

TWO RECENTLY DISCOVERED FIELD BOOKS FROM SOPWITH'S MINERAL SURVEY OF THE FOREST OF DEAN

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Summary

The paper describes two field books dated 1833-34 containing survey data for Sopwith's mineral survey. They record numerous chain surveys and they include detail in the form of sketches and notes that do not appear on the published plans. The content of the field books is summarised and some items are reproduced.

Introduction

In the 1830s Thomas Sopwith FGS, an eminent surveyor of Newcastle on Tyne, surveyed the mineral district of the Forest of Dean. The resulting plans included underground mine workings as well as the surface. The survey was made at the request of the 1831 Dean Forest Commission in connection with an investigation into the customs of the free miners and the right to win minerals. The purpose of the survey was to create an accurate base for the deliberations that led to the Awards of the coal, iron-ore and quarry gales (1). The survey also equipped the Crown with a firm starting point from which to administer the minerals and mines.

The original plan and the mine surveys were drawn up at various scales. At the Gloucestershire Archives there is an incomplete set of manuscript plans drawn at a scale of 4 chains to one inch (2). In the 1980s, David Bick acquired a near complete collection of 54 numbered mine plans. They were drawn on cartridge paper at a scale of 2 chains to one inch and bound within a single volume. The Deputy Gaveller's office at Coleford was formerly full of mine plans and related documents dating from Sopwith's day. These are now stored at Gloucestershire Archives but not catalogued in detail and rather less accessible than formerly.

One version of the plan was published. The scale was of 8 chains to one inch, equivalent to 10 inches to one mile. The title was:

“Plan of the Coal and Iron Mine Districts of the Forest of Dean. County of Gloucester. Surveyed by order of Her Majesty's Commissioners of Woods, Forest and Land Revenues by T. Sopwith FGS 1835. Engraved under the direction of John Buddle, Thomas Sopwith and John Probyn, Dean Forest Mining Commissioners, by W. Col-lard, Newcastle on Tyne.”

Although the date of 1835 is printed on the plan it is not altogether correct. The survey was ordered by the Commissioners in January 1833. Work commenced early that year and continued during 1834. Drawn plans existed in manuscript form by 1835, the year in which the Report of the 1831 Commission was published. Additional survey work was carried out in 1837 in connection with Sopwith's geological models of the Dean Coalfield (3). Furthermore, many gale stones appear on the published Plan but their locations cannot have been decided before the Mining Commissioners began their work in 1838. The plates were engraved between April 1839 and March 1840. A precise publication date is not known but it was intended that the 16 large scale plans should be made available for sale when the Coal and Iron Mine Awards were published in 1841 (4).

The published Plan consisted of 15 individual large scale sheets and one Index Plan. Together they formed the “Series of 16 Engraved Plans... for sale at two shillings each or £1 4s.0. the set”. A few sets survive in the repositories detailed at Appendix 1, and only one complete set is known to be in private hands. Thus these interesting plans are not easily available to historians, despite a reprint by David Bick in 1976 of the Index Map (Plan No. 16) which is also out of print. To remedy this matter the current author hopes that a reprint of the 16 large scale plans will appear during 2010. Whilst a commentary for this reprint was being prepared, Mr M Howell showed me two notebooks that he thought might be of interest. They proved to be field books from Sopwith's 1833-34 survey of Dean Forest; a rare and fortunate survival from what must have been a large number of similar field books containing all the original survey data.

The books measure 20 cm high, 12 cm wide and 2cm thick, and are strongly bound in dark green leather. The binding is stitched in a manner that allows them to open flat at any page. Each page has ruled horizontal lines in blue, and is divided by four vertical lines that create five columns. The right hand column occupies about half the page width for sketches and notes. The remaining columns occupy the left hand side and form a table for logging measurements. Figure 1 illustrates the general format. Figure 2 shows part of a page of records from a chain survey undertaken on 5th April 1834 by members of Sopwith's team and indicates how chain surveying was carried out at that time.

Chain surveys

From the 17th to the mid 20th century the standard tool for measuring distance was a Gunter Chain of 22 yards, calibrated into 100 links. It was used for line surveys and for fixing points by triangulation. To obtain true distance the chain needed to be both level and held taut but if the ground was too steep for this, levelling and calculation became necessary. The work of surveying has to begin from a known, fixed point or station. To move forward, a straight line of sight must be sought ahead to the point where the next station will fall. The line between stations is a traverse along which measurements will be read from the chain.

