

Chapter 6

Underground quarrying after Ralph Allen

After Allen's death, the documentary and literary supporting material to complement the archaeological investigations is much less, and it has thus been gathered under a single chapter. The data is especially weak for the remaining part of the 18th century, though it has been possible to describe the reasons for the break-up of the estate which do not appear otherwise adequately described, and there is a brief glimpse of the quarrymasters and their production for some three years at the end of the century.

In the 19th century, the underground quarries, like their surface counterparts described in Chapter 4, entered into their major phase of output. The fortunate survival of a series of quarry leases dating to the beginning of the century allow the ownership and working areas to be projected forwards and, to a certain extent, backwards in time. This illuminates, in conjunction with archaeological findings, the problem of chronologically phasing the underground workings. The limited data on late 19th- and early 20th-century underground working is also summarised.

Quarrying under the Allen Estate 1764 to c 1805

This chapter follows on from the previous one, outlining the business of underground quarrying and the areas affected. There is emphasis, as the documents allow, on leasing arrangements under which most quarrying was carried out thereafter. The exception to this was for small parts of the far-eastern part of the underground quarries where owners of the land above seem sometimes to have exploited the freestone below their own small bounds.

Allen's will and the subsequent owners of Combe Down

The new ownership of the land and quarries underneath, and the eventual break-up of the Allen Estate at Combe Down were the most significant factors in the continuing working of the quarries and the changes which began to affect the Combe Down settlement as the older workings near the southern escarpment began to be worked out. The timing of change was markedly affected by the only partially anticipated effects of Allen's will, the relevant parts of which, as a result are considered first.

Under Ralph Allen's complex will (see Peach 1895b Appendix 1 for the full text of the will), Prior Park and the House, and other property were all placed in a trust controlled by John Chapman, Alderman, and James Sparrow, Clerk, both of Bath in order 'to support and preserve the . . . estates . . . from being defeated or destroyed'. The main legatee was Gertrude Warburton, but she was not to be fully in control, that is – able to make disposals of the estate other than those specified, during the life of Mary Allen. Mary was Allen's niece, the only daughter of Allen's brother Philip and Jane, née Bennet. She married Sir Cornwallis Maude in 1767, who later was to become the first Earl de Montalt and the first Lord Warburton. She was the residual legatee should Gertrude (and others named) die with no issue. Gertrude Warburton, née Tucker and her younger brother William had been orphaned children of Allen's sister Elizabeth of St Blazey in Cornwall. The two children came to live with Allen when Gertrude was eight years old (Boyce 1967, 62).

Allen's widow, Elizabeth née Holder, was entitled to enjoy the use of the Park House and other property for her life and £1300 of the rent and profits arising from freehold property as an annuity. There were also many listed payments to legatees to be paid out of the freehold estate. Sufficient could be sold or mortgaged within six months after his wife's death to raise a capital sum to compensate for loss of a marriage annuity for his brother Philip. After this the rents and profits passed for life to Gertrude Warburton. All rents and profits from leaseholds belonging to the estate were to go to Gertrude during her lifetime. Heirs after Gertrude's death were first her own children (her only child pre-deceased her), and, after a number of eventualities of which none applied because of deaths, would finally pass to Mary Allen if she was alive. Only at the end of Mary's life could the capital assets of the estate be sold. In fact Gertrude did not have that long to wait, as Elizabeth died in 1766 and Mary died in 1775 (www.thepeerage.com).

The Trustees had severe problems in supporting the legacies and annuity commitments of the estate, and it was only after the death of Allen's widow that opportunity to partly remedy the situation arose by allowing sale of personal assets. In the meantime Gertrude and the Trustees were clearly able to determine that the estate income, at least halved by the loss of the postal business, was unable to support Gertrude in the manner she

hoped to be accustomed after liabilities were paid.

It was probably the problems caused by the will that prompted Gertrude and the Trustees to rationalise the quarrying business. They quickly ended anything of the building and blockstone export businesses, though St Bartholomew's Hospital was not finally completed until 1766. Chattels were not part of the real estate so a sale was being arranged as early as September 1764 and items from the railway and quarries which presumably belonged to Gertrude, were either sold on her behalf by Jones or had been sold by December at auction. Dealing with a now over-large household could be done quickly and after performing his last duty, the erection of the mausoleum, Richard Jones was dismissed, along with many other staff which Jones said numbered about a hundred.

In 1769 Gertrude went much further and took the drastic action (Jones thought wicked as contrary to her promise to Allen) of selling all the internal furnishings of Prior Park House which was then let, a year later, to Lord Kerry. In 1779 her husband Bishop Warburton died. She married again, about 1780, to Warburton's former curate (Boyce 1967, 275-58). This and the death of Mary probably encouraged her to move back to Prior Park since she could, through Chapman, then make modest disposals of property. Items began to be sold to Sir Cornwallis Maude from 1781. The major sale affecting Combe Down was in May 1788, when the Allen Estate Trust transferred much of the Combe Down area, including the quarries, land across as far as Entry Hill to the west and Kingham Field to the east, to the Trustees of Lord de Montalt, formerly Cornwallis Maude whom Mary Allen (by then deceased) had married. This portion was immediately mortgaged, to Henry Cecil for £9831. The mortgage was renewed for a third time in 1799 for a somewhat lesser sum. De Montalt, created Lord Hawarden in 1793, died in 1803 when he was succeeded by his son, who himself died in 1807. In 1808 his trustees offered the whole of the residual estate to John Thomas, a Bristol Quaker, for £28,000 which he accepted. By then however many of the properties, notably those including the old quarrying area and quarries, had already been broken up.

Developments in the wider area

The Turnpike Trust completed its roads around Entry Hill (entering Bath via the Holloway and Bath Bridge) and by about 1769 the Bradford Turnpike (along present day North Road) linked Combe Down with Entry Hill, which was winding and steep but passable for loaded carts. The Prior Park Carriageway was closed to stone traffic. The Blind Lane and Foxhill tracks, descending from Combe Down were precipitous and not suited to heavy traffic even had they been improved. East of Combe Down the new stretch of turnpike turned down Brassknocker Hill, but from the top of the road

there, horse and carts could branch-off and approach Bath via Claverton or Bathampton. Improved roads and the ending of the wooden railway meant much greater competition was possible and quarrying gradually expanded in the wider area of the Downs, conspicuously so by the beginning of the 19th century.

Building in Bath appears to have gone through a major expansion in the late 1760s and early 1770s and again between 1785 and 1792 (Neale 1981, 168) before declining during the war years at the end of the century. Probably the Combe Down quarries, already in business in a developed form, were initially the principle beneficiaries of the boom, but growth of competition was the natural result once Allen's stranglehold was broken.

Leasing the quarries

At the sale in December 1764, Gertrude Warburton bought back a number of quarrying items. It is not fully certain why this procedure was followed, but almost certainly the purchase was intended to enhance her income by ensuring equipment was available to the new users of the quarries. The railway system had stopped being used by the end of 1764 (new style calendar by this date) and it is very likely that the new practice of leasing the quarries to independent quarry-masters or freemasons began at Christmas 1764.

It is possible, indeed the repurchase of items suggest it, that she took a certain rent quarterly or annually for the quarries including any equipment, which went to her directly, while a royalty payment for the actual stone (part of the estate) went to the Estate, from which there would be deductions before she received the benefit. The items sold at auction included:

A crane at Jones Quarry	£3.3s.0d
A crane at the Masons Crane House Quarry	£3.11s.0d
A crane at the Sheeps House	£5.15s.0d
Two crane chains and two stone chains	£5.13s.11d
A roundabout crane at Dolemead	£8.18s.6d
A stone carriage	£1.2s.0d
A smiths anvil, bellows, grindstone and board vise	£0.10s.6d

We have a little knowledge of what happened to two of the cranes, while that at Dolemeads seems to have gone to Bristol and that at the Masons Crane House possibly to Dolemeads, but at least one other was still at site and there were various parts obviously still available, including ironmongery from Combe Down sold in a second sale for £102.7s.0d (BRO. 667/5, 49) presumably from the cranes and carriages.

In June 1765 a payment of 10 shillings was made by Richard Jones and his son for half a year's rent of the crane: Richard and William Jones traded as

masons and supplied block and wrought stone and 'measur'd and plan'd out' buildings (Pollard 1994, 9). The name Jones Quarry has survived for the Rockhall Lane site (Ralph Allen's Yard today) and though Addison (1998, 42) suggests a Herbert Jones may have owned the quarry, it is more likely a survival of the Jones' name from this time, or even earlier. If so, based on crane sites on the post-1764 Allen Estate map then, since the Masons' Crane House site is already known, the Rock Lane site was Sheeps House Quarry (this is the first time the quarry name could be located to the site, but has been used previously in this account to identify the quarrying based there).

Pollard identifies a further tenant in 1765, Richard Singer, a master builder (BRO D339/4/31); he – or a namesake – was still quarrying there in 1794 (see below). This can be inferred from a newspaper account of theft of stone from Singer by two of his men: Popjoy a freemason who had care of the quarry and Neat his wagoner. The latter worked Singer's horses night and day as part of his felonious pursuit supplying Prime Buildings in Bath at night (Pollard 1994, 9-10). In 1794 Popjoy was quarrying on his own account, so possibly he started his own quarry soon after 1765. Of other quarrymasters at Combe Down we have no knowledge until 1794 when data becomes available from an account for the by-then Lord Hawarden's Estate. Other separate quarries were, however working elsewhere in Combe Down and Odd Down, and there were also unlocated quarries in Combe Down known as Morris's and Sumsion's. The latter name was to become the best known in the district (BRO. D334/4/31).

