.2 All finds belong to the landowner, but will be stored appropriately in the offices of North Pennines Archaeology Ltd at Nenthead. Ultimately, it is recommended that that the curation of finds should be vested in Tullie House Museum.

4.3 *The Contractor*

4.3.1 North Pennines Archaeology Ltd is a wholly owned trading subsidiary of the North Pennines Heritage Trust, a registered charity. Its work is monitored by and subject to the approval of the County Archaeology Service. Based in Nenthead, Cumbria, the company has considerable experience of archaeological investigation throughout Cumbria and the North of England.

4.3.2 The company has a fully staffed professional field team capable of undertaking work ranging in scale from large scale archaeological excavations to small desk based projects.

5. THE 2006 EVALUATION RESULTS

5 The evaluation consisted of a total of five trenches, which were excavated within the compound of the former egg packing plant (Figure 3). The evaluation area for the purposes of this report has been designated as Area C.

5.1 Trench 1

5.1.1 Trench 1 was 13m long by 1.9m wide and orientated in a northwest-southeast direction. The trench was opened by a mechanical excavator down to natural (**101c**), a yellow-orange sandy deposit containing a large proportion of river cobbles and gravel.

5.1.2 Following machine excavation, the trench was fully hand-cleaned revealing no archaeological features within the area. The topsoil (**100c**), was 0.20m deep and a moderately compact brown/black loam. The subsoil (**102c**) was a orange-brown silt containing small lenses of light grey clay. The trench was cut to the depth of 0.50m.

5.1.3 The topsoil (**100c**) contained a small amount of post-medieval pottery.

5.2 Trench 2

5.2.1 Trench 2 was 30m long by 1.9m wide and orientated in a northwest-southeast direction. The trench was opened by a mechanical excavator down to natural (**101c**), a yellow-orange sandy deposit containing a large proportion of river cobbles and gravel.

5.2.2 Following machine excavation, the trench was fully hand-cleaned revealing one potential archaeological feature. Topsoil (**100c**) averaged a depth of 0.15m, with the orange-brown silt subsoil (**102c**) averaging a depth of 0.25m.

5.2.3 The potential archaeological feature was longitudinal ditch [**104c**], 6.70m from the southern end of the trench, orientated east-west, and filled with a dark brown loose silty soil (**103c**). (**103c**) contained inclusions of sandstone, with small charcoal and timber fragments and contained no artefactual remains. *Environmental Sample <13>* was taken from (**103c**), which produced mainly amorphous organic material, with stones and gravel and small amounts of charred plant and root material with damp or waterlogged wood. The flot yielded mostly woody plant parts and a small amount of charred wood and amorphous organic material. This has been interpreted as a modern deposit, making the ditch potentially modern in origin.

5.2.4 The trench was cut to a maximum depth of 0.55m at the southern extent, and 0.35m at the northern extent.

5.3 Trench 3

5.3.1 Trench 3 was a T-trench cut to 25m long on the long axis and 20m long on the short axis. The long axis was orientated roughly north-north-west to south-south-east. The trench was opened by a mechanical excavator down to natural (**101c**), a yellow-orange sandy deposit containing a large proportion of river cobbles and gravel.

5.3.2 Following machine excavation, the trench was fully hand-cleaned but revealed no archaeological features. The trench was cut to a maximum depth of 0.30m. The topsoil (**100c**) contained a small amount of modern items constructed of iron, steel and lead.

5.4 Trench 4

- 5.4.1 Trench 4 was 30m long by 1.6m wide and orientated in a northwest-southeast direction. The trench was opened by a mechanical excavator down to natural **[101c]**, a yellow-orange sandy deposit containing a large proportion of river cobbles and gravel. Following machine excavation, the trench was fully hand-cleaned revealing no archaeological features within the area. The trench was cut to the depth of 0.23m.
- 5.4.2 The topsoil (**100c**) contained a small amount of modern items constructed of iron and lead.

5.5 Trench 5

- 5.5.1 Trench 5 was 25m long and 1.6m wide, and orientated in an east-west direction. The trench was opened by a mechanical excavator down to natural (**101c**), a yellow-orange sandy deposit containing a large proportion of river cobbles and gravel.
- 5.5.2 Following machine excavation, the trench was fully hand-cleaned revealing no archaeological features within the area, though it did reveal two modern intrusions, an electric cable and the remains of a fence post. The trench was cut to the depth of 0.50m.
- 5.5.3 The topsoil (**100c**) contained a small amount of modern items constructed of iron.

5.6 *Evaluation Finds*

- 5.6.1 Context (**100c**) produced a small amount of post-medieval pottery, steel, iron and undiagnostic lead. The finds were universally modern in make and no further work on this assemblage is required.

6. 2006 MITIGATION EXCAVATION RESULTS

6.1 *Project Management and Staff*

6.1.1 The project was undertaken under the overall management of Frank Giocco BA, Dip. Arch. AIFA, Principal Archaeologist. The fieldwork and post excavation work was undertaken by a team of professional archaeologists directed by Gareth Davies, Project Archaeologist. The excavation team comprised Jo Beaty, Kevin Mounsey, Tony Liddell, Joe Doran, Andrew Downes and Alan James. The environmental analysis was undertaken by Patricia Shaw.

6.2 *Methodology*

6.2.1 The area of the main mitigation excavation measured approximately 85m by 35m and was designated as Areas A and B. This area was excavated in a single phase over a five week period during May and June 2006.

6.3 *Area A – Description by Building Remains*

6.3.1 *Overview*

The northern end of the site was heavily truncated by modern features including concrete wall foundations, sewer pipes and drains. However, a number of discrete features, building foundations and areas of undisturbed medieval soil were identified during the excavation and are discussed individually below (see figures 17 and 18).

6.3.2 *Well (Post-medieval) [122], [123], [124], [127], [128], <2>*



Plate 3: *Post excavation view of well (123)*

6.3.3 A well, of post-medieval date, was uncovered in the northern extent of the excavation area. The well was cut into the natural subsoil (101), the cut itself [122] measuring 1.5m in diameter and filled with (128), an orange-brown compact clay lining which butted up to the brick construction of the well itself (123). The well was

filled by context (124), a waterlogged soil and rubble with sherds of post-medieval pottery and glass. An environmental sample, <2>, was taken from (124) which revealed mainly charred wood, coal, coke, clinker and a few *Taraxacum* seeds. The well had been capped by three sandstone slabs (127), the largest measuring 0.5m in length and 0.3m wide, with a thickness of 0.2m. Cast-iron pipe work remained in situ that would have connected the well to a mechanical pump. This capping is likely to relate to date from the late 19th century when small portable engines first became readily available.

6.3.3 *Mill Race Western Edge [169]*

6.3.3.1 Along the eastern edge of the area at its northern extent, a sandstone wall (169) was recorded (see figure 18). This was identified as the western wall of the Mill Race, and comprised of mortared roughly dressed rectangular sandstone blocks (see plate 4). The wall was running on a north-south alignment and was highly truncated with a few standing courses surviving in a few sections.



Plate 4: North east corner of site.

6.3.4 *Medieval Soil Remnants [102], [218], [225], [226], [227], [230], [249], [250], <5>, <10>, <11>*

6.3.4.1 Unfortunately no structural evidence relating to medieval activity survived in the area of excavation, however a number of areas of medieval soil did remain within the excavation area, undisturbed by post-medieval and modern intrusions. The soil consisted of a pale brown compact sandy clay with inclusions of small stones, and lay above natural (101). The generic context for the medieval soil was (102) but other areas were numbered separately for identification purposes.

6.3.4.2 Deposit (218) was located at the southern edge of Area A, just north of the concrete sewer base (see figure 18). The layer was 0.14m deep and was half-sectioned, revealing eight sherds of medieval pottery. There was also a sample taken <5>, which revealed the presence of wood, charred oats, seeds of fat hen and hair grass and some root material.

6.3.4.3 Deposit (227) was located just to the east of deposit (218) and again contained sherds of medieval pottery. Below (227) was a thin (0.02m) deep layer of pale brown sandy

silt (226) and beneath that was a layer of yellow-brown compact sand (225) with frequent charcoal fleck inclusions and contained one sherd of medieval pottery.

6.3.4.4 Deposit (230) was 0.20m deep and situated to the north of (218) and (227) and although the soil matrix was the same, in this case there were no finds from the section cut through the centre of the deposit.

6.3.4.5 The most interesting medieval deposit revealed during the fieldwork was context (249), the remnants of what appears to be a cobbled surface. The spread, 0.15m deep, was excavated revealing fifteen sherds of medieval pottery and it was also environmentally sampled <10>, revealing another sherd of medieval pottery as well as charred oats, roots, woody plant parts, charred wood and seeds of *Scirpus*. Beneath (249) was context (250), a grey-brown compact silt which also contained four sherds of medieval pottery. Environmental sample <11>, taken from this context, contained charred grain, oats, wheat grain and wood as well as nut shells and root material.

6.3.5 Cottage A (170), (171)

6.3.5.1 At the northern edge of the site the remnants of a sandstone wall foundation (170) were recorded (see plate 3), sitting directly on top of the natural subsoil (101) with no discernable cut (see figure 18). These remains have been identified as the southern property boundary wall of a cottage present in that location from the at least the mid 19th century when it appears on the 1842 Tithe map, the first useful map of the area (see figure 5). The building is listed in the tithe index as a cottage and garden. This structure ceases to exist by the time of the first edition ordnance survey of 1861 when it was replaced by a new cottage constructed slightly to the north of the original and beyond the limits of the excavation.



Plate 5: Remains of wall (170) and flagged entrance (171) looking east.

6.3.5.2 The wall extended for approximately 12m, measuring 0.46m in width and was aligned east-west (see figure 18). There was no obvious construction trench with the surviving foundations resting directly on the natural subsoil (**101**). A group of three sandstone flags (**171**), were recorded in a break in the foundation and are likely to represent an entranceway into this property.

6.3.6 *Cottage B (175)*

6.3.6.1 The remains of this building, again referred to as a cottage on the 1842 tithe map were positioned approximately 8m to the south of wall (**171**). The remains were highly truncated and fragmentary with the eastern and southern sides of the building having been totally destroyed by later activity (see figure 18). The surviving remains comprised the northern gable (see plate 4) and length of the western side (**175**), the foundation were of sandstone construction and measured approximately 0.78m in width (see figure 18). The foundations were found to lie within a shallow foundation cut [**174**], which was cut into natural subsoil (**101**). The original structure would have been rectangular in plan and measured approximately 5m in width and 12m in length. No floor surfaces survived within this structure.



Plate 6: Northern end of cottage 2.

6.3.7 *Rolling Mill Extension and Alley (154), (155)*

6.3.7.1 The Rolling Mill (used to produce rolled oats) was built sometime between 1905 and 1910 – the second edition Ordnance Survey map, surveyed in 1901 doesn't show the presence of the Rolling Mill, but by 1905 there is a plan for the proposed extension available and by 1910 a planning application drawing (CRO Plan 14465) illustrates the presence of the northern extension to the plant.

6.3.7.2 Context (**154**), consisted of a brick wall running in an east-west alignment, indicates the southern wall of the north-westernmost section of the extension, with an alley lying between that and wall (**155**), visible in the south western corner of *Area A* (see Figure 23). The foundations of this northern extension were far less substantial to those of the main block, measuring 0.90m in width with the brick footing set on a thin bed of concrete measuring 0.16m in depth (see plate 5). The shallow foundations

of this extension were cut into the natural subsoil (101), due to the high levels of later truncation no floor surfaces or internal features survived within this structure.



Plate 7: Foundation remains of the northern rolling mill extension

6.3.8 *Bag Store (150),(153)*

6.3.8.1 The remains of the structure that had been described as a cart shed, bag store and cottage during its existence consisted of context (150)/(153) a north-south aligned wall constructed of small blocks of sandstone forming the south-western corner of the building (see figure 18). The wall remains were 0.6m wide and ran for approximately 3m in length, and appear to represent the lower foundation course of wall (175), a brick building with two surviving courses that make up the western wall of the cart shed. Wall foundation fragment (174) made up the surviving elements of the eastern wall of this structure.



Plate 8: south western corner of bag store

- 6.3.8.2 The surviving remains of this structure were slight compared to the cart shed's original dimensions of 17.5m x 4.8m, with the southern and south-eastern portion of the building totally destroyed during the later development of the site
- 6.3.9 *Probable Chimney base and associated drain [172], [173], [176], [177], [182], [183]*
- 6.3.9.1 A probable chimney base (**408e**) measuring approximately 1m by 1.4m was recorded in the north-eastern corner of *Area A* associated with a small rectangular brick structure measuring 2.5m by 3.8m of which only fragmentary traces survived (see figure 18). This structure first appeared on the first edition Ordnance survey and was still in existence by 1919 Third Edition Ordnance survey but had been demolished by 1959 as it does not appear on a plan of that date (see figure 14). All that remained of the stack was a brick surface measuring 3.46m x 3.2m and an associated drain running from Cottage B that would have feed directly into the mill race. No evidence in the field or through documentary research yielded any information regarding the function of this structure.
- 6.3.9.2 A number of drains were recorded in the vicinity of this structure with cut **[172]** containing a large brick-built drain (**173**). The drain ran on a north-west to south-east alignment and joined onto brick an earlier drain (**183**) (within cut **[182]**), which ran along the northern edge of the Cottage B (**175**). It appears that the earlier drain (**183**) respected cottage B but predated the structure housing the chimney base as the its original course was diverted by the later drain (**173**) kinked around this later structure (see figure 18).

6.4 Area B – Description by Building Remains

6.4.1 Overview

- 6.4.1.1 The central area of the site was again heavily disturbed by modern features including concrete walls and drains and included the remains of the corn mill itself and associated wheel pits and mill race. Due to the heavy disturbance little medieval archaeology survived with the vast majority of surviving features dating to the final decade of the nineteenth century and beyond. However, a number of earlier features did survive which are likely to related to earlier post medieval mills constructed on the site.
- 6.4.2 *The Engine House (134), (136), (137), (140), (142), (144), (145), (207), (208), (209), (210), (211), (212), (214), (215), (293).*
- 6.4.2.1 The remains of the Engine House were situated on the eastern edge of the Millrace in the south eastern extent of the excavation area (see figure 22). The remaining archaeology was largely comprised of the western half of the building, the eastern half being destroyed in the late 20th Century.
- 6.4.2.2 To the north of the remaining elements of the Engine House lay the condenser chamber measuring 2.5m in length and 1.8m in width (see plate 7). The condenser carried out a crucial role in cooling the steam used to force the piston down within the cylinder block of the engine (hot steam was required to push the piston up), but the vacuum required to force the piston down only formed efficiently with significantly cooled steam. The walls (**214**) above ground only survived to one course in height, but the full extent of the underground chamber itself was still in

place, constructed out of dressed St Bees red sandstone blocks. The chamber walls (214) were braced with four cast iron supports which was recorded to a depth of over 2.7m beneath the current ground surface.

