Tamar

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EDITORIAL

Memories of life in the Tamar Valley may be stirred by articles in this issue which mention the names of so many people and places. If this is so, please feel free to share your recollections or researches into your family history with the rest of our readers and write to us about them.

Colin Buck, The Cornwall Archaeologist, follows his exhaustive account of New Quay in the last issue with a survey of the nearby George and Charlotte Mine, familiar in part to all who have penetrated its depths in the safety, if not the comfort, of the narrow-gauge railway from Morwellham. For a full account of the hazards presented by the mine we refer you to his survey and recommendations for improvements in the *George and Charlotte Mine Archaeological 2010R122* commissioned on behalf of the Devon Historic Environment Service. The mine is difficult of access, on private land and dangerous and so is best viewed from the train. We are fortunate to be able to publish Colin's thorough description of the site and his historical assessment of the mine, surely one of the best accounts of its present state available for local historians and the general public.

Jane Webber has given us a vivid account of how families lived a hand-to-mouth existence in the Valley around the time of the Second World War.

In November, 2010, Andrew Meharg, Professor of Biochemistry at the University of Aberdeen, dared to deliver a lecture at Kelmscott House, the London home of William Morris from 1879 until his death in October, 1896; it is now a museum and the centre for the study of his life and work. In 1885 it was the base for the Hammersmith Branch of the Socialist League. The title of the lecture was: *Poisonous Mines, Wallpapers and Seamstresses* and in it he accused Morris of allowing his desire for profit to override all protests about the lethal qualities of arsenic, its environmental scars and the detrimental effect it had upon the health of the workers who produced it. An indication of Morris' indifference to the dangers of arsenic is the fact that for the last eighteen years of his life he slept in a room the walls of which were papered with his favourite, but most poisonous design, the trellis pattern. Patrick O'Sullivan, The Editor of the *Journal of William Morris Studies*, reviewed the lecture, and from this we have abstracted the case for the prosecution; for a lively defence of William Morris and his reputation as a humanist and socialist you are invited to attend his talk at the AONB Centre on Friday, 7th September; following this Part II will appear in our next issue.

In a moving article, John Snell tells how a hundred years ago as the mines closed down, men from the Tamar Valley, in a desperate attempt to find work abroad, made the fatal mistake of booking a passage to America on the *Titanic*. He includes a contemporary account of the tragedy by our youngest ever contributor, Mary Veale, aged nine.

Last year Colin Buck wrote a complete description of the abandoned village of New Quay. This year we are fortunate enough to include the names and lives of some of the families who lived there in its heyday. Michael Mashford has researched his family history and discovered that his great, great grandfather, William Henry Foote, was brought up in one of those two-roomed cottages and at an early age had become the captain of one of the paddle-steamers that operated on the Tamar as far as Weir Head. This is the first part of the family saga; in our next edition we hope to include the second part in which will be included the story of the founding of Mashford's boatbuilding yard, its valuable work in wartime and its importance to the economy of the area in times of peace.

One hundred and fifty years ago the Devonshire Association was formed. Helen Harris has recorded for us its connections with Plymouth and the Tamar Valley.

Jane Kiely, our Meetings Secretary, has compiled a lively and vivid account of the activities she arranged for the Friends of the Tamar Valley during the past year. The full programme of our future events is published in our Newsletter.

The George and Charlotte Mine

By Colin Buck

George and Charlotte Mine is a medium-sized but relatively undocumented historic mine site; it contains surface evidence of a number of shafts, two large water-wheel pits and a number of adits and mine buildings – all characteristic of copper mines in the steep-sided Tamar Valley. This report outlines the history of the site, identifies archaeological remains and assesses their significance.

George and Charlotte Mine has early mining origins from at least the late 18th Century, a common factor in many Tamar Valley mines. However, the first decades of the 19th Century brought about greater financial speculation and investment, resulting in larger amalgamations of neighbouring mine setts. Thus, Devon & Cornwall United Mine, an amalgamation of George & Charlotte and William & Mary Mines, worked both sides of the Tamar and Tavy Valleys from the 1850s, pursuing and working the same lode. Although the mine closed relatively early compared to other mines in the Tamar Valley (George & Charlotte in 1868, and William & Mary in 1872), it was likely that the easily available ore had been worked and processed. However, within the past three decades, George and Charlotte Mine has enabled, for many, an awakening of interest in industrial archaeology and history. From the late 1970s a small mine railway has been built to provide a short 'taster' tour which goes into the mine and across two of its old shafts.

Since abandonment, the site has become generally overgrown and the buildings and structures have decayed to varying degrees, but overall the complex is largely intact. Surviving components include water-wheel pits, mine shafts, mine adits, mine buildings, dressing-floors and shaft pumping mechanisms.

George and Charlotte Mine is a component part of the World Heritage Site within the Cornwall and West Devon Mining Landscape. All the mine is privately owned. Access will be at the discretion of the landowner: part includes an area of Lord Bradford's Tavistock Woodlands Estate and part belongs to the owners of Morwellham Quay, Simon and Valerie Lister. However, it is fundamental to note that parts of this mine are deemed to be a working mine in the eyes of Her Majesty's Inspectorate of Mines and is subject to stringent health and safety regulations and to the same legislation as a working mine.

The deep, steep-sided valley of the River Tamar cuts through a rolling, cultivated landscape, flanked on the west by the distinctive granite ridge of Hingston Down and on the east by the granite uplands of Dartmoor. The Tamar Valley is considered to be one of the most attractive areas in the south-west. The lower and broader part of the valley from Cotehele southwards and from the junction of the River Tavy with the Tamar eastwards has wide expanses of reed beds and mud flats which attract a variety of wading birds. Upriver from Calstock the meandering valley narrows, and the Devon side is particularly scenic with its steep and rocky wooded outcrops opposite Gunnislake; further north at Bishop's Rock, the river meanders through Tavistock Woodlands. The setting of the mine, close to Morwellham, has allowed many thousands of people to experience in a small way by means of the narrow-gauge railway the nature of hard rock mining within the steep, wooded hillsides of the Tamar Valley.

George and Charlotte Mine lies on the east bank of the River Tamar immediately east of Morwellham within the parish of Tavistock Hamlets, Devon. It is located below the tidal limit, approximately 1.0km downstream from Morwellham and 6 km from Tavistock. The study area has

been defined in Fig 1, and includes part of Lord Bradford's Tavistock Woodlands Estate and a part belonging to the owners of Morwellham Quay. Its buildings are hidden in a dense blanket of mature trees and ivy between the Medieval woods shown as Sheepridge and Maddacleave (see Figs 8 and 9). The setting is incredibly tranquil and picturesque. Vehicular access is not direct but along the original cart track through the woods from a northern direction via the B3257. A footpath, an alternative to the existing public footpath from Morwellham above the main core of the mine, also provides access directly to New Quay.

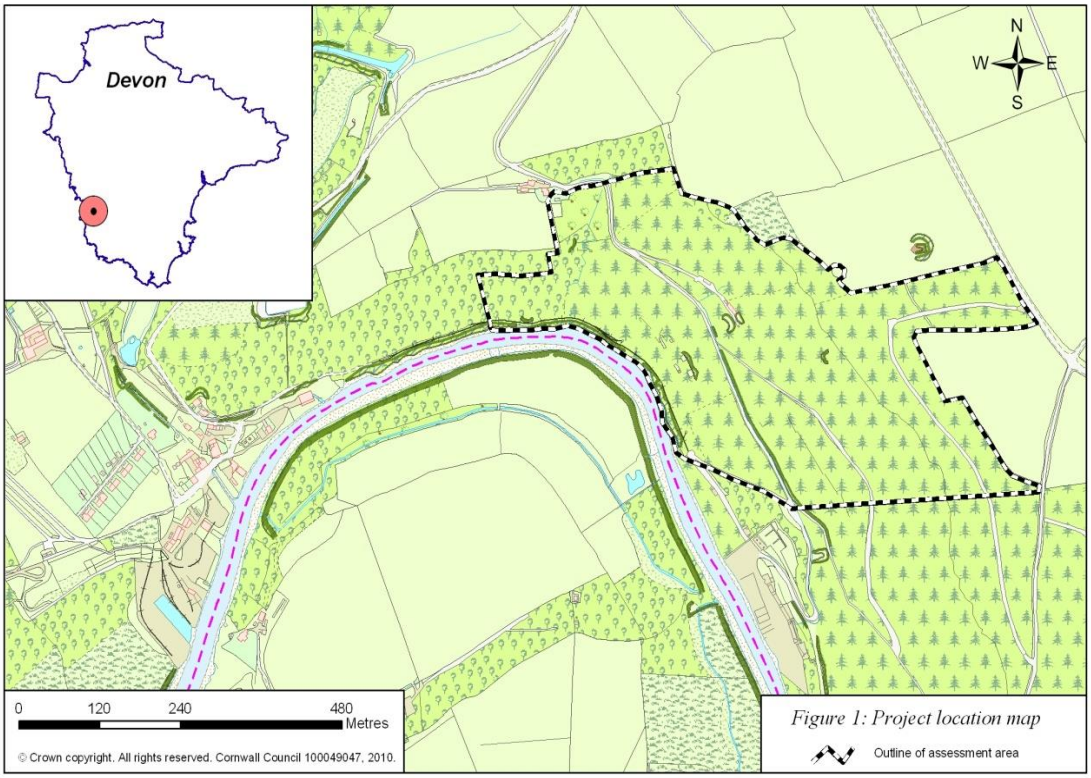


Fig. 1: Outline of the area of the mine between Morwellham and New Quay.

This important historical heritage can still be found over a century after the related industries and mines have folded, a result of which has been its inclusion in the World Heritage Site for the Cornwall and West Devon mining landscape (Area 10). The Cornish Mining World Heritage Site seeks to demonstrate the international importance of the developments within mining and allied technologies which took place within Cornwall and West Devon during the last half of the 18th Century and into the 19th Century, establishing beyond doubt the contribution of this region to the development of the modern industrialised world. It has also been designated as an Area of Outstanding Natural Beauty, one of only thirty-two sites in the country. There is a Site of Special Scientific Interest along the banks of the River Tamar on either side of this site for the conservation of marine flora and fauna.

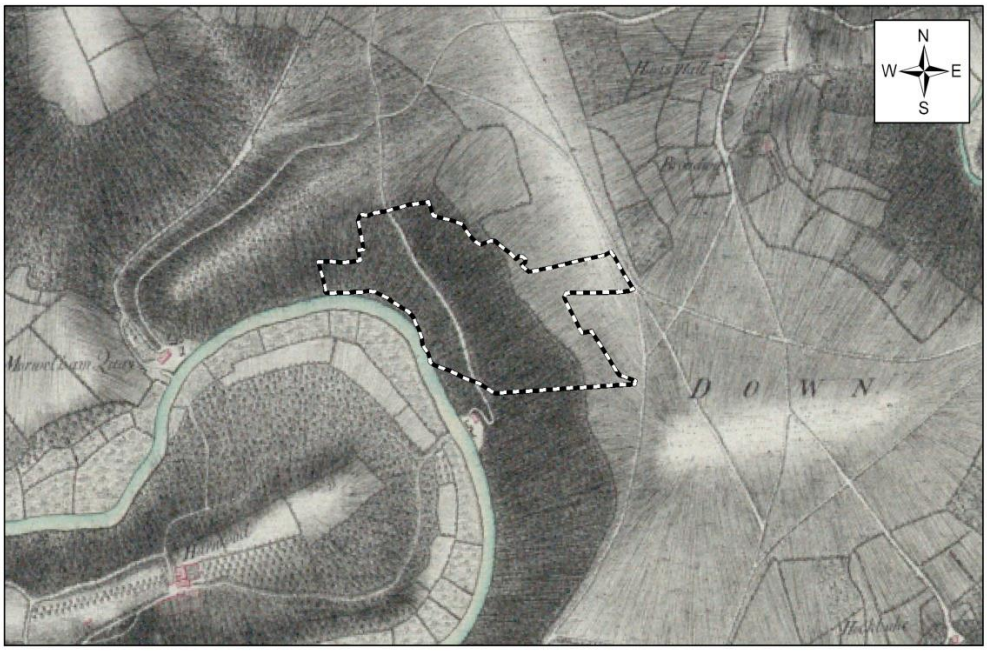


Figure 2. Gardner Map (1784-1786)

(MAPS K.TOP XI 80-80a. By Permission of The British Library)

Fig. 2: The Gardner Map of the area (1784 -1786).

Figure 3. Tavistock Parish (Index Map) Tithe Map (1843)
(DRO/Tavistock Tithe Map)

Fig. 3: Tavistock Parish Tithe Map (1843).

The published geological map of the area (Geological Survey Sheet 337, Tavistock, 1994) indicates that the site is underlain by the Kate Brook Slate of Upper Devonian geological age ('killas'); *'The most important mineral area is a belt of country 12 miles long from east to west, and 4 miles broad, extending from the edge of the Dartmoor granite, westwards across the Gunnislake and Kit Hill granites. The lodes of tin and copper which nearly all course about east and west, have yielded also large quantities of mispickel and pyrite…The district has been more prolific in sulphide ores than in tin, and large yields of copper with much pyrite and mispickel have been obtained from nearly all the mines on the east of the Gunnislake granite from Devon Great Consols southward to Gawton Mine..'* (Dines and Phemister 1956, 623).

Figure 4 (Symons 1848 mining map) focuses on the two east/west lodes within the area. However, this map also shows a total of three north/south cross-courses intersecting the two lodes on the western side of the mine sett (George & Charlotte), the central section and the eastern side of the mine sett (William & Mary). The western and main part of the site was named *'Huel George & Charlotte'*, the eastern part *'William & Mary old mine'.* Both are described: *'Main Lode, coursing about E. 10º N. and underlying south, extends for about a mile from the Tamar, 300 yds. N. of New Quay, to the Tavy, 500 yds. E. of Broadwell. George and Charlotte Mine is on the western end and William and Mary Mine on the eastern, but the workings are separated by about 100 fms. of unexplored lode'* (Dines 1956, 676).