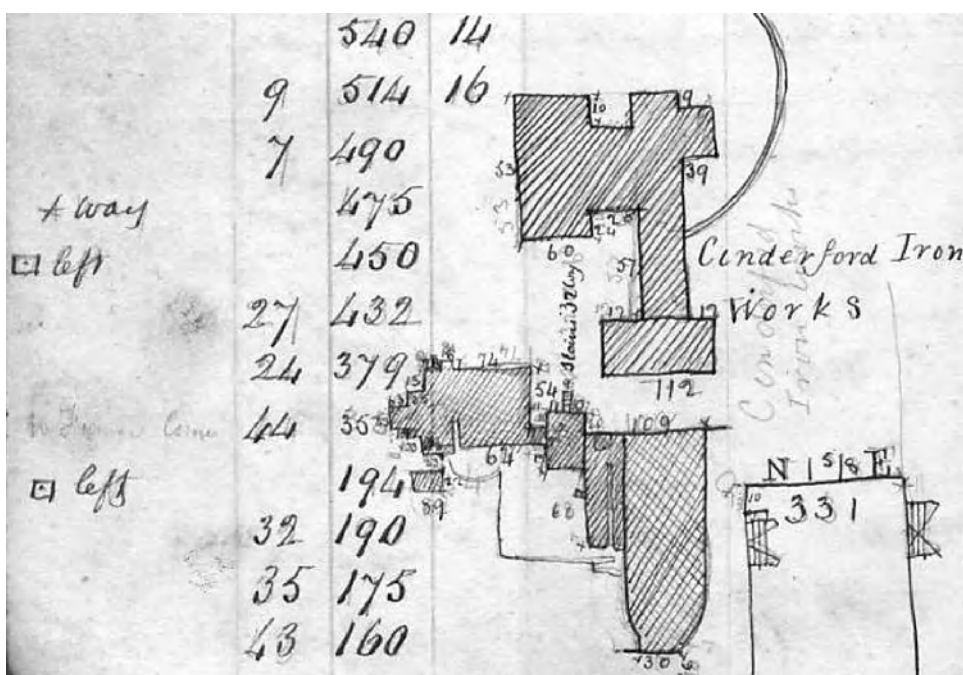


Figure 1.
Detail showing the format of the survey records and one of the sketches.
See Figure 2 for explanation.

Figure 2 records a chain traverse, No 87, of a survey that is working its way up the Bixslade Valley.

Starting at the bottom of the page the surveyor recorded the point on the ground already fixed by traverse No 86. The need for a fresh traverse is due to a change of direction at this point. Using a dial or circumferenter the surveyor has measured the bearing of the new line from point 1100 (links) of No 86. It was 62.5° N of W. The surveyor recorded this detail at the foot of the page so that his data runs up the page in the same direction as the survey. The full column of figures records the cumulative distances measured in links from the start point 00.

To the right and left of this column are the offsets, or measured distances (also in links), at right angles to the traverse, to fix the exact position of features that are to be recorded.

The prominent feature is the main line of the Bixslade branch tramroad with sidings to serve 'Mr Mushet's Low Level', and one near the top to Mine Train Quarry. On the right is the wall or boundary bank of Barnhill Plantation. On the right hand side of the page the surveyor has sketched the detail of those features.

The straight traverse line, along which the chain is held, is not drawn on the page. However, its alignment can be recreated by placing a straight edge through the dotted circles at 700 and 800 links and producing the line down to the bottom of the page. It falls between the inclosure wall on the right and the main line of the tramroad on the left. The first chain measurements were offsets of 5 and 13 links to the left of the 00 station to fix the two lines of plate rail, and 31 links to the right of the same point to fix the inclosure wall.

The next measurement was forward along the traverse for a mere 25 links (5.5yds) Here offsets to the plate rails were measured again to determine their alignment. The work then proceeded forward. At 62 links from 00, the tramroad crosses the traverse line, and an offset to the right fixes the enclosure wall at 41 links. After 190 links from 00 the tramroad branches and sidings proliferate; some were fixed by offsets and some were noted as sketched. At 550 links the surveyor left a mark for Johnson, another member of the Sopwith survey team. At 613 there is a building and at 725 is "Mr Mushet's Low Level". The level mouth was fixed by triangulation from the 700 and 800 points and their positions were marked. It is possible that Johnson will use these marks, and the earlier one left for him, to commence the underground survey of the Level. The traverse ended at 850 links due to a change of direction and bearing was taken for the next traverse, No. 88.