This limited information and the data from a 1794 account and from leases after 1800, in light of information from the underground archaeological survey, allows some tentative conclusions to be drawn as to what was happening throughout the Allen Estate period of operation.

There was obviously no delay in implementing the new system at the old quarries on Combe Down. Jones was permitted to begin quarrying on some form of lease with his son almost immediately and while probably still working for the estate. At that time he was still presumably living at Prior Park. One can presume that other freemasons who worked for Allen were similarly treated, as it was advantageous to the Estate to act quickly, so they would have also leased quarries, the numbers being possibly determined by the number of entries and shafts to avoid conflict in working – possibly half a dozen or so operations. Singer may have been a new entrant, but conceivably was previously a building foreman for Allen who secured his stone supply by employing Popjoy to take care of the quarry. Popjoy's ability later to take a lease after his disgrace does not suggest much difficulty was put in the way of new tenants. There may have been an additional annual payment above Jones 'certain rent' of a pound per year for the horse crane, but

later evidence suggests this would not have been onerous. The charge of £1.10s.0d a perch (equivalent to about £11.2s.0d for 1000 tons of 20 cubic feet of blockstone) was also very modest and, by its acceptability to the estate, does not suggest that direct management as under Allen was viewed as likely to be a more profitable alternative. Presumably the rent was set by comparison with other quarries in the area.

The use of levels or cartways certainly continued long past the Allen Estate period (Phase III) of operation, with new ones started and others extended after the estate breakup (see the early 19th-century section below). It is also clear, from the 3.5 to 4.5 m wide shafts (sometimes dubiously known as 'light shafts') found at, near or just beyond the Allen (Phase II) period working across the whole quarrying area, that winding of stone from shafts partly took over from hauling down the cartways. This may have been since the cartways were difficult to maintain, as can be seen by cleared collapses in them. But, more important, once well under the hill and without whatever advantages the railway had offered, it made sense to raise the stone directly from near or at the working place from the modest 10-12 m below surface. From the surface at the top of the Down it could be carted direct to its destination. It was a least-cost alternative and could be done with a simple hand winch or capstan or by horse crane, the latter much better for loading carts and capable of much higher output.

The availability of the sold-off parts of cranes suggests these would have been re-utilised on the shafts. At Jones' Quarry then Richard Jones and his son presumably had to re-erect one there since there was not one shown on the *c* 1764 Estate Map. The leases for after 1800 (below) strongly suggest the Allen workings at the Central Byfield area, with the diverging entries which the *c* 1764 map suggests were then abandoned, were not restarted until after 1800. It is just possible that the Jones' father and son worked on the west side of the Combe Road boundary pillar (Quarry 2398) in Lyncombe and Widcombe land acquired by Allen long before as part of his estate where the archaeology shows that workings of a suitable type for the time exist which are not otherwise easily explicable. They would have used an old entry into apophygate workings probably predating Allen, from just west of the Allen entries, possibly sinking the wide shaft for removing the stone at the roadside edge of what is now the William IV Public House car park.

Given that Allen's monopolistic methods no longer dominated the market, and demand was probably good at the start of the new regime, most of the leased ventures had a good chance of success, even with the existing or growing competition from others working or starting up at Combe Grove or the Lawns near Shaft Road in Monkton Combe lands, or elsewhere in Lyncombe and Widcombe, notably at Entry Hill and Crossways.

A set of accounts has survived for payments for

the quarries under Lord Hawarden from 1794 to the first half of 1799 (SRO. DD/X/LA/12). Unfortunately, as well as the pre-war building boom having fallen away by 1792, these were particularly bad years, as can be seen even in the small amount of data available. Even so, in the first year 7365 tons were produced, suggesting the 20,000 tons previously cited for Allen's likely peak production was not unrealistic (note that the ton is of 20 cubic feet, the contemporary measure. In modern tons, the figure would be 15-20% higher). Given the increased competition by that date and a transport system that imposed average tonnage costs rather than the near marginal cost of Allen's time, perhaps twice this level was appropriate to good years, shared between the freemasons. Some quarries produced nothing in some half-years, suggesting a direct connection with a particular building and implying that when it was completed, there was no general market for stone. The others with fairly high outputs like those of the Lancasheres (and Singers previously), Cromwell, Nowell, and Johnson and Pearce, were possibly master-mason builders.

The 1794 accounts show summer and winter production each year at Hawarden's Estate quarries, with total per year expressed both in the original perches, and derived, in tons of 20 cubic feet. Summer production was usually more than winter. In addition to the rental for the quarries, there was also a rental for Jon (sic) Godwin who had

a stable adjacent to a quarry, who was charged at £2.2s.2d. This may indicate Godwin was working the old Masons Crane House Quarry, which a plan in a deed of 1805 shows as having a stable at the south-west corner of the quarried area. (LL. A/91/18/5/17).

Underground quarrying areas are defined for the Allen Estate (Phase III) based on technology changes considered to be post-Allen Phase II, and by inference based on the leased areas agreed after the estate break-up (see table below). The 1799 Charlton map of Lyncombe and Widcombe (BRO copy) suggests there was then no quarrying taking place in the Greendown late Collibeas area off and to the west of Combe Road, though it very clearly shows the surface quarries a short distance away at Crossways and Entry Hill. Apart from the possibility of the underground quarry operated by Richard Jones and son in the 1760s, (Quarry 2398), and believed to have been accessed from the Jones Surface quarry (now Ralph Allen Yard), the granting of leases after 1803 suggests no other previous activity in Lyncombe and Widcombe. Similarly leases set for east of Combe Road, for the adjacent area in the Monkton Combe area of Byfield, and for the area between The Avenue and the Long Drung (East Firs), strongly suggest activity stopped with Allen's removal of the cranes and railway before his death.

The Layton and Hadley and other leases of the

Table 6.1 Underground stone quarries leased by the Lord Warburton, 1795-98

Areas quarried-out in (square) perches by individual quarrymasters and aggregate annual totals with conversion to tons of 20 cubic feet. It is assumed the workings were 5? yards (5 m) high.

<i>Ladyday to Ladyday</i>	1795-1796 <i>Summer + Winter</i>	1796-1797	1797-1798	1798/1799 <i>(half year)</i>	<i>Total</i>
Richard Singers	2.75+3.00	-	-	-	5.75
Richard Lankashere	-	4.75+3.00	2.50+2.25	1.75	14.25
Jas Lankesheer	3.00+2.50	3.00+1.50	2.00+3.00	1.75	7.00
Robert Simpkin	2.75+2.00	1.50+1.00	1.25+1.25	0.75	10.50
Peter Cromwell	4.50+ 2.75	1.50+3.00	0.25+2.50	0.75	15.25
Samuel Noel	2.50+1.50	2.00+0.50	1.25+1.00	1.50	10.23
William Hulance	2.25+1.50	2.00+0.00	0.25+0.00	0.75	6.75
William Popjoy	2.25+0.50	0.50+0.50	0.50+0.50	0.50	5.25
Jonathan Rudman	1.50+0.00	0.25+0.00	0.50+0.00	0.25	2.50
Joseph Smith	1.00+0.00	1.00+0.00	0.00+0.00	0.00	2.00
John Legg	3.75+1.25	0.50+0.00	0.00+0.00	0.00	5.50
Chas Godfrey	1.75+0.50	1.00+0.50	0.50+0.00	3.25	4.25
James Broom	1.25+1.00	1.50+0.50	0.25+0.25	0.00+0.00	4.75
Jon Godwin	2.50+1.00	0.75+0.00	0.50+1.50	1.00	7.25
William Johnston & Chris Pearce	3.25+2.00	3.00+2.00	0.50+0.00	0.00	10.75
Totals	54.50	5.75	22.50	9.00	121.75
Total tonnage at 20 cubic feet/ton.	7365	4831	3041	1216	16452

7.4 cubic perches = 1000 tons Source: SRO.DD/X/LA 12. Also Pollard (1994 p11) with modifications

first decade of the 19th century (see Fig. 4.2 and next section for detail) affected the Firs quarrying areas. The Allen Estate period (Phase III) workings here seem to have commenced work in a strip which ran across the whole Firs site to the Long Drung, and at that time must have been marked by shafts at surface close to their southern limit. This was from near the Firs Shaft (as called in the Stabilisation Scheme) northwards in the Central Firs area, and by a new cartway from the west side of Sheeps House Quarry in West Firs. It left behind two or three unworked areas south or east of Sheeps House which were worked later, but generally somewhat more than the southern half of the whole site had been worked by the end of Allen Estate (Phase III) times. The worked area extended to between 40 and 100 m from the North Road of today, from which the new leases were issued after 1800. It is not known what work was done east of the Long Drung in these years, but the level from near the Brow extends north into a similar area, for which the Greenway family were the most likely quarrymasters. Much the same line of new development was also leased out after 1800 in the western side of this area, within Byfield, though this seems to have been almost a half century after work previously stopped there in Allen's time.

Underground quarrying and Combe Down 1801 to c 1838

Introduction

The first years of the 19th century saw the break-up of the Hawarden Estate into several parts. By 1800 quarrying on the southern part of the Combe Down area had virtually ceased while underground quarrying in the whole central underground area south of North Road was largely completed by 1838. The area between Combe Road and The Avenue became the core of the modern settlement owned by the Hadley family in what was virtually a planned settlement. This period also saw the beginnings of a great transition from underground to surface quarrying and large areas became occupied for this purpose on the periphery of the older areas (see Chapter 4).