In the 19th Century both mines were amalgamated to form Devon and Cornwall United Mine, which is the name under which it is described by Dines (1956, 676), '*George and Charlotte Mine plans are incomplete, but show the lode was opened up by three adits* (Deep, Middle and Shallow) *on the eastern slopes of the Tamar valley and by six shafts… Veinstones in the dumps consist of quartz and dark green chlorite with chalcopyrite and much pyrite. The lode is heaved 5 fms. left by the crosscourse on which Crosscourse Shaft is sunk and is heaved about 10 fms. right by another east-dipping crosscourse that passes through Deep Adit Level 25 fms. W. of Ley's Shaft (Dines 1956, 677).*Also of geological interest is a rare mineral, childrenite (*pers. comm*. Rick Stewart).

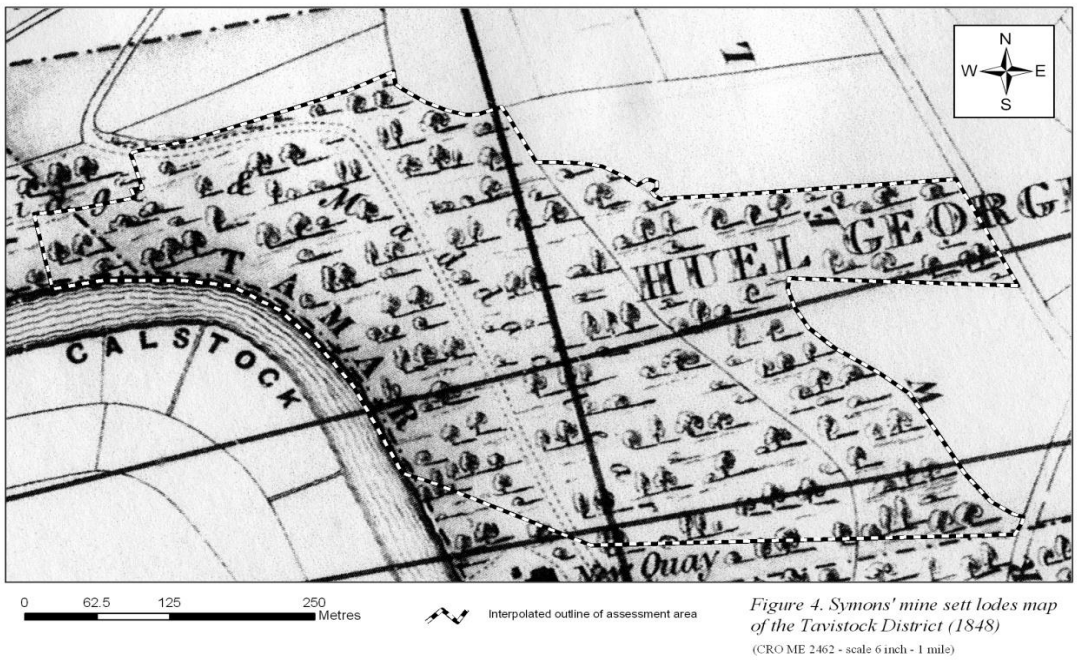


Fig. 4: Symons' map of the mine setts and lodes of the Tavistock District.

In 2005, Devon was systematically assessed by Historic Landscape Characterisation in which each parcel was assigned to one of a number of HLC Zones according to the predominant historical character of its landscape. The character of the landscape within the area consists of four zones of different types (see Fig. 11): the predominant characteristics of the landscape are *Ancient Woodland,* although this has mostly now been removed and planted with conifers, and the mine itself, which is described as *Industrial: Disused*. Two smaller characteristic areas are *Farmland,* post-medieval at the north west corner and also bounding the site entirely on its north, east and west sides, and *Plantation and Scrub* at its eastern side following a lode outcrop; this still shows evidence of the 18th Century working which was never enclosed for this reason after 1828 when much of Morwell Down was turned into rectangular fields. The area has a predominantly west-facing topography, probably always wooded, given its steep valley sides.

Although predominantly now an agricultural and wooded, sloping landscape, in the mid 19th Century (see Figs 7 and 8) the remains of George and Charlotte Mine to the north of New Quay, Morwellham Quay to the west, and the Tavistock Canal portal and Gawton Mine to the south, all

demonstrate dramatic and long term changes to the character of the landscape of the Tamar Valley and nearby communities, many newly built as a result of the exploitation and export of the mineral lodes by these 19th Century mines to feed the market demands of the industrial revolution.

The general topography of the site (as shown on Fig. 1) is predominantly wooded and steeply sloping from the east down to the River Tamar, which turns from an easterly direction from Morwellham to the south-east towards New Quay and Gawton Quay. The landscape above the site is predominantly open, having been formerly enclosed from Morwell Down after the 1830s, and characterised by large fields and stone hedges. The lower, steeper sides of the valley near the river are often occupied by strips of mature, deciduous woodland (as shown in Figs 1-4), with the higher side, which is owned by the Tavistock Woodlands Estate, planted with conifers. George and Charlotte Mine includes both forms of woodland, symptomatic of changing 20th Century attitudes to the financial potential of woodland and differing forms of woodland management. The west facing setting of the site provides a wonderful opportunity to view the vista of the wide expanse of the tidal River Tamar as it proceeds to the south towards Plymouth.

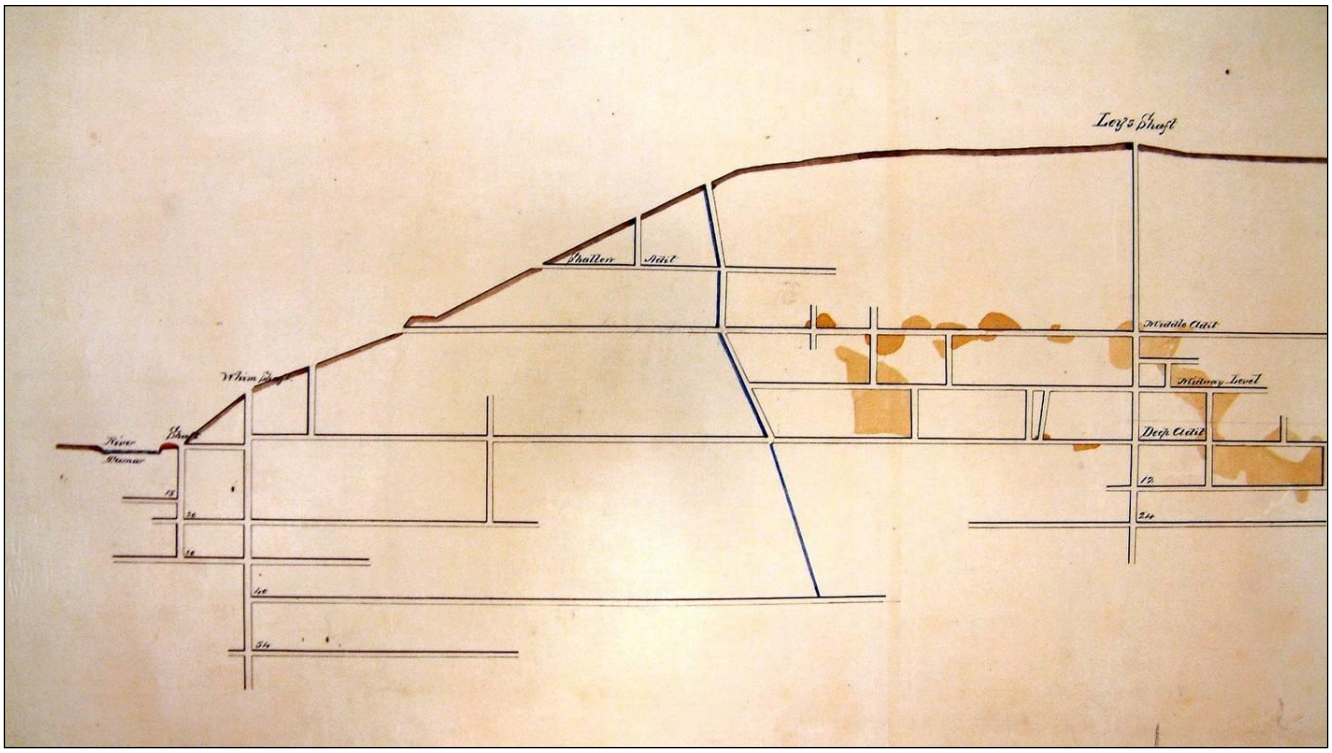
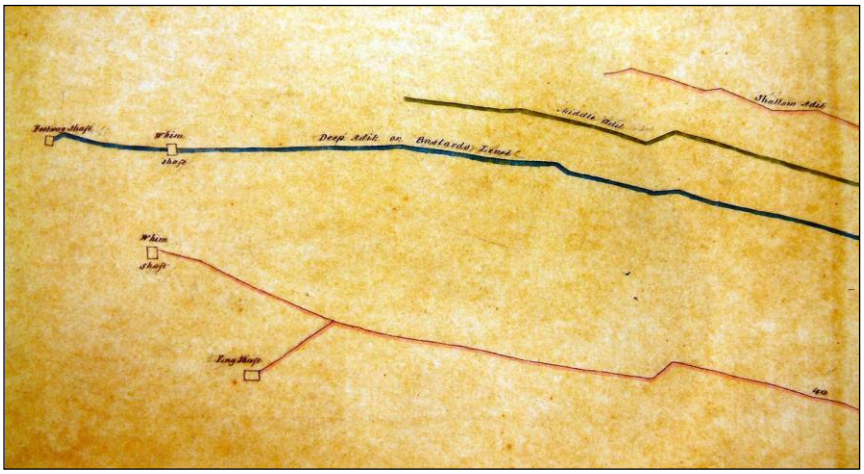


Fig. 5: Excerpt from an undated section plan of the George and Charlotte Mine.



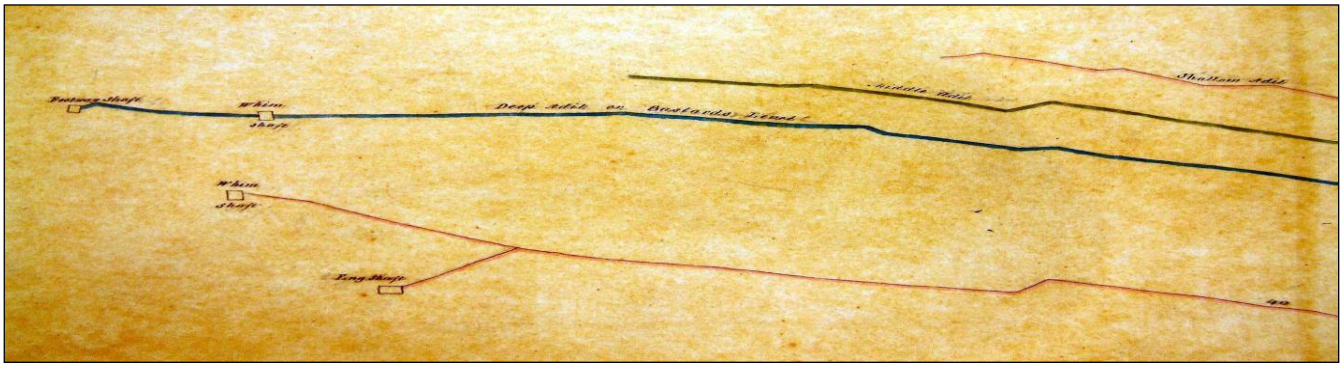


Fig. 6: Excerpt from an undated section plan of the Devon and Cornwall United Mine.

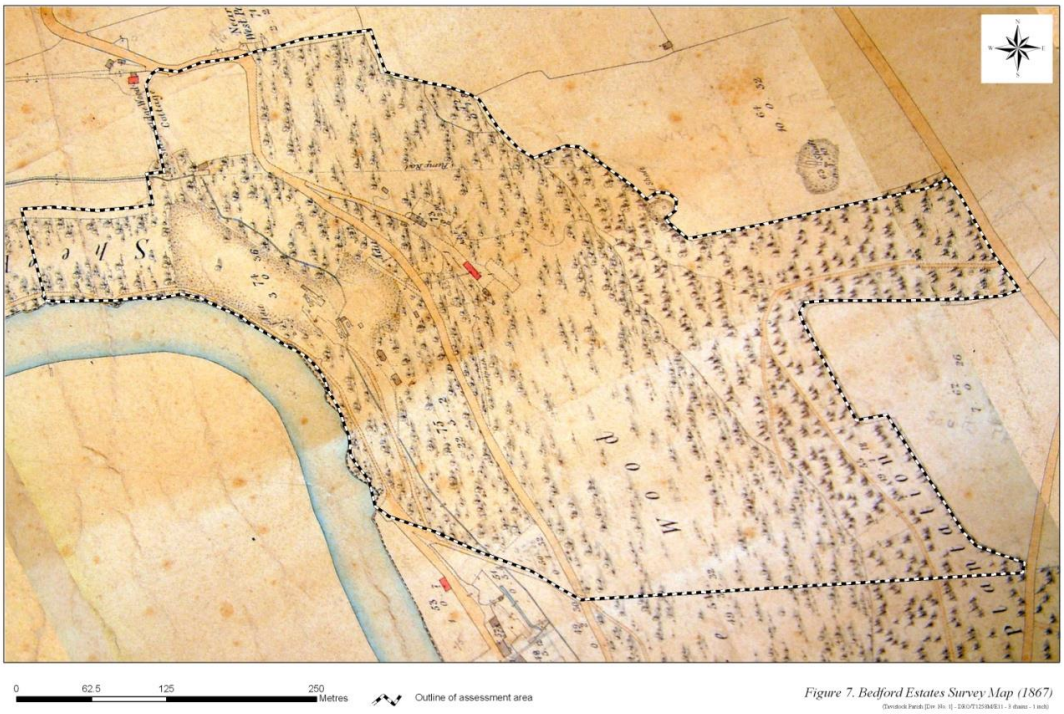


Figure 7. Bedford Estates Survey Map (1867)

Figs 7 & 8 Bedford Estates Survey and Tavistock Parish Shafts Map (1867)

Figure 8. Tavistock Parish (Div. 1) Lodes shafts map (1867)

Historical Background

The Devon Sites and Monuments Record has no sites of prehistoric date within the area of the George and Charlotte Mine. However, a general survey of prehistoric and medieval sites in the Tamar Valley has been summarised below:

Neolithic axes have been found at Tavistock, Bere Ferrers, and Buckland Monachorum. At Heathfield Beacon between the parishes of Lamerton and Milton Abbot a Bronze Age barrow cemetery has been located. Earthwork defensive enclosures probably of Iron Age date are found overlooking the Tamar at Furzeleigh or Dunterton, opposite Cartha Martha Woods on the Cornwall side of the Tamar and there is a similar feature in nearby Dunterue Wood. Other Iron Age enclosures include Ramsdon Camp in Milton Abbot parish, Northcott Wood in Northcott parish, and an earthwork enclosure at Berra Tor in Buckland Monachorum parish five miles to the south-east. The recent confirmation by geophysical means and trench excavation of the former Roman fort at Calstock, the largest yet discovered in Cornwall, has certainly opened up a discussion of the possible relationship between metallic mineral extraction in the River Tamar and the Roman Empire.