- 6.4.2.3 The condenser wall also butted up to wall (129), a rough undressed red sandstone wall (see plate 8), aligned north-south over the culvert between the wheel pit east wall of the main wheel and the condenser room. This section of substantial crude walling measuring 1.7m in width and 4.45m in length was undoubtedly of the same phase as the whole condenser chamber build and possible associated with a date stone in the main wheel pit dated to 1899 which would relate to the rebuilding of sections of the wheel pit to incorporate the water supply to the condenser chamber. Above ground, both the sandstone condenser chamber walls and the crude sandstone wall (129) were sealed by a red brick wall (212) measuring 0.60m, built directly on top of 214. Within the condenser chamber an outlet pipe was still present as was the water feed to the wheel pit and the steam feed from the engine. The condenser chamber was supplied with water by a brick arched culvert which was not recorded due to health and safety concerns. The culvert survived complete and could be seen to curve towards the back wall of the main wheel pit which provided the water supply for the condenser.



Plate 9: The condenser chamber



Plate 10: Wall 129 with top of arched culvert exposed at base of trench

- 6.4.2.4 Lying to the south of the condenser room were the remains of the Engine House, which was defined by two surviving walls which made up the western and northern sides of the building. The surviving remains of the western wall (**293**) measured over 11m in length and were aligned north-south and of red brick construction. The northern wall (**131**) measured over 4.5m in length and 0.55m in width and was bonded with wall 214 of the condenser chamber confirming that both structures were of the same building phase (circa 1900).
- 6.4.2.5 To the east of wall (**293**) lay the remains of what would have been the interior of the main engine room (see figure 22), the surviving archaeology remaining consisted mainly of the stone supports for the engine bases (see plate 9) for the machinery that would have powered the drive shafts. The supports consist of three sets of stone mounting blocks (**144**), (**145**), (**207**), (**209**), (**210**) and (**211**), all roughly aligned east-west but obviously shifted off their original alignment during the later destruction of the building.
- 6.4.2.6 On the southern extent of the remaining engine room building a section of the concrete floor did still remain in situ (**137**) and butted up to a neatly tooled sandstone block (**134**) measuring 4m in length and c.1m wide, which would have been another mounting block for a steam engine, with two mounting bolts remaining in situ (see plate 10). The remains of a small brick drain (**135/136**) lay beyond that block running off in a southerly direction beyond the limits of excavation. An internal ceramic drain (**141**) was also recorded running on an east-west alignment (see plate 10).



Plate 11: Engine mounting block in situ within remains of engine house

6.4.2.7 The fragmentary remains of a internal sandstone wall (**140**) were also recorded running parallel to wall 293 approximately 2.4m to the east (see figure 22) and butting up to mounting block 136. This section of wall foundation measured 0.75m in width and survived to a height of 0.56m. The function of this wall is unclear and it is entirely possible that this stub of wall supported machinery and acted as base rather than a internal wall as such (see plate 10).



Plate 12: Detail of southern limit of engine house

6.4.3 Rolling Mill (154), (155), (198)

- 6.4.3.1 The Rolling Mill (used to produce rolled oats) was built over two major phases at sometime between 1901 and 1910 – the Second Edition Ordnance Survey map, of 1901 doesn't show the presence of the Rolling Mill, but by 1905 there is a plan for the proposed extension and by 1910 a planning application drawing (CRO Plan 14465) illustrates the presence of a completed northern extension to the plant (see figure 11).
- 6.4.3.2 The western and southern extent of the Rolling Mill was uncovered during the excavation (see plate 11), revealing substantial brick walls (198) measuring 0.75m in thickness (three courses end to end thick), although badly disturbed it was possible to trace the full footprint of this north-south aligned building with overall dimensions of 11.5m by 25m for the original structure with the later addition increasing its length by 11.4m (see figure 23). Unfortunately none of the bricks were stamped which could have shed some light on the exact date of construction.
- 6.4.3.3 The excavated area of the Rolling Mill revealed the remains of a number of other wall foundations within the main building although no traces of an floor surfaces did survive. The most significant of these internal walls (196) measured 0.45m in width and was of course sandstone construction. The wall ran on an east/west alignment with a northward return on the same alignment as the eastern wall of the rolling plant. This wall was truncated by the western wall of the rolling mill (198) and sealed beneath the same wall on the eastern side as is likely to be the remains of a field boundary wall illustrated on the second edition Ordnance Survey of 1901 (see figure 23).



Plate 13: The south east corner of the Rolling mill

- 6.4.3.4 The next major wall foundation (285) was located in the south west corner of the Rolling Mill. (285) is an early 20th Century brick wall and is thought to have been part of an internal division in the Mill, possible associated with a toilet block as a number of ceramic sewer pipes led out of this area beneath the western wall of the

mill (see figure 23). The final wall foundation to be recorded within this building comprised Wall (199) a narrow 0.44m wide wall running east-west across the alignment of the mill and unbonded into the main exterior wall (198). A large chimney is illustrated on plate 1, just off the south east corner of the building, no evidence survived on site for this chimney.

6.4.4 *Wheel Pits and Associated Floors (103), (104), (105), (106), (107), (109), (110), (111), (112), (113), (115), (116), (117), (118), (129), (130), (264), (265), (266), (267), (268), (269), (270), (277), (278), (279), (290), (299), (312), (313), (315)*

- 6.4.4.1 This area represented the heart of the mill complex and included the two wheel pits, tail race and the fragmentary remains of the corn mill itself. For the ease of discussion I will start with the remains of the wheel pits themselves and then move on to the more fragmentary remains of the structural remains of the mill building.
- 6.4.4.2 There were two wheel pits present on site joining (Wheel pits **A** and **B**) on to a common tailrace and served by a single overflow channel to the western side of western wheel pit (see *Figure 20 and 24*), with the western most pit, from now on referred to as *Wheel Pit A* on the figure, being the earliest. Both wheel pits and length of the tail race would have originally been within the mill building itself with the water supply coming into the building through two timber launders or shoots.
- 6.4.4.3 **Wheel Pit A** measured c.12m in length by c.1.9m in width and was constructed primarily of dressed sandstone, with wall (313) forming the western side of wheel pit (see figure 24) and continuing northwards where it forms the western side of the tailrace (see plate 12). Wall 313 measured between 0.45m and 0.70m in width and was subject to numerous repairs over its working life. The eastern wall of the wheel pit (298) formed the common wall between the two wheel pits and was again constructed out of well dressed St Bees sandstone blocks measuring 1.2m in width.
- 6.4.4.4 The substantial width of this wall was the result of it having to secure the axles for both water wheels on what was largely a free standing wall. Only one of two sides of the wheel pit were keyed into wall southern wall of the wheel pit (315), which the eastern wall (298) butting up to wall (315). This clearly indicates that wall 298 although constructed out of a similar same type of dressed sandstone as the rest of the wheel pit; was constructed at a later date to walls (313) and (315). It is possible that the southern and western sides of the wheel pit are remnants of the mid 19th century mill. The most likely date for the major rebuilding of the eastern wall (298) would be during the early 1860s when the site was redeveloped from a gypsum crushing mill into a new corn mill with two water wheels (see 3.1.17).



Plate 14: Wheel pit A, facing south east

6.4.4.5 Scarring on both sides of the wheel pit caused by the water wheel becoming unbalanced during use resulting in grinding along the edges of the wheel rim and sides of the wheel pit. This scarring is useful in the analysis of the site as it gives a fair indication of the size of wheel (or wheels) used, which in this case would be approximately 4.2m in diameter; which corresponds well with a 14 foot wheel with 5 foot width documented in use at the site during the 1840s.



Plate 15: Scarring on the west side of wall 298

- 6.4.4.6 The probable reuse of this 1840s wheel in the 1860s rebuild is hinted at by the fact that the width of the new wheel pit was kept at 5 feet, (the width of the water wheel and wheel pit are always very close to each other with only minimal clearance required to allow for a efficient wheel to function) during its rebuilding. The wheel pit was aligned north-south upon the same axis as the millrace and measured approximately 1.8m in depth and 1.6m in width with the massive central wall running for 6.5m before it changed to a far narrower wall which merely separated the two channels of the tail race prior to the two channels merging. The base of the wheel pit was flagged in sandstone and sloped slightly from south to north. The wheel pit at some point in the 20th century went out of use with the mill reverting back to one operating wheel, with a small brick wall constructed across the wheel pit (268), blocking it off from the rest of the tailrace.
- 6.4.4.7 Along the western side of the wheel pit was a substantial stone overflow which fed into the main mill race via a small rectangular culvert, constructed primarily of sandstone walling (312) and (313), with a slabbed base (290) was constructed (see figure 24). This feature was cut into the natural sandy gravel (101) subsoil and was clearly of the same build as walls 313 and 315 and appears to have been kept in use until the closure of the mill in the mid 1950s even after Wheel Pit A had gone out of use.
- 6.4.4.8 **Wheel Pit B** (see Figure 24) lay to the east of *Wheel Pit A*, and measured c.10m in length by c.2.5m in width and survived to a maximum depth of 2.8m. The wheel pit was defined by three substantial sandstone walls, wall (298) the common central wall, wall 219, the rear wall of the pit and wall (106) which formed the eastern side of the wheel pit and tail race. The rear of the wheel pit was defined by a brick archway (271) spanning the tailrace which marked the beginning of the tail race proper.
- 6.4.4.9 It is clear that this wheel pit post dated wheel pit A and was probably originally constructed in the 1860s but substantially altered or at least partially refaced in 1899 as a date stone remains in situ in the eastern face of wall (298). This rebuilding is likely to relate to the conversion to steam with the construction of the nearby condenser chamber and water supply culvert requiring a total rebuild of the south wall (219) of the wheel pit to include a brick arched tunnel and leading from its southern extent into the condenser chamber.



Plate 16: The brick arched tunnel leading from Wheel Pit B to condenser chamber

- 6.4.4.10 The scoring marks visible on the sandstone walls of (314) and (298) allowed for the measurement of the water wheels used within the second wheel pit to be estimated. The size of the wheels used can be seen in *Figure 25*. It is clear that at least two wheels were used in the wheel pit with the largest measuring 4.5m in diameter by 2.5m in width and a second wheel of 3.5m diameter by 2.5m in width. This second wheel appears to have been repositioned for some reason as there are two sets of scarring on a different axis visible on the wheel pit wall. The repositioning of the wheel would have resulted in the repositioning of the axle and drive gears and represented a significant undertaking both in financial terms and in time. As in Wheel Pit A the wheels within Wheel Pit B are likely to have been pitch back wheels (Mike Davies-Shiel pers comm) with the final section of water supply coming from the mill race via a timber shoot of launder.
- 6.4.4.11 Wall (106=314) was the main east wall of the eastern wheel pit, was constructed out of dressed sandstone blocks, and ran on a north-south alignment. In some places (see figure 25) the upper three courses of sandstone had been replaced with brick (107) which undoubtedly relates to repairs carried out on the wheel pit in its final phase of use in the mid twentieth century. The cut for this wall (118) was seen to cut context (110), the sandstone foundation remains of a east west wall which is likely to formed an internal wall within the 19th century mill complex, This wall earlier wall (110) was also cut by [111], the construction cut for wall (112), forming the eastern side of the drive chamber (see figure 20) proving that this internal wall had been removed prior to the construction of the surviving drive pit.
- 6.4.4.12 The northern end of wall 298 butted up to a narrow sandstone wall (273) that separated the eastern and western tailrace, supporting a original brick archway (271) which sat on a brick and concrete base (272) and later concrete slab (275) that roofed the tail race for approximately 5.6m as it crossed the interior of the mill building. The wall was similar in composition to (313) and (279), formed from nicely dressed sandstone blocks. The eastern side of the tail race was made up of wall (279) was a

large sandstone wall measuring over 10m in length and 0.48m in width The wall was aligned roughly north-south and was smeared with concrete over much of its length especially in the vicinity of surface (275).

6.4.4.13 The concrete slab (275), a large flat concrete surface measuring approximately 0.30m thick and resting on a series of iron girder supports (274), was concreted into both (107) and (273) and butted up to an area of original arching (271) (see figure 24). This surface also had a raised concrete platform (0.05m thick) (276) cast onto the top of slab, as well as a large sandstone block (278) set on top the slab. These two features are likely to represent the remains of the much altered northern wall of the mill as they are perfectly aligned on the original location of the 1860s mill, (see figure 24 and 28). A 4m long section of this concrete slab had been lifted during the demolition work on the site with the tail race filled with mixed brick and concrete demolition material (269).

6.4.4.14 To the north of the concrete slab (275) the tail race reverted to being covered by a low brick arch (265) which extended for a length of 4.5m (although only surviving on the eastern side) at which point it originally terminated. The capped millrace was later extended to the north with a new section of brick arching (264) added which again only survived on the eastern side and continued beyond the limits of excavation (see plate 15). This later section of arching appears to have covered the width of the millrace in a single span as there was no associated central wall extending beyond the northern limit of wall (273). This whole area was badly disturbed by the insertion later plastic sewer pipes into the course of the millrace.



Plate 17: Brick archway 265 with fragment of later extension in foreground

6.4.4.15 Apart from the well preserved wheel pits and drive pit, little survived even at foundation level of the mill building itself with a small area of undisturbed internal flooring of a late 20th century date surviving to the east of the drive pit (see plate 16). Context (113) was a concrete floor lying to the east of drive pit (112) / (115), clearly

later than the walls themselves which it respected. The floor surface was fragmentary and sealed by a later modern floor (103) which is likely to date to the final phase of activity at mill and could even relate to its later use as a storage depot in the late 1950s and 1960s by the West Cumberland Farmers.

- 6.4.4.16 A large rectangular concrete block (105) still in situ and set on top of concrete floor (103) measuring 1.2m by 0.60m appears to be a mounting block for a large piece of machinery. No metal fixings or fittings were present on this block to give any clues as to its original function. Floor surface 103 was the only substantial area of surviving floor surface relating to the mill itself and extended by approximately 3m by 1.5. This floor surface (103) partially overlay a late red sandstone flagged floor surface (104) within the mill extending to the east for over 3.4m and continued beyond the limits of excavation. The floor was composed of rectangular flags, measuring 1m by 0.60m which were laid directly onto the natural subsoil (101), no earlier features were recorded beneath surfaces (113) and (104).