West of Combe Road

West of Combe Road, only a small portion of the ground leased by Harry Salmon (see Chapter 4 for the other parts) was worked underground. The northern of the four southern plots was quarried underground by William Hulonce, and contains the larger part of the workings west of Combe Road. Even so the western end of his plot to the boundary was worked from surface, as can be seen today beyond the remaining entrance to the stabilised West Byfield workings now used as a bat sanctuary. In 1818 Hulonce sold part of his plot (copy documents supplied by Richard Irving), an acre at

the western end including part of the extant underground to Daniel Byrne, and more to Sumsion later, whose portion on his death may have passed to Henry Street. Byrne's portion went through two changes of ownership before the remains of the surface quarry passed to James Byfield (1825), who left his name to the complex. His ownership too passed eventually to Henry Street in 1841. This multiple ownership explains the diversity of working methods seen underground, with at least three styles of operation in addition to any earlier working.

There is no doubt also that some working had taken place here long prior to 1805, since apophygate pillars have been found extending well into the area. It seems likely a cartway driven through these from the Jones Quarry entry to the north on the west side of the Combe Road Pillar was extended to facilitate the extraction from the area owned by Hulonce and, probably, two wide shafts, one in the William IV yard, belong either to the current phase (IV) or to the previous Allen Estate Phase III.

To facilitate underground working of the northernmost area an arched declined entry was driven in, to the rear of Tor View. It appears that it left just enough room to allow cart access to Rockhall Lane. (Professor Irving of Tor View has evidence the adjacent brewery (Hines Brewery at the William IV pub – Bone 2000, 42) used this entry via a track coming up against the back of his house: this was probably Hulonce's original route to the incline). The incline encountered bad ground at the bottom end, causing walls to be constructed and narrowing the access, so cannot have ever been as effective as was clearly intended by the size of its construction. From the base of the incline the workings extend to the still open (but gated entry) area into what is now the preserved bat area. A shaft was sunk at the back of the workings, in addition to that in the William IV yard, so in all this small area had the choice of some five entries. Whether all were used to draw out stone in this phase is not clear, but it remains a possibility, the surface being close with each owner using the nearest exit and making another if considered necessary (Case Study 7 in Chapter 12).

John Scrace worked part of his northern lease underground – in the area extending from a few metres south of the turnpike (thus excluding the roadside buildings from undermining) approximately to the modern service road off Combe Road to the western entrance of the Hulonce workings. It is possible the entry was from his or his neighbours adjacent surface quarry section since links with the southern workings of Central and East Byfield would not then have been established. The reason for underground working was probably the ground conditions, as in the northern section Scrace met a cockle bed (bearing calcitic vugs) of 1.0 to 1.5 m thickness, as revealed by underground boreholes, which caused him to work on two levels, leaving the useless cockle bed intact. This was a costly way

of working for a limited height of stone, and in the Stabilisation Scheme it was found to be very unstable as the pillars appear to have been slightly misaligned. It is also likely that work by another freemason took place at the south end of this section (under the service road) since the style of quarrying in a small area there was very distinctively neat (Case Study 8 in Chapter 12).

Underground quarrying under the Hadley Estate east of Combe Road

As has been described earlier, the Hadley family gained lands in Combe Down (and elsewhere in Bath) about 1808 from the estate of Edward Layton. Layton had purchased them from Benjamin Wingrove, who had acquired the central area of Combe Down from the Thomas Viscount Hawarden's Estate.

The Hadley papers, in the Archives at Lewisham Library (LL.A91/18/—), have agreements relating especially to the quarrying of the 'understratum' of the land under the area between the Avenue and Combe Road (then Combe Lane) and on the south to what is now Combe and Church Roads. They enable a glimpse of the quarrymasters and their terms of working between about 1804 and 1815, with two substantially later agreements.

The agreements, or memorandum of agreements were probably drawn up by Jonathon Cruse, a Bath Land Surveyor. From about 1802 until 1804 a Jeremiah Cruse (possibly his father) was in partnership with William Smith, the geologist, as Smith and Cruse, at Trimbridge Street, Bath (Winchester 2001, 200). Jonathon Cruse, on his own or on behalf of the partnership, seems to have acted as agent, first for Layton, then Hadley. If so it seems likely that Cruse was not initially well acquainted with mining and quarrying leases as the early ones were particularly naïve. Successive leases gradually acquire additional conditions for which the most obvious source would have been Smith. Though accustomed to acting as surveyor on large estates, Smith was often away on his travels, which may have left the business without his continuous advice.

Mining and quarrying leases were essentially designed to protect the interests of the landlord. Broadly the landlord would wish to include some aspect of at least the following stipulations:

- The limits of the area to be worked and the type and quantity of stone (or mineral) to be worked within it and the period for which the lease was to run
- To ensure that the material extracted can be measured to allow payment and when, and to specify the price (royalty) to be placed on the material extracted, and what, if any, allowances might be made against the payment
- To ensure the income stream is maintained an entry fine might be levied and periodic,

certain payments demanded whether material is extracted or not, and minimum levels of output required with penalties if this is not reached

- Specified minimum levels of employment and/or work to be carried out
- Payment of taxes and other expenditure incurred as a result of the lease are specified
- Penalties, notably recovery of debt from assets on the premises and personal effects of the tenant, voiding of the lease and return of the premises to the landlord if these above or other conditions are not met
- Provision for arbitration in case of dispute or to establish any allowable compensation to the tenant or landlord
- To protect the landlords' interest in continued working after the termination of a tenancy, and to protect the surface above from damage (other than expressly permitted in the lease)
- To prevent the lessee passing on his lease to another, without the consent of the landlord
- To specify the working methods to be used so as to protect future working, access and roof support and that of the surface
- To ensure access for the landlord or his agent without notice so as to ensure conditions of the lease are being kept

Other terms, especially for surface quarries would include the condition the surface would be left in – where it would bear on the infilling or conditions of the shaft top (*Bainbridge's Law of Mines and Minerals* (Brown 1900, Chapter 10; Appendix C).

Before the effective external control provided by late 19th-century Mines and Quarries Acts, the character of the lease and the inspections carried out by the landlord or his agent were also important in helping determine safe working conditions for underground workers.

The perch used in the leases for both linear and superficial perches of 5.5 yards and 5.5 yards square respectively (5.5 yards is almost exactly 5 m) with 40 perches to the rood and four roods to the acre. There are thus 160 perches to the acre.

Edward Layton died about 1807-1808 and his estate was inherited by his nephew Nathaniel Hadley of Lewisham in Kent, so after that date the leases are drawn up for the latter by the local surveyor or land agent. See Figure 4.2 for a plan of the quarry leases and Table below.

The first agreement was made on the 10th of May 1804 (LL. A91/18/5/25), when Edward Layton, now described as of Bath, let Samuel and John Pearce the understratum of the land adjacent to Combe Road. This was the land transferred by Salmon. It was described as one perch wide and forty perches long, extending south from the Turnpike and adjoining, eastwards, the adjacent quarry already occupied by Joseph Lankesheer. No lease seems to be available for this supposed

Table 6.2: Early 19th-century quarries and leases on Greendown, Combe Down (LL.A91/18/5/25 to 35) (see Fig. 4.2 for plan of locations)

Quarry leases sold by Harry Salmon in Lyncombe and Widcombe's Quarr Down west of Combe Road (Irving 2005).				
<i>Quarrymaster</i>	<i>No.</i>	<i>Date</i>	<i>Size</i>	
Samuel Nowel	1	1805	NK	Worked as a surface quarry
Jonathon Rudman	2	1805	NK	Worked mainly as a surface quarry. He died 1807 and his widow Sophia took over as quarrymaster, 1807-33
William Hulonce	3	26 Aug 1805	NK	Quarry worked mainly underground except at western end. One acre at the west end of the plot (including the west underground section) was taken over in 1818 by Patrick Byrne. Part also was sold to Abraham Sumsion in 1807 and presumably to Street after 1809. Byrnes portion sold (indirectly) to James Byfield in 1825, Richard Lankasheer, 1841 and Street just after.
Henry Street	4	1805	NK	Worked as a surface quarry. Son Henry took over in 1814, retired 1851
Henry Street	5	1805	NK	Worked as a surface quarry. Son Henry took over in 1814, retired 1851. Passed to Phillip Nowell.
Abraham Sumsion	6	1805	NK	Worked as a surface quarry. He died 1809 and quarry sold to Street
John Scrace	7	1805	NK	Worked underground at the northern end on two levels. Shared crane with Sumsion in surface quarry
Quarry leases let by Edward Layton and Nathaniel Hadley (LL. A/90/18/5/25-28) between Combe Road and The Avenue, Monkton Combe.				
Samuel Pearce and John Pearce	8	10 May 1804	1 rood	Strip along the east side of the new Combe Road Wall
Samuel Pearce and John Pearce	9	15 May 1804	about 1? acres	Lease not available. This and the above quarry were taken over by Isaac Sumsion on 24 Sept 1808
Richard Lankasheer	10	15 May 1804	1? acres	The cartway and line of shafts run from the Rockhall entries almost to the Turnpike serving the adjacent quarries too.
Samuel Pearce Jun	11	15 May 1804	NK	Largely unreadable. later occupied by John Davidge and Abraham Sumsion with a moiety each
Ann Godwin	12	15 May 1804	1? acres	Widow of Jonathon Godwin. Originally drawn up for Richard Lankasheer, to whom it reverted if Godwin failed. Taken over by William Harold (by 1811) and on 1 Nov 1816 by Job Salter
Samuel Pearce and John Pearce	13	NK but by 1804	NK	Involved the ground on the north and north-east sides of Sheeps House Quarry. Largely worked-out.
John Greenway	14	22 Nov 1804	2 acres	Area to east of line perpendicular from Turnpike at Farris Lane ranging south. Already much worked.
John Greenway	15	26 Sep 1808	4 acres	This took the leased area in (14) across to opposite the Prior Park gates, and included the two acre quarry (14) above. It later became part of John Burgess' Three Acre Quarry
John Davidge	16	7 March 1827	1 acre 3 roods and 23 perches	In the semicircle just north of the southern curve of Combe Road
Combe Park Leases (Pollard 1994)				
Richard Lankasheer	17	17 Dec 1856.	Combe Park	Payment by the superficial yard
Andrew Greenaway	18	17 Nov 1809	? acre	Wingrove lease to Greenaway, passed to John Burgess in 1813.
Andrew Greenaway	19	1809	? acre	Mrs Drinkwater to Greenaway. Passed to John Burgess in 1814
John Burgess	20	1821		Bought and sold almost immediately, probably retaining underground rights
Main Firs Field Quarry Three Acre Quarry.				
John Burgess	21	October 1809	3 acres	Quarry ground advertised and sold to Burgess. Remnant unworked area of Greenway's 4 acres. No. 14
John Burgess	22	ND but c 1809	Approx 1 acre	John Houlton, c 1809 to Greenway and subsequently to Burgess.