The Tamar Valley itself is likely to have been occupied in the prehistoric era due to its preferred, more fertile, lowland sites and the utilisation of the river as a means of transport and for trade and as a source for food such as trout, salmon and lampreys. Later Medieval and post-medieval settlements are likely to have hidden or destroyed much archaeological evidence for prehistoric occupation.

Evidence from Domesday Book and medieval place-names indicates a typical medieval farming landscape with settlements largely confined to the lower ground with the uplands left as open pasture. Medieval farming settlements are indicated from documentary sources and from field evidence of strip-based field systems; they appear to have been small, co-operative hamlets of three to six farmsteads. Examples on the Devon side of the Tamar are in locations similar to those in Cornwall, as, for example, a medieval strip-field complex to the south of Dunterton. The farming landscapes on both sides of the Tamar now largely consist of single farms, some of which are the remnants of former medieval hamlets.

Near the George and Charlotte Mine, the only medieval settlements are those of Morwell Barton to the north of the area and probably Morwellham. Tavistock, the medieval stannary town, would have provided administration through the Abbey and the stannary court. It is likely that the land within the project area would have been owned by Tavistock Abbey which also owned Morwell Barton. This would have continued from the Medieval period up until the Dissolution in 1539 when the lands were transferred to the Russells, later Dukes of Bedford. Since the 1950s, some of these lands were transferred to the ownership of Lord Bradford. It is likely that Tavistock and Buckland Monachorum were the area's centres for social and market needs from the 19th Century onwards.

Mining activity in the Tamar Valley is by no means confined to the post-medieval period. Although tin appears to have been worked in Cornwall since the Bronze Age, during the 12th Century the alluvial gravels of Dartmoor and possibly the Tamar Valley were of major national economic importance. Documentary evidence from the late 13th Century and early 14th Century attests to lead and silver mining in the Bere Alston and Lopwell districts which appears to have continued sporadically for some years.

On both sides of the Tamar Valley alluvial and shallow ore extraction proceeded from time to time until the early 18th Century when there was renewed interest in the copper ore resources of this area. Furthermore there is documentary evidence of copper mining in the 18th Century, mostly in the first and last quarters, at many sites in the Tamar Valley (Patrick, 1983). Copper ore was located using the traditional method of costean-pits or trenches and through excavation of the back of the lode using open-works into the valley sides. The outcropping back of the lode, oriented east or east-south-east, was followed up the steep sides of the hill by the sinking of shallow pits, open-works and shafts for as long as the lode was found. Adits were also driven along the lode for access, drainage and for removing the ore and waste rock at varying heights from river level to nearly the top of the valley slope.

After being dressed locally, copper ore was exported mainly from Impham Quay, New Quay, Morwellham and possibly Gawton Quay, all on the Devon side of the Tamar, to the Bristol and Swansea smelters. Through archaeological fieldwork, a single site in the area has been found that mirrors this early technique of ore extraction by means of costean-pits and an early example of a likely 18th Century lode back working. A mid 19th Century leat has been definitely located which supplied water to power water-wheels for flat-rods and winding or pumping shafts.

The Gardner Map of 1784/6 (Fig. 2) is the first relatively detailed map that shows the form of the landscape towards the end of the copper boom of the 18th Century. Of note is the upland track that led from the 'Waggon Lane' and that later became the route for ore waggons from Devon Great Consols to ore quays at Morwellham, Gawton, New Quay and Impham Quay prior to the construction of the Devon Great Consols railway in 1858 down to the quay at Impham and Morwellham. The map also shows a long, looping track from 'Waggon Lane' down to New Quay

next to the River Tamar through dense woodland. Mine working appears to have taken place mainly within the steeply sloping sides of the valley and so is not shown in detail. However, the post Medieval field systems up to the edge of the wooded slopes can be plainly seen, with the enclosure of Morwell Down starting after 1828 when a local Enclosure Act was passed in the reign of George IV.

The 1843 Tithe (Index) Map (Fig. 3), and Symons' 1848 lodes and setts map (Fig. 4), replicate the detail of the earlier 1784/6 map. The Tithe Map in particular shows the distribution of woodland parallel to the River Tamar along the steep sides of the valley and the location of post-medieval settlements and their associated field system making inroads into the surrounding woodland. Level ground from the top of the valley sides eastwards appears to have been farmed from the early years of the Medieval period. The distinctive west to east thin line of wooded areas and, for example, the long lode outcrop working of Site 23 in the north-east of the area, stretching from the steep valley slopes up to the north/south spine road to Bere Ferrers, had already been formed (see Buck 2003, Bedford United and Buck 2006 Bedford Consols/Gawton Mine), forever changing the landscape of the area. These workings, many likely to be a century old by this date, appear to have reached their full eastern extent by the late 18th Century. However, the presence of occasional charcoal-burning platforms (Site 32), along the steep sides of Maddacleave Wood perhaps gives a general indication of an industry that preceded the small, 18th Century mines and the later 19th Century amalgamations.

The Gardner Map (Fig.2) shows two settlements in the Tavy valley, both north of the later site of William and Mary Mine (SX 46256 70097): Hartshall at SX 46034 70491, later named Hartshole on the 1843 Tithe map and Old Hartshole on the 1904 OS map before it disappeared to form a new site to the north (SX 46103 70837, Devon HER No. 5134) also named Hartshole; the second site is named Broad(way) on the 1784 map (Fig. 2), but is shown and named incorrectly on the later 1843 Tithe (index) map as Romansleigh. The site is named Broadwell on the 1848 and subsequent maps (SX 46172 70239). The site of Sheepridge Wood Cottage is first shown on the Bedford Estates survey map of 1867 (Fig. 7).

In the 18th Century small copper mine setts were being leased from the Duke of Bedford's Estate. They were being worked by relatively small numbers of people who were locating the surface outcrops of the lodes by digging regularly-shaped pits and then working out the lode outcrops both at the surface and underground, following them up through the steep sides of the valley. The names of these small setts are often difficult to reconcile with the place names of later 19th Century maps, nor do they appear on Gardner's map of 1784-1786 (Fig. 2). However, attempts have been made to locate these 18th Century documented sites where they are within the boundary of the area.

William and Mary Mine, working the same lode as George and Charlotte to the north-east in the Tavy Valley, a distance of nearly a mile, was perhaps an older, 18th Century prospect referred to by Kahlmeter in 1725, a Swedish engineer who visited the mine and whose text was published in 2001 by Justin Brooke. He noted that the mine was worked on three adit levels since 1719 up the western bank of the River Tavy on the same lode and by three different companies.

The later George and Charlotte Mine sett between Sheepridge Wood and Maddacleave Wood prior to its amalgamation in the later mid 19th Century with William and Mary mine is mentioned as Providence Mine in the 18th Century dated to 1718. A mine is also shown on this site by an old

Bedford Estate map dated to 1766. Site 23 may relate to this 18th Century mine sett. Documentary evidence for at least three small 18th Century copper mines to the south-east of the mine near New Quay (Buck 2006)) have been identified by John Goodridge (pers. comm.) in Maddacleave Wood: Maddacleave Works 1717, The Dimond 1719 and Two Brothers 1734. A large lode back open-work on the south-east and upslope of New Quay has been identified during field surveys, which may relate to the 18th Century mine setts (Buck, 2006, Gawton, Site 4).

George and Charlotte Mine, named either after the sixth Duke of Bedford and his wife or from King George III and his consort, Queen Charlotte in 1766, is first mentioned in documentary sources from 1775 (see Booker) and then in 1799 when it is listed as being a copper producer by Amber Patrick (*Tamar* 1983). In October the following year eight shares were put up for sale (Brookes 1986). *'In 1775 the estate records of the Duke of Bedford, who as the 'Lord of the soil' was entitled to dues on any minerals mined in the area, mention a small amount of copper ore produced at George and Charlotte'* (Booker in an undated pamphlet, *Morwellham Quay)*'. However, in 1817 the opening of the Tavistock Canal, which had been under construction since 1803, allowed the export of copper ore and the import of coal etc. from and to the Tavistock mines via the water-wheel powered, inclined railway to the north of Morwellham and would come to influence this site greatly. The mine and Holming Beam were purchased by the Tavistock Canal Company in 1806 for £3,779, no doubt under the direction of John Taylor, the famous engineer (Booker 1971). However, Holming Beam was abandoned in 1810, and George & Charlotte was still not working in 1815 (Lysons 1822). It is highly likely that the copper ore from the adjacent mines was sampled and exported from Morwellham or New Quay even before the canal incline was built. A leat from the canal was also constructed to feed not only the mine but also New Quay and Bedford Consols Mine, later to become Gawton Mine.

To date, there appears to be no further documentary evidence of the small, mining setts described above as often following a single lode until the end of 1846 when, within the area, the old 18th Century underground workings were re-opened (128 shares at £2 per share) and amalgamated into the sett of George and Charlotte Mining Company. This was a cost book company for the sett measuring a mile on the course of the lode and 400 fathoms from north to south. *'The adit, from which large returns were said to have been made, was driven about 90 fms. from the river (Tamar)…A good course of ore was found in Deep Adit Level at the end of 1846'* (Brookes 1986). In July of the same year, the Duke of Bedford leased the mine for twenty-one years from Lady Day, 1845, at 1/20th dues for copper and tin, excluding royal metals and William and Mary Mine. However, work at the mine stopped after 1846. *'The lease, together with a fresh lease for William and Mary Mine, passed into the hands of the Devon and Cornwall United Mines Company some time before December 1851, and was surrendered in April 1864'* (*op. cit.*).

'After the workings had been suspended for some time, a new cost book company was formed to work this mine … work began about May 1850, and by September a shallow adit had been driven east to a point where a cross-course intersected the lode' (*op. cit.*). Several tons of inferior quality were raised from a drive to the south with only £5 showing in the accounts at the end of November. In October 1851 the mine changed its name to Devon and Cornwall United Mines.

This new company amalgamated the two setts of William and Mary and George and Charlotte with the port of New Quay as well as Harewood Mine situated on the west bank of the Tamar in Cornwall and held from Sir John Trelawney, a combined sett of 1,200 fathoms in length. *'The two mines on the Devon side of the river were being worked in the autumn of 1852 through*

Whim (Site 16) and Emily (Site 29) Shafts. An engine was erected at Albert's Shaft (presumably sited in Cornwall) *a year later (the engine and boiler purchased in August for £1,128.15), and in January, 1854, Harewood Shaft was 36 fms. deep from surface… In August, 1855, 66 people were employed, and by June, 1858, the number had risen to 130, though it fell to 100 in 1862. In June, 1856, owing to a leakage in a leat carrying water to the machinery, a landslide took place near Morwellham Quay, by which a large piece of coppice, large trees, stones etc. were thrown across the river, and prevented any vessel from passing… (In 1858) a special meeting was called to consider the Harewood sett, and empowered the committee to sell it, together with the engine at Albert's Shaft'* (*op. cit.*). In June, 1859, £158.10s was spent on a presumably much smaller, 12" hauling engine. However, in July of the following year the company's accounts record that a steam engine and materials were sold for £476.12s (*op. cit.*).