Two things are notable here. Firstly the surveying is extremely detailed because Sopwith wants great accuracy at large scale. Secondly, and at odds with the first, no direct vertical measurements are recorded, despite the fact that the survey was travelling up a valley. Presumably, horizontal chaining was sufficient. We might also note that this traverse of 850 links, or 187 yards, is a tiny detail within a survey that covered sixty four square miles of ground and for which a framework of fixed reference points and altitudes must already have been accurately established with dial and level.

Chief content of the field books

Book 1, Volume 1

This has *Book 1, Vol 1*. faintly inked on the cover, and a pasted label states: *Surveys from Mar 10th 1834 to April 18th 1834*. The contents were originally in pencil but have been finely

+ road or Sidge to quarry $\begin{matrix} 232 & 11 \\ 130 & 2 \\ 118 & 10 \\ 55 & 5 \\ 00 & 14 \end{matrix}$
 No 88 | N $33\frac{7}{8}$ W from 850 in No 87 Book 1

□		850	11
+ way		800	
		750	24
	8	725	26
		700	29
	to House	696	
	96	683	
House + way	103	73	53
613			
to Parting of way	42	590	16
550			
Left for Whiston	26	14	520
			18
45	15	7	475
			21
		450	
		415	
	37		
	80	38	380
			18
		285	
Small way	17		
	29	6	218
	30	6	190
		154	46
		135	
	50	24	
		62	41
		45	
Double way			
	17	8	25
	13	5	00
			31
No 87	N	$62\frac{1}{2}$	W from 1100 in No 86

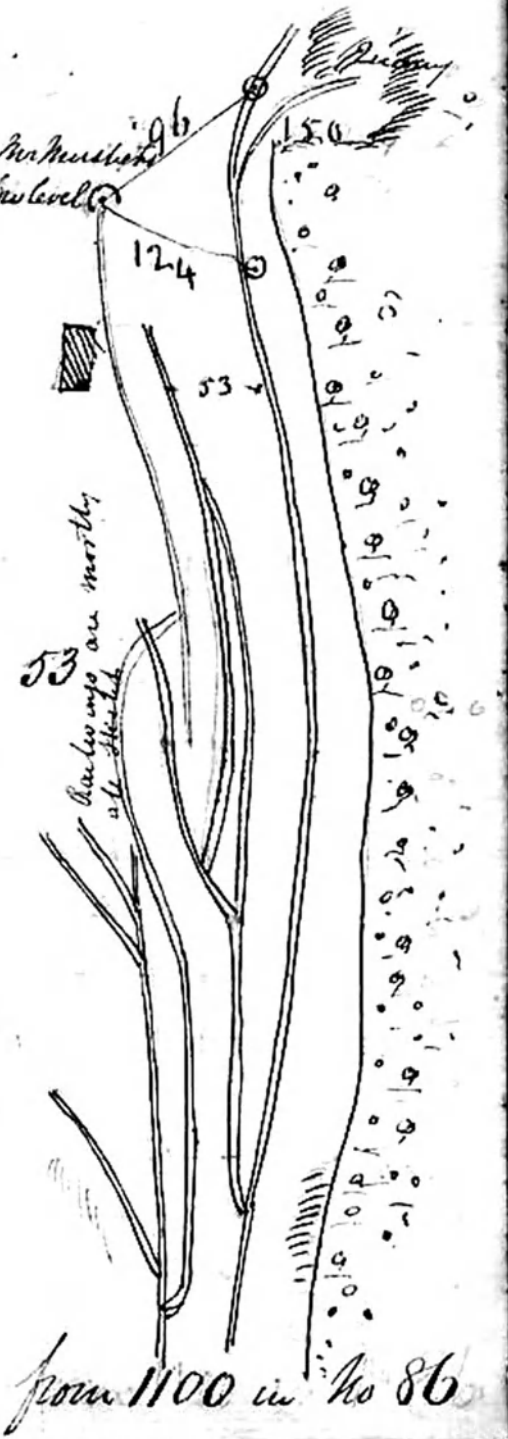


Figure 2. Bixslade

overdrawn with pen and ink. There are no page numbers, but the surveyors started their records on or near the last page and worked steadily 'backwards' through their field books towards the front. This, as mentioned before, is because these surveyors liked their field books to run in the same direction as their surveys. In this volume the inside back cover records bearings taken from two fixed points to a group of pits between Nofold and Churchway. The next three pages carry an alphabetic index of marked reference points for sidelines, some of which are illustrated with sketches.