Notes

John Greenway also leased part of the Sheeps House (surface) quarry area, in front of the two Allen entries for 99 years (LL. A91/18/5/30) presumably to secure level access to the underground quarries he bought or leased.

Abraham Sumsion was also quarrying at Lodge Style, Isaac Sumsion at Mount Pleasant and Mr Bennet was involved at Entry Hill.

Lankesheer quarry and, in fact the Lankasheer Quarry is later shown to be further away and the Pearces had altogether about two acres of reserves, with the ownership clear from other leases. The lessees could quarry and take away the blockstone and could use the same entry as Lankasheer, which was the eastern of the old Rockhall Lane entries south of Combe Road, which eventually ran north almost to the Turnpike. The Pearces' perch-wide holding had its own entry from Rockhall Lane, the west-side cartway running up the east side of Combe Road and under the old Telephone Exchange, now a church, but its usefulness had ended before the end of the Allen period because of instability. The quarrying was to be up to six inches inside the newly made wall, but not to go under it (which partly explains why the Combe Road pillar has been left at least for part of its length). Work was to commence the following Ladyday (March 23) and they were to pay three guineas a superficial perch (of $5\frac{1}{2}$ by $5\frac{1}{2}$ yards or 5×5 m) – and no height limits were imposed. The workings would be measured by a competent surveyor, the Pearces would be barred entry if the rent was not paid and they had to sign a performance bond.

Commentary on the Hadley leases

This earliest of the Hadley leases (Samuel and John Pearce 1804) described the area involved, price of material from the 'understratum' extracted by superficial measurement (in the roof presumably, as the floors would have been obscured by spoil by time of survey) in addition to the dates on which it became due, and the termination as when the furthest boundary (the Turnpike, now North Road) was reached. There was provision for a surveyor to measure the stone extracted. The working conditions were limited to specifying the entry and underground level (ie cartway) and a requirement to support the surface and for the precise position of the Combe Road boundary. A performance bond, and reversion of the lease and barring of entry to the workings to the lessees if payment was not made were the only compliance conditions. Probably the landlord relied on custom and practice for his protection, but unfortunately we do not have earlier leases extant to compare. Undoubtedly, it was a minimal kind of lease, placing much on trust.

The lease for the larger, adjacent part of the two Pearce's quarry is not extant but it seems likely it would have been similar to those granted to Richard Lankesheer, Samuel Pearce the Younger and to Ann Godwin on the same date, 10 May 1804 (A91/18/5/26-28), less than a week later, on which the two Pearces' holding is shown on the plans. If so, the price was higher, £3.13s.6d against three guineas per superficial perch levied earlier. In each of the extant leases a light hole, or shaft was to be permitted of a specified size (14 feet diameter) and place at the tenants' expense, and spoil had to be removed. There was a somewhat grudging conces-

sion that more could be sunk 'if absolutely necessary', and there was provision for compensation if a gully, that is bad ground, had to be unprofitably worked through, and provision for arbitration. Work was to be done without delay or cessation and with all possible diligence and present roads to, and levels in the quarries, were not to be stopped. In the case of Ann Godwin, who was presumably the widow of Jonathon Godwin who had been a quarrymaster in 1795-98 under Viscount Hawarden, there was a condition that should she fail, then the quarry would be let to Richard Lankesheer, though for others the leases could not be passed on and there were provisions to cover non payment of the rent. In Lankesheers's lease Godwin had been substituted for him, but the succession of plans show ownership was as set out in the table and on the plan. Possibly Godwin's husband had had an earlier lease she intended to continue, or she was receiving help from her husband's previous quarrying colleague. Lankasheer was certainly one of the 1795-98 lessees, and perhaps pressure had been brought to bear on Layton the owner. There was also an arrangement for Godwin and the younger Pearce to share in the costs and benefits of driving an entrance and level into their two quarries.

This set of leases, plus that of the residual semicircular area to the south, bordered by the curve of Combe Road and let to John Davidge in 1827 (No. 16 on Figure 4.2 and in Table 6.2), took in all the ground bought from Salmon across to the boundary line running from the Turnpike south of Stonehouse Lane. Most of it was previously only quarried in the southern part, the Davidge quarry perhaps exploiting an unworked block most distant from the Rock Lane entries (probably Quarry 520 and/or 912).

From the above line, the area across to The Avenue and to opposite the Prior Park Lodge Gates (to where the Hadley Arms now stand), had been very much worked in its southern part, from the entries in Sheep's House Quarry, both from the two original Allen entries, and from a third on the west side, shown as extending in 120 feet northward by 1804. This western side entry appears to have been leased to Samuel and John Pearce (who are described as being west of Greenway and shown on his plan as so), and probably there was still considerable stone left unworked in the northern area up to the Turnpike (No. 11 on Figure 4.2 and Table 6.2), and likely to be attributable to Quarry 2342. The western Allen entry cartway had reached not far short of the Turnpike and had turned to the east in parallel with the Turnpike, at the southern edge of Quarry 2213, and the east Allen entry, from the archaeology below ground, would have been some way past the main Firs Shaft used on the Stabilisation Scheme and there were probably workings extending between them.

Greenway took a 99-year lease on the entrance area of Sheep's House Quarry in front of the two

older entries, presumably to secure his access point and in 1804 took a two acre lease south of Farris' Lane served by the two older Allen entries, which was stated as having much previously worked ground. Four years later, he negotiated a further lease with Hadley, which incorporated the earlier lease, as was described as being about four acres, to opposite the Prior Park Lodge gates. With this, all the area between Combe Road and The Avenue was covered by these leases.

The terms of the first Greenway lease were essentially the same as for the others except that firstly, the landlord reserved the right to enter and examine the workings at any time, 'without hindrance, molestation or intimidation'. Possibly this was the result of a bad experience in the previous half year, if so probably by the surveyor and agent, Jonathon Cruse of Bath. Secondly, that as a great proportion had been worked previously, Greenway was forbidden to pick or reduce in size any pillars remaining in such areas, which were to be left standing without any alteration whatever. There is, in the recent archaeological recording, plenty of evidence that such 'reworking', often by use of saws, was common in previous workings hereabouts and again this provision was probably the result of recent experience. The use of saws underground at this time, from the positions in which cuts have been found, was probably innovative, although the landlord's concern was probably that he did not receive royalty on stone recovered from workings previously measured. Another possible change of working method (perhaps only as used in the other leased quarries), may just be indicated by a further provision, that removal of the blockstone by 'horse, cart, wagon or carriage' was permitted. This may indicate a proposal to use either horse transport or a rope-hauled system along the cartway. Evidence for rope haulage has been found in workings of this phase, though the practice was also used previously in workings probably of Allen's time.

Other evidence shows that a possible relative of John Greenway, Andrew Greenaway, who was also a mason in Walcot, Bath, was also accumulating quarrying rights in the adjacent area of the land between the Avenue and the Long Drung, the two of them possibly intending to sell them on. For the first time, perhaps significantly in view of the consolidations later, Hadley in the second lease imposed the condition that at least six perches of land were to be worked annually.

In 1808 there is also the first documentation of transfer of a lease (though another transfer prior to this is known, of Ann Godwin's to William Harrold). In this case Samuel and John Pearce's lease at the edge of Combe Road was passed to Abraham Sumsion (A91/18/5/31) whose family, from archaeological evidence (graffiti) and documentary evidence (Irving 2005; Addison 1998, Pollard pers. comm.), date back at least to 1750 (GRO. D2700/QP3/4/4) and forwards to after 1900.

From the mid 19th century they became one of the more prominent quarrying families in the Combe Down area. In 1811 the quarry leased by Samuel Pearce Junior (No. 11 on Figure 4.2 and in Table 6.2) was also re-leased. It became held in two moieties (normally two undivided halves, but the plan shows Davidge holding the north-eastern half – Quarry 514), by Abraham Sumsion and John Davidge. The latter was also a long-time Combe Down quarrymaster for whom Davidges Bottom at Rock Lane would be named (for the area where he had a brewhouse and Public House. The 'lightholes' – as the wide shafts were sometimes known – in the lease were obviously by then considered normal, but a new provision was that they should be fenced.

In the 1827 John Davidge lease for the semi-circular area he took effectively was the final major lease available in the Combe Road, Church Road and The Avenue – bounded area. It was an isolated block of unworked ground which was reached from the entries on the west side of Sheeps House Quarry by going south. Even after he finished work there, probably in Quarry 520, a small block within it was left unexploited until the end of the century (the later James Riddle's Quarry – no. 518). The price of any stone extracted had risen from the £3.13s.6d of the previous leases (bar the first) to £8.16s.0d per superficial perch – a very substantial change indeed.