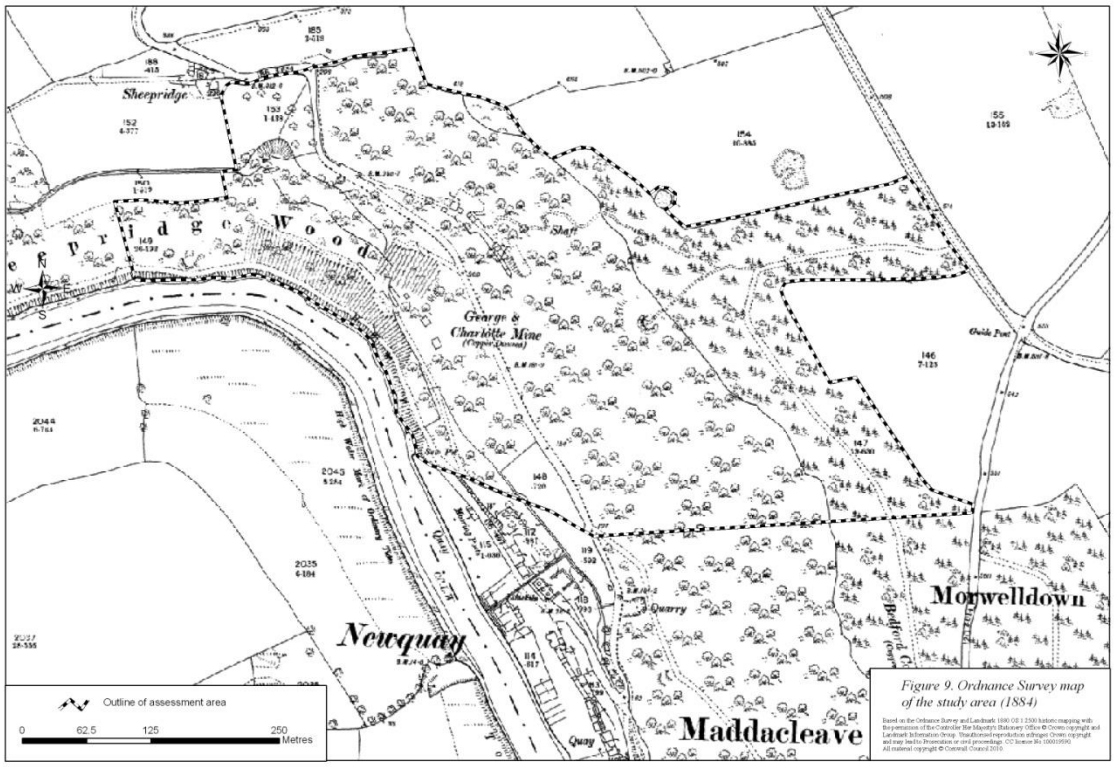


Figure 9. Ordnance Survey map of the study area (1884)

Based on the Ordnance Survey and Landmark 1880 OS 1:2500 historic mapping with the permission of the Controller Her Majesty's Stationery Office © Crown copyright and Landmark Information Group. Unauthorised reproduction infringes Crown copyright and may lead to Prosecution or civil proceedings. CC licence No: 100019566
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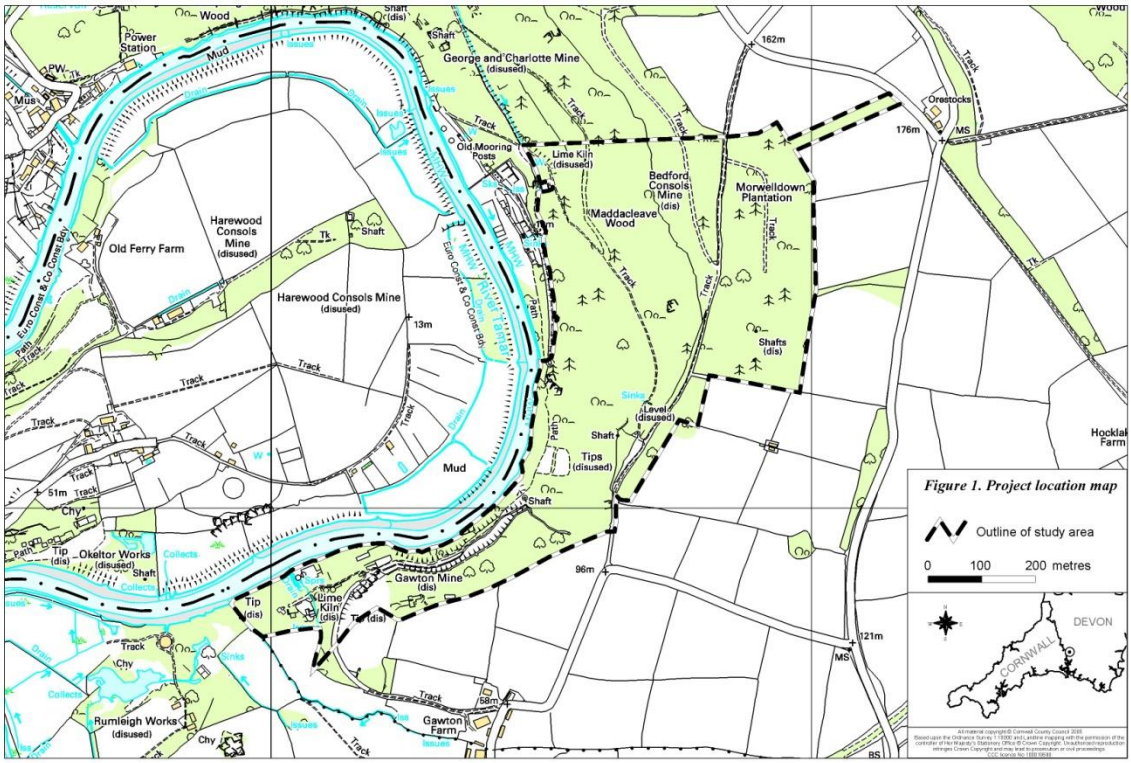
Figs 9 and 10: Ordnance Survey Maps (1884 and 1904).



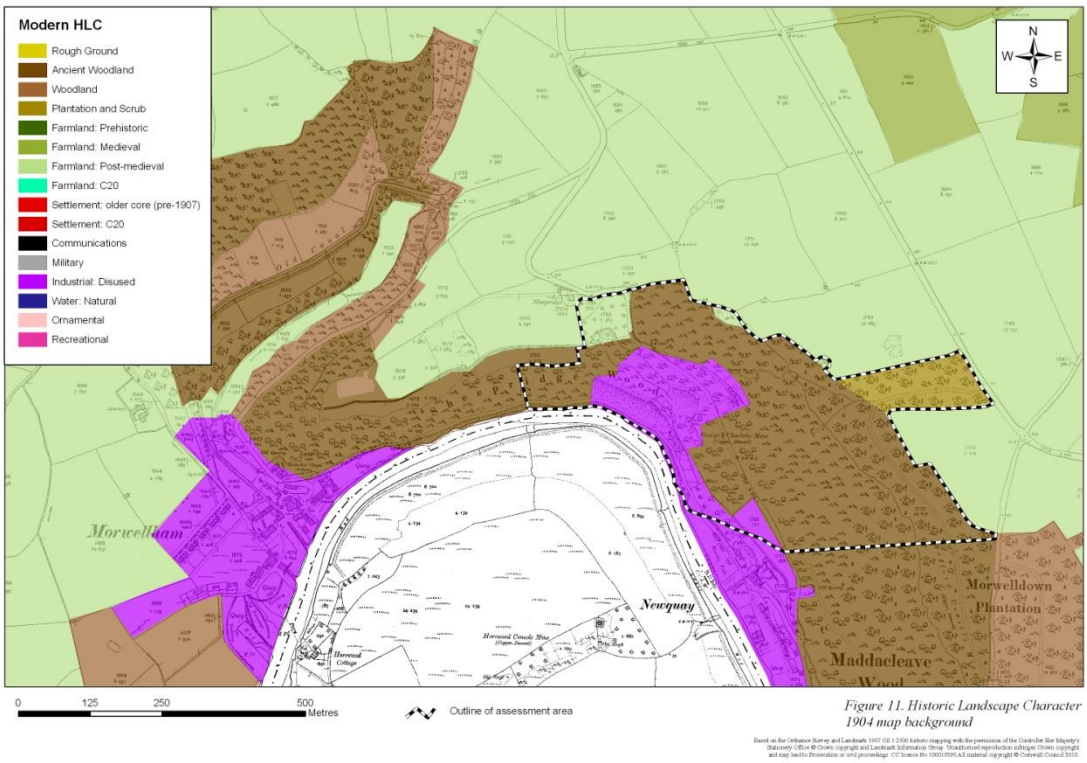


Fig. 11: Map showing the character of the landscape (1904).

At the end of 1865 cross-cuts were being made at the 24 fathom level east and west of Ley's Shaft (Site 30). Ley's ended up being 34 fathoms below adit (83 fathoms below shaft collar), and Engine Shaft (Site 11) near the railway to 46 fathoms under adit (40 fathoms from surface). In 1866 a mining correspondent stated; *'It may not be generally known that one of the most interesting 'points' which has ever 'come off' is daily expected. An immense body of ore was discovered at George and Charlotte, in the deep adit, which enabled the mine to pay dividends, and the huge excavations caused by its removal have been familiarly named 'Devil's Kitchen'. A long and expensive cross-cut has been put out, with a view to undermining his Satanic Majesty's cooking department, which cross-cut is now near the desired object … However, no extension of the deposit was found, and in October 1868, the mine was put up for sale*' (*op. cit.*). This entire episode has been interpreted as being a 'puff', whereby stock-brokers would put about rumours of incredible finds to increase stock value and interest, which was happily reported by the *Mining Journal* for increased sales, no doubt (Barton 1964, 41). The machinery included a 20" whim steam engine (auctioned on 17/10/1868, and presumably not sold because it was auctioned again on 27/7/1871), a 12" portable steam engine with hauling gear, three water-wheels 45' x 5', 40' x 4', 27' x 8, 155 fathoms of pumps, 600 fathoms of rods, and account-house furniture (*op. cit.*). It is quite likely that the 20" whim steam engine was used at Ley's Shaft, and the 12" portable steam engine used for shaft sinking etc. rather than a specific shaft (*pers. comm*. Rick Stewart).

'The company had returned a net loss of £27,135 (although from 1857 – 1868 nearly 17, 200 tons of copper ore were produced, realising £66,000)*, From this mine miners from Morwellham*

would often take a short cut underground into the workings of the adjoining William & Mary mine in the Tavy Valley' (Booker 1971, 141). Unfortunately, both of the 1840s maps (Figs 3 and 4) do not show any surface workings, and the mine sections are undated (Figs 5 and 6) although the shafts, adits and levels are shown.

Figures 7-8 (1867 shafts, lodes and survey maps) from the Bedford archive show the extent of the surface plan mine workings. The mine's leats, water-wheels, mine buildings, flat rod routes, adits and shafts can all be seen in detail as well as their working relationships. Figs 5 and 6 (undated) show abandoned mine sections and plans, indicating the working levels, adits, shafts and winzes along the lode workings. Details for the William and Mary Mine have not been shown. The Bedford Estates 1868 *Report on the Mines* (dated 31st Dec.) by Gilson Martin, showed that the mine's first lease (dated 11/4/1864) from the Duke of Bedford ran for 21 years, 4,076 shares having been issued, with dues reduced to 1/18th. The lessees were John J. Gervis and Josh Pley. The area of the sett was 220 acres, 66 of which were woodland but *'the remainder in arable and pasture'*. Two cottages are rented from the estate with six shafts in use and four abandoned and protected.

By 1868 the mine described as George & Charlotte in the Bedford Estates survey had closed down. It had recently employed only nine men and boys with no women and girls. *'This company was formed in 1851, the outlay has been £29,173 in addition to its receipts of £61,438 for ores. There has been a dividend of £2,038, which leaves a net loss of £27,135, but Mr Paul says that that loss is more attributable to mismanagement on the part of the company's officers, than to the poverty of the ground. The mine is washed and drained by three large water-wheels and one steam engine. The ores are carted to New Quay a distance of about one mile. The water is very foul and some provision for cleaning pits must be made.*

The company suspended operations in October last and the sett and machinery were sold by private contract, many of the old shareholders retired from the concern, but some of the largest and most influential ones still retain their interest and are endeavouring to raise capital to carry on the mine. Mr Paul believes that with good management the prospects are very fair for future profit' (The Bedford Estates, 1868, *Report on the Mines*).

Accordingly, a company of the same previous name was restarted in the spring of 1869 by a cost book company formed largely of Tavistock shareholders. '*Reporting this fact a correspondent noted in March that the lode in the 34 fm. level west of the engine shaft was about 6' wide and worth a ton of copper per fathom. The local opinion was that all the mine needed to make it profitable was good management. The back of the 34 fm. level was being stoped in March 1869. In July the concern was described as a new company, and in August George Down called for debts, evidently about the time he lost the pursership. At this time there was a debit balance of £84.2s.2d. The working continued until May 1871, when the mine was offered for sale by tender as a going concern. The shares were listed in the Mining Journal from March 1869 to June 1872'* (Brookes 1986). It is possible that this company focused its efforts at the William & Mary (Tavy Valley) side of the mine sett.

This last working appears to have produced 109 tons of sulphurous iron pyrites, and from 1869 to 1871 sold 271 tons of copper ore for £770.1s. Production returns for Devon and Cornwall United Mines start in 1852 when 98 tons of copper ore were sold for £475.8s.0d. No detailed returns are given for 1856 – 1861. The peak production years were from 1862 to 1867 when 1,105 to 2,920 tons of copper ore per annum were sold for £4,167 - £9,912 (Burt, Waite, Burnley, 1984, 36).

The Bedford Estates, 1868, *Report on the Mines* by Gilson Martin (dated 31st Dec.) showed that the mine's first lease (dated 11/4/1864) from the Duke of Bedford ran for 21 years, 4,076 shares having been issued, with dues reduced to 1/18th. The lessees were John J. Gervis and Josh Pley. The area of the sett was 220 acres, 66 of which were woodland but *'the remainder in arable and pasture'*. Two cottages are rented from the estate with six shafts in use and four abandoned and protected.

The surface plan of George and Charlotte Mine (Copper disused) is shown in detail on Figures 7 and 8 (1867, Bedford Estate Maps), and Figs 9 and 10 (OS 1884 and 1904 maps respectively). The main centres of operation follow the single main lode. Likely 18th Century remnants of the lode working are shown on Fig.18 (Site 23) extending westwards from the site of the Counthouse (Site 19) with later 19th Century shafts (Sites 29 and 30) used for pumping out the inclined lode using flat-rods powered by a water-wheel (Site 2 as shown on Fig. 8) and possibly a small steam engine for either Emily and/or Ley's Shafts (Sites 29 and 30). The 19th Century centre of the mine was focused at the lower part of the site (SX 45273 69906), which contained another water-wheel (Site 10), shallower shafts, adits and the main dressing-floors. As the mine closed a few years or so after the 1867 Bedford Estate map, the map of Fig. 8 is more detailed than the later OS 1884 map, when the mine had been abandoned for some time. However, one must assume that the easily 'winnable' copper ore had been removed over a century before, and the miners by the late 1860s were concentrating on seeking new lodes rather than continuing old drives that had already become exhausted.

'The chief mining setts are in the midst of very fine scenery adjoining the River Tamar which of course is much defaced by them although everything is done to make the surface works as sightly as possible and also that they should not be extended further than can be avoided, still to look at these mining operations as a lover of the beautiful only it would, I think, seem a great pity that such a strikingly picturesque district as that of Morwell Rocks and its vicinity should have been in any way disturbed when nature had done so much for it – in a commercial point of view there can be no doubt but that the Duke's mines have proved to be a most complete success and fortunately the richest deposits of ores have been found where the surface land is very poor and commanding but a small rent for agricultural purposes' (Gilson Martin 1868).