Plate 18: View of floor surface 104 and 113 and mounting block 105

- 6.4.4.17 One of the most interesting areas of survival was situated just to the east of **Wheel Pit B** (see figure 20) and was the location of the pit ring which took the power from the water wheel axle. In order to understand the significance of this feature it is important to understand the basic workings of the power transfer from wheel to machinery in a corn mill. The pitch back wheel would have been powered by water fed from a wooden launder supplied from the mill race, this wheel would turn on its axle which would be extended on one side to incorporate a large wooden gear (the pit-ring). This gear would turn with the wheel and in turn, turn the wallower (a horizontal gear attached to a huge timber shaft (tree axle) that would often extend to the full height of the mill and be in effect the main drive shaft for the mill. At about first floor level this tree axle would go through another large gear (the great spur wheel) which would drive up to five pairs of mill stones.

- 6.4.4.18 Remains for mounting blocks for the wheel axle survived on walls 298, 106 and 112 (see Figure 20), contexts (116), (117) and (299), and a representation of the inner

workings of a corn mill, kindly produced by Michael Davies-Shiel can be found on Figure 21. The mounting blocks measured approximately 1m in length and 0.26m in width and were made out of quarter inch steel plate holding two sets of half inch bolts that would have secured the water wheel to the wheel pit walls (see plate 19). A similar mounting arrangement for the wheel axle was recorded still in situ at the surviving 19th century water mill at Warwick bridge (see plate 18).

- 6.4.4.19 No mounting block survived on wall (313), suggesting that the surviving mounting plates relate only to the wheel that would have been contained within wheel pit B. No evidence survived for a drive pit associated with Wheel A, a drive to the west of the wheel would have been problematic as it would have had to cross the overflow channel. It is also (possible but unlikely) that both wheels would have shared a common axle with all traces of the mounting block on wall (313) having been removed by later activity.



Plate 19: Detail of pit wheel and mounting arrangement at Warwick Mill



Plate 20: Drive pit showing detail of both mounting plates

- 6.4.4.20 The drive chamber, which housed the pit wheel was well preserved (see figure 20 and plate 19) and defined by two substantial walls and butted up to the eastern wall of Wheel Pit B (106). Context 112 formed the eastern side of the drive chamber pit, a substantial sandstone wall running north-south measuring 2.4m in length, 0.60m in width and 1.5m in depth. The western wall of the drive pit (115), was again well preserved and measured 2m in length by 0.52m in width and had a maximum depth of 1.5m, a large sandstone block measuring 1.2m by 0.60m forming the southern end of wall 115 extended to wall 112 to form the southern side of the drive pit.
- 6.4.4.21 To the west of Wheel Pit A the level of survival was much poorer than to the east of the site with fragments of the sandstone wall foundations (303) being the most significant remains. The main section of surviving wall foundation ran for approximately 4.5m on a east-west alignment measuring 0.71m in width and surviving to one course sitting directly on top of the natural subsoil (101). The interface between this wall (303) and the mill race wall (313) was very disturbed but did appear to show wall (303) keyed into the mill race and therefore contemporary with context (313). A stub of wall (148) forming a fragment of the southern side of the mill building survived running off the western side (207=312) of the overflow channel. The wall foundation again of sandstone extended for 1.7m and measured 0.58m in width with no obvious foundation cut.
- 6.4.4.22 The only other feature of note that related to the corn mill in this area was a substantial 3.5m long by 1.3m wide brick base (297). The brick structure (297) was built into the side of the tail race (313) and contained a number of internal slots for which is likely to have supported a large upright structure. As very little

else survived of the mill in this area it is impossible to give a definite function to this brick support, with one possible function having been as a base for a large drive shaft that would have crossed the mill race and provided power to the western side of the mill.

6.4.5 Chimneys/Corn Drying Kilns (188), (189), (190), (192), (193), (194), (195), (196). (313ev), (314ev), (324ev)

- 6.4.5.1 This area contained a two celled building which in its final phase measured 13m in length and 6.8m in width and is well illustrated in plate 1 sandwiched between the mill building and the rolling plant. Although the building was cut by numerous modern sewer pipe trenches (**188/189**) the surviving remains represented the best preserved remains of any of the structures recorded during the excavation. but enough of the structure remains to be identifiable. The interior of the structure was dominated by the bases of the two centrally positioned furnace bases belong to the corn drying kilns.
- 6.4.5.2 The north-half of the structure was originally excavated during the site evaluation in 2002, described as such: “Structure (**313ev**) and consisted of a sandstone wall foundation measuring 0.70m in width, bonded by black ‘pug’ lime mortar. Measuring approximately 8.0 m x 7m in total, this structure forms the corner of a substantial building. This structure had a concrete floor (**312ev**) within it that was different in character, and likely to be older, than the modern reinforced concrete, consisting of large pieces of river gravel cemented into the base of the concrete acting as a reinforcing agent. Kiln base (**314ev**) consisted of a square, brick built structure cut to the north by a narrow band of modern reinforced concrete. Measuring 1.80 m x 2.0 m and constructed from engineering bricks, the floor of this structure was heavily stained by a black ashen deposit.”



Plate 21: Detailed view of kiln base, context 190

- 6.4.5.3 The elements described in the evaluation were the furnace and wall foundation remains of the original corn drying kiln building. This building was likely to have been constructed in the late 1870s when the site appears to have been redeveloped (see 3.1.19). The southern wall and southern edge of kiln (**314ev**) were recorded during the excavation with the surviving concrete floor (**312ev**) found to extend up the southern wall (**287**) of the original structure (see figure 19). The only side of the building that had been totally truncated was the eastern side of which nothing survived.
- 6.4.5.4 The southern half and later extension measured 7m by 7m and was basically a mirror image of the original corn drying building, with a much better level of preservation. This building constructed circa 1905 had a variety of foundation styles with the western wall utilising a sandstone foundation which could possibly relate to an earlier garden wall foundation reused for this extension (see figure 29) and the southern wall using a narrow brick foundation. The brick wall (**195**) measured 0.33m in width and survived for a length of 6m and was clearly butting up to wall 196. Again as with the earlier kiln building nothing survived of the eastern wall.
- 6.4.5.5 Internally the room was floored in concrete (**193**) which covered approximately two thirds of the interior, the northern limits of the room were floored with sandstone flags (**191**) and had a small drain remaining in situ. This had the appearance of an external flagged surface, which was contemporary with the earlier building and later incorporated into the new internal concrete floor.



Plate 22: View of southern kiln and small “coal store”

- 6.4.5.6 The kiln base (**190**) was slightly larger than the primary kiln but still of approximately the same design with a square fire box measuring approximately 1.3m by 1.3m and constructed out of engineering bricks which survived to three courses in height. The interior showed signs of intense heat with the inside course of bricks in a very poor state of preservation, indicating that the kiln was well overdue a relining by the end of its working life hinting at little investment on the

mill in its final years which is not unusual in a business in decline, (as it clearly was in the post war period).

- 6.4.5.7 The fire box to the kiln was flanked by two stone flags (**194**) which were positioned directly in front of the exterior doorway. It is possible that there was an internal doorway between the two kilns, as a section of wall 287 appears to have been infilled at a later date possibly blocking an internal doorway to the rear of kiln (**192**) and directly in front of kiln (**314ev**). The chamber walls were constructed to the west, north and internal divide, of sandstone blocks (**196**) with the southernmost wall (**195**) being constructed of brick, standing in places 3 courses high.
- 6.4.5.8 A small brick structure (**199**) measuring 3.8m by 2m was constructed outside the southern wall of kiln building and floored in concrete (**197**). It is possible that this later structure may have been a small coal store serving both kiln furnaces.
- 6.5.6 *Early Drain, pits and Wall [162], (163), [164], (165), [306], (307), (308), [309], (310), (311)*
- 6.5.6.1 At the southernmost extent of the site lay a stone drain and a substantial sandstone wall, tentatively dated to pre-1842, (and quite possibly much earlier) lying on a totally different structural alignment to the rest of the site (see figure 19a). The function of this earlier wall foundation is unknown as it does not appear on any of the cartographic representations of the area.
- 6.5.6.2 Wall (**307**), within cut [**306**], was constructed of stone cobbles and slabs, with the occasional sandstone block and extended for 7.5m, sitting within a shallow u-shaped cut [306] measuring 0.90m in width and 0.12m in depth (see plate 22). The wall was only really faced on its western side although this could possibly be the result of the later disturbance that was apparent along its eastern side. The wall was bonded with a light brown clay and soil matrix (**308**) and was unlike any of the other recorded stone walls from the site. A small amount of lead glazed black ware pottery was recovered from the matrix surrounding the cobbles (**308**) giving this wall a possible 18th century date.
- 6.5.6.3 The stone drain lay within cut [**309**], and was represented by cobbles, sandstone slabs and a ceramic drain (**310**). This structure lay at an angle to (**307**) so not necessarily related to it, but was constructed in a similar way and utilising similar cobbles. The drain was also filled by fragments of crushed gypsum and alabaster coated pebbles and stones, as well as a light brown clay (**311**), which is likely to relate to the period that saw the site utilised as a gypsum crushing mill in the mid 19th century. What is unclear due to the disturbed nature of this drain is whether the gypsum fragments that filled the drain were deposited when the drain was still in use or represent the later dumping of waste material in this area after the drain had gone out of use.
- 6.5.6.4 Two pits cutting into the natural subsoil (**101**) just to the east of wall 307 produced pottery of a similar 18th century date. The larger of the two pits [**162**] measured 1.7m in diameter and had a maximum depth of 0.16m. The pit was filled by a single fill (**163**) a clean dark brown silt which produced 3 sherds of 18th century pottery.
- 6.5.6.5 The smaller of the two pits [**164**] was sub-oval in shape and measured 1.17m in diameter with a maximum depth of 0.15m. Again the feature was only filled by

single deposit (165), which produced a small quantities of coke, a single sample of burnt grain. Both pits 162 and 164 are likely to be the remains of highly truncated rubbish pits associated with occupation at the mill site in the 18th century. A third pit [204], highly truncated and measuring approximately 1.3m in diameter and 0.12m in depth and filled by a mixed gravel silt (206) could relate to this phase of pitting.

- 6.5.6.6 The only other deposits that could possible be associated with this phase of activity were two spreads of redeposited natural sandy gravel (202ev) recorded approximately 4m to the north of pit 164. These thin spreads of re-deposited natural measured approximately 0.08m in depth and extended over an area measuring approximately 5m by 4m and were clearly cut by the overflow channel (312) of the mid to late 19th century mill.



Plate 23: View of probable 18th century wall foundation

7. ENVIRONMENTAL AND BONE REPORT

7.1 Introduction – Environmental Remains

- 7.1.1 In the trenches excavated some 13 contexts were considered worth sampling. Samples <1> to <12> were from the main excavation area, HGM-B. Sample <13> was from the evaluation area, HGM-C, specifically Trench 2. All the whole earth samples were selected for processing in order to assess their environmental potential. This will help provide further information as to the depositional processes involved in their formation. The methodology employed required that the whole earth samples be broken down and split into their various different components. This was achieved by a combination of water washing and flotation. The recovered remains can then be assessed for content.
- 7.1.2 Flotation separates the organic, floating fraction of the sample from the heavier mineral and finds content of sands, silts, clays, stones, artefacts and waterlogged material. Heavy soil and sediment content measuring less than 1mm falls through the retentive mesh to settle on the bottom of the tank. Flotation produces a ‘flot’ and a ‘residue’ for examination, whilst the heavier sediment retained in the tank is discarded. The method relies purely on the variation in density of the recovered material to separate it from the soil matrix, allowing for the recovery of ecofacts and artefacts from the whole earth sample.
- 7.1.3 The retent, like the residue from wet sieving, will contain any larger items of bone, or artefacts. The flot or floating fraction will generally contain organic material such as plant matter, fine bones, cloth, leather and insect remains. A rapid scan at this stage will allow further recommendations to be made as to the potential for further study by entomologists or palaeobotanists, with a view to retrieving vital economic information from the samples. Favourable preservation conditions can lead to the retrieval of organic remains that may produce a valuable suite of information in respect of the depositional environment of the material, which may include anthropogenic activity, seasonality and climate and elements of the economy.
- 7.1.4 The contents of the samples are listed below in Tables 2, 3 and 4.

Details for HGM-B and C		Volumes of material (mls)		
Context no	Sample no	Sample	Retent	Flot
121	1	8000	4000	70
124	2	10000	2000	5
126	3	10000	600	5
165	4	20000	4000	5
218	5	10000	500	30
238	6	10000	500	250
237	7	10000	1500	250
236	8	10000	500	80
283	9	10000	400	400
249	10	10000	3000	10
250	11	10000	150	5
234	12	10000	500	200
103	13	20000	800	150

Table 2: Environmental data - sample details and volumes recovered

Sample number	CONTEXT NUMBER	Charred grain	Raspberry	Nettle	<i>Sambucus nigra</i>	<i>Pale persicaria</i>	<i>Malus sylvestris</i>	Docks	<i>Taraxacum</i>	<i>Stellaria media</i>	<i>Chenopodium</i>	<i>Scirpus</i>	<i>Plantago lanceolata</i>	Hair grass	Woody plant parts	Moss	Charred plant material	Amorphous organic	Bone	Burnt bone	Charred wood	Cinders	Coal	Wood	Larvae/insects	Metal droplets	Root material
1	121	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	1	0	0	0	0
2	124	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	3
3	126	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	2	0	0	0	0	0	1
4	165	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	3	0	1	0	0	0	1
5	218	2	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	2	0	0	3	0	0	0	0	0	1
6	238	1	1	1	0	1	0	1	0	1	0	1	0	0	1	0	0	0	1	0	0	1	0	3	0	0	2
7	237	1	0	1	0	1	0	1	1	1	1	0	0	0	0	0	0	1	0	0	1	0	0	2	0	0	0
8	236	1	0	0	0	1	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
9	283	1	0	0	0	1	0	0	0	0	0	0	1	0	1	0	1	0	0	0	1	0	0	2	0	0	2
10	249	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3
11	250	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	3
12	234	1	0	0	0	1	0	1	0	0	0	0	0	0	3	0	1	1	0	0	1	0	0	2	0	0	1
13	103	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	3	1	0	1	0	0	3	0	0	2

Table 3: Contents of flot and retent residues from samples

Key to tables: Fill = ditch, posthole or pit fill. Contents assessed by scale of richness 0 to 3.
0 = not present, 1 = present, 2 = common, 3 = abundant.