The final lease, of 1856 to Richard Lankasheer, was for an area beneath Combe Park which is between The Avenue and the Long Drung and which would by then probably largely be worked out. This was perhaps the reason for pricing the stone produced, for the first time, by the superficial yard rather than the perch, which would be more suitable for reworking small areas such as large pillars. The rate of three shillings and sixpence was equivalent to around £5 5s 10¹/₂d per superficial perch, a substantially lower price than in 1827, perhaps due to competition from the large Wiltshire quarries but, possible also, because of the dispersed nature of reworking or scavenging from old pillars (if that was what in fact taking place). The lease also specified a certain rent of ten pounds a year (a minimum rent regardless of production though otherwise the rent was based on production), with penalties if sufficient stone had not been cut, at three shillings and sixpence, to cover the half-year rent.

What effect might more carefully drawn-up leases have had, especially in the early cases? The obvious omissions are indicated by the additional clauses inserted in the leases as time went on. Some of these were very likely to indicate the learning curves of both landlords and their agent/surveyor in letting underground leases. The simpler leases were, perhaps a legacy of estate working under the Allen Estate and Hawarden resulting from letting, after Allen's death in 1764 to men who were likely to have been his trusted quarrymen previously, working to similar custom and practice. As new

men came in, this would have proved less satisfactory, though the informal system had the possible advantage of permitting easy low-cost entry to quarrymasters, which might not have been possible (and thus disadvantageous to the landlord too in difficult times) with a more developed system with such impediments as entry fines and certain rents.

Not specifying the price or royalty of the stone quarried was an obvious defect, though perhaps less obvious before the inflation of the Napoleonic War years. Pollard has noted how the price of block-stone, seven shillings a ton, was the same in the early years of the 19th century as it had been in the 1730s. However he also notes that by the early 19th century some quarries, at least, were quoting 16 rather than 20 cubic feet to the ton (Pollard, pers comm.). There may thus be a hidden price increase. By pricing the stone got by the superficial perch, in combination of a time limit on working expressed only by the reaching the limit of the leased area (as opposed to a fixed and shorter lease period), the chance was lost to elevate the price when conditions permitted. Leases for an acre or so might well last for 25 years or more. The much higher royalty realised by the landlord in the 1827 lease illustrates how important this might have been to the landlord.

A further major potential defect was the lack of control (and thus pricing), over what the 'understratum' actually meant. It is not possible to be precise, but the working at that time had previously only exploited some five metres (and at times possibly less) of freestone, of which up to a metre might be the roof bed which was discarded either to give headroom or because of lower quality. Presumably this was the customary working height. However, by the 1820s, in Burgess' 'Three Acre' quarry particularly, up to some 7-8 m came to be worked, vastly increasing the amount of stone with far less than proportionate extra extraction costs, on long-held leases for the same royalty.

The requirements for supporting the roof and the surface above seem to have been satisfactory in practice. Despite modern health and safety concern at roof conditions and stability, after nearly two centuries of post-working stresses very little surface actually appears to have been let down. However had lessees decided, as they could under the terms, to work down to or even in the underlying Fullers Earth, at a depth from surface of only 20-25 m (working of the latter was later carried out at Odd Down and in the even closer Horsecombe), then short term stability during the actual leased period might have been followed, at the landlord's later expense, by substantial long term surface subsidence.

East of the Avenue and John Burgess' triangular 'Three Acre' Quarry

This section is a development of work done previously by Pollard (1994, 15-18). The Hawarden Trustees in 1805 conveyed the area east of the

Avenue to the Long Drung to Benjamin Wingrove. While the above accumulation of leases was being developed by John Greenway, on the other side of The Avenue, Andrew Greenaway was also taking control of leases. On 17th November 1809 Wingrove leased to him for 29 years the right to quarry a triangular area of a quarter acre at the apex between the Long Drung and The Avenue. Greenaway agreed to drive a 'subterranean road or way' in a straight line from the mouth of his own quarry which was located on the Poor Tynning, just east of the Long Drung. It was to go across Combe Park to the 'rock head of stone lying under Firs Field'. The purpose was to convey away the stone belonging to the devisees of Edward Layton (Hadley), to be completed within ten years. Examination of the area near to the Long Drung and Greenaway's entry (perhaps the Brow Cartway which may have been owned by the family since Milo Smith's time) in the archaeological survey could find little trace of any such cartway in Quarry 2330, and it was probably agreed to simply to secure the lease; ten years was a long time, and the lease may have been part of a consolidation to be sold on (as in fact happened) and, in the event wide shafts were sunk in the target area anyway, making the idea of using a very long cartway entirely redundant.

In 1809 also Greenaway bought the adjacent $\frac{1}{2}$ acre adjacent to the earlier small purchase of $\frac{1}{2}$ acre at the top of the Long Drung, in between the Drung and Tynning Road, from Mrs Drinkwater: it seems likely from these two small remnants that the Combe Park and southern part of the Poor Tynning were largely worked out (Nos. 17 and 18 on Figure 4.2 and Table 6.2). In 1813 and 1814 the leases were assigned to John Burgess and in 1821 by default of an alternative buyer, Burgess was able to purchase the whole of Combe Park. He sold it very soon after (it passed, somehow, to the Hadley Estate), but it is extremely likely that he retained the right to quarry, rework and – possibly most important to him – use the previously worked ground to dump his spoil. The archaeological survey found considerable evidence of both reworking by sawing ashlar off pillars, and dumping of waste southwards using barrow-ways from the Burgess workings.

In October 1809 too, three acres of quarry ground upon Combe Down were advertised for sale 'at very reasonable terms'. This seems to have been the larger part (and, presumably, the unworked part) of the triangle of land between the Turnpike and The Avenue (No.14 on Figure 4.2 and in Table 6.2 – Quarry 2211), owned by Hadley and occupied by John Greenway. Whether Greenway and Greenaway were in cahoots, or if Hadley forced Greenway to terminate his lease (perhaps because of low production), this quarry too passed to Burgess. A combination of area calculation and archaeology makes it highly probable this three acres was unworked ground north east of a long boundary pillar about 50m east of the (Stabilisation Scheme) Firs Shaft, enclosing the ground from there to the

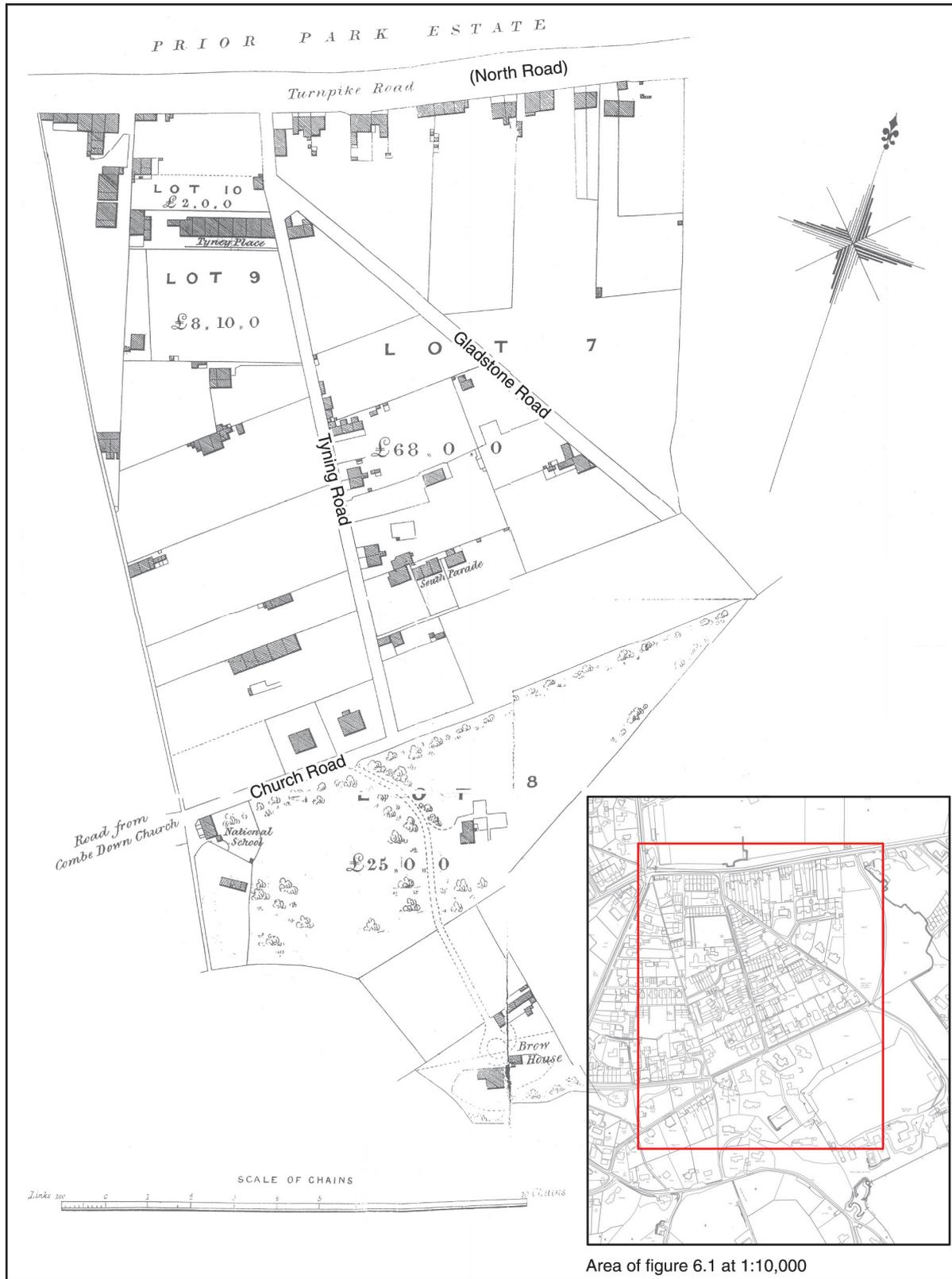


Fig. 6.1 Cotterill's plan of the area of Combe Down east of the Long Drung, with Tynning Road and Gladstone Road and the Brow in 1845. The plots for lease included the use of the stone beneath them (BRO)

apex opposite the Prior Park Lodge. The boundary shown (see Figure 4.2) avoids a later quarry operated by William Stennard at the north-west corner of Greenway's triangle, while part of his south-west corner had probably already been worked. Burgess and his son Harry appear to have worked this quarry through to the area beyond the Long Drung, apart from a substantial pillar left near the Turnpike road.