It was not until over a century later in 1977 that Bob Le Marchant, mine manager of Morwellham, put forward a planning proposal to create a new access near River Tamar level close to Footway Shaft (Site 34) to utilise an old mine adit (Deep Adit-Site 33) for a prospective underground narrow-gauge railway to inform and delight visitors to Morwellham Quay (Site 37). This work was quickly undertaken with labour from a job creation scheme. Following additional excavation in 1985/6 to create a single route under the mine, the railway still runs today and is a big attraction for the thousands of visitors to Morwellham and George and Charlotte Mine as they experience in a small way the character of the wet, dark adits, an underground water-wheel and narrow lode-working

There are signs of 18th Century lode outcrop working (Site 23) and costean-pits in the upper part of the site. It is likely that evidence for 18th Century working of the lode outcrop in the lower part of the site has been destroyed or filled in by the later 19th Century mine. The western section of the overall mine site is accessed via adits from the River Tamar, with William and Mary Mine accessed via adits from the River Tavy.

There are no significant remains of buildings with the exception of the Mine Captain's House (Counthouse), a Listed Building (Grade II* - Site 19). Other significant mining remains include

intact water-wheel pits of variable quality (Site 2 infilled, and Site 10 visible). There are other remains of mine adits (Site 5 Middle Adit, Site 21 Shallow Adit, Site 33 Deep Adit and Site 36 New Quay Adit Trial). All of the mine's main shafts appear to be visible: Site 11 Engine Shaft, with a good example of a small balance-bob masonry pit; Site 16 Whim Shaft; Site 24 Air Shaft; Site 25 Cross-course Shaft; Site 26 a mine shaft; Site 27 a possible shaft; Site 29 Emily Shaft; Site 30 Ley's Shaft and Site 34 Footway Engine Shaft.

Landscape remains include the site of the water-wheels (Sites 2 and 10), leats (Sites 1 and 4) and the 'cut and fill' techniques of making ground available to construct many of the mine buildings (Sites 7-9, 15, 18, 20 and 22). There are denuded remains of the former site of the stamps dressing-floors (Sites 5.2 and 14), and associated spoil heaps (Site 17). The low masonry remains of some mine buildings (Sites 8, 9 and 18) can be seen, although covered in ivy, together with long lines of walls retaining the upslope to form building platforms. There is occasional evidence of charcoal burning platforms (Site 32), with visual evidence of coppicing and the growth of deciduous woodland in and around the former mine site, with later 20th Century conifer plantations higher up the valley.

Site significance:

The mines of George and Charlotte and, to the south, Bedford Consols, which later formed Gawton Mine (Buck, 2006), are mine sites on the West Devon side of the Tamar Valley that contain evidence of 18th Century mining, both documentary and physical, as shown by open adits and lode back openworks. It is quite rare to find so many examples of the early years of copper mining, the steep slopes of the valley and dense woodland having preserved these features. As a result, these are of national importance. George and Charlotte Mine demonstrates to a degree the overall survival of a coherent 18th and 19th Century copper-mine complex with its range of related components. Some of the mine buildings are partially extant, and other ground level features such as wheelpits, dressing-floors etc., are simply covered with years of vegetation and the build-up of earth and leaves. The primary use of water as a power source for water-wheels can be seen at two sites, a theme that has been repeated at many Tamar Valley mine sites. The opening of the Tavistock Canal in 1817 provided a significant water source for a number of mines to the north, primarily South Bedford Consols and Devon Great Consols (Buck, 2002), and to the south for this mine, New Quay and Gawton, part of a planned water management scheme possibly designed by John Taylor, the 19th Century engineer. Again, from this respect, the site is important in a national context.

George and Charlotte Mine has been graded as regionally important in terms of its historic landscape value and for the quality of its archaeological sites and documented history. In addition, this site has been graded as locally important for its community and access components with its significance to local people and to visitors from outside the area as a result of the Morwellham train trip. This includes the cultural values placed on the site by the local community and also the potential value of the site for recreation. George and Charlotte Mine is a small part of a select list of sites in West Devon that have World Heritage Site status.

In terms of the wider context of the study area and its historic land use, Sheepridge and Maddacleave Woods, a major part of the landscape around the area, are historically associated with Morwell Barton Manor, a medieval ecclesiastical settlement owned by Tavistock Abbey. Morwellham Quay was this Medieval settlement's link to the river, always a major trading and

industrial thoroughfare, and was a Tavistock borough and Abbey port from the 12th Century, busy not only importing products, but exporting metallic ores at different times throughout its existence. The dissolution of the monasteries in 1539 saw the former Abbey lands transferred to the ownership of the Russells, the Duke of Bedford's family, and in the early 1960s to the Earl of Bradford, the present owner. There is some evidence of woodland management in terms of hedge boundaries and, of course, numerous charcoal platforms. The field pattern around Morwell Barton and the enclosure of Morwell Down to the east and south-east (see Fig. 2) can be seen to be part of a broader picture of agricultural expansion in the 18th and early 19th Centuries.

The mines within this southern part of the Tamar Valley area are highly mineralised, and particularly in this area they were amongst the 19th Century's principal producers of tin, silver, lead and fluorspar. Residues from the mining activity, especially upriver from Devon Great Consols but specifically from Ding Dong Adit near Gunnislake and perhaps other smaller adits, have resulted in spoil tips barren of vegetation and local soils which are highly contaminated with arsenic, ranging from 120 to 52,600 µg/g, and tin. However, simultaneous exposure to the environment can also be from a number of other elements present in the mining waste at highly elevated levels, including copper, lead, zinc, antimony, molybdenum, tin, selenium and mercury.

Site Inventory

Site 1: Leat (Tavistock Canal to Gawton Mine via New Quay)

Historically, the Tavistock Canal was in use by 1817. The project engineer, John Taylor, was also a mining engineer and had interests in many mines close to or cut by the Tavistock Canal project. One of these was George and Charlotte Mine. It is possible that he was involved in the creation of the new leat, at least for the benefit of George and Charlotte Mine, as the mining company was owned by the Canal Company from 1806. Thus the construction of the leat may date to when the water was available from either the southern end of Tavistock Canal or perhaps from the southern side of Morwell. The New Quay lime-kiln inclined plane powered by a water-wheel was built in late 1825. Consequently the leat to supply the water may be of a slightly earlier date, i.e. from 1817. The 1867 and OS maps (Figures 7-10 incl.) are the earliest maps that show in detail a leat from the Tavistock Canal tunnel portal running around the south side of the Morwellham access road and then leading due east to George and Charlotte Mine. From here it ultimately fed two water-wheels before it continued towards New Quay. The sluice from the main water-wheel continued as the tail-race discharging into the Tamar. A sluice feeds the New Quay reservoir pond (Buck, 2006, Site 8.3) before it continues along the side of the valley and goes under the main access track into the quay (Buck, 2006, Site 11.1). It then continues along the side of the valley to power another water-wheel a mile away near Bailey's Shaft of Bedford Consols, later renamed Gawton Mine (Buck, 2006a, Site 24). However, analysis of Figs 7 and 8 (OS maps) also shows an additional, parallel leat from the vicinity of the wheel-pit (Site 2). A hypothesis, therefore, is that the second leat (Site 4) is later, between 1867 and 1884, than this leat.

Evidence of the leat is best seen in the steeply-wooded sides of the Tamar Valley. Part of the leat's course has been utilised to form a new footpath from Morwellham to New Quay. In places it is 0.5 to 0.8m wide at its base, with the downslope bank 0.5 to 0.7m high, and the upslope bank 0.9 to 1.3m high. The leat is likely to have been sluiced before it fed the small header pond (Site 10.3) next

to the central mine's water-wheel (Site 10), the remainder of the water feeding into the leat that proceeds towards New Quay close to the mine track to New Quay (Site 13.1). Where the leat goes across the waste rock from Middle Adit (Site 5), revetment walling has been built for a height of 1.5m and a length of 6.0m.

Site 2: Wheel-pit

2.1: Balance-bob pit

The construction of this wheel pit and its tail-race feeding the leat (Site 1) to the mine appears to be of later date than the original construction of the leat. It may date to the Devon & Cornwall United Mine tenure from 1851 which focused on opening up new, deeper shafts to access the lodes eastwards towards William and Mary Mine in the Tavy Valley. The wheel would have been of either 40' or 45' diameter and functioned to power flat-rods and, perhaps latterly in 1867, to pump or wind Ley's Shaft as shown on Fig. 8, the Bedford Estates map (Site 3). It may be the case that these rods first worked Emily Shaft (Site 29) before the lode extended further eastwards to Ley's Shaft. The tail-race leat (Site 1) from the water-wheel then joined the original leat to supply water to the mine's second water-wheel (Site 10).

The wheel-pit is visible on its west and south sides only; the remainder of the external and interior walls are obscured by the build-up of earth, stone and water. The masonry of the south-west corner stands 1.9m. high above ground level with a width of 2.0m. It is approximately 11m. long. There is a flat area of ground 3.0m. wide south of the wheel-pit that would have been the site of masonry loadings and the crank-pit where the main power shaft was connected to the flat-rod to transfer circular motion to horizontal, and, further to the west, a vertical rock face approximately 7.0m. high and 5.0m. wide of uncertain function.

Masonry at the south eastern end of the wheel-pit has been interpreted as the outer walls of the balance-bob pit. The flat-rod would have travelled over the balance bob onto a trellis structure to support the moving flat-rod as it traversed the hillside up to the shaft. The masonry is 1.0m. wide, 1.3m. deep on the north side and approximately 5.0m. long. Additional walls and further architectural details are obscured by fallen material from the hill-slope to the east.

Site 3: Header pond

The header pond is shown on both of the Bedford Estates, 1867, survey maps (Figs 7 and 8). However, it is not shown on any other archive maps. The header pond would have formed a reservoir of water from at least one, if not two, further small leats uphill (see Fig. 8 – the 1884 OS map) from the north and east. A sluice sited between the header pond and the water-wheel inlet would have carefully managed the water flow to achieve sufficient rotation to power the flat-rods at an efficient speed.

As shown on Figs 7 and 8, the rectangular shaped header pond is situated above and next to the wheel-pit. There is no obvious sign of the reservoir pond at ground level since it would have been filled with earth, stone and water.

Site 4: Mine Leat/water-wheel tail-race

4.1: Vertical rock cut

4.2: Wheel-pit Tail-race

The mine leat and water wheel tail-race, fed via a vertical rock-cut (Site 4.1), is shown on the OS 1884 and subsequent OS maps. The route of this later leat is parallel to the earlier leat but higher

up the side of the valley although it may well have joined the earlier leat where it turned downwards. The reason for this additional leat is unclear, but perhaps it provided a faster or additional head of water for the mine's other water-wheels (Site 10).

The tail-race water from the central mine water-wheel (Site 10) appears to join the main leat and then head towards New Quay after going along an underground channel under the mine track from the mine to New Quay. However, the later 1884 OS map (Figs 9 and 10) shows an additional section of tail-race built from the point where it would go under the track, perhaps to feed water to the water-wheel of the saw-pit at New Quay (Buck 2006, Site 1). Figure 10 also shows that a sluice had been built from the main leat also to feed the saw-pit of the water wheel.

Evidence of the leat is best seen in the steeply wooded sides of the Tamar Valley. Trees are growing along and inside the leat in places. It is 0.6 to 0.9m. wide at its base, with the downslope bank 0.5 to 0.8m. high, and the upslope bank 1.0 to 1.5m. high.
The east-west oriented vertical rock cut averages 1.2m. at its base and 2.0m. across its top edge, with the north side of the opening being approximately 5.5m. deep and the south side 3.7m. deep. There is little surface evidence of the tail-race as shown on Fig. 9.

Site 5: Middle Adit

5.1: Higher dressing floor

5.2: Balance-bob pit

Fig. 12: Middle Adit (from entrance) after removal of rock/silt build up (Site 5)
Photo Colin Buck

Middle Adit is on the abandoned mine plan, Figure 5, and labelled on Figs 7 and 8. It extends past Ley's Shaft (Site 30) towards Down's Shaft.

'… the lode was opened up by three adits on the eastern slopes of the Tamar valley and by six shafts. Deep Adit level from the river bank, and Middle Adit Level, 28 fms. higher … both extend to 340 fms. E. of the river… The sloping shown on the plan is confined between Middle Adit and 12 fm. levels and extends 60 fms. E. and 90 fms. W. of the shaft (Cross-course Shaft – Site 25)*, but is patchy, less than 25 per cent of the area having been removed'* (Dines, 1956, 677).

Near the adit portal, there were the 'Higher Floors', as labelled on the front cover of the abandoned mine plan (DRO R98E). Waste rock, transported via a tramway from the working levels, would have been disposed of down the slope (see Fig. 8), and the ore rock dressed by 'bucking' with hammers on the 'Higher Floors' at the flattish area to the south and west side of the adit portal. In the last decade, the adit portal has been cleared and tram-rails set in the floor.

The excavated floor of the adit now reveals an opening 0.9m wide at ground level and 1.7m high. A padlocked steel gate measuring 0.9m x 1.5m has been set into the portal entrance to restrict access. During the past decade, the Tamar Mining Group have removed a great deal of earth and stone from the floor and mouth of the adit and then installed a tramway (see Fig. 12) within the adit, a turntable (now removed) outside the portal and a tramway out to a spoil heap to the east in order to illustrate how the material was separated and then processed. Surveys, description of finds and an archaeological record of this excavation can be found at the Tamar Valley Industrial Archaeology website as recorded by Robert Waterhouse.

The adit water drained under the turntable (in 2005) to a trench and outflow to the south into the large spoil heap that descends steeply down the slope to the centre of the mine. The tram-rails have been built to extend from the turntable outside the portal to the east across the higher dressing-floor formed by the construction of a 1.7m high masonry retaining wall approximately 8.0m long. A slight, rounded, cut-out masonry feature close to the north side of the adit portal has been interpreted as a mechanical fan or bellows which would have pumped air into the adit via a long trunking fixed to the wall (*pers. comm.* Rick Stewart).