Figure 3, shows the first page of the chain survey record in this volume. The chaining records are obvious but the subject of the sketch is not. The location is the modern cross road junction at Miry Stock on the A 4136 road between Coleford and Mitcheldean.

At that time it was only a T junction where the road to Lydbrook left the main road. In the sketch, the Lydbrook road is narrow and somewhat obscured by the upside down words: *To Ker[ne Bridge]*. The main road to Mitcheldean crosses the stream by a skew bridge.

In the top right is the Severn & Wye tramroad, sketched here as a sloping Y. The right hand arm is the main line from Cannop heading for Lydbrook and the R. Wye. The Churchway branch joined it shortly before the main line crossed the road.

The survey record begins with the words: *Survey of Forest of Dean Field Book No. I, Monday March 10th 1834*. The traverse started at a guide, or sign, post that resembles a mini version of the Angel of the North at the Miry Stock junction on the modern A4136 road. It ended where the tramroad crossed the road and, as described below, continued along the tramroad to Cannop. The first traverse of 8.11 chains ended on a tree that stood just beyond the Churchway branch tramroad. At that point the survey turned in a southerly direction along the Severn & Wye tramroad, through the summit tunnel and on past Old Engine Middle Pit to Cannop Bridge. Here the traverse turned to the west and ascended Howlers Slade to the outskirts of Broadwell where it turned to the north east past Mile End and Perch Lodge. It then proceeded along the road to Edge End and along the course of the modern A4136 road to finish at the guide post at Miry Stock, the point from which it began. Ending at the start point closed the series of traverses and enabled a check on accuracy. The distance was about four miles and the survey was completed in a maximum of 6 days, but more likely in 4 days because dates are recorded only for the 10th, 12th, 14th and 15th of March. No direct vertical measurements are recorded but some legs are annotated with '*whole of this line is 1 in 12*', or similar.

The rapidity with which this main line circuit was completed is not due to easy ground. On the Friday there were 13 changes of direction to be recorded by dial, and over 630 chain measurements, many of them offsets, were taken. Detail on either side of the line was continuously sketched forward and several buildings were individually measured. One suspects that Sopwith's assistants worked in highly efficient teams and knew how to get the job done.

Traverses No.39 to 95 surveyed a new main line around Barn Hill and Nagshead Inclosure. It began on 26th March from the corner of Barn Hill Inclosure and traversed to the head of the Fetterhill Valley. This it descended, fixing the mouths of Dark Hill Level and Endeavour Level en route to Arthurs Folly and the Parkend Turnpike. The surveying continued along the road past Whitmead Park and on to the bridge over the Cannop Brook at traverse No 62. From hereabouts the surveyors began to ascend the Cannop Valley, following the tramroad for easy passage, fixing Gulley's Level and leaving various marked reference points for Johnson to use later. On traverse 78 a previous reference mark of Mr Sopwith's was reached and shortly after the mouth of Miles Level was triangulated. Some sidelines were run along Cannop Ponds but

Road
 the Junction of Railway and where Railway + Triumph
 at Mid of Tree near 8.11

+ Railway	7.85			
+ Railway 10	7.75			
+ bank Top	7.44			
42	7.00			
Hagleft and Ticket	5.40			
	4.40	dyke		
	3.60	70	by the	
	2.96	30	Rowlet	45
	2.85	20	Brook	35
		8		
to Bridge end 28	2.78			
to Centre of Bridge 7	2.60			
	2.42	15		
to Bridge 22	2.34			
	1.00			
30	.65			
Road	.10			
Guide Post	00	Road	Road	110
N ^o 1	S 78 1/4	E	from Guide post	

Monday March 10th 1834

Field Book N^o 1.
 Survey of Forest of Dean

Figure 3. The first page of chain survey records in Book 1, Vol. 1.

the main line began the ascent of Bixslade to reach the starting point at the corner of Barnhill on traverse No. 95. on, or about, 3rd April. The traverse illustrated in Figure 2 was No. 87 of this survey.