Burgess worked there, presumably to near his death in 1835, followed by his son Harry until the lease ran out in 1838. Previously John Burgess had been surface-quarrying behind the east end of the de Montalt Row and behind what later became Hopecote. It is clear that this quarry was either too small and/or was insufficient to supply what appears to have been a substantial market, including the Devizes Prison. It is shown as disused on the 1851 Tithe Survey, and was accessed from the 'Road to the quarries' alongside Claremont on Church Road. The move by him to underground quarrying, at a time when many others were beginning to work at surface was probably clinched by the leasing to him of three acres (leading to it being called by the archaeologists as the Three Acre Quarry) from Hadley or John Greenway.

The area involved in the Three Acre Quarry (2211) forms the largest single quarry underground at Combe Down, and has the appearance of being the best and most thoroughly worked with the greatest heights of stone removed comparable with anywhere else in the underground workings. Possibly Burgess had the highest output also, of any single quarry, surface or underground there. In production within the central area of Combe Down he was rivalled by Henry Street's surface quarry west of Combe Road, and underground output overall must have been greatly exceeded by surface working in the proto-parish as a whole.

Workings east of the Long Drung

In comparison to further west, very little is known about this area in documentary sources. A long cartway from the area later to become the house and grounds known as the Brow has a long cartway of rather different characteristics to those driven for Allen. The apophygated pillars along the entire cartway length through Quarry 2339 and 2350, suggest the cartway was begun at an early date. The most likely quarrymen for this were the Greenway family, one of whom was somewhere there in 1730 and another, who took the lease including the agreement to drive from the Poor Tynning to Firs Field, about 1810. This suggests the area known as the Poor Tynning, just east of the Long Drung was largely worked out, except for the piece owned by Mrs Drinkwater (née Houlton) at the top. Further east however there were number of quarries, most of them small and most of them apparently 19th century in date, working to about the end of the century.

The Poor Tynning had belonged before 1809 to the Houlton family and apart from that portion above, it passed to John Houlton of Farleigh Castle, and in 1825 he conveyed it to John Ovens Thomas of Prior Park (who had bought Prior Park after the death of the second Lord Hawarden in 1807). Thomas engaged Henry Fowler Cotterill to survey the site, then a farm, and to lay out private carriage roads, Tynning Road and Gladstone Road, obviously preparatory to development. Using 1000-year leases, the southern end, in 1828, was leased to Brow House (a large house with a fine outlook which would gain a premium price). The central part, of over 17 acres, went to Cotterill in 1830, including the freestone underground with rights to dig etc, and in 1831 and 1832 Tyney Place and land adjoining went to Jacob Wherret and Thomas Greenham respectively. Cotterill sub-divided his purchase into building lots and in 1835, for example, sold two houses built on an acre plot under 'which is an excellent freestone for building, with a well with an excellent supply of water'.

Thomas' leases paid a ground rent (£8 per annum in the case above), and in 1845 the ground rents of the properties were sold, for the Thomas devisees, by Cotterill. The plan of the area he produced (Fig. 6.1) showed some 50 houses had been built in the area between the Long Drung and The Lawns (BRO. 313). The properties gave opportunity for a number of quarrymen to secure their own quarries within their own boundaries, or to lease the stone from others which is very much reflected in the diversity of small quarries found under the area. Pollard (1994) on which the above is largely based, identified three such sales, including to Frederick Cross in 1831, mason: one acre in the fork between Tynning and Gladstone Roads 'and all stone quarries mines and minerals for 990 years' (possibly part of Quarry 2397); Harry Burgess of Combe Down, Quarryman also in 1831; and James Ford, Quarryman in 1840 – a plot 328 feet by 68 feet and the stone etc. He built two cottages there, now known as Richardson Place, and possibly part of Quarry 2351. John Davidge was also a purchaser but quarries were not mentioned.

Output of stone in the early 19th-century quarries

An acre of stone worked underground of 160 perches and 5 m high will weigh about 50,000 tons gross, and pro rata for other thicknesses. Taking the Three Acre Quarry as an example, perhaps 6 m high or more, it would thus gross some 180,000 tons less a 10% reduction for pillars left in place. Of the remainder only about 60% would be blockstone or other saleable stone, so in this case then the net output would be some 97,200 tons over some thirty years or about 3250 tons per year. A little higher yield is possible due to the greater height of at least of some of the stone worked. At this rate, the quarries, both west and east of Combe Road and as far as the Three Acres, might thus together produce some 10,000 tons as an annual average. Given that

some years in the first third of the 19th century were particularly difficult, a maximum output of some 20,000 tons annually could have been possible. This is much the same as was possible for Allen's time, but there were at this time also substantial quarries in Combe Down north of North Road, and at Entry Hill, in Prior Park and Claverton nearby, at Kingham and Vinegar Down and near Lodge Style and Mount Pleasant. These were mainly surface quarries with less loss of stone (a little over 10% perhaps is likely) than for underground quarrying. Overall output capacity must thus have been at least double that enumerated above, possibly treble, in the early decades of the 19th century.

For the landlord this meant, in cash terms per acre, a gross revenue of 90% of 160 perches at £3.13s.6d a superficial perch, about £530. For the quarrymaster, per acre gross revenue, from 5 m-high workings at 14 shillings a ton (the price delivered at the Navigation in 1808), the yield is £18,900 and in workings 7 m high, up to £26,450. Thus on an annual basis, at the six perches minimum eventually demanded per year in the later leases, the landlord's income would be about £22.1s.0d per quarrymaster, and a one acre quarry would last some 24 years. The quarrymaster's gross revenue would be about £709, or in 7 m workings, about £992. Surface workings would gain at least 10% on this by not having to leave pillars, and there would be greater ease in extracting more blocks without breakage. The landlord would, of course, suffer surface damage, but, two centuries later, the surface worked ground would not need expensive stabilisation.

These rather modest returns demonstrate the problem to the landlord of having a large number of small lessees, creating substantial administration costs. A smaller number of larger producers with minimum output levels set to reflect the amount of land leased would probably be a more favourable situation. In the case of Burgess and his Three Acre working, it works out that he extracted about 16 perches annually over the thirty years. By his time the rent had risen. This would yield a rent of £58.8s.0d annually to the landlord and £2275 to Burgess for stone delivered to the Navigation or Kennet and Avon Canal. We have no idea of the level of profitability for the quarrymaster.

In the leases granted discussed above, only the later ones had a minimum stipulated output (six perches), and the turnover of lessees suggest that outputs were probably generally no higher than the six on average so landlord income was, at the lower level of expectation with eight leases, possibly no higher than around £170 gross. Developments after 1810, and the consolidation under Burgess and his probable wider market via the Kennet and Avon Canal suggests he had the potential to make a substantial contribution to the Hadley Estate. It was probably achieved, but at the levels of return shown above, the interest in property speculation, for other than or as well as quarrying, is easy to appreciate.

Working practices and areas involved

Layton and Hadley's leases generally directed that existing entries should be used where possible for the workings in the leases north of Combe and Church Roads and from the Sheeps House Quarry, allowing only one or two new entries at the latter which were within the same area as earlier. In two instances adjacent quarries were to use the same entries, an obvious economy imposed by the landlord. They were somewhat grudging about allowing shafts to be sunk and overall this probably suggests that an important concern to them was to protect the surface as far as possible from being affected by underground working. But, by being stipulated, it forced quarrymasters to rationalise their infrastructure and keep costs down, all of which would assist in their survival as tenants or lessees. Nevertheless, the line of shafts between Combe and North Roads in the Central Byfield area and one or two others on the eastern side, and the line of four shafts again from Firs shaft to the Hadley Arms and at least one beyond, suggests that regardless of the levels, the great bulk of stone was drawn out vertically. The exception may have been the largest blocks brought out from the western side, which might have been too heavy for the winding mechanism.

The proposed Greenaway long level was an unlikely venture to have been successful, as it would have had to be driven a long distance through old workings without the possibility of working stone en route. When he inherited the Greenway titles Burgess certainly used shafts for hauling stone out of the workings, and it is likely that other operators with 'light shafts' did similarly, in some cases (as the archaeology showed) using 'down-the-shaft' cable haulage to get the stone to the shaft bottom. It did not prove possible in the archaeological survey to locate any long section of cartway which may have been Greenaway's in the relevant area.

The plans with the leases (summarised on Fig. 4.2 and in Table 6.2) show that the Pearce's and Lankesheer's quarries used the old entries at Rockhall Lane. Already in 1804 the Lankesheer entry is shown as extended to the quarry south boundary, but only the starting point of the Pearce's entry is indicated; it had reached the quarry by 1808. In the case of the Godwin's and John Pearce the Younger's quarries, they were to drive a new joint entry and level, sharing costs and value of any stone sold en route, from just south and west of what today are the Rock Cottages, the surface entry-roads of which joined and curved to come to the general road level up Rock Lane. The route of the Godwin level underground is not clear, though presumably it communicated with two apparent light shafts shown on the plans, one near the southern boundary, the other at what is now Westerleigh Road. In Pearce's quarry the underground level is shown running west then

sharply north, to communicate with a (probable) light shaft some 90 m from the southern boundary at the west side of the north branch of the Westerleigh Road.