Next to a low retaining wall south west of the adit portal is some masonry that resembles a balance-bob pit (Site 5.2), now filled with silt from the adit, water and leaves etc. This is approximately 5.0m long, 2.0m wide and 0.4m above ground level on the south side. Thus, there is likely to have been a need for a flat-rod power source within the adit, perhaps for winding, pumping or for the fan or bellows.

The higher dressing-floor (Site 5.1) is visible as a flattish, compacted, hard floor of stone very close to the surface over an area to the south and west of the portal. There may have been timber sheds or corrugated iron structures to keep the rain off when the ore was being manually broken up by men, women and boys, but this would not have survived.

Much effort by volunteers has been expended to clear out the adit and to install the tram-rails and outside turntable. With additional work this site could prove to be an interesting exhibit for members of the public to discover whilst walking around the surface features of the mine, a counterpoint to the underground features shown during the railway trip.

Site 6: Site of Powder House

The mine would have had its own powder house to store the fuse and gunpowder, situated away from general activity and not far from where it was needed – i.e. the main working adits. The building is shown on the 1867 maps only (Figs 7 and 8). There is no visual evidence of this building although the flat site upon which it stood can still be seen.

Site 7: Mine building

A building is shown on this site on the 1867 maps (Figs 7 and 8), and the later OS maps (Figs 9 and 10). There are no buildings labelled on the mine plans, therefore this has an unknown function (as well as Sites 8 and 9), although it may have been simply a crib hut; a place for shelter during snack or meal times.

The site is set in an area that has been excavated from the hillside to form a flattish site for the construction of a vertical masonry wall (0.45m high) on the upslope north-east side. There are remnants of all four walls. The building is small (internally 2.2m. x 3.0m.with a maximum height of 1.7m.). There is a possible doorway in the east side with the remnants of a window-sill in the south-west wall. The north-west wall has remnants of the gable wall, with the other walls approximately 1.5m high at the most.

Site 8: Mine building (possible carpenter's shop)

A building is shown on this site on the 1867 maps (Figs 7 and 8), and the later OS maps (Figs 9 and 10). It is thought that this may possibly have been the mine's carpenter's shop. However, there are no buildings labelled on any map that has been viewed. This building has a distinctive shape, and may have been divided into two halves. Alternatively, it may have functioned as a dressing-floor building.

The site is set in an area that has been excavated from the hillside to form a flattish site and with the construction of a retaining masonry wall, approximately 6.0m high, on the upslope north east side (which extends also to include Site 9). There are remnants of all four walls, but the building is densely overgrown with growing and fallen trees, and the walls are obscured by ivy. The plan of the building is shown in detail on Fig. 8. The east and west walls are approximately 1.5m high, and the north wall 2.0m high. Internally it is approximately 4.7m from east to west and 3.8m from north to south.

Site 9: Mine building (possible Smithy)

A building is shown on this site on the 1867 maps (Figs 7 and 8) and the later OS maps (Figs 9 and 10). It is thought that this may have been the mine's smithy. However, there are no buildings labelled on any map that has been viewed, therefore this building has an unknown function (as well as Site 8). Alternatively, this may have functioned as a general store; a track from the building leads to the main mine track south to New Quay.

This building is also set in an area that has been excavated from the hillside to form a flattish site with the construction of a retaining masonry wall approximately 6.0m high on the upslope, north-east side. The building has more extant remains of all four walls than Site 8, but it is also densely overgrown with growing and fallen trees, and the walls are obscured by ivy. The plan form of the building is shown in detail on Fig. 8. The east and west walls are approximately 1.5m high, and the north wall is 3.0m high, with a probable central window. The south wall is more extant on the south-east side, being 3.0m above ground level, but the east gable wall with evidence of a central window has collapsed. The west wall with a doorway in its south end is now only 1.8m above ground rubble level.

Site 10: Water-wheel pit

10.1: Winding drum pit

10.2: Site of Crank housing

10.3: Header pond

This feature is clearly shown on all archive maps, although the best detail is shown on the 1867 survey map (Fig. 8). The water-wheel appears to have functioned mainly to provide a power source to pump up water from Engine Shaft (via flat rods - Site 11), sited to the south-east, and also to wind up ore from Whim Shaft (Site 16), sited to the north-west. The wheel would also have been of 40’ or 45’ diameter fed by the main leat (Site 1) and later by an additional head of water provided by another leat (Site 4). The construction date of the water-wheel is not known; however, it may originate in the mid 1840s when George & Charlotte was formed, primarily to wind from Whim Shaft (Site 16). As the mine’s working levels deepened and Engine Shaft (Site 11) was cut, it is likely the water-wheel would have had to be increased in diameter to pump from the latter shaft also (*pers. comm.* Rick Stewart).

The wheel-pit is extant although it is partially infilled at either end. The walls are approximately 12.0m long, visibly 4.0m deep to rubble level and 2.0m wide. A sycamore tree is growing out of its centre, and it is choked with vegetation and rubble whilst the masonry is obscured by dense ivy, and smaller sycamore trees are also growing from the top of the masonry walls. The north-west end of the wheel-pit masonry wall has collapsed at its west and east ends whilst the south-west wall has collapsed at its east and west ends. The central section of the wheel-pit is constructed of granite and large killas whereas the end sections are constructed of smaller killas which have collapsed at the north end side. This may suggest a primary and secondary stage of development. However, this feature remains an impressive structure.

The wheel-pit would have had a winding-drum set in a pit or slot on its eastern side (as shown on Fig. 8) close to the Header Pond to wind from Whim Shaft (Site 16, to the north-west). This is evidenced by a slight depression on the north side of the north end of the wheel-pit 4.0m long, 0.7m wide and 0.6m below surrounding ground level and bounded on its east (upslope) side by a 1.5m long retaining wall.

On the western side of the wheel-pit there is likely to have been a crank housing to transfer the circular motion of the crank on the wheel to a flat-rod to pump Engine Shaft (Site 11), the flat-rod going over the balance-bob pit to the shaft pump-rod.

On the north eastern corner of the wheel-pit north of the winding-drum, a small header-pond can be seen on Fig. 8. However, this is not visible now at ground level.

Site 11: Engine Shaft

11.1: Balance-bob housing and mountings

Figure 6 shows the shaft in plan only; the section line is further to the north following Main Lode where it was cut to the 40 fathom level. *'Engine Shaft, 80 yds. S.E. of Whim Shaft, is vertical, lies south of the lode, and is connected to the 40 fm. Level by a cross-cut N.E., 20 fms. in length'* (Dines 1956, 677). The shaft is not shown on any section plan. The shaft appears to have pumped water from the underground working levels by a flat-rod powered by the nearby water-wheel. Whim Shaft (Site 37), would have wound ore up from the same 40 fathom deep working. Figure 13 shows the balance-bob box housing and mountings which would have counteracted the weight of the pump-rods in the shaft. The flat-rod would have passed over the top of the balance-bob structure and then connected to an angle bob sited at the northern edge of the shaft. Discovery and excavation of the shaft with explosives have been described by Le Marchant (1980, 24 – 26).

The mine shaft is open, has extant stone collar walls and is grilled at a depth of 3.0m below ground level. The stone collar extends to bedrock at a depth of approximately 5.8m below ground level. The safety grill is constructed of railway rail and 5mm thick steel (in 0.15m square sections). Set against the east face of the shaft is a 6" rusty steel water pipe, fed by a nearby square header tank (see Site 12 description for function). The shaft at surface is approximately 1.6m x 1.6m, and surrounded by a low post and wire fence 0.7m high.

11.1: On the north west side of the shaft is a very good example of the masonry for a balance-bob housing and mountings; however, it is obscured by ivy and vegetation (see Fig. 13). The walls are approximately 2.2m high and 0.5m thick, the 'box' end being 3.0m x 4.0m. On the south and west sides the 'box' walls are approximately 1.5m above the height of the nearby 'slot' walls. The 'slot' mounting masonry is approximately 5.0m long, but filled with vegetation.

Site 12: Braithwaite header tank,

The late 1970s underground railway experience (see Site 33), also contains a reconstruction of a water-wheel that is sited lower in Whim Shaft (Site 16), next to the route of the railway tour. The water-wheel is activated by allowing water to fall via the pipe set in the shaft (Site 11) from the Braithwaite header tank onto the wheel to force it to turn. The flow of water into the pipe is actuated by the engine-driver during the underground tour. The plastic covered steel Braithwaite header tank, installed in the mid 1980s, is filled by a 6'' water pipe further up the valley.

The plastic covered steel Braithwaite header tank is of modern construction (1980s) and is approximately 2.1m wide, 2.6m high and 4.0m long.

Fig. 13: Balance-bob box next to Engine Shaft (Sites 11.1 and 11).

Site 13: Mine Tracks: Morwellham to New Quay via George & Charlotte Mine

13.1: George & Charlotte Mine to New Quay

A mine track ran from Morwellham to New Quay via George & Charlotte as shown on Figs 7 – 10. Site 13.1 is a section of a mine track from the lower dressing-floors (Site 14) to the northern quay of New Quay. The historical background section of the mine does state that it used New Quay to assay and export its copper ore; presumably it was an alternative cheaper than Morwellham.

The main mine track from Morwellham to New Quay is still extant; part is a public footpath. The section of track running through the George & Charlotte Mine sett has essentially been used as the outside route of the Morwellham underground railway line since its inception. Within the last five years another footpath has been made from Morwellham to New Quay by creating a new route higher up the hillside than the mine's buildings and shafts. The track from the mine to New Quay is still extant, but the track is much more obscure and infilled.

Site 14: Lower Dressing-floor

The lower dressing-floor also undertook the manual dressing of copper ore from Whim Shaft and perhaps the lower adits in the early years of the mine's development of the lode. Figs 8 and 9 show the structures that existed at the time. However, there may have been a small stationary engine

which powered a small ore-crusher although manual means of breaking ('bucking') the ore may well have predominated.

The ground is flat in places, but its character is mainly one of a large spoil heap cascading down the hillside. There is little evidence of any other dressing-floor buildings apart from Site 15 as shown on Figs 8 and 9 with the exception of a long, stone retaining-wall, 3.2m high at its maximum height for a length of approximately 15.0m, which has collapsed in places, and a small building at its north end. There may have been a flat-rod power source from the water-wheel, Site 10, for turning other dressing-floor machinery although there is little site evidence of this. Water from the leat above could have been used for dressing the ore.

Site 15: Mine building (dressing-floor)

A building is shown on this site on the 1867 maps (Figs 7 and 8), at the north end of the long retaining wall (Site 14). This small building has an unknown function but was likely to be related to ore dressing.

The building has a visible south side wall which is 1.0m above ground level with a doorway at its east end. The site is set in an area that has been excavated from the hillside to form a flattish site, and its east (upslope) wall is the long retaining wall (Site 14). The building is small, being internally 2.2m x 4.0m.

Site 16: Whim Shaft

Figs 5 and 6 show the shaft in section and plan where it was cut to approximately the 60 fathom level. *'Whim Shaft … about 80 yds. from the river is on the underlie to 64 fms. below Deep Adit level, which it meets at about 10 fms. depth … The workings from Footway and Whim Shafts are all below Deep Adit level* (Dines 1956, 677) (see Site 34 for a fuller description of stoping). The shaft appears to have been quite important to the mine; it was possibly the earliest shaft and the main shaft to wind up ore from the George and Charlotte side of Main Lode as shown on the section plans. Discovery of the underground features of a 10' water-wheel and surface slot, perhaps an angle-bob, during the late 1970s in this shaft have been described by Bob Le Marchant (1980).

The mine shaft is closed, has partially extant stone collar walls and is capped with timber at a depth of 2.0m below ground level, measured from the north side of the shaft. The stone collar is partially collapsed on the north, west and east sides. The capping obscures the visible depth to bedrock. The shaft is not fenced and is rectangular and is 2.2m square.

This building is rectangular and set in an area that has been excavated from the hillside to form a flattish site. The building has extant remains of three of the walls, but the tops of the walls are overgrown with ivy. Internally the walls are higher than externally as it has been cut into the hillside. The plan form of the building is shown in detail on Fig. 8, with a winding track shown from the doorway to 'Counthouse Road.' The south-west wall formerly had a central window but is now 2.4m high on its south side internally. The north wall is 2.3m high internally, whilst the east wall is 1.9m high. The south-east wall and doorway are missing. In plan the building is 5.0m long and 2.7m wide, the walls are 0.55m thick.

Site 19: Counthouse

The Counthouse/Mine Captain's House is shown shaded in red on Fig. 8, the 1867 Bedford Estates Map, as being habitable. From the evidence of the map it can be seen that two fields upslope of the house had been formed and cleared for use as a garden or an allotment and grazing area for animals, probably chickens, pigs and goats etc., in the mid 19th Century. South of the house was another small building which probably was an animal outhouse (hen house or piggery) and an outside toilet.

As there does not appear to be a detailed site plan of this mine, it seems likely, that this complex of buildings housed the mine's administration, mine captain's house, smithy and carpenter's shop. The whole of this complex of buildings, however, is private with no public access. It is therefore deemed to be outside the study area. However, the main habitable building is Listed Grade II. The Listing description is given below:

George and Charlotte Mine. Mine Captain's house, used as gamekeeper's house, now house. Probably c18, enlarged early-mid c19, with later c20 alterations. Granite and slatestone rubble with slate roofs with gabled ends. Plan formed by accretion, one long range built into side of hill; early building may have been originally 2-room and central passage plan with rear lateral stack, taller building attached to left of single depth plan. Range to right of 2 storeys and 3 windows, 12-pane sashes under eaves, ground floor right and left 16-pane sash with brick segmental heads, central door with segmental head in c20 porch. Straight joint to left to taller 2-storey block with 2 windows, has at ground floor 16-pane sash and 2-light casement with brick segmental heads, slate apron to casement to right; first floor has 16-pane sash and 4-pane casement. Left gable end has single-storey lean-to, right gable end blank, set into slope of ground with timber lintel in wall at lower ground floor left. Interior not inspected (Listing text).