SITE CODE NPA06 HGM-B and C					CONSTITUENT ECOFACTS/ ARTEFACTS OF THE RETENTS																			
CONTEXT NUMBER	SAMPLE NUMBER	CONTEXT TYPE	VOLUME (LITRES)	SOIL CONDITION	Stones	Gravel	Quartz Fragments	Pottery	Metalwork	Magnetic	Seeds/ Fruit	Nut shells	Charred wood	Charred plant material	Waterlogged wood	Bone	Burnt bone	Root material	Coal	Coke/clinker	Glass	Iron pan	Amorphous organic	Root material
121	1			M	1	1	0	0	0	1	0	0	1	0	0	0	0	0	1	3	0	0	0	0
124	2			M	2	3	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0
126	3			M	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	3	1	0	0	0
165	4			M	3	2	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
218	5			M	1	3	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
238	6			M	1	2	0	1	0	0	1	0	1	1	3	0	0	1	1	0	0	0	0	1
237	7			M	1	3	0	0	0	0	1	0	1	1	2	0	0	0	1	0	0	0	0	0
236	8			M	3	2	0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	1	0	0
283	9			M	2	3	0	0	0	0	0	0	1	0	1	0	0	0	1	1	1	1	0	0
249	10			M	3	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
250	11			M	1	3	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0
234	12			M	3	2	0	0	0	0	1	1	1	0	1	0	0	1	1	0	0	0	0	0
103	13			M	1	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	1

Table 4: Environmental data - retent sample analysis

7.2 Sample Analysis

7.2.1 Sample 1 (121)

This sample was from the fill of a 19th century pit. The matrix consisted of burnt material as slag, clinker and bricks. The retent was made up of a small amount of stones and gritty gravel but mostly clinker and coke, a modern context from the fill of a pit. The flot contained mostly cinders, a small amount of coal, charred wood and woody plant parts with an amount of tiny metal droplets, possibly from metalworking close to the area. Only one seed of common nettle was recovered, consistent with an industrial area.

7.2.2 Sample 2 (124)

This sample came from the fill of a well and consisted of waterlogged soil and rubble with some pottery and glass inclusions. The retent of this sample was made up of gravel and stones with a small amount of charred wood, coal, coke and clinker present. The flot contained mainly root material with a small amount of wood and a few seeds of *Taraxacum*. This was the secondary fill of a well, dated to the post medieval period. Nothing meaningful can be said about this deposit.

7.2.3 *Sample 3 (126)*

This is the fill of a small irregular shaped pit again consists of burnt material with a soily texture with no inclusions. The retent produced mostly coke and clinker with a small amount of root material, coal and glass. The flot yielded mostly amorphous organic material with an amount of charred wood and charred plant material with a few seeds of elder. This pit was modern in date and nothing can be added about its origins.

7.2.4 *Sample 4 (165)*

This very compact brown silty matrix was the fill of a shallow pit or smear. The retent of this sample was made up of gravel and stones and again contained no organic matter but a small amount of coal, clinker and coke were also present, denoting another modern deposit. A small piece of post medieval salt glazed ware was also recovered from the retent indicating a possible 18th century date for the deposit. The flot contained 1 charred oat grain, a small amount of charred wood and a seed of raspberry.

7.2.5 *Sample 5 (218)*

This skim of Medieval soil was a pale brown compact sandy clay that contained Medieval pottery. The retent again produced mostly gravel with some stones and an amount of charred wood. There was also an amount of wood present, probably waterlogged or very moist from the degree of preservation. The flot yielded a few charred small oats, seeds of fat hen and hair grass. The flot consisted mainly of charred wood and some root material.

7.2.6 *Sample 6 (238)*

This deposited material was the upper level of a complicated series of deposits, just a thin layer of material. The retent produced only stones and gravel with a considerable amount of amorphous organic. A small fragment of Medieval pottery was also recovered from this context. The flot yielded a few fossilised oats and wheat grains. Raspberry and pale persicaria were also present, along with docks, chickweed and *Scirpus* species. Wood fragments were prolific as well as an amount of root material.

7.2.7 *Sample 7 (237)*

This deposited material showed signs of burning. The retent again produced mainly gravel with some stones. There was also an amount of wood present, probably waterlogged or very moist going on the preservation. There was also a small amount of coal, charred wood (mostly small wood), charred plant material and charred grain. There was also some material resembling a compacted, layered floor surface. This material lay above a sandstone block or flag. This context was also probably Medieval in date although there was no artefactual evidence. The flot yielded several different seeds and a small amount of charred oats and a grain of charred wheat. The seeds were nettle, pale persicaria, docks, dandelion, chickweed and *Chenopodium* species. There was also an amount of wood, and small amounts of both charred wood and amorphous organic. All the seed species denote waste areas,

the ground possibly being left exposed before other levels were deposited. The wood may have been from a lining formed in the shallow pit from which the sample came.

7.2.8 *Sample 8 (236)*

Another deposit produced a clayey soil. The retent again produced mostly stones and gravel. A small amount of coal, clinker and coke were also present, some charred small wood and charred grain. The flot yielded a few charred oats, seeds of fat hen, pale persicaria, crab apple, docks, and plantain. A small amount of wood was also present.

7.2.9 *Sample 9 (283)*

From this grey layer within the area of context 236, the retent again produced only stones and gravel with a small amount of both charred and waterlogged or moist wood. Coal, coke, clinker and a small globule of glass were also present with some iron pan, suggesting an industrial area. The flot yielded a few charred oats, seeds of pale persicaria, a seed of plantain, roots and woody plant parts. There was also a small amount of charred wood.

7.2.10 *Sample 10 (249)*

This cobbled surface in a Medieval soil had a sandy texture and small and medium cobbles. The retent again produced only stones and gravel with a fragment of medieval pottery. The flot yielded a few charred oats, seeds of *Scirpus*, roots and woody plant parts. There was also a small amount of charred wood.

7.2.11 *Sample 11 (250)*

This grey brown compact silt was a Medieval deposit with inclusions of Medieval pottery. The retent again produced only stones and gravel with some charred grain, nut shells, charred and either damp or waterlogged wood. The flot yielded a charred small oat and a charred wheat grain. There was also a small amount of charred wood but mostly it consisted of root material.

7.2.12 *Sample 12 (234)*

From this fill of cut [233] the retent again produced only stones and gravel with a few fragments of charred hazelnuts or acorns. There was also a small amount of magnetic material, charred wood, wood and root material. The flot yielded mainly woody plant parts and fragments of wood. Charred plant material, charred wood, wood and amorphous organic material were also present with a small amount of root material.

7.2.13 *Sample 13 (Evaluation Context 103)*

From this ditch fill, the retent was mainly amorphous organic material. Stones and gravel were also present with small amounts of charred plant and root material and damp or waterlogged wood. The flot yielded mostly woody plant parts and a small amount of charred wood and amorphous organic material.

7.3 Discussion

- 7.3.1 Sample numbers <1>, <2>, <3>, <4>, <12> and <13> recovered from the site were post medieval in origin and probably date to the 19th or 20th centuries. There were some that dated to earlier periods. Sample <5> was a skim of Medieval soil that contained a few charred small oats. Sample 6 was also from the Medieval period and contained fossilised oats and wheat grains.
- 7.3.2 In Sample <7> there were both charred oats and wheat with some charred cereal husk fragments. The material also had an odour of cess about it but had some compacted material resembling a much trampled floor surface. Sample <8> could be Medieval in date and also has charred grain present with weed seeds and an amount of wood. This again smelled of cess. Sample <9> contained charred oats and weed seeds with some charred wood and an amount of root material. Wood was also present and again may have come from the lining of a pit. Sample <9> also smelled of cess. All three of these samples were from adjacent areas, probably all dating to the Medieval period and probably all cess or rubbish pits. Sample <12> was also from this area and had a similar content apart from a large amount of woody plant parts.
- 7.3.3 Sample <10> had some charred oats and an amount of root material present. Sample <11> was almost the same and both these contexts were of Medieval date, context (249) being above (250). Charred wood was also present with a few weed seeds of arable land.
- 7.3.4 Evaluation Context (103), sample <13> was the fill of a ditch and contained waterlogged or moist wood with woody plant parts and amorphous organics. This fits in with the modern origins of the material, the amorphous organics being degraded plant material from the surroundings.

7.4 Dating

- 7.4.1 It is not thought necessary to carry out any scientific dating on the material recovered from this site, as the site sequence is already well dated.

7.5 Vertebrate Remains

- 7.5.1 No vertebrate remains were recovered from the site.

7.6 Mollusc Remains

- 7.6.1 No mollusc remains were recovered from the site.

7.7 Conclusion and Recommendations

- 7.7.1 Charred grain was recovered from most of the samples in the flot. It is obvious that there was some on site activity leading to the recovery of the charred grain but it is difficult to determine what the exact source of this material was given the limited information retrieved from the site relating to the pre Victorian phases of. It is almost certainly related to the site over the course of time as a reused mill and grain processing area. It is unlikely the material would be from soil management processes or hearths. The potential for further information being gained from the examination of this material is limited and so it is recommended that no further work be done.

8. FINDS ANALYSIS

8.1 *Introduction*

8.1.1 A total of 639 finds were recovered from Harraby Green Mill, Carlisle. The selection of finds dated from the roman period up to modern times.

8.2 **Pottery**

8.2.1 *Roman Pottery*

8.2.1.1 A total of 4 sherds of roman pottery were recovered from Harraby Green Mill. 3 of the sherds were from the same vessel of black burnished ware from the 3rd to the 4th century. The fourth sherd was a badly abraded sherd of oxidised Romano British pottery. All four sherds were recovered from **(100)** during the initial cleaning of the site. The sherds of roman pottery were thought to be accidental as they were recovered from the mill-race backfill, so could have transported on site as opposed to recovered from a roman context.

8.3.2 *Medieval Pottery*

8.3.2.1 A total of 64 sherds of medieval pottery were recovered from Harraby Green Mill, Carlisle. The medieval pottery sherds recovered from context **(100)** consisted of 15 jug sherds of partially reduced greyware with a green glaze dated from the 13th to the 15th centuries. A single sherd of partially reduced red gritty ware and a single sherd of oxidised pottery with a pale buff fabric were also recovered from **(100)**, the reduced gritty ware was thought to have an earlier date of 12th to 13th century.

8.3.2.2 A total of 6 sherds of medieval pottery were recovered from context **(102)**. 4 sherds of reduced greyware with green glaze dated to around the 14th to 15th century, 1 of which had rouletting decoration around the outside. The remaining 2 sherds were reduced greyware also dated to around the 14th to 15th century.

8.3.2.3 A total of 8 body sherds of partially reduced greyware with green glaze were recovered from context **(167)**. These sherds are thought to date from the mid 13th century to the late 14th century.

8.3.2.4 A total of 10 sherds of medieval pottery were recovered from context **(218)**. 8 of the sherds were partially reduced greyware with a green glaze and the remaining 2 were reduced greyware with green glaze all of which are thought to date to the 14th to 15th century.

8.3.2.5 A single sherd of medieval pottery was recovered from context **(234)**. The sherd consisted of an abraded fragment of red gritty ware dated to around the 12th to 13th century.

8.3.2.6 A total of 16 sherds of medieval pottery were recovered from context **(249)**. 7 of the sherds were comprised of small, abraded fragments of red gritty ware dated to around the 12th to 13th century, one of which was recovered from environmental sample (10). The rest of the sherds were partially reduced greyware with a green glaze dated to around the 13th to 15th century, one of the sherds was a fragment of a jug handle.

8.3.2.7 A total of 4 sherds of medieval pottery were recovered from context **(250)**. All 4 of the sherds were red gritty ware from the 13th to 14th century, one of which was reduced the remaining sherds were of oxidised red gritty ware.

8.4.3 *Post-medieval Pottery*

8.4.3.1 A total of 316 sherds of post-medieval pottery were recovered from Harraby Green Mill, Carlisle. The majority of the post-medieval sherds were recovered from the topsoil context **(100)**. The dates of the pottery recovered from the site vary from late 16th century blackware to modern 20th century stoneware.

8.4.3.2 A total of 248 sherds of post-medieval pottery were recovered from context **(100)**. The sherds consisted of 32 sherds of blackware or black glazed earthenware dated from the 17th century to the 19th century. There were 6 sherds from the same vessel and 7 sherds appeared to be fine blackware. 42 sherds of tin-glazed pottery were recovered 6 sherds were earlier than the rest being early 18th century. 10 sherds of 19th century salt-glazed stoneware were recovered from **(100)**, the sherds appeared to be from ink wells and ginger beer bottles, which were commonplace at this time. 37 sherds of cream ware were recovered from **(100)** dated to the late 18th to 19th century.

8.4.3.3 35 sherds of brown ware or brown glazed earthenware were recovered from **(100)** dating to around the 19th century to 20th century. 12 sherds of trail slipware were recovered from context **(100)** dated to around the late 19th to 20th century. 9 sherds of yellow slip earthenware were recovered from context **(100)**, dated to the late 19th to early 20th century. 18 sherds of transfer printed ware were recovered from context **(100)**, dated to early to late 19th century, including 4 with a pearl ware glaze, which were possibly earlier.

8.4.3.4 2 plain earthenware sherds and 2 pearl ware sherds were recovered from context **(100)**, dated to around the early to late 19th century. 13 sherds of porcelain were recovered from context **(100)**, 5 of the sherds had an earlier date of early 19th century the remaining sherds appeared later than this possibly late 19th century. 1 of the sherds was from an ornament dated to around the late 19th century. The remaining sherds comprised of 3 sherds of modern stoneware and 1 sherd of earthenware with white slip and mocha design dated to the 20th century.

8.4.3.5 A total of 4 sherds of post-medieval pottery were recovered from context **(124)**. These comprised of 3 sherds of cream ware and 1 sherd of pearl ware dated to the 19th century.

8.4.3.6 A total of 3 sherds of post-medieval pottery were recovered from context **(138)**. The 3 sherds were later blackware or black earthenware dated to the 17th to 18th century.

8.4.3.7 A total of 3 sherds of post-medieval pottery were recovered from context **(163)**. The 3 sherds comprised of 2 sherds of trail slipware dated to the late 19th early 20th century and a single sherd of blackware dating to the 17th to 18th century.