On 8th April a new survey began, No.111, from Parkend up the road past the school to Moseley Green where the surveyor noted; *This part is full of pits part of which are now working but the greater part are abandoned and filled up.* This area is covered with bell pits and the note might indicate that some were still at work? The survey reached Cockshoot and Staple Edge Inclosure and finished at No. 125.

The next work began on April 14th ; the record states: *Survey of Main Lines Continued beginning at the end of Book 1 and Surveying along Turnpike towards New Bridge Level, Bilston [sic]. M.W.J.S.* The initials may be those of William Smith who together with George Johnson and N. Seymour were Sopwith's chief assistants. The first traverse, No.126, began at the same guide post at Miry Stock noted above and followed the main road towards Gloucester, passing Brierley and Herberts Lodge to Nailbridge. From here traverse No.140 headed south towards Nofold Green and beyond. After about 40 chains the surveyor recorded a pit building called *Old Water Engine.* Continuing roughly south, traverse No. 143 passed *Oak Pit.* No. 144 *Famish Pit* and No.146 was in the vicinity of *Paragon Pit.* Traverse No 149 includes a section of the Bullo tramroad, a weigh house, and an enclosure noted as '*used for burning coak but now done away with*'. Beyond are limekilns and a lengthy but unidentified building. Traverse No.152 follows the tramroad across or along a pool, reaching Cinderford Bridge in No.153. Many sidelines surveyed the Bilson area and take in *Young Colliers Pit, The Squib Pit, Lucks All Pit, No Luck at All Pit,* numerous filled up bell pits, *Dipple Pit* and *Bowson.* Further sidelines cover *Nofold Pit* and the tramroad and water courses at *Churchway Pit.*

Sideline surveys from various main lines fill the remainder of the field book. Of interest are sketches of the surface buildings of Parkend Furnace, Cannop Bridge area including the *Cannop Bridge New Level mouth,* and *Derby Pit* near Broadwell. Another section depicts the surface layouts of *Parkend Royal Deep* and *Land Pits* and their extensive tramroad sidings, the tips at *Parkend Main* and *Water Engine called Ivy Moor Head,* likewise at Parkend. Sideline 117A depicts *Brick Pit,* on Moseley Green, with a nearby horse gin noted as not at work.

Book 1, Volume 2

This book has ***Book 1, Vol. 2, Surface Survey Forest of Dean.*** written in faint ink on the cover. A pasted label reads "Surveys from Dec. 26th 1833 to May 13th 1832 [sic]. It should have read 1834. Being the earlier of the two books one might have expected it to be Vol.1 No.1. The book contains over two hundred side lines. Some of them spring from the Main Line traverses in *Book 1. Vol. 1.*

The volume contains 210 numbered pages. Pages 1-58 are written and sketched in pencil. Pages 58-210 were originally in pencil and later penned over in ink. Page 1 is the last page of the field book and carries the first entry on the last line. It states: '*Survey of Dean Forest commencing at the mouth of Miles Level near Cannop Brook Thursday morning 26th December 1833, 10 am*' The days work concluded with a note. '*Finished at ½ past 5 being quite dark*'. This must have been a local time, perhaps Coleford, or even Newcastle, because surveying and recording would be impossible at 5.30pm GMT on a Boxing Day. However, Sopwith's assistants seem to have been adaptable characters. A record in Sopwith's diary noted that Smith, Seymour and Johnson arrived in the Forest on 15th December 1833 and began surveying next day at the Hopewell Colliery, in which they surveyed all night on the Wednesday and Thursday preceding Christmas Day.

Among the many sidelines the following are of interest.

- P.12. *28th December 1833 Bixslade Valley 9am.* Chaining towards the Purples.
- p.45. measured sketch plan of Nagshead Lodge
- p.73. measured sketch plan of Serridge Lodge
- p.81. measured sketch plan of Beechenhurst Lodge [Kensley]
- p.98. chaining at Nailbridge and Ruardean Hill Inclosure, May 23rd. 1834
- p.107. measured sketch plan of Herbert Lodge
- p.119. measured plan of Sallow Vallets Lodge
- p.124. *SIDE LINES BOOK 1 Cont..* chaining Bullo Pill Railway near Winning Land Pit
- p.136. chaining near Ditch Pit and Oak Pit
- p.138. measured sketch plan surface buildings Regulator Colliery
- p.141. ditto Lucks All Deep and Land Pits
- p.143. ditto Whimsey Pit and New Victory
- p.150. side lines to Paragon Pit
- p.166. sideline to Prospect Pit with sketched detail of surface
- p.177. measured sketch plan of Cinderford Iron Works. See Figure 1
- p.184. Cinderford Brook near Mr Protheroe's pit near to Nofold
- p.188. Blackpool Brook at Middle Ridge; Reform Bridge on p.194; The Black Pool on p.198
- p.207. White Lea Pits, disused, near Cannop lower pond and a branch tramroad to them.