Site 17: Mine waste dumps

17.1: Processed waste

17.2: Waste rock

The mine waste dumps are shown on Figs 7 – 10 in two main areas, firstly down-slope of Middle Adit (Site 5) for the material brought out of that upper working, secondly, west of the lower dressing floor (Site 14). Material would have been brought up Whim Shaft (Site 16) and separated and processed on the dressing-floor. Fig. 8 shows this in quite good detail.

The processed waste is smaller in size and weight, resulting from the manual 'bucking' of the ore (see Site 14), and would have been located relatively close to the site where the ore was being processed, i.e. immediately north-west of the ore floor (Site 17.1). The larger sized waste material would have been taken by tram-rail further along the side of the valley (Site 17.2). When viewing the spoil heap it is possible to see where these different stages of the dressing process caused different sizes of rock waste.

Site 18: Powder House

The mine would have had its own powder house to store the fuse and gunpowder, sited away from general activity and not far from where it was needed, i.e. the main working adits. Site 6 is likely to have been a Powder House for use in the nearby Middle Adit (Site 5). This building (Site 18) is not far from Shallow Adit (Site 21) and is shown on the 1867 maps only (Figs 7 and 8). A photograph of the building is shown in Fig. 14.

Site 20: Site of mine building (Miners' Dry?)

A rectangular shaped building with annex on its east side is shown on Figs 7, 8 and 9. The building had gone by 1904 (Fig. 10). It seems likely (although there does not appear to be a detailed site plan of this mine) that this building housed the mine's Miner's Dry. An area has been cleared upslope of the building, perhaps as a store yard. The whole of this complex of buildings, however, is private with no public access. It is therefore deemed to be outside the study area.

Access into this site was not attempted as it is private property.

Site 21: Mine building

This small building is not far from Shallow Adit (Site 21), and is shown on the 1867 maps only (Figs 7 and 8). Its function may be related to the operational working of the adit, or simply site toilets.

The building is small and rectangular. It is set in an area that has been excavated from the hillside to form a flattish site. The building has extant remains of two walls, but the tops of the walls

are overgrown with ivy. The plan of the building is 2.6m wide and 3.0m long. The south-west wall survives to a height of 1.0m, but the south wall is only 0.7m high. The north wall has been robbed, only the earth cut being visible.

Site 22: Shallow Adit

Shallow Adit is shown on Fig. 5 and labelled on Figs 7 and 8. It is sited just above *'Count House Road'*, and extends under Air (Adit) Shaft and Cross-Course Shaft (Sites 24 and 25 respectively) eastwards towards Emily Shaft (Site 29 - the mine section is likely to be incomplete). The adit has been cleared by the Tamar Mining Group as far as Cross-Course Shaft (Site 25).

'... the lode was opened up by three adits on the eastern slopes of the Tamar valley and by six shafts... Shallow Adit Level, 200 yds. E. of the river and 14 fms. above Middle Adit, has been driven 76 fms. east'. (Dines 1956, 677).

It is likely that the upper section of the lode through which this shallow adit was cut, was mined in the preceding century (Site 23). *'The Tamar Mining Group have excavated approximately 120 yards during the period 1999 to 2004 up to a 'run-in' at Cross-Course Shaft'* (*pers. comm.* Rick Stewart).

The adit site was not visible during the site survey as the site is within private ownership.

Site 23: Lode back openwork and 23.1: Costean-Pits

The surface lode back mining and exploratory costean-pits are likely to date back to the 18th Century. This is the only part of the site which appears to have relatively good evidence of early mine workings (see Fig. 15). Both extend eastwards up the side of the valley.

The location of the costean pits and subsequent narrow lode excavation (see Fig. 18 for the extent of Site 23), shows that the lode was heaved by a north-south cross-course (see Fig. 4), further to the east. *'The lode is heaved 5 fms. left by the cross-course on which Cross-Course Shaft* (Site 25) *is sunk and is heaved about 10 fms. right by another east-dipping cross-course that passes through Deep Adit Level 25 fms. W. of Ley's Shaft* (Site 30)*'* (Dines 1956, 677).

The steep section of the narrow lode outcrop or gunnis is demonstrated to good effect from Site 21 up to Site 26, a possible shaft. The minimum width of the narrow open-work at its base is 0.8m, originally at its top surface edge to 1.5m width, but now collapsed back to 4.0 – 5.0m width, and a depth of 5.0m in places from the surrounding ground level. However, in many places the open-work inclining to the north-west has been filled within the last century by earth, stone and vegetation. The waste dumps are mainly on the down slope, east of the gunnis.

23.1: Although there are smaller, circular costean-pits around the edges of the main gunnis, the larger and longer pits or trenches are sited within the strip of woodland extending to the main road adjoining the east side of the project area. A track, still extant, runs parallel and to the south. These numerous pits and trenches are approximately 7.0m long, 1.0 to 1.8m deep, some being filled with water after rain, and averaging 0.5m at the base and up to 1.0m wide at ground level. The long, rectangular pits are approximately 4.0 to 5.0m apart. These trenches and pits were initially searching for the back of the lode and some larger pits were shallow mining took place at the top of the lode.

Fig. 15: 18th Century lode back openworks. *C.Buck 2005 ©*

Site 24: Air (Adit) Shaft

Fig. 5. shows the shaft in section; however, it is not shown on any plan. It is sunk to a depth of approximately 15 fm. to meet Shallow Adit Level (Site 22). The shaft would have been cut mainly to provide air, ventilation and access to Shallow Adit.

This small mine shaft is located on the east side of an overgrown forestry track, and on the same alignment as the openwork. The mine shaft is open to a depth of approximately 3.5m below track level when it is choked. The bedrock is visible to surface level, and it has an insufficient metal pole and rope barrier. The shaft in plan measures 1.0m x 1.8m.

Site 25: Cross-Course Shaft

Fig. 5 shows the shaft in section. It is not shown on plan where it was cut to Deep Adit Level, the cross-course extending to a lower depth. However, this shaft is sited approximately 60 fms above Deep Adit Level, thus giving the total shaft depth to be a minimum of 60 fathoms although it is not

known if the shaft was later deepened to follow the cross-course lower than Deep Adit. *'Cross-Course Shaft, 90 yards E. of Emily Shaft, is sunk on a cross-course, underlying about 20° E, to Deep Adit Level …Midway Level between Middle Adit and Deep Adit extends 40 fms E and 105 fms W where it meets Cross-Course Shaft… A crosscut south from Shallow Adit Level at Crosscourse Shaft intersects a lode 5 or 6 fms S of Main Lode. This has been driven on eastward for 30 fms and has also been picked up in a cross cut south from the 24 fm. Level, 70 fms. W of Ley's Shaft* (Site 30), *and driven on for about 5 fm.; no other work appears to have been done on it'* (Dines 1956, 677).

Fig. 16: Deep Adit, new railway

The shaft would have been important to the mine when it was being cut (to remove the mineralization from the cross-course heave) but the shaft would have been quite crooked and inclined so difficult to use for winding or pumping.

The mine shaft is choked at a depth of 2.5m below ground level and is 1.4m x 2.2m in plan. There is a dilapidated post and three-strand barbed wire fence surrounding the shaft.

Site 26: Possible Shaft

This collapsed feature, which resembles a shaft, is not shown on mine plans nor abandoned mine sections. It may have been a later re-working or a collapsed earlier working as it is on the course of the earlier gunnis.

The mine shaft is mainly choked at a depth of 2.5m below ground level, except that the eastern side is choked at a deeper depth of 4.5m. The feature is 1.5m x 1.5m in plan. There is a dilapidated post and three-strand barbed wire fence surrounding part of the shaft. The shaft is sited just below an overgrown track (former hedge line - Site 28).

Site 27: Possible Shaft or Lode back pit

This feature may equally be a lode back pit or shallow shaft in the older 18th Century gunnis.

The mine shaft is mainly choked at a depth of 2.0m below ground level. The feature is 3.8m x 3.8m in plan. The south, west and east sides of the feature are cut into bedrock, whilst the north side is open into the gunnis alignment. There is no fence surrounding the feature.

Site 28: Site of former hedge

Figs 7 to 10 show a line which, when compared with Fig. 2 (1784 Gardner Map) can be seen to be an old hedge line that formerly marked the boundary between Morwell Down and the steep Tamar Valley woodland. It is highly likely that mining operations (Sites 23, 27, 29 and 30) and the construction of mine access tracks, followed by mining closure, resulted in land to the east of the hedge line within the study area being planted with woodland, now conifers, managed by the Tavistock Woodlands Estate.

This former hedge line has been removed in previous forestry operations approximately twenty years ago in order to create a forest access route.

Site 29: Emily Shaft

Figs 7 to 10 show the shaft in section and plan. Figs 7 and 8 also show the site of the shaft within its surrounding spoil mound. '*Emily Shaft, vertical to Middle Adit level, which it meets at 48 fms'* (Dines 1956, 677). It may well be the case that as the main lode was worked from west to east under the side of the Tamar Valley from the early 1850s as Devon and Cornwall United Mine and after the large water-wheel was erected (Site 2), this shaft may have been the first recipient of the flat-rod power source for winding and perhaps pumping. After the lode went further eastwards, the flat-rods were moved to Ley's Shaft by the mid 1860s (see Fig. 8 and Site 30). Thus, in the early 1850s this shaft appears to have been quite important to the mine; and at that time it may have been the main shaft to wind up ore from Main Lode as shown on the section plans. Furthermore, it is likely that of the few steam engines used on this mine in the early 1850s, this shaft may have been the site either of the 20" whim engine or of a 12" portable engine with hauling gear.

The mine shaft is closed, and has a partially extant stone revetment collar wall around its north and west sides, 1.0 to 2.5m high. There is a wide, choked depression within the debris of waste

rock enclosed by the revetment wall, which extends approximately to field ground level. There is a high spoil mound on the north side of the shaft, and the latter is partially and poorly fenced.

Site 30: Ley's Shaft (out of study area)

Figure 5 and Figs 7 to 10 show the shaft in section and plan. Figs 7 and 8 also show the site of the shaft within its surrounding spoil mound, and in addition the route of the flat-rods from the large water-wheel (Site 2) to the western side of the shaft is shown whilst Fig. 8 also shows detail of the long, angle-bob pit on the west side of the shaft, which transferred the horizontal motion of the flat-rod to a vertical motion to pump the deep workings up to adit level. *'The chief shaft appears to have been Ley's … sunk on the underlie to 34 fms below Deep Adit Level which is 83 fms.below the shaft collar… From Ley's Shaft there are no levels shown above Middle Adit Level though there are some old open-works on the back of the lode'* (i.e. Site 23 - Dines 1956, 677). After the lode went further eastwards, the flat rods were moved to Ley's Shaft by the mid 1860s (see Fig. 8 and Site 30). Thus, by the mid 1860s this shaft appears to have been quite important to the mine as the main pumping shaft to drain the deep working levels as they extended eastwards with a strong likelihood that it was also used to wind up ore using a small steam engine.

This site was not surveyed as it is located in a privately owned field. However, it can be seen that the shaft has a large, circular spoil mound as shown on mapping. The Tamar Mining Group has confirmed that the shaft needs to be re-fenced, but that it is of great interest as it '*is one of the deepest accessible shafts in Britain, also that a pile of masonry rubble on its east side may be the possible remains of a house for the 20" whim steam engine*' (*pers. comm*. Rick Stewart).

Site 31: Stone outcrop

Figs 9 and 10 show a round feature linked by a track from the nearby road. This outcrop juts out from the valley side and commands a spectacular view of the bends of the River Tamar and specifically of Morwellham Quay. In the Victorian period, high landscape viewpoints were popular especially for Sunday walks and pursuits such as painting. However, within the past few years, the tops of trees are starting to obscure the view.

Site 32: Charcoal-burning platforms (woodland areas)

Charcoal-burning platforms are likely to have been distributed around the steeply sloping sides of Sheepridge and Maddacleave Woods from the Medieval and/or the post Medieval period. These can be seen to a much greater degree in landscapes occupied by mature, deciduous trees rather than those that have been planted with conifers. Presumably ground landscaping for the conifer plantations has destroyed evidence of them.

The platforms measure approximately 4.0 to 5.0m long along the slope and 2.0 to 3.0m wide. They are cut into the hill slope giving a rear face approximately 0.5 to 0.7m high depending on the slope. They are distributed across the side of the hill from a quarter of the way up the slope to the steepest slopes.

Site 33: Deep Adit (Bastard's Level)

Deep Adit is shown in section on the abandoned mine plan, Fig. 5, whilst Figs 6 to 8 show the site in plan. It is situated just above the River Tamar and extends past Whim Shaft (Site 16), an internal shaft or winze, the bottom of Cross-Course Shaft (Site 25) and past Ley's Shaft (Site 30) towards Down's Shaft; the mine section is likely to be incomplete, so it may have finally connected all the way to the Tavy Valley. It is likely that this adit was the main water drain for the mine and access for materials etc.
'Below Deep Adit the 12 fm. Level extends for 8 fms W and 60 fms E and the 24 fm. Level for 45 fms W and 55 fms E. The stoping shown on the plan is confined between Middle Adit and 12 fm. levels and extends 60 fms E and 90 fms W of (Counthouse) shaft, but is patchy, less than 25% of the area having been removed'. (Dines 1956, 677).

See Site 37 for a description of the workings related to the construction of the Morwellham underground railway.

The adit roof is approximately 2.0m high and 1.8m wide. The adit roof, near the portal entrance is constructed of timber and supported partly by old, re-used railway lines for a length of approximately 30.0m. (see Fig. 16). Thereafter the adit roof and sides are the original rock face.

Site 34: Footway Shaft

Figures 5 and 6 show the shaft in section and plan. Figs 7 and 8 also show the site of the shaft close to Deep Adit (Site 33). *'Whim Shaft… is sunk on the underlie to 64 fms below Deep Adit Level, which it meets at about 10 fms. depth;60 yds. S-W of this is Footway Shaft sunk to the same depth… The workings from Footway and Whim Shafts are all below Deep Adit Level. From Footway, the 15 fm., 20 fm.,and 30fm. levels extend about 20 fms W while the 20 fm., 30 fm., 40fm., and 54 fm., levels block out the ground for 100 fms E, the 40 fm. extending a further 100 fms east. No stoping is shown in this part of the mine'* (Dines 1956, 677). The shaft also worked the lode under the River Tamar and into Cornwall (Harewood Sett in the early 1850s).