8.4.3.8 A total of 14 sherds of post-medieval pottery recovered from context **(165)**. 11 of the sherds comprised solely of later blackware from the 17th century. The sherds were too small to ascertain if they were all from the same vessel. 3 sherds of trail slipware dated to the 18th century were recovered from environmental sample 4 retent.

- 8.4.3.9 A total of 1 sherd of post-medieval pottery was recovered from context (**167**), which comprised of white stoneware dated to the 20th century.
- 8.4.3.10 A total of 2 sherds of post-medieval pottery were recovered from context (**234**). The 2 sherds comprised of 1 sherd of blackware or black earthenware, dating to the late 17th early 18th century and 1 sherd of white slip earthenware with a brown mottled design dated to the 19th century.
- 8.4.3.11 A total of 8 sherds of post-medieval pottery were recovered from context (**244**). The 8 sherds comprised of 4 sherds of tin-glaze dated to the 19th to 20th century, 2 transfer printed ware from the 19th century, 1 sherd of trail slip ware dated to the 19th to 20th century and 1 sherd of modern white stoneware.
- 8.4.3.12 A total of 21 sherds of post-medieval pottery were recovered from context (**301**). The 21 sherds comprised of 8 sherds of tin-glazed dated to the 18th to 19th century, 4 sherds of trail slip ware dated to the 19th to 20th century, 4 sherds of white stoneware dated to the 20th century, 3 sherds of creamware dated to the 19th century and 3 sherds of pearlware dated to the 19th century.
- 8.4.3.13 A single sherd of post-medieval blackware from the 17th to 18th century was recovered from context (**308**).
- 8.4.3.14 A total of 6 sherds of post-medieval pottery were recovered from context (**310**). The sherds were comprised of 1 sherd of early blackware dated to the late 16th century, 3 sherds of later blackware dated to the 17th century and 2 sherds of creamware dated to the 19th century.
- 8.4.3.15 A total of 5 sherds of post-medieval pottery were recovered from context (**311**). The 5 sherds comprised of 2 sherds of creamware dated to the 19th century, 1 sherd of blackware dated to the 18th century, 1 sherd of white slip earthenware with mocha design dated to the 19th to 20th century 1 sherd of transfer printed dated to the 19th century.

8.5 Glass

- 8.5.1 A total of 127 sherds of bottle and window glass were recovered from Harraby Green Mill, Carlisle. The majority of the glass recovered was from the topsoil context (**100**). The dates of the glass vary from late 18th century bottle glass to modern window glass.
- 8.5.2 A total of 102 sherds of bottle and window glass were recovered from context (**100**). The sherds comprised of 9 sherds of late 18th century to early 19th century bottle glass, including 2 bases with pontil marks. 67 sherds of bottle glass dating from the 19th to modern, including 1 early 19th century green glass bottle-neck with a double rim string. There were 26 sherds of modern window glass recovered from context (**100**).
- 8.5.3 A single sherd of modern window glass was recovered from context (**102**). A total of 4 sherds of bottle glass dated to the 19th to 20th century were recovered from context (**124**). A total of 2 sherds of bottle glass were recovered from context (**136**). A total of 2 sherds of bottle glass dated to the 19th to 20th century were recovered from context (**163**). A single sherd of modern bottle glass was recovered from context (**165**). A total of 3 sherds of window glass were recovered from context (**167**). A total of 3 sherds of 19th to 20th century bottle glass and 6 sherds of 20th

century window glass were recovered from context (244). A single sherd of 20th century window glass was recovered from context (305). A total of 2 sherds of 19th century bottle glass were recovered from context (311).

8.6 *Fe and Other Metal Objects*

8.6.1 A total of 58 Fe and other metal object were recovered from Harraby Green Mill, Carlisle. The majority of the metal objects were recovered context (100) including 37 Fe objects comprising of unidentified modern machinery fragments of various sizes, 4 Pb objects including 3 small lead shots and 1 Cu alloy fragment too corroded to identify.

8.6.2 The remaining metal objects included 1 handmade Fe nail from context (102), 3 Fe nails were recovered from context (244), 10 modern unidentified Fe objects were recovered from context (247), 1 modern Fe object and 1 modern aluminium object recovered from context (249), 4 modern machinery Fe objects of varying size from context (305) and 1 Fe nail recovered from context (311).

8.6.3 A number of aluminium and iron corn sack tags were recovered from Harraby Green Mill. The corn tags appeared to the names and addresses of customers or contacts embossed on one side. The tags were recovered from demolition layers (100) within the engine room of the mill in the vicinity of the large sandstone engine blocks. The tags themselves were difficult to read as the iron was heavily oxidised. The tags appear to have been used during the last phase of the mill.

8.7 *Building Materials and Clay Pipe Fragments*

8.7.1 A total of 26 fragments of building material were recovered from Harraby Green Mill, Carlisle. The fragments varied from kiln tiles to slate. The dates for these items appeared to be from the last phases of use for the mill and the site in the 20th century. The majority of the building material fragments and clay pipe fragments were recovered from context the topsoil (100).

8.7.2 A total of 21 fragments of building materials were recovered from context (100) these comprised of 2 fragments of kiln tiles used in the floor of a kiln, 1 fragment of red clay floor tile, 12 fragments of modern wall tiles, 1 grey slate sherd, 1 fragment of plaster, 1 fragment of ceramic field drain, 2 fragments of salt-glazed field drain and 1 miscellaneous object (a small unidentified object recovered from the topsoil). A further 5 fragments of gypsum were recovered from a drain thought to have been use when the mill produced gypsum context (311).

8.7.3 A total of 31 fragments of coal, slag and clinker were recovered from Harraby Green Mill, Carlisle. The majority of the fragments were recovered from context (127). 2 slag and 2 clinker fragments were recovered from the topsoil (100). 2 fragments of clinker were recovered from context (124), 24 fragments were recovered from context (127) and 1 fragment of coal was recovered from context (163).

8.7.4 A total of 11 fragments of clay tobacco pipes were recovered from Harraby Green Mill, Carlisle. The majority of the fragments were recovered from the topsoil (100). A total of 7 stems and 3 bowls (2 of which were decorated) were recovered from (100). The most decorated of the clay pipe bowls was small and depicted a scene with an airship flying above a church and a steamboat on the adjacent side, the second bowl had a leaf design along both seams of the bowl. A single clay pipe

stem was recovered from context (244). All of the clay pipe fragments appear to be dated to the late 19th early 20th century. No maker's stamps or names were visible making precise dating difficult.

8.8 *Leather*

8.8.1 A total of 2 fragments of leather were recovered from Harraby Green Mill, Carlisle. A single large fragment of unidentifiable leather was recovered from context (205) and 1 small fragment of leather was recovered from context (100).

8.9 *Conclusions and results*

8.9.1 The conclusions for the finds assemblage from Harraby Green Mill, Carlisle show that the lack of finds from site this large is likely to be the result of the heavily truncation of the during the 20th century. The majority of the finds recovered were from the topsoil (100) and very few from other features showing how disturbed the site had been previous to the excavation. The majority of the features have mixed dates from the finds record this also show the possible medieval features have been truncated by later post-medieval features. The dating evidence from the finds however can still show activity on the site from the 13th century right through to modern day.

8.9.2 It is recommended that no further work be carried out on the finds.

Context	Material	Quantity	Weight (kg)	Period
100	Fe	107	5.715	Post-medieval
100	Pb	11	1.488	Post-medieval
100	Pottery	265	4.381	Post-medieval
100	Bottle glass	76	3.106	Post-medieval
100	Pottery	19	0.288	Medieval
100	Pottery	3	0.052	Roman
100	Window glass	27	0.305	Post-medieval
100	Clay pipe fragments	10	0.044	Post-medieval
100	Ceramic drain	3	0.093	Post-medieval
100	Slag	2	0.017	Post-medieval
100	Tile	11	0.679	Post-medieval
100	Wall plaster	1	0.005	Post-medieval
100	Clinker	2	0.217	Post-medieval
100	Misc	1	0.026	Post-medieval
100	Slate	1	0.014	Post-medieval
100	Cu Alloy	1	0.001	Post-medieval
102	Pottery	6	0.048	Medieval
102	Fe	1	0.004	Post-medieval
124	Bottle glass	4	0.167	Post-medieval
124	Pottery	4	0.004	Post-medieval
102	Window glass	1	0.001	Post-medieval
127	Clinker	24	0.434	Post-medieval
136	Bottle glass	2	0.045	Post-medieval
136	Coal	1	0.001	Post-medieval
138	Pottery	3	0.039	Post-medieval
163	Pottery	3	0.005	Post-medieval
163	Coal	1	0.002	Post-medieval

Context	Material	Quantity	Weight (kg)	Period
163	Bottle glass	2	0.009	Post-medieval
165	Pottery	13	0.125	Post-medieval
165	Bottle glass	1	0.001	Post-medieval
167	Window glass	3	0.007	Post-medieval
167	Pottery	7	0.067	Medieval
167	Pottery	1	0.005	Post-medieval
218	Pottery	10	0.040	Medieval
234	Pottery	2	0.029	Post-medieval
234	Pottery	1	0.006	Medieval
238	Pottery	1	0	Post-medieval
244	Window glass	6	0.332	Post-medieval
244	Bottle glass	3	0.046	Post-medieval
244	Fe	3	0.026	Post-medieval
244	Clay pipe fragments	1	0.002	Post-medieval
244	Pottery	8	0.060	Post-medieval
247	Fe	10	6.900	Post-medieval
249	Pottery (from retent)	1	0.004	Medieval
249	Pottery	15	0.196	Medieval
249	Steel	1	0.051	Post-medieval
249	Fe	1	0.025	Post-medieval
250	Pottery	4	0.036	Medieval
301	Pottery	21	0.242	Post-medieval
305	Fe	1	2.516	Post-medieval
305	Window glass	1	0.016	Post-medieval
311	Pottery	5	0.037	Post-medieval
311	Gypsum	5	0.108	Post-medieval
311	Fe	2	0.018	Post-medieval
311	Bottle glass	1	0.074	Post-medieval

Table 5: Finds From Harraby Green Mill

9. CONCLUSION AND RECOMMENDATIONS

- 9.1 The excavation of the remains of the mill complex has allowed for the most extensive study of a post medieval corn mill with medieval roots to be carried out in Cumbria. Although the site had been badly truncated by major redevelopment work in the late 20th century enough of the evidence survived on the ground and in documentary sources to trace the development of the site from the 12th century to the closure of the mill in the late 1950s.
- 9.2 No evidence of any prehistoric activity was recorded during the excavation. The earliest evidence for activity at the site came in the form of a number of abraded sherds of Roman-British pottery recovered from the remnants of medieval plough soil in the northern end of the site. The discovery of these sherds does not necessarily point to Romano-British occupation in the immediate vicinity and given that the site is only 150m to the south of London Road the main southern route out of Roman Carlisle. The small Roman-British pottery assemblage are more likely to represent residual material that has been dispersed through ploughing in the area.
- 9.3 Through the documentary research and results of the initial evaluation it was hoped that significant remains would be uncovered of a medieval mill on the site. Unfortunately the later development of the mill complex and subsequent redevelopment in the 1990s had removed nearly all traces of medieval activity from the site. What survived were scattered spreads of medieval soils which may possibly be the fills of highly truncated pits, (see figure 26) which produced pottery dating from the late 12th to the 15th century and small amounts of charred wheat and oats. Although these deposits can tell us nothing about the exact location and form of the mill they do confirm that significant activity was taking place here throughout the medieval period.
- 9.4 Residual pottery and documentary evidence points to activity on the site throughout the 17th and 18th century with the earliest structural activity recorded on the site confined to the southern limit of the excavation (see figure 19a and 26). Again the evidence was highly truncated but for the first time contained a structural wall foundation and a recognisable concentration of pits. This wall was set on a different alignment to the later 19th century mill and is likely to be associated with the 18th century mill complex of which unfortunately there are no known plans. The fact that these features are concentrated in the south east corner of the site points to the focus of pre Victorian mill being broadly on the same location as the later mill.
- 9.5 The first phase of mill of which a useful plan exists is the mid 19th century mill illustrated on the 1842 tithe maps (see figure 27) which shows the isolated buildings in a totally rural setting. Due to the fact that the later rebuilds occurred over the footprint of this original mill there was no features that could be dated to this mill with any certainty. From the map evidence the mill appears to have sat on the eastern side of the mill race with an likely external undershot wheel. It is likely that this antiquated structure was totally demolished and mill race improved when the first Victorian mill was constructed some time before 1864.