The two leases granted to Greenway in 1804 and 1808 (and thus probably Burgess later), had an entry, probably used the western of Allen's original two parallel entries from Sheeps House Quarry, which by then had to pass through extensive areas of earlier working, to not far short of the Turnpike boundary. It was developed in a straight line just west of north for about 125 m, then turned north-east for a distance of about 30 m, at the southern limit of Quarry 2213. Firs Shaft is some 20 m south of this. It is known from the archaeology to have met bad ground at the turning point, which probably caused the Allen Estate lessee to give up working further, but generally indicates the extent reached by 1800. The eastern of the Allen entries is also indicated on the 1808 Greenway Quarry plan, but without inside details. Since the last apparent use of this (based on the archaeological survey) was to connect by an eastwardly branch, it is possible this entry was in use for another area, most likely Quarry 2202. This may have started in the current period, but continued (on evidence of graffiti referring to the Hadley Arms, for a decade or so after 1838 at least. It is not known who operated this quarry, or the earlier quarry linked to it under Gay Staith to its south, 2340.

In 1804 Greenway was banned from picking or cutting into pillars in worked-out areas entirely, suggesting that the practice was common. If so it may have added a substantial extra amount of revenue to those quarrymasters close to older workings and (literally) prepared to cut corners. Although on each measuring day the surveyor would have little difficulty in monitoring the current workings, it would have been difficult indeed to check the maze of the older workings, so there was little risk of discovery. As observed in the underground survey the practice of working old pillars was widespread.

There is little information in the plans on underground boundaries, though archaeological investigation suggests these were often kept in the form of more-or-less continuous pillars. The only specific example in the leases is the Combe Road Pillar, whose position was carefully specified underground in the two Pearces' quarry, (no. 11 on Figure 4.2 and in Table 6.2). Underground the pillar was an obvious feature in the southern older workings (Quarry 505), and also appeared, less regularly, in the north (Quarry 507). It was hard however to distinguish in the central area at the south end of their quarry where work no doubt commenced in 1804, so the provision in the lease was presumably largely ignored.

No provisions was made in the leases about how cartways were to be laid out, or their size, except that they were not to be closed or obstructed, and the only issue in relation to them was that horses,

carts, wagons, and carriages could be used. Only slight traces of the use of horses were found, although wheel ruts were fairly common. The term 'carriages' may however refer to the flanged wheel vehicles running on wooden rails, or may alternatively, as a somewhat strange technical term, refer to the use of cable-hauled vehicles, since their use was apparent in the west Central area of Byfield (Quarry 514), drawing over 40 m without evidence of rails, from a small dock formed of low walls, back to a shaft.

The sales and leases of quarries and other documents also tell us a little about the surface quarrying methods. West of Combe Road, Irving (2006) suggests that Nowell, on the southern outcrop of the Oolite, was the most fortunate in having the minimum overburden to remove. However as already noted, the overburden was fairly thin north of the underground workings owned by Hulonce. It diminished to around a metre in the area on Combe Road near the old Telephone Exchange (now a church nursery), making the cartway alongside the east side of Combe Road unsafe for use and causing the Pearces to share the eastern one of the old Allen cartways with Lankasheer. Removing this thin layer was obviously likely to be the most advantageous way of working. In other cases substantial amounts of overburden needed removal to allow the freestone to be worked economically, even if some return could be made for selling some of the Twinhoe Beds which could be used for specific uses, as Allen had found in the mid 18th century.

One fairly major purchaser of stone in 1808 was Westminster Abbey, for the Henry VII Chapel (Cottingham 1822, 10-12). Their mason Thomas Gayfere was authorised to visit quarries and report on useful stone – 'The finest were in the quarries of Samuel Pearce or for long and large blocks, the quarries of Mrs Radman and Samuel Newell.'

Despite misspellings of names, these are clearly the adjacent quarries east and west of Combe Road. The Abbey ordered 150 tons of stone from Samuel Pearce, to be delivered 'well and properly squared', on the quay at Bath at 14 shillings a ton by the 17th of March 1808 (note the doubling of price in the last decade or so). It reached the Bristol quay by May or June, but no boat was found to take it to London until December and it was then lost off Portland. Other stone was eventually used. This recalls Ralph Allen's earlier wartime difficulties (described in Chapter 5) and, possibly, the men were again pressed for the Royal Navy. It again emphasises the difficulties of marketing Combe Down stone before the Kennet and Avon Canal opened two years later.

Pierce Egan in 1819 was able to project a rosy view of the industry at that time (cited in Addison 1998, 32-33):

The vast depth of freestone which has been excavated from the earth, the lofty arches, or pillars

remaining in a craggy state left by the excavators to let light into the subterraneous passages and caverns which extend for a considerable way under the earth, most interestingly claim the attention of the explorer.

James Tunstall in 1847 was equally admiring, though by this time the local industry was certainly being damaged by the Wiltshire quarries following the access opened up there by the railway:

. . . and now let us look into the Bath freestone quarries, now in full operation, immense blocks of stone taken out of the rock without the aid of blasting, and at once worked into convenient ashlar for the mason (Tunstall 1847).

From a local viewpoint, other than of the quarryman, there could be a different perspective; in 1829 in Bathford, just east of Bath, Henry Skrine, landowner, was approached by leading members of the community who were intent on limiting the damage done to the highways by the carrying away of extracted stone from Samuel and George Watson's recently quitted quarry. They persuaded Skrine to agree a lease for the quarry for fourteen years at ten pounds a year, which covenanted the new lessees, on behalf of the parish, not to quarry against penalties of an additional £100 a year, the latter of which was twice the earlier rent paid by Watson (SRO. DD/SK 8/2).

Some idea of the loads actually carried and how, which caused such damage, are contained in two inquests of 1825 and 1827. In the first William White had been crushed, dying later in the Casualty Hospital in Walcott, by a two-ton block of stone which fell off a truck, when the way-side collapsed. White was leading the shaft horse of the truck while the foreman (who was the witness), was leading the forehorse of the team of horses. In the second accident John Brewer was killed driving a stone carriage loaded with a block of stone about five tons in weight on the turnpike road. He fell and the fore-wheel passed over his body (BRO. Coroners Inquests 1814-27).

This first part of the century was probably the 'golden age' of quarrying at Combe Down. It was not the monopolistic and integrated concern which Allen had operated, but a period of widespread ownership often by master building masons, at many substantial and some smaller quarries cheaply and commonly enough available to be open to almost any mason to directly operate. Collectively these had the capacity of double or even triple that of Allen and may have actually produced at such levels, in the best years outside of the depressions around 1825 and again around 1830.

Combe Down itself also grew, its housing development closely associated with the quarry development, quite often involving the same masons either on their own quarries or sites purchased or leased

from speculators. By 1838, with the exception of some small blocks of stone left unexploited underground, the central area of what we today know as Combe Down, once associated with Allen's quarrying adventure, was virtually worked out.

Combe Down underground quarrying after 1838

Quarries in the core area of Combe Down

For the core area of Combe Down by 1838, the ventures established under the Hadley leases were over, and the underground section under the Harry Salmon leaseholds had also closed, leaving only the 1856 lease from Hadley to Richard Lankasheer to work under Combe Park (at the east side of the Avenue to the Long Drung). This was probably for reworking pillars rather than any surviving block of ground and most likely was done using one of the old shafts there.

This left only four (or five if reworking of a substantial pillar is included) small blocks of unexploited stone, measured only in a few tens of yards, not acres, within the ground originally marked out by Allen for his quarrying adventure. There was further unworked ground east of the Long Drung and the Tynning as far as the eastern limit of older housing beyond Gladstone Road. As a finale, the activity from these remnant operations was however, fairly attenuated. Activity in the surrounding area however remained substantial, with a revival late in the century of underground working, though on a very modest scale compared to that at surface.

Thus the bulk of the underground quarries were probably fortunate in their timing, since the virtual exhaustion of substantial deposits in the core area coincided with a huge growth in competition from the Wiltshire quarries, competition which the surface quarries and the few later underground ventures had to face after the great Western Railway extended to Bath and Bristol, actually passing through the Wiltshire freestones at Box tunnel.

The five quarry sites

One of the larger blocks remaining was just east of the entries at the bottom of Sheeps House Quarry, and a second, just south of that almost under Gay Staithe (Quarries 2202 and 2340 respectively). There is no obvious reason why these, right in the core of the village, were left unexploited as the stone there appeared to have been of good quality. The former has a graffito mentioning the Hadley Arms and Coxes' and the relative qualities of the beer in those houses. The Hadley Arms was built in 1846 (Hadley Arms Deeds), so the graffito must be later. Other graffiti, possibly part of a later Bath Stone episode, and attributable to James Morris, was dated to 1863. The technology suggests working after the middle of the century. Both were worked using a branch out of the eastern of the two old Allen entries down

Rock Lane, thus ensuring the lane retained its industrial use at this late phase

The last (third) quarrying area carried out in the core area of the village seems to have been a substantial pillar or block of un-worked stone, located adjacent to the western edge of Allen's western cartway from the bottom of Rock Lane. This was worked via a shaft to the south of the block, presumably one sunk during or soon after Ralph Allen's time. The Quarry (2344), worked a large block of stone that was clearly demarcated with survey crosses and the stone was transported to the shaft via a barrow-way. There was probably a small winding apparatus at the shaft top. The shaft was subsequently capped in the mid 1850s, as later surface-derived pottery recovered from a shaft cone below the shaft dated to around the 1840s and 1850s. There was also later Bath Stone activity (2370), close to the base of the shaft where a large pillar was robbed and the former Allen cartway was cut through, this activity is thought to have taken place even later than other later Bath Stone activity in the 1860s, again attributable to James Morris, (Quarries 2367 and 2368).