Acknowledgement

My warm thanks are due to Mike Howell for sensing the connection between the field books and my research and lending them for study. The opportunity to examine them in depth has shed new and interesting light on Sopwith's Dean Forest Survey.

References

- (1) Standing, I. J. 2007. *The regulation of quarrying in the Forest of Dean in 1841.* Gloucestershire Society for Industrial Archaeology Journal for 2007, pp14-30.
- (2) Gloucestershire Archives GA D3291/IV/13, The C. E. Hart Deposit, see Appendix.
- (3) Turner, S. and Dearman, W. R. 1982. *Thomas Sopwith's large geological models.* Proc. Yorkshire Geological Society, Vol. 44, No.1, pp1-28. illus. bibliog.
- (4) Sopwith, T. 1841. *The Award of the Dean Forest Mining Commissioners as to the coal and iron mines in Her Majesty's Forest of Dean, and the rules and regulations for working the same.* 209pp. index map. London: John Weale.

Appendix.

Sets of Sopwith's large scale plans held in repositories

Sets of the original printed 16 large scale plans are uncommon, but a few survive:

The National Archives, Kew .

Map catalogue 2202. F 17/21. A set of plans numbered 1 – 15.

A second set, 2203 F 17/23, appears to be a mounted and is unfit for production due to poor condition.

British Library . A brief catalogue entry indicates that a set is held, shelf mark 11.e.17.

Dean Heritage Museum, Soudley .

A near complete set is held in the Gage Library, Accession No. 1995.3.86=101. Photocopies are available for use.

Gloucestershire Archives, Alvin Street, Gloucester .

Searched in 1988. The catalogues indicate three sets but only one is complete. They are:

D232. This appears to be the only complete set at GA. The 16 plans have been trimmed and mounted on linen to form a single map of over 50 square feet in size.

This is rather larger than most tables making it difficult to use.

D1437. A brown folder containing 17 plans but not a complete set. The plans are:

Index Map and numbers 1, 4, 5, 6, 7 (x2), 8 (x2), 9, 11 (x3), 12, 13, and 15 (x2).

D3291 / IV /13. The C. E. Hart Deposit.

These are not the 16 large scale printed plans but a: “ *Plan of the Coal Mines in His Majesty's Forest of Dean surveyed by order of His Majesty's Commissioners of Woods, Forests and Land Revenues by T. Sopwith F.G.S.*” When examined by the present author in 1989 there were 9 plans and not ten as recorded in the catalogue. They are fine, coloured drawings; Dr. Hart referred to them as being Sopwith's personal set. They are undated; the inclusion of “His Majesty” in the title indicates a date not later than 1837.

The 9 plans are drawn on tracing linen at a scale of 4 chains to 1 inch, on sheets of 40 by 40 inches (twice that of the engraved plans) and with borders that differ from sheet to sheet. On the exterior of each sheet is the number 19 stencilled in black ink (very similar, if not identical, to those found on mine plans formerly held at the Coleford office of the Deputy Gaveler) The quality of the penning is so good that they resemble quality engraved work. The plans are extensively coloured: colliery workings in blue, black and red, water blue and the inclosures edged with green. Seven of the plans carry numbers and titles and two do not. The numbering and the areas covered differ from the 16 engraved plans. The details are: No. 1, Coleford area. No 2, Birch Hill Inclosure. No 3, Parkend. No 4, Perch and Sallow Vallets. No 5, Pludds. No 6, Ruardean Hill and Lennards Hill. No 10, Stapledge Inclosure. Un-numbered: Cinderford and Cinderford Bridge. Un-numbered: Speech House with Great Kensley Inclosure.

It is possible that now (2010) there may be additional copies of the engraved 16 large scale plans at Gloucestershire Archives following the transfer of Office of Woods material from The National Archives and from the Coleford office of the Deputy Gaveler.