- 9.6 It was during this period (from 1843) that the mill was converted to a gypsum crushing mill, this small scale crushing of gypsum was short lived as with the coming of the railway network centralised industrial scale crushing plants became the norm leaving small scale plants uneconomic (Dennis Perriam pers comm). The only structural evidence that could be dated to this period that remained on site was for the chart shed/ bag store of which only fragmentary areas of foundation survived.
- 9.7 The mid Victorian rebuild of the mill which is illustrated on the 1st edition ordnance survey of 1864 fared no better, with only the north west corner and traces of an internal central wall surviving. This mill was rectangular in form and measured 24m by 12m and although greatly extended over the fifty years remained the heart of the mill. By this period the rural setting of Harraby is becoming a thing of the past with residential developments growing off London road and the major railway depot on the opposite side of the river Pettril giving this area an altogether more industrial feel.
- 9.8 A small annex on the north west corner of the mill may have been the site of the original corn drying kiln, however nothing of this structure survived on site to prove this theory one way or another. No floor surfaces survived from this period although the basic millrace, particularly the western side is likely to date from this period. A small square structure of unknown function situated in the north eastern corner of the site dates from this period survived well into the 20th century, probably at the time of the mill closure in the late 1950s.
- 9.9 From the map evidence there appears to have been little change between the 1860s mill and the 1900 mill with the exception of a new corn-drying kiln added onto the western gable of the mill (see figure 29). However from the evidence retrieved from the fieldwork and documentary research it is clear that the mill received a large amount of investment. The most obvious sign of this investment was the provision a second water wheel. In order to accommodate this second wheel, a second wheel pit had to be constructed which would have resulted in major rebuilding work in the eastern half of the mill. It has been impossible to give an exact date for this expansion of the mill but a date in the 1870s is likely.
- 9.10 The next phase of development in the site was the most significant in the sites history and marked the high water mark in the sites prosperity. This investment was due to the new wealthy owners of the mill, the Ling family wanting to modernise and expand the business. The first process in this modernisation was the construction of a steam plant, which may have commenced as early as 1891, which involved a steam plant, engine plant and condenser chamber. The main problem with this early conversion to steam and dual power is that a date stone within the second wheel pit is dated to 1899, the wheel pit would had been greatly modified with the construction of the condenser chamber and large sections (including the dated section) rebuilt. One possibility is that the original steam plant had a different water supply with the condenser added a few years later to create a more efficient system.
- 9.11 Of these structures only the condenser chamber and engine plant were within the area of excavation, the foundations of both structures surviving well. The engine house was rectangular in plan and measured 13m by 5m and from the surviving engine mounting blocks is likely to have housed six steam engines. It is unclear if

- the original thinking for the steam plant was to provide power to the proposed rolling plant or if it was originally solely intended to supplement the water wheels that powered the corn mill. What is clear, is that in the first decade of the 20th century that a large purpose built steam powered rolling mill was constructed that by 1919 measured 38m in length by 12m in width, and was three stories high with a distinctive concave corrugated iron roof which mirrored the earlier roof of the steam plant and engine house (see plate 1).
- 9.12 The plan of the mill complex on the 3rd edition Ordnance survey of 1919 shows the mill in its final stage of development, (see figure 30) producing approximately 600 tonnes of oatmeal a year, this decline in the mill is perfectly illustrated by its production figures in its final recorded year of production which was 9 tonnes in 1951. There are no known figures for flour production and it is not even clear if the mill was still producing flour in its final years of operation. From these figures it was clear that the mill had no future and operations were ceased from 1957.
- 9.13 Much of the mill complex survived the takeover of the site by the West Cumberland Farmers Trading Society in 1957, and continued to be used for storage as a minor depot. There does not appear to have been much investment on the buildings, which were allowed to gradually decay with some of the minor buildings appearing to have been demolished in the following decade. The main focus on the site shifting away from the mill to a newly constructed egg grading station (see figure 31).
- 9.14 The next major development to the site occurred in the late 1960s with the development of the new West Cumberland Farmers depot in 1967. This building destroyed the remaining minor structures to the north of the mill complex but most of the mill complex survived this development. An aerial photo of the site taken in 1972 shows the rolling plant and mill complex including the engine house still intact. Over the next decade much of the complex still survived albeit in a dilapidated condition until the 1967 depot and former poultry plant was demolished in the late 1980s to make way for a new development.
- 9.15 The new development, Highgrove Dairy was a large purpose build dairy unit and occupied most of the area of the former mill (see figure 32), which was largely obliterated by the construction of this dairy. The new dairy operation did not prove a success and closed down in 2000 with the factory unit demolished in 2003 prior to the first phase of archaeological fieldwork taking place.
- 9.16 In summary, the site was clearly one of the earliest mill site within the Carlisle district with milling continuing on the site from the 12th century through to the second half of the 20th century, representing an incredible 900 years of continuity of use on the site. Relatively few large-scale mill sites have been fully excavated and none in Cumbria, making this an important site in showing the continuous development and use of new technologies which dictated how these sites evolved.
- 9.17 This work also highlighted the fact that although mills are continuously modified rebuilt and extended over their working lives they don't tend to shift much from the *footprint* of the earlier mills. This fact is due to the need for water, once the original millrace is constructed, which in this case could date back to the twelfth century the position of all subsequent mills is basically fossilised. Although millraces, wheel pits and tailraces are often rebuilt or widened they still follow the original route.

- 9.18 This causes a significant problem for anyone excavating similar sites especially sites that are known to have remained in use for a considerable time, in that the latest phase of mill development, particularly in the wheel pit area and heart of the mill often totally removes all traces of the earlier mills. This would be especially true in regard to the less substantial remains of a timber medieval mill, the type of which would have undoubtedly once stood at Harraby but been totally removed from the archaeological record by the later development of the site.

10: UPDATED PROJECT DESIGN

- 10.1 This report, in addition to being an assessment, also serves as a level 3-archive report for the site. The primary records have been checked, ordered and appropriately stored, and stratigraphic matrices have been produced.
- 10.2 Some of the final publication report text has been written, and a significant quantity of the publication drawings have been completed. To take the report to publication level would require only an amount of editorial work and further research on regional and local comparisons.
- 10.3 Some additional research will take place on a number of potential sources with the potential to clarify unresolved functional and dating problems.
- 10.4 Structural and stratigraphic study**
- 10.4.1 The structural and stratigraphic data from the various phases will form the basis a synthesised report that will include any additional data gathered from further documentary and artefact studies.
- 10.5 Artefactual study
- 10.5.1 **Iron Objects:** No further work is planned.
- 10.5.2 **Lead objects:** No further work is planned.
- 10.5.3 **Copper alloy objects:** No further work is planned.
- 10.5.4 **General non-ferrous metal objects:** No further work is planned.
Discard of items of no significance.
- 10.5.5 **Glass and ceramic objects:** specialist examination. Selected items to be recorded photographically and by line drawing.
- 10.5.6 **Brick and tile:** No further work is planned.
- 10.6 Environmental study
- 10.6.1 No further work is planned.
- 10.7 Deposition of the archive
- 10.7.1 On completion of the analysis and publication the archive will be prepared for deposition in the Tullie House Museum, Carlisle, Cumbria.

10.8 Publication report

10.8.1 The final report will be submitted for publication in the Cumberland and Westmorland Antiquarian Journal.

10.9 Resources

Named project team

Team Member	Project role
Frank Giecco (NPA)	Project management, structural/stratigraphic analysis, documentary research, manipulation of digital graphic data, report synthesis
David Flush (NPHT)	NPHT administrative project management
Matt (NPA)	Documentary research, research, archive update
Matt Town	Manipulation of digital graphic data
Juliet Reeves	Illustrator
Alan James	External consultant
Dennis Perriam	External consultant

10.10 Management structure

10.10.1 The team will be managed by Frank Giecco BA, Arch Dip, AIFA, NPA archaeologist. The Project Manager has the ultimate responsibility for the implementation and execution of this Project design. The project manager may delegate specific aspects of the project to other key team members, who may supervise others and have a direct input into the final report. They may also undertake direct liaison with external consultants and specialists who will contribute to the project, and the museum named as the recipient of the project archive. The Project Manager will compile the final reports.

10.10.2 Internal NPA administrative management will be undertaken by David Flush (NPHT Manager).

10.11 Timetable

10.11.1 The projected date for submission of the completed report to the Cumberland and Westmorland Antiquarian society for inclusion in the Transactions of the Cumberland and Westmorland Antiquarian and Archaeological Society is December 2008.

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Socage map of Carlisle 1611

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APPENDIX 1

Context	Type	Trench	Description
100c	Topsoil	1-5	Topsoil/turf, moderate compaction, dark brown/black with river pebbles <30mm, with occasional finds of post medieval pottery.
101c	Natural	1-5	Natural moderately compact yellow/orange gravel and sand.
102c	Subsoil	1-5	Moderately compact orange-brown silt with small pebbles <0.40mm
103c	Fill	2	Loose dark brown silty soil with small pebbles and minimal charcoal and timber fragments.
104c	Cut	2	Narrow linear V-profiled cut for modern? drain

Table 6 :. List of Contexts in the Evaluation Area.

Context	Type	Description	Env Sample
100	Deposit	Topsoil/Turf	-
101	Deposit	Natural	-
102	Deposit	Medieval soil deposits	-
120	Cut	Cut for pit. (Modern)	-
121	Fill	Fill of pit [120]. Modern material, burnt slag and clinker with bricks.	-
122	Cut	Cut for well. Post-medieval in date.	-
123	Structural	Primary structure of well, made of brick.	-
124	Fill	Fill of well cavity. Waterlogged soil and rubble, post-medieval.	2
125	Cut	Cut for irregular shaped pit.	-
126	Fill	Fill of cut [125]. Burnt material mixed with soil. Modern in date.	-
127	Structural	Sandstone cover for well.	-
128	Fill	Clay fill around well stones.	-
150	Structural	Sandstone Wall	
151	Structural	Modern Drain Concrete	
152	Structural	Brick Structure	
153	Structural	Sandstone Wall	
154	Structural	Same as [152]. Modern brick structure.	
155	Structural	Sandstone Wall.	
156	Structural	Sandstone Wall.	
159	Structural	Sandstone wall	
166	Cut	Cut for modern pit feature containing [231]	
167	Fill	Fill of cut [166].	

168	Structural	Concrete wall extent	
169	Structural	Sandstone wall. Mill race.	
170	Structural	Sandstone wall	
171	Structural	Sandstone slabs associated with [170]	
172	Cut	Cut for [173]	
173	Structural	Brick-built drain.	
174	Cut	Cut for [175]	
175	Structural	Brick building wall	
176	Structural	Brick drain	
177	Cut	Cut for brick drain [176]	
178	Structural	Sandstone Wall	
179	Structural	Modern concrete slabs. Part of a structure?	
180	Structural	Sandstone wall, with brick overlay [187] in places.	
181	Cut	Cut for slabs [171]	
182	Cut	Same as [172]	
183	Structural	Brick drain same as [173]	
187	Structure	Brick wall built on [180]	
218	Deposit	Same as [102]. Medieval soil.	
223	Cut	Modern drain cut	
224	Fill	Ceramic pipe and grey fine gravel fill of [223]	
225	Deposit	Medieval deposit.	
226	Deposit	Medieval deposit.	
227	Deposit	Medieval deposit.	
228	Cut	Cut for clay [229] butting up to wall [156]	
229	Deposit	Clay butting up to wall [156]	
230	Deposit	Medieval deposit.	
231	Deposit	Sandstone block.	
232	Deposit	Layer beneath block [231]	
249	Deposit	Cobbled Surface(?) - medieval	
250	Deposit	Silty deposit - medieval	

Table 7: Associated Contexts of Note within Area A

Context	Type	Description	Env Sample
100	Deposit	Late 20 th Century modern disturbance	-
101	Natural	Light brown silty sand with gravel and small cobble inclusions.	-
103	Deposit	Light grey 20 th Century concrete floor remnant	-
104	Deposit	Red sandstone rectangular flags, late floor surface of mill.	-
105	Deposit	Rectangular concrete block on top of concrete floor (103). Machine mounting?	-
106	Structural	Eastern wall of eastern pit. Sandstone wall, dressed blocks, running on a north-south alignment.	-
107	Structural	Early 20 th Century brick wall forming final phase of tail race.	-
108	Cut	Construction cut for wall (107)	-
109	Cut	Construction cut for wall (110)	-

110	Structural	19 th Century sandstone wall within mill complex along eastern limit of site wall.	-
111	Cut	Construction cut for early 20 th Century wall.	-
112	Structural	North-south aligned sandstone wall remains for rectangular chamber around wheel pit.	-
113	Deposit	Concrete floor to east of drive pit sealed beneath (103) . 20 th century.	-
114	Fill	Fill of pit [119]. Early 19 th century.	-
115	Structural	Wall on western side of drive pit. Same as (112)	-
116	Deposit	Iron plate. For securing bearing for water wheel.	-
117	Deposit	Iron plate. For securing bearing for water wheel.	-
118	Cut	Construction cut for main east wall of eastern wheel pit.	-
119	Cut	Cut for highly truncated pit with fill (114)	-
129	Structural	Rough sandstone wall built after and on top of the brick arch linking the condenser room to the wheel pit.	-
130	Structural	Dressed sandstone wall match engraved 1899 wall in wheel pit.	-
131	Structural	Brick wall butting up to (129) and (130)	-
132	Structural	Small area of brick work running underneath concrete (133)	-
133	Deposit	Concrete running along (131) and in some areas on top of (132) .	-
134	Structural	Sandstone block, possibly a support for a machine/engine.	-
135	Cut	Cut for brick drain (136)	-
136	Structural	Early 20 th Century brick drain.	-
137	Deposit	Concrete floor from inside engine room.	-
138	Cut	Cut for possible oil drain through (137)	-
139	Structural	Potential oil drain cut into concrete next to (134)	-
140	Structural	Sandstone wall.	-
141	Structural	20 th Century ceramic drain.	-
142	Deposit	Concrete floor same as (137)	-
143	Structural	Sandstone wall next to slots for base of engine	-
144	Structural	Sandstone block for machine fittings.	-
145	Structural	Sandstone engine support.	-
146	Deposit	Concrete floor, same as (131) and (145)	-
147	Structural	Brick wall that butts up against wall (140)	-
154	Structural	Modern brick wall same as (152)	-
155	Structural	Sandstone wall	-
162	Cut	Cut for possible pit.	-
163	Fill	Fill of cut [162]	-
164	Cut	Elongated oval pit	-
165	Fill	Fill of pit [164]. Post medieval.	4
188	Cut	Cut for sewer pipe.	-
189	Fill	Modern sewer pipe.	-
190	Structural	Brick wall for chimney surround.	-
191	Structural	Brick base for chimney floor.	-

192	Deposit	Cinder left from chimney use.	-
193	Deposit	Concrete floor surrounding the chimney base.	-
194	Deposit	Stone flagged floor outside the chimney next to (193).	-
195	Structural	Brick outer wall for chimney.	-
196	Structural	Sandstone wall.	-
197	Deposit	Concrete floor outside of (195).	-
198	Structural	Brick wall butting up against (196).	-
207	Structural	Sandstone machinery base no longer in situ.	-
208	Structural	Brick surround for machinery.	-
209	Deposit	Concrete machinery base.	-
210	Deposit	Slate sitting on (217) and acting as a level for (207).	-
211	Structural	Sandstone wall.	-
212	Structural	Brick top for condenser room.	-
214	Structural	Sandstone built chamber for condenser room	-
215	Deposit	Concrete floor.	-
264	Structural	Sandstone slabs for wall supporting arched tunnel (265).	-
265	Structural	Arched tunnel made of brick	-
266	Structural	Sandstone slabs on top of brick wall (267)	-
267	Structural	Brick wall	-
268	Structural	Sandstone slabs for wall supporting arched tunnel (265).	-
269	Deposit	Rubble and soil from demolished arch	-
270	Structural	Potential arch base	-
277	Structural	Small brick structure	-
278	Deposit	Sandstone block	-
279	Structural	Sandstone wall	-
293			-
299			-
313ev			-
314ev			-
324ev			-