In the northern part of the Firs Field, a fourth block had been left, probably because a fault just north of the Firs Shaft discouraged work beyond. This was close to but south of the Turnpike opposite Stennards surface Quarry on the north side of the Turnpike. The underground quarry (2215) was accessed from a small area of surface quarry (close to Selway Court today) left open after the rest of the quarry had worked north and the southern area was otherwise backfilled, and partly built upon. The entrance would have appeared as a deep hole surrounded by spoil mounds and was probably equipped with some form of crane. This was open on the 1882-84 OS 25 inch to a mile map, but was gone on later maps. This quarry thus seems to have been operational in the 1870s or a little later.

A further underground quarry, possibly worked by the Sumsions as owners of the surface quarry, is found largely north of the Turnpike under the original winding course of the surface quarry road there (now straightened as Stonehouse Lane). The quarry (2219) seems to have had a series of entries from the surface quarry along its length, which, from wrought stone found underground, may have acted as shelters for banker masons. It communicated with the workings under and south of the road, and exploited unquarried ground under the surface quarry road and the 18th century house (s) there. It seems likely to have worked in the 1870-80s and exploited (and perhaps exceeded) its rights to work to the centre of the Turnpike, since the trusts by a quirk of law only seem to have acquired the surface. Other surface and underground quarries along the road had probably done similarly. There was an obligation for them to support the road, but this seems only to have been seriously done, with a very substantial stone pack,

in the 100 m or so near the Hadley Arms (Quarry 2211).

The fifth and final block was to be found just north of the curve in Combe Road near the junction with Summer Lane, apparently left unworked by John Davidge in his Hadley Lease. This was worked by James Riddle early in the 20th century, using a petrol winch on the 'Allotments Shaft' (Quarry 518). According to Addison it (1998, 43) it probably worked from about 1905 or a little earlier to about 1908, though it was still registered as his until 1914. The last quarrying, the fifth site carried out in the core area of the village seems to have been a substantial pillar adjacent to Allens western cartway from the bottom of Rock Lane. This was worked via a shaft, presumably one sunk at or soon after Ralph Allen's time. It took both the pillar and worked through the bottom of the cartway. Graffiti suggest this was done about 1912. There most likely was a small winding apparatus at the shaft top.

Underground quarries away from the core area of Combe Down

Entry Hill

A small underground working there (Quarries 2374 and 2375), infilled during the Stabilisation Scheme, may be of late 18th- or early 19th-century date. It initially seemed to have been superseded by the large, surface, Springfield Quarry adjacent which the Charlton map of 1799 shows was working on a considerable scale (Chapman 1996). However, the easternmost workings, (2374), that had mainly corbelled pillars, were likely to have been worked from the south-western edge of the surface quarry, using wedges and picks to extract the stone. Crane anchorage slots and wedge holes were noted in relation to other anchorage fixings in the surface quarry cliff face. The westernmost workings, Quarry 2375, were later in their working methods, and used saws to extract the stone, as well as picks and wedges, with evidence of several sawn faces and different crane anchorage holes. Lewis slots were larger than those in the former quarry workings to the east and were possibly driven from the Entry Hill road eastwards.

Foxhill

This fairly small series of four linked but separate phases of working was north of the Turnpike between and under the Foxhill MOD Establishment and the end of Combe Road (Quarries 2380, 2381, 2382 and 2384). An underground quarry there – possibly incorporating Coxes Shaft Mine and certainly Tank Field Quarry – was infilled as part of the Stabilisation Scheme. At the corner (shown on the 1882-84 OS map) an underground quarry (2381) was, almost certainly, operated by Randall and Saunders, a Wiltshire based company, who worked a very small under-

ground section at the end of a surface quarry noted by Addison (1998) as Gilks Quarry (now the Rugby ground). A crane was used to raise the stone from the north end of the underground workings which were there left opened out to surface (Quarry 2382). The Tank Field Quarry was adjacent to this, operated by the Combe Down (Bath) Freestone Co. Ltd, and had as owners J.A. and Lucy Tucker (the former a solicitor) with Frederick William Armstrong a builder and Frederick John Box a timber merchant as shareholders. The company aimed to take over an existing quarry (possibly 2380 or 2381) and operated from about 1909 to 1924 with the company dissolved in 1931. They employed up to 16 people in 1912 with 11 above ground, suggesting a masons' yard was in operation. The quarry stopped working in 1917 but briefly revived in 1923. The quarry extended underground almost to the west end of the MOD establishment. By about 1930 (OS 25 inch Map) the area had been designed Ralph Allen Park and houses had been built lining the road. The land was apparently requisitioned in the Second World War. See Case Study 13 (Chapter 12).

Lodge Hill (Style) Quarry – Shaft Mine

Quarrying was certainly being carried out there in the 1830s when the landowner was William Vaughn Jenkins, probably of what is Combe Manor (Hotel) today, and the operator was Isaac Sumsion. In the 1851 Tithe survey the quarry was owned by Isaac and Giles Sumsion. This is the longest-known family operating at Combe Down, with the first reference (above) in 1750 and which provided the chairmen of the Bath Stone Firms well into the 20th century. The quarry beds were described by the 1839 Stone Commission reporting on the stone for the new Houses of Parliament: there was ridding of 7 feet (Twinhoe Beds), then 'weathering beds of 3¹/₂, 4, 4¹/₂ and 2 feet with blocks 12 to 96 cubic feet obtainable' (Hemmings 1983). It is not known when underground quarrying began there. The northern part of the underground quarry (2372), was stabilised as part of the Scheme, and the depth of ridding found suggests that southwards the cover was very thin, reduced to only some 1¹/₂ feet, including the road's asphalt covering. The overall height of 'weathering beds' (freestone), given in the 1839 account, corresponds reasonably with what was seen there recently. The Commission gave the cost of stone as 6d per cubic foot and a cost of 2d to transport this to the Dundas Wharf (about 2s.8d per ton). It closed around 1934-35 (Wooster 1978, 10). It was Philip Wooster (pers. comm.) who originally discovered the thin cover over the underground working under Shaft Road, while surveying the mine which by then covered some 6¹/₂ acres, extending east towards Combe Manor. According to him it used horse-drawn tramways underground and, in latter years had three gangs of men at work, each using a face-crane to assist transport. In this it

was more like the much larger Wiltshire quarries than most underground workings at Combe Down. At surface it still had the crane for loading, in disused state, in 1939 and seems previously to have used a steam wagon to convey stone to the railway station via Summer Lane (Midford Station, perhaps, or to Bath via the Prior Park Carriageway, paying a 2d toll. (Hemmings 1983).

Freylings Quarry

This was the name given during the Stabilisation Scheme to a small underground quarry (2373), bordering the Mount Pleasant Quarry. It used a decline for access (though the Scheme sank a new shaft to avoid dumped material) in the decline. It had similar features to the Shaft Mine section of the Lodge Style Quarry, above. Evidence was found for numerous underground cranes, represented by the chog hole loactions in the roof, and considerable amounts of contemporary quarrying graffiti from several phases of quarrying in the 19th and 20th centuries.

St Winifreds Quarry

Between Shaft Road and the road to Combe Manor Hotel is an area known as St Winifreds, bordering the area known as Combe Down Quarries adjacent to Shaft Road. Most of it has uneven ground produced by dumping waste as the quarrying faces moved from north to south, with a low face partly apparent at the front. An underground quarry of the same name is found in the south-west corner, worked in the 1920s and 1930s (Hemming 1983) and was approached by an external decline, and is of unknown extent but still open, behind locked gates, as a bat reserve. This ground belonged to Vaughn Jenkins in the mid 19th century, but the quarry company seems unknown, but was possibly Sumsions again, and later the Bath Stone Firms.

Even, however, if the surface quarrying activity was included, the activity after 1838 was meagre compared with the boom that took place in the 'Bath Stone' quarries of Wiltshire around Box and Corsham especially. The Oolitic limestones exploited in these areas are of later geological date than Combe Down, but are sufficiently similar to be termed 'Bath Stone' and be used as a substitute for Combe Down Stone. Depending on the source and its origin, they may even be better than some Combe Down, being free of clay and calcitic inclusions which were sometimes ignored by Combe Down in selling their stone. The Wiltshire beds are also far more massive than Combe Down, which was perhaps a disadvantage in the 18th century when the easy extraction of Combe Down's well-jointed beds was very useful, but an advantage in the mid 19th century when rail transport was easy for them (the GWR passed through the Box Tunnel) and working methods had evolved.

Nevertheless, demand up to the mid-century for Combe Down stone remained high, partly due to the success of Philip Nowell (Irving 2005, 76-79) and a stone business (also keeping several quarrymasters at work) driven by his architectural success, and partly to the local demand it was assured of from Bath. Combe Down also benefited, like the Wiltshire quarries, from the huge growth in building which took place in London and other urban areas, for which readily worked stone was a key element and where the Nowells had a (canal) quay devoted to stone.

Underground working today

There are no underground workings operating today within Combe Down, but in nearby Limpley Stoke an underground quarry is extracting beds from under the stone previously extracted, probably in the 19th century. These beds are harder than were previously worked, though this is not a problem for modern machinery. A modern mobile dimension stone-cutting machine can cut stone from the face to precise sizes.