Table 8. Associated Contexts of Note within Area B

APPENDIX 2: THE FIGURES

APPENDIX 3: DRAWING REGISTER

Drawing No.	Sheet	Scale	Subject
1	1	1:20	Elevation of wall
2	2	1:20	Plan of chimney
3	3	1:20	Plan of chimney
4	4	1:20	Plan of elevation wall area
5	5	1:20	Plan of wheel pit area
6	6	1:20	Plan of elevation wall
7	7	1:20	Plan of engine base
8	8	1:20	Plan of surrounding chimney area
9	9	1:20	Plan of driving wheel area
10	10	1:50	Plan of north west area
11	11	1:50	Plan of north west corner
12	12	1:50	Plan of north east corner
13	13	1:50	Plan of north east area
14	14	1:50	Plan of north west area
15	15	1:20	Plan of top of chamber with concrete and area to south
16	16	1:20	Plan joining drawings 9 & 15
17	17	1:10	Section through (121)
18	17	1:10	Section through (126)
19	17	1:20	Feature
20	18	1:20	Plan of wheel arch and tunnel
21	19	1:20	Pits (3) on west side of engine house
22	20	1:20	Detail of mid area slots
23	20	1:20	North facing section through (227)
24	20-	1:20	East facing section through (218)
25	21	1:20	Overlay of drawing 9
26	20	1:10	Profile of cut [166]
27	20	1:20	East facing section
28	22	1:20	North end of arched tunnel and western wall
29	17	1:10	3.5m of sondage north facing
30	23	1:20	Void
31	24	1:20	Wall
32	25	1:10	Section through [240]
33	255	1:10	Elevation of (281)

APPENDIX 4: THE PHOTOGRAPHIC REGISTERS

FILM 1 COLOUR PRINT 400 ASA

Frame No.	Date	Direction Facing	Subject
1	10/5/06		Misfire
2	10/5/06	East	General shot of northern end of site
3	10/05/06	East	General shot of northern end of site
4	10/5/06	East	General shot of northern end of site
5	10/5/06	East	General shot of northern end of site
6	10/5/06	South	North east corner of site looking south at brick floor platform
7	10/5/06	South	North east corner of site looking south at brick floor platform
8	10/5/06	East	North east corner of site looking east at retaining(?) wall within evaluation trench
9	10/5/06	East	North east corner of site looking east at retaining(?) wall within evaluation trench
10	10/5/06	East	Far north east corner of site
11	10/5/06	East	North east corner, brick floor detail
12	10/5/06	East	North east corner, looking east towards retaining(?) wall within evaluation trench
13	10/5/06	East	North east corner, looking east towards retaining(?) wall within evaluation trench
14	10/5/06	East	North east corner, looking east towards retaining(?) wall within evaluation trench
15	10/5/06	South	Possible medieval feature at southern edge of evaluation trench
16	10/5/06	South	Possible medieval feature at southern edge of evaluation trench
17	10/5/06	North	General shot looking north up NE edge of excavation area
18	10/5/06	East	Drain/ gully running east-west across site by brick structure (evaluation trench)
19	10/5/06	East	Continuation (west) of drain/ gully running east-west across site by brick structure (evaluation trench)
20	10/5/06	East	Continuation and terminal of drain/ gully running east-west across site by brick structure (evaluation trench)
21	10/5/06	North	Feature butting brick structure in the NE corner, cut by east-west drain
22	10/5/06	Nor- north west	Possible well, northern end of excavation area
23	10/5/06	Nor- north west	Possible well, northern end of excavation area
24	10/5/06	East	Excavated "posthole" shown in context to excavation area
25	10/5/06	South east	View along drain from NW corner towards central

			building
26	10/5/06	South east	View along drain from NW corner towards central building
27	10/5/06	North east	View along modern drain
28	10/5/06	North east	View along modern drain
29	10/5/06	North	Central brick building, northern end
30	10/5/06	North	Central brick building, northern end
31	10/5/06	West	Concrete block on eastern side of brick building
32	10/5/06	North	Northern brick building extent
33	10/5/06	North	Northern brick building extent
34	10/5/06	North	Central building sandstone blocks northern segment
35	10/5/06	Northern	Central building sandstone blocks northern segment
36	10/5/06	North	Central shot of buildings

FILM 2 BLACK AND WHITE PRINT 200 ASA

Frame No.	Date	Direction Facing	Subject
1	16/5/06	East	Main north-south wall of mill
2	16/5/06	East	South of wheel pit
3	16/5/06	East	South of wheel pit, south of last segment
4	16/5/06	East	South of wheel pit, south of last segment
5	16/5/06	East	South of wheel pit, south of last segment
6	16/5/06	East	South of wheel pit, south of last segment
7	16/5/06	East	South of wheel pit, south of last segment
8	16/5/06	East	South of wheel pit, south of last segment
9	16/5/06	East	South of wheel pit, south of last segment
10	16/5/06	East	South of wheel pit, south of last segment
11	16/5/06	North	Southern end of north-south wall
12	16/5/06	North	Southern end of north-south wall
13	16/5/06	North	Engine mounting block
14	16/5/06	North	Engine mounting block
15	16/5/06	South	Southern end of mill building
16	16/5/06	South	Southern end of mill building
17	16/5/06	North	Southern end of mill building
18	16/5/06	North	The steam house?
19	16/5/06	West	Condenser chamber
20	16/5/06	West	Condenser chamber
21	16/5/06	South	North end of engine house
22	16/5/06	South	North end of engine house
23	16/5/06	South	Main north-south wall of engine house
24	16/5/06	South	Main north-south wall of engine house
25	16/5/06	East	Remnant of concrete floor, to east of main wheel pit
26	16/5/06	East	Remnant of concrete floor, to east of main wheel pit
27	16/5/06	East	Southern end of site after cleaning
28	16/5/06	East	Southern end of site after cleaning

29	16/5/06	East	Southern end of site after cleaning
30	16/5/06	East	Southern end of site after cleaning
31	16/5/06	East	Southern end of site after cleaning
32	16/5/06	East	Southern end of site after cleaning
33	16/5/06	East	Southern end of site after cleaning
34	16/5/06	East	Southern end of site after cleaning
35	16/5/06	East	Southern end of site after cleaning
36	16/5/06	East	Southern end of site after cleaning

FILM 3 COLOUR SLIDE 200 ASA
VOID

FILM 4 COLOUR PRINT 200 ASA

Frame No.	Date	Direction Facing	Subject
1			OTHER SITE
2			OTHER SITE
3			OTHER SITE
4	10/5/06	North	General shot looking up site
5	10/5/06	North	General shot looking up site
6	10/5/06	North	Central "spine"/brick
7	10/5/06	East	Central "spine"/brick
8	10/5/06	East	Central "spine"/brick
9	10/5/06	North east	General shot across north end of site
10	12/5/06	North west	Brick chimney area
11	12/5/06	North	Brick chimney area
12	12/5/06	North	Brick chimney area
13	12/5/06	West	Building SW of brick chimney
14	12/5/06	West	Building SW of brick chimney
15	12/5/06	North	Central "spine" of brick buildings (w/sw of chimney)
16	12/5/06	North	Central "spine" of brick buildings (w/sw of chimney)
17	12/5/06	North	Drain south-south east of brick chimney
18	12/5/06	North west	Main brick building including chimney block
19	12/5/06	South east	Main brick building including chimney block
20	12/5/06	South	Chimney block
21	12/5/06	South east	Chimney block
22	12/5/06	West north west	Walls west and south of west of chimney
23	12/5/06	West	Stone wall within building SW of chimney block
24	12/5/06	North west	Sandstone wall corner (South of concrete divider4, west of main wheel pits etc)
25	12/5/06	North	Sandstone wall corner (South of concrete divider4, west of main wheel pits etc)
26	12/5/06	North	Southern extent of sandstone wall north of concrete

			divider, central spine
27	16/5/06	West	Cleaned brick arch, (main complex)
28	16/5/06	South	Cleaned brick arch, (main complex)
29	16/5/06	south	Cleaned brick arch, (main complex)
30	16/5/06	East	Main north south wall of mill, south of wheel pit
31	16/5/06	East	Main north south wall of mill, south of wheel pit
32	16/5/06	East	Main north south wall of mill, south of wheel pit
33	16/5/06	East	Main north south wall next segment to the south
34	16/5/06	East	Main north south wall next segment to the south
35	16/5/06	East	Main north south wall next segment to the south
36	16/5/06	East	Main north south wall next segment to the south
37	16/5/06	East	Main north south wall next segment to the south

FILM 5 COLOUR PRINT 200 ASA

Frame No.	Date	Direction Facing	Subject
1	16/5/06	East	Last segment of north-south wall of mill
2	16/5/06	East	Last segment of north-south wall of mill
3	16/5/06	North	Southern end of main north-south wall of mill
4	16/5/06	North	Southern end of main north-south wall of mill
5	16/5/06	North	Engine mounting block
6	16/5/06	North	Engine mounting block
7	16/5/06	South	To the south of condenser chamber
8	16/5/06	South	To the south of condenser chamber
9	16/5/06	West	The condenser chamber
10	16/5/06	West	The condenser chamber
11	16/5/06	South	Main north-south wall of mill
12	16/5/06	South	Main north-south wall of mill
13	16/5/06	East	Remnant of concrete floor to east of main wheel pit
14	16/5/06	East	Remnant of concrete floor to east of main wheel pit
15	16/5/06	North	Central wall between wheel pits
16	16/5/06	North	Central wall between wheel pits
17	16/5/06	West	Wall which defines north end pf eastern wheel pit and drive wheel chamber
18	16/5/06	West	Wall which defines north end pf eastern wheel pit and drive wheel chamber
19	16/5/06	South	Southern limit of tail race
20	16/5/06	South	Southern limit of tail race
21	16/5/06	North	Southern limit of tail race
22	16/5/06	North	Southern limit of tail race
23	16/5/06	South	Detail of drive shaft chamber
24	16/5/06	South	Detail of drive shaft chamber
25	16/5/06	South	Detail of drive shaft chamber
26	17/05/06	East	HGM-C general shot evaluation trench 1
27	17/05/06	East	HGM-C general shot evaluation trench 1
28	17/05/06	South	HGM-C north facing stratigraphy trench 1

29	17/05/06	South	HGM-C north facing stratigraphy trench 1
30	17/05/06	South	Site
31	17/05/06	South	General shot evaluation trench 2
32	17/05/06	South	General shot evaluation trench 2
33	17/05/06	West	East facing stratigraphy trench 2
34	17/05/06	West	East facing stratigraphy trench 2
35	19/05/06	South west	General shot of evaluation trench 3
36	19/05/06	South west	General shot of evaluation trench 3

FILM 6 BLACK AND WHITE 400 ASA

Frame No.	Date	Direction Facing	Subject
1	16/5/06	North	Central wall between wall pits
2	16/5/06	North	Central wall between wall pits
3	16/5/06	West	Wall forming northern end of eastern wheel pit and shaft wheel chamber
4	16/5/06	West	Wall forming northern end of eastern wheel pit and shaft wheel chamber
5	16/5/06	South	Southern limit of tail race
6	16/5/06	South	Southern limit of tail race
7	16/5/06	North	Southern limit of tail race
8	16/5/06	North	Southern limit of tail race
9	16/5/06	South	Detail of drive shaft chamber
10	16/5/06	South	Detail of drive shaft chamber
11	16/5/06	South	Southern end of site engine room
12	16/5/06	South	Southern end of site engine room
13	17/05/06	East	General shot of evaluation trench 1 (HGM-C)
14	17/05/06	East	General shot of evaluation trench 1 (HGM-C)
15	17/05/06	South	North facing stratigraphy; trench 1 (HGM-C)
16	17/05/06	South	North facing stratigraphy; trench 1 (HGM-C)
17	17/05/06	South	General shot evaluation trench 2 (HGM-C)
18	17/05/06	South	General shot evaluation trench 2 (HGM-C)
19	17/05/06	West	East-facing stratigraphy, trench 2 (HGM-C)
20	17/05/06	West	East-facing stratigraphy, trench 2 (HGM-C)
21	19/05/06	SW	General shot evaluation trench 3 (HGM-C)
22	19/05/06	SW	General shot evaluation trench 3 (HGM-C)
23	19/05/06	NNW	General shot evaluation trench 3 (HGM-C)
24	19/05/06	NNW	General shot evaluation trench 3 (HGM-C)

FILM 7 COLOUR PRINT 400 ASA

Frame No.	Date	Direction Facing	Subject
1	19/05/06	NNW	General shot evaluation trench 3 (HGM-C)
2	19/05/06	NNW	General shot evaluation trench 3 (HGM-C)
3	19/05/06	West	Concrete floor adjacent to eastern wheel pit
4	19/05/06	West	Concrete floor adjacent to eastern wheel pit
5	22/05/06	North	Northern blocking wall to eastern wheel pit
6	22/05/06	North	Northern blocking wall to eastern wheel pit
7	22/05/06	South	Southern blocking wall of eastern wheel pit
8	22/05/06	South	Southern blocking wall of eastern wheel pit
9	22/05/06	South	Detail of drive wheel pit
10	22/05/06	South	Detail of drive wheel pit
11	23/05/06	East	Larger burnt pit in north-east of site
12	23/05/06	East	Larger burnt pit in north-east of site
13	23/05/06	East	Smaller burnt pit in north-east of site
14	23/05/06	East	Smaller burnt pit in north-east of site
15	23/05/06	East	(120), (121) and (125), (126) showing positioning
16	23/05/06	East	(120), (121) and (125), (126) showing positioning
17	23/05/06	North	Well in NW Corner, [122], (123), (127) and (128)
18	23/05/06	North	Well in NW Corner, [122], (123), (127) and (128)
19	23/05/06	East	Inside of well in NW corner [122], (123), (127), (128)
20	23/05/06	East	Inside of well in NW corner [122], (123), (127), (128)
21	23/05/06	East	Medieval feature (half-sectioned)
22	23/05/06	East	Medieval feature (half-sectioned)
23	23/05/06	South	Medieval feature (half-sectioned)
24	23/05/06	South	Medieval feature (half-sectioned)
25	25/05/06	NW	Section through 'medieval soil' (120)
26	25/05/06	NW	Section through 'medieval soil' (120)
27	25/05/06	West	Slot of area to east of drive pit post excavation, showing pit half-sectioned
28	25/05/06	West	Slot of area to east of drive pit post excavation, showing pit half-sectioned
29	25/05/06	North	Area to the west of wall (129) and pits pre-excavation
30	25/05/06	North	Area to the west of wall (129) and pits pre-excavation

FILM 8 BLACK AND WHITE 400 ASA

Frame No.	Date	Direction Facing	Subject
1	22/05/06	West	Concrete floor adjacent to drive wheel pit
2	22/05/06	West	Concrete floor adjacent to drive wheel pit
3	22/05/06	North	Southern blocking wall to east wheel pit
4	22/05/06	North	Southern blocking wall to east wheel pit
5	22/05/06	South	Southern blocking wall to east wheel pit
6	22/05/06	South	Southern blocking wall to east wheel pit
7	22/05/06	South	Detail of drive wheel pit
8	22/05/06	South	Detail of drive wheel pit
9	23/05/06	East	Larger burnt pit in north-east of site, (120), (121)
10	23/05/06	East	Larger burnt pit in north-east of site, (120), (121)
11	23/05/06	East	Smaller burnt pit in north-east of site, (120), (121)
12	23/05/06	East	Smaller burnt pit in north-east of site, (120), (121)
13	23/05/06	East	(120), (121) and (125), (126) showing positioning
14	23/05/06	East	(120), (121) and (125), (126) showing positioning
15	23/05/06	North	Well in north-west corner of site
16	23/05/06	North	Well in north-west corner of site
17	23/05/06	East	Inside of well in north-west corner
18	23/05/06	East	Inside of well in north-west corner
19	23/05/06	East	Medieval feature (half-sectioned)
20	23/05/06	East	Medieval feature (half-sectioned)
21	23/05/06	South	Medieval feature (half-sectioned)
22	23/05/06	South	Medieval feature (half-sectioned)
23	25/05/06	NW	Section through 'medieval soil' (102)
24	25/05/06	NW	Section through 'medieval soil' (102)

FILM 9 BLACK AND WHITE 400 ASA

Frame No.	Date	Direction Facing	Subject
1	26/5/06	West	Area to the east of drive pit, includes shot of pit ()
2	26/5/06	West	Half sectioned.
3	26/5/06	North	Area to the west of wall (129)
4	26/5/06	North	
5	26/5/06	West	Wall (148)
6	26/5/06	West	
7	30/5/06	North	Cut [166]
8	30/5/06	North	Cut [166]
9	30/5/06	North	Cut [166] post-ex
10	30/5/06	North	Cut [166] post-ex
11	30/5/06	East	Cut [166] post-ex
12	26/5/06	East	Cut [205] Fill (206) organic pit general shot in plan
13	31/05/06	East	Cut [205] Fill (206) organic pit general shot in plan
14	31/05/06	East	Cut [205] Fill (206) organic pit general shot in plan
15	31/05/06	North	Cut [205] Fill (206) organic pit general shot in section
16	31/05/06	North	Cut [205] Fill (206) organic pit general shot in section
17	31/05/06	West	Deposit (218) half sectioned
18	31/05/06	South	Deposit (218) half sectioned
19	31/05/06	West	Test slot west of [167] showing pipe and relationship to wall
20	31/05/06	West	Test slot west of [167] south facing section
21	31/05/06	North	Section through [205]
22	31/05/06	North	Section through [205]
23	01/06/06	West	Concrete floor (247)
24	01/06/06	West	Concrete floor (247)
25	01/06/06	West	Concrete floor (247)
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FILM 10 COLOUR PRINT 200 ASA

Frame No.	Date	Direction Facing	Subject
1			
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4			FILM USED ON ANOTHER SITE
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8	26/5/06	Various	General Site Shots
9	26/5/06	Various	General Site Shots
10	26/5/06	Various	General Site Shots
11	26/5/06	Various	General Site Shots
12	26/5/06	Various	General Site Shots
13	26/5/06	Various	General Site Shots
14	26/5/06	Various	General Site Shots
15	26/5/06	Various	General Site Shots
16	26/5/06	Various	General Site Shots
17	26/5/06	Various	General Site Shots
18	26/5/06	Various	General Site Shots
19	26/5/06	Various	General Site Shots
20	26/5/06	Various	General Site Shots
21	26/5/06	Various	General Site Shots
22	26/5/06	Various	General Site Shots
23	26/5/06	Various	General Site Shots
24	26/5/06	Various	General Site Shots
25	26/5/06	Various	General Site Shots
26	26/5/06	Various	General Site Shots
27	26/5/06	Various	General Site Shots
28	26/5/06	Various	General Site Shots
29	26/5/06	Various	General Site Shots
30	26/5/06	Various	General Site Shots
31	26/5/06	Various	General Site Shots
32	26/5/06	Various	General Site Shots
33	26/5/06	Various	General Site Shots
34	26/5/06	Various	General Site Shots
35	30/5/06	North	Cut [166]
36	30/5/06	North	Cut [166]

FILM 11 COLOUR PRINT 400 ASA

Frame No.	Date	Direction Facing	Subject
1	30/5/06	North	Cut [166] Post-Excavation
2	30/5/06	North	“
3	31/5/06	East	Cut [205] fill (206) General Shot
4	31/5/06	East	Same of 4
5	31/5/06	North	Cut [205], fill (206) General Shot
6	31/5/06	North	Same as 5
7	31/5/06	West	Deposit (218)
8	31/5/06	South	Deposit (218)
9	31/5/06	West	Deposit (218)
10	31/5/06	West	Test slot west of [167]
11	31/5/06	West	Same as 10
12	31/5/06	North	South Facing Section
13	31/05/06	North	Section Through [205}
14	31/05/06	East	Same as 13
15	31/05/06	East	Same as 13
16	31/05/06	West	Concrete floor (247) and wall [149] and [106]
17	31/05/06	West	Same as 16
18	31/05/06		Cobbled area under (138) and (137)
19	2/06/06	West	Relation of sandstone and brick walls in SW corner of site
20	2/06/06	West	Same as 19
21	2/06/06	West	Same as 19
22	2/06/06	East North East	Same as 19
23	2/06/06	East North East	Same as 19
24	2/06/06	West	General shot of evaluation trench 5
25	2/06/06	West	Same as 24
26	2/06/06	North	Western post hole in evaluation trench 5 (250) and (260)
27	2/06/06	North	Same as 26
28	2/06/06	North	Eastern post hole in evaluation trench 5 (261) and (262)
29	2/06/06	North	Same as 28
30	2/06/06	North	Relationship between post holes in evaluation trench 5
31	2/06/06	North	Same as 30
32	2/06/06	South	General shot of evaluation trench
33	2/06/06	South	Same as 33
34	5/06/06	NW	Section across run off
35	5/06/06	NW	Same as 35
36			

FILM 12 BLACK AND WHITE 400 ASA

Frame No.	Date	Direction Facing	Subject
1			BLANK SHOT
2	1/06/06	North	Cobbled area below (138) and (137)
3	2/06/06	West	Relation of brick and sandstone walls in SW corner of site
4	2/06/06	West	Relation of brick and sandstone walls in SW corner of site
5	2/06/06	ENE	Relation of brick and sandstone walls in SW corner of site
6	2/06/06	ENE	Relation of brick and sandstone walls in SW corner of site
7	2/06/06	West	General shot of Evaluation Trench 5
8	2/06/06	West	General shot of Evaluation Trench 5
9	2/06/06	North	Western post hole in Evaluation Trench 5 (259) / (260)
10	2/06/06	North	Western post hole in Evaluation Trench 5 (259) / (260)
11	2/06/06	North	Eastern post hole in Evaluation Trench 5 (261) / (262)
12	2/06/06	North	Eastern post hole in Evaluation Trench 5 (261) / (262)
13	2/06/06	North	Relationship between post holes in Evaluation Trench 5
14	2/06/06	North	Relationship between post holes in Evaluation Trench 5
15	2/06/06	South	General shot of Evaluation Trench 4
16	2/06/06	South	General shot of Evaluation Trench 4
17	5/06/06	North West	Section across run-off
18	5/06/06	North West	Section across run-off
19	5/06/06	North West	Section across run-off
20	5/06/06	North West	Section across run-off
21	5/06/06		Date Stone
22	5/06/06		Date Stone
23	5/06/06		Date Stone
24	5/06/06	South	Arch from southeastern wheel pit
25	5/06/06	South	Linear feature 1 in Evaluation Trench 2
26	5/06/06	South	Linear feature 1 in Evaluation Trench 2
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FILM 13 COLOUR PRINT

Frame No.	Date	Direction Facing	Subject
1	5/06/06	South	South eastern wheel pit
2	5/06/06	South	Same as 2
3	5/06/06	South	Same as 2
4	5/06/06	South	Same as 2
5	5/06/06	South	Same as 2
6	5/06/06	South	1899 Inscription
7	5/06/06	North	Looking north down tail race in eastern wheel pit
8	5/06/06	South	Looking up arch
9	6/06/06	SW	Linear feature in evaluation trench 2
10	6/06/06	SW	Linear feature in evaluation trench 2
11	6/06/06	SW	Linear feature in evaluation trench 2
12	6/06/06	East	Section across wall [287]
13	6/06/06	East	Section across wall [287]
14	6/06/06	South	
15	6/06/06	South	
16	7/06/06	West	Slot of feature 1 in evaluation trench 2
17	7/06/06	West	Slot of feature 1 in evaluation trench 2
18	7/06/06	West	Section of feature 1
19	7/06/06	West	Section of feature 1
20	7/06/06	West	Shot of feature 2 just north of feature 1 evaluation trench 2
21	7/06/06	West	Shot of feature 2 just north of feature 1 evaluation trench 2
22	7/06/06	West	Shot of feature 3 towards northern end of evaluation trench 2
23	7/06/06	West	Shot of feature 3 towards northern end of evaluation trench 2
24	7/06/06	East	West facing side of central wall
25	7/06/06	East	West f Tailrace detail shots acing side of central wall
26	7/06/06	East	West facing side of central wall
27	7/06/06	East	West facing side of central wall
28	7/06/06	East	West facing side of central wall
29	7/06/06	East	West facing side of central wall
30	7/06/06	East	Tailrace detail shots
31	7/06/06	East	Tailrace detail shots
32	7/06/06	East	Tailrace detail shots

33	7/06/06	East	Tailrace detail shots
34	7/06/06	East	Tailrace detail shots
35	7/06/06	East	Tailrace detail shots
36	7/06/06	East	Tailrace detail shots

FILM 14 BLACK AND WHITE 400 ASA

Frame No.	Date	Direction Facing	Subject
1	6/06/06	East	Section across wall (287)
2	6/06/06	South	Shot through () next to wall ()
3	6/06/06	South	Shot through () next to wall ()
4	7/06/06	West	Shot of excavated feature 1 in evaluation trench 2
5	7/06/06	West	Shot of excavated feature 1 in evaluation trench 2
6	7/06/06	West	Section through feature 1 in evaluation trench 2
7	7/06/06	West	Section through feature 1 in evaluation trench 2
8	7/06/06	West	Shot of feature 4, north of feature 1 in evaluation trench 2
9	7/06/06	West	Shot of feature 4, north of feature 1 in evaluation trench 2
10	7/06/06	West	Shot of feature 3, towards the north end of evaluation trench 2
11	7/06/06	West	Shot of feature 3, towards the north end of evaluation trench 2
12	7/06/06	East	West facing side of central wall
13	7/06/06	East	West facing side of central wall
14	7/06/06	East	Southern and northern limits
15	7/06/06	East	Southern and northern limits
16	7/06/06	East	Southern and northern limits
17	7/06/06	East	Southern and northern limits
18	7/06/06	East	Tail race from the north
19	7/06/06	East	Tail race from the north
20	7/06/06	East	Various shots of the tail race area
21	7/06/06	East	Various shots of the tail race area
22	7/06/06	East	Various shots of the tail race area
23	7/06/06	East	Various shots of the tail race area
24	7/06/06	East	Various shots of the tail race area
25	7/06/06	East	Various shots of the tail race area
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FILM 15 COLOUR SLIDE 400 ASA

Frame No.	Date	Direction Facing	Subject
1	7/06/06	E	West facing side of central wall of tail race
2	7/06/06	E	
3	7/06/06	E	Wall (301)
4	7/06/06	E	
5	7/06/06	E	Wall (307) early wall and drain
6	7/06/06	E	
7	7/06/06	E	View of tail race
8	7/06/06	S	
9	7/06/06	S	
10	7/06/06	S	Various working shots
11	7/06/06	S	
12	7/06/06	S	
13	7/06/06	S	
14	8/06/06	E	Detail of sluice gate
15	8/06/06	E	
16	8/06/06	E	
17	8/06/06	E	
18	8/06/06	N	Early wall (307) and drain 306
19	8/06/06	N	
20	8/06/06	S	Early wall (307) detail shot
21	8/06/06	S	
22	8/06/06	NE	General site view
23	8/06/06	NE	
24	8/06/06	E	Detail of rolling mill
25	8/06/06	E	
26	8/06/06	N	Detail of kiln building
27	8/06/06	N	
28	8/06/06	S	Detail of concrete floor (256)
29	8/06/06	S	
30	8/06/06	E	Detail of wheel marks in west wheel pit
31	8/06/06	E	
32	8/06/06	S	Back wall of west wheel pit
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FILM 16 COLOUR PRINT 400 ASA

Frame No.	Date	Direction Facing	Subject
1	7/06/06	W	Detail of underside of sluice gate
2	7/06/06	W	
3	8/06/06	E	Wall (301)
4	8/06/06	E	
5	8/06/06	N	Wall (307) early wall and drain
6	8/06/06	N	
7	8/06/06	S	Wall (307) early wall and drain
8	8/06/06	S	
9	8/06/06	NE	General view of site
10	8/06/06	NE	
11	8/06/06	E	Detail of rolling mill area
12	8/06/06	E	
13	8/06/06	N	Detail of kiln (fire box) building
14	8/06/06	N	
15	8/06/06	S	Detail of concrete floor (256)
16	8/06/06	S	
17	8/06/06	E	Detail of wheel marks in west wheel pit
18	8/06/06	E	
19	8/06/06	S	Back wall of western wheel pit
20	8/06/06	S	
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FILM 17 BLACK AND WHITE 400 ASA

Frame No.	Date	Direction Facing	Subject
1	7/06/06	W	Detail of underside of sluice gate
2	7/06/06	W	
3	8/06/06	E	Wall (301)
4	8/06/06	E	
5	8/06/06	N	Wall (307) early wall and drain
6	8/06/06	N	
7	8/06/06	S	Wall (307) early wall and drain
8	8/06/06	S	
9	8/06/06	NE	General view of site
10	8/06/06	NE	
11	8/06/06	E	Detail of rolling mill area
12	8/06/06	E	
13	8/06/06	N	Detail of kiln (fire box) building
14	8/06/06	N	
15	8/06/06	S	Detail of concrete floor (256)
16	8/06/06	S	
17	8/06/06	E	Detail of wheel marks in west wheel pit
18	8/06/06	E	
19	8/06/06	S	Back wall of western wheel pit
20	8/06/06	S	
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