The shaft is shown in Fig. 17. No record has been seen of its excavation and clearance by Morwellham under Bob Le Marchant in the 1970s as the railway line runs close by the north side and returns close by the south side. The shaft is approximately 5.0m. from the former entrance of Deep Adit Level. The shaft opening diameter is 0.9m x 1.3m, and is sealed with timber and steel mesh at a depth of 0.5m. below ground level. A stone revetment wall appears to have been built from bedrock to ground level, within which it has been capped with timber. Three timber 'head-winding gear' posts have been set over the shaft, the posts set in the shaft to a depth of 1.2m. A section of ladder has also been set into the shaft sides, all of which is for public interpretation as the train goes past the shaft. *'The shaft is completely backfilled, and the current shaft collar is a replica*' (*pers comm*. Rick Stewart).

Site 35: Pump drain lobby SX 45258 69830

This feature has been interpreted to be a pump drain lobby (*pers. comm*. Rick Stewart). It connects to Engine Shaft (Site 11) at a point where mine water was pumped up from the 40 fathom level and out through this lobby.

The lobby has been cleared of debris by Morwellham under the supervision of Bob Le Marchant the former Mine Manager in the mid 1980s.

The 8.0m long pump drain lobby from the River Tamar is partially revetted with stone, its top edge 3.0m below railway track level. The portal opening is only 1.5m. high and 1.0m. wide inside the steel-gated and padlocked portal exterior. Water currently still drains out of the feature.

Site 36: New Quay Adit Trial portal

At the junction of the saw-pit retaining wall and the north quay-track retaining wall is another opening, which is a trial adit portal for George and Charlotte Mine. Presumably, this was to search for and to develop a parallel lode to the south of Main Lode, an east-west lode as shown on Symons mine sett/lodes map (Fig. 4). This is not labelled on the 1867 Lodes/Shafts Bedford Estate Map (Fig. 8).

The stone-arched adit opening is 1.4m wide and 1.7m high. The adit inside the portal is 1.5m high and 0.8m wide. There is clear water at the floor of the adit.

Site 37: Site of underground railway route

Deep Adit (Site 33) was cleared of debris and re-timbered by Morwellham under the supervision of Bob Le Marchant, a former mine manager, in the late 1970s. The adit floor was laid with tram-rails which now take the Morwellham underground railway guided tour. In 1985/1986 the ‘New Quay Drive’ railway tunnel through virgin rock connected the side of Deep Adit at a point approximately 200m from the portal to a new railway tunnel portal via Engine Shaft (Site 11) and a reconstructed underground working water-wheel.

The underground railway line is a wonderful opportunity for young and old to experience fleetingly the character of mining in narrow lodes through hard rock. It is hoped that the underground railway will remain in place for many more years to come.

Fig. 17: Footway Shaft (Site 34) between new railway tracks: entrance right, exit left.

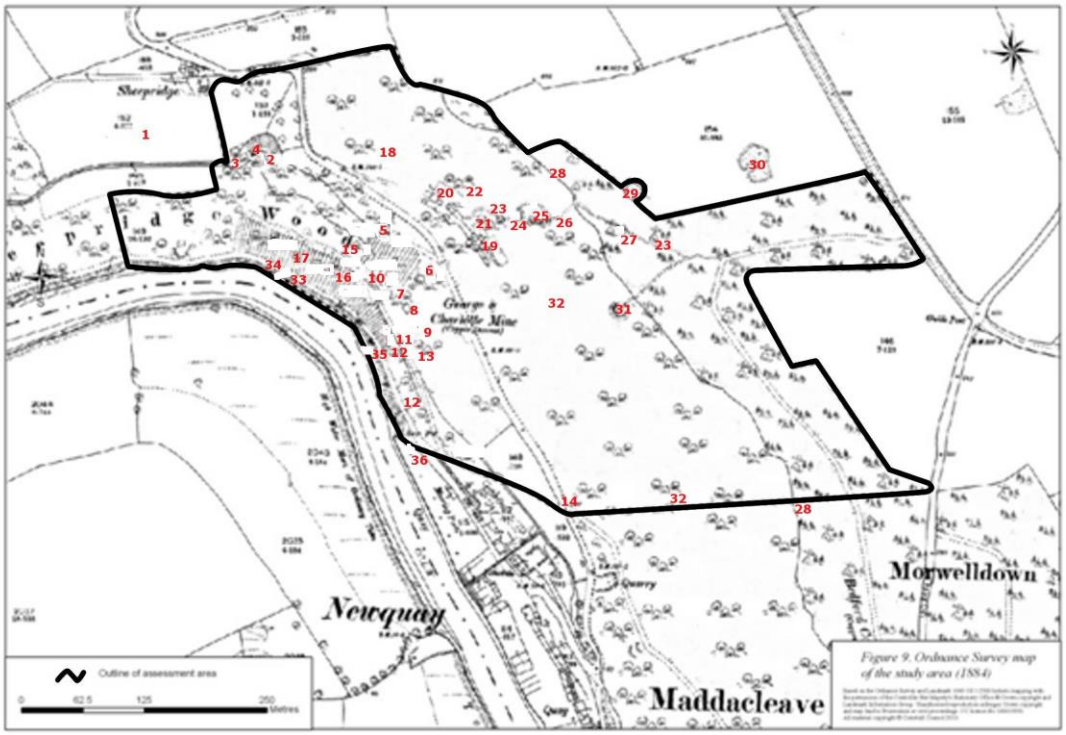


Fig. 18: Site Inventory plan.

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Glossary of Mining Terms

ADIT: a level tunnel (usually driven into a hillside) in order to give access to a mine, used for drainage or the hauling of broken ore. Deeper adits did not necessarily connect to the surface. They were used to carry water back from distant workings to a pumping shaft.
ALLUVIAL: of matter transported in suspension and deposited in rivers or floods, Latin *alluvius*, washed up: *ad* (towards) and *luere* (to wash).
ANGLE-BOB: a simple lever-based device with which the direction of a reciprocal motion of pump-rods or flat-rods could be changed, for example, from horizontal to vertical.
BALANCE-BOB: a large, counter-weighted lever attached to the shaft pump rods and used to offset their weight and thus reduce the work of a pumping engine to lifting water alone. A surface balance-bob would be mounted adjacent to the shaft on a pair of plinths or on a masonry support at ground level (balance-bob mounting), the attached counterweight - a large box filled with scrap iron or rocks - working in an adjacent stone-lined pit. Other balance-bobs would be installed in chambers cut into the rock adjacent to the shaft wall as needed to counterbalance the weight of the pump rods, especially on a deep shaft..
BAL-MAID: a woman or girl employed at the surface of a mine, generally in the dressing of ore.
BUCKING: the breaking down of copper ore on an anvil to about 10mm in diameter by bal-maids using small hammers, after which the ore was separated from the waste by hand. This process followed cobbing, in which it had been broken down to about 25mm in diameter, the waste again being hand removed. These processes, through which the majority of the highest quality copper ore was recovered, took place within roofed structures called bucking houses.
CHILDRENITE: a rare mineral with elements of iron, manganese, phosphorus, oxygen and hydrogen. It was first discovered in 1823 by John George Children (1777 - 1852), a prominent chemist and mineralogist, at the George and Charlotte Mine. It has slso been found in several places between Tavistock and Callington.
CHALCOPYRITE: copper pyrites.

CHLORITE: a salt of chlorous acid; a general name for a group of minerals, hydrated silicates of alumina, iron and magnesia, dark green and rather soft like mica but not elastic.
COFFIN or GOFFEN: the narrow excavation resulting from stoping on a lode being carried to or from the surface on part or all of a lode. See also GUNNIS, STOPE, OPENWORK.
COST BOOK COMPANY: a company of unlimited liability into which shareholders either paid 'calls' for further finance or shared any profits. Mines kept a 'cost book' to record expenses/costs/dues/earnings. This system was replaced by the end of the Nineteenth Century by limited liability companies.
COSTEAN: of pits dug down to bed-rock in prospecting; said to be derived from the Cornish *cothas*, dropped, and *stean*, tin.
CRIB HUT: a place for shelter during snack or meal times.
DRESSING: the concentration of the tin, copper or other ores contained in the rock excavated from the stopes of a mine; carried out on DRESSING-FLOORS.
DRESSING-FLOORS: an (often extensive) area at the surface of a mine where the various processes of concentration of ore took place; these consisted of crushing or stamping to attain a uniform size range, sizing (particularly on later mines), separation of waste rock, concentration (generally mechanically and hydraulically on tin mines, manually on copper mines), the removal of contaminant minerals (by calcination, flotation, magnetic separation), and finally drying and bagging for transportation to the smelter. Tin floors in particular were generally laid out down a slope to reduce mechanical or manual handling between stages in the process.
DRIVE: a tunnel excavated on the line of a lode as the first stage of the development of a stope.
FATHOMS: measurement of horizontal or vertical distance at surface or underground (one fathom is the equivalent of six feet)
FLAT-RODS: reciprocating (or very occasionally rotative) iron rods used to transfer power from a steam-engine or water-wheel to a remote location.
GUNNIS: a narrow, linear excavation left where a lode has been worked, most commonly used when open to the surface. See COFFEN.
HORSE-WHIM: similar to a capstan, but in this case the power was supplied by a horse walking around a circular platform or PLAT and was applied to an overhead winding-drum; frequently used for winding from small shafts on Cornish mines, especially during exploratory work and shaft-sinking. The smaller, under-gear whims found in some nineteenth century farms were little used on mines.
HUEL: a Cornish name for a mine: cf. WHEAL
KILLAS: clay slate, a Cornish miners' term.
LEAT: an artificial water-course, built to carry a supply of water to a mine.
LOBBY: the excavated cutting running up to an ADIT PORTAL.
LODE: a linear area of mineralization underground. In other parts of Britain a VEIN, or SEAM: generally vertical or near-vertical and often extending for considerable distances along its strike.
MISPICKEL: arsenical pyrites, a mineral composed of iron, arsenic and sulphur.
OPEN-WORK or BEAM: a mineral extraction site open to the surface and similar to a quarry but usually distinguished by its elongated shape and steep sides. The term is generally applied to features broader in extent than a GUNNIS or COFFIN. A variety is a STOCKWORKS where an area of ground containing a large number of small parallel lodes was removed wholesale.
PLAT: a circular platform; see HORSE WHIM.
PORTAL: the entrance to an adit beyond its LOBBY. Often timbered or stone vaulted.
PYRITES: a yellow mineral, iron disulphide.
QUARTZ: the commonest rock-forming mineral. composed of silica and occurring in hexagonal crystals which are clear and colourless when pure.

SETT: the legal boundary within which a mine could extract minerals.
SETT: one of a series of stone supports for a tramway, performing the same function as sleepers.
SETT: one of the components of timber framing of an adit where it ran through loose ground; also the timber framing of a shaft to which the shaft guides and LAGGING BOARDS were attached.
SHAFT: a vertical or near-vertical tunnel sunk to give access to the extractive areas of a mine.
STAMPS: a mechanical device for crushing ore-bearing rock to a fine sand. Heavy, vertically-mounted beams, or later iron rods, carrying cast or forged iron heads were sequentially lifted and dropped onto the prepared ore beneath them by a series of cams mounted on a rotating drum; this usually being driven by a water-wheel or rotative steam engine.
STANNARY: a tin-mining area (Latin *stannum*, tin).
STOCKWORKS: where an area of ground containing a large number of small parallel lodes was removed wholesale.
STOPE: a step-like excavation produced during the extraction of ore-bearing rock. Often narrow, deep and elongated, reflecting the former position of the lode. Where open to the surface, these form GUNNISES or COFFENS.
WHIM: the winding gear used for hauling from a shaft; it consists of a power source and a winding drum. See Horse-Whim.

WINZE: a small ventilating shaft between two levels.

Life in the Tamar Valley Seventy Years Ago

By Jane Webber

I was born in a cottage at Higher Dimson, but later we moved to a smallholding of eleven acres at Bircham, Father, Mother, my brother and sister and I. We had apple and cherry trees and a field which Father dug himself. Father worked as a roadman, trimming the verges and layering the hedges on the side of the roads. People said that the roads have never looked so tidy since. Then he took another job at the quarry because the wages were a little better, not much, but enough to make a small difference to our way of life. He was not tall but strong and wiry. At the end of the week he would hand his wages over to Mother who did the shopping for the family. She had difficulty in making ends meet. I remember coming home from school one day to find her in tears. When I asked her what the matter was, she said that all she had for our tea was one egg. On another occasion Father had an accident in the quarry. He slipped and fell down the rock face but was able to turn in the air to avoid falling on his head, and this was said to have saved his life. The first we knew of his fall was when he was brought home on the back of a lorry. Although he was badly hurt, he was back at work the next day because he could not afford to miss a day's wages. Sometimes when I came home from school at the end of the morning, Mother would say to me, "Here's a pasty. Take it to your father for his dinner." After I had taken him his pasty at his work in the quarry, it was time for me to go back to Delaware or I would be late for afternoon school. Sometimes there would be blasting in the quarry and small stones would rain down on the road around me.

In the spring Father would get up at three-thirty in the morning to pick daffodils. Mother would put them into bunches and pack them into cardboard boxes. We would put the boxes on our hand-cart and Father and I would push and pull it up the hill to Gunnislake Station to catch the morning train. Other people who did not have daffodils to pick would gather violets and tie them up with a few leaves. All the flowers were sent up to Covent Garden. After the flowers were put on the train, Father would say, "Off to school, Maid" and I would walk further up the hill to Delaware School while Father wheeled the hand-cart back home before setting off to work. Later in the season we would send other flowers to the market. I don't think we made much money from it.

When the war came, Father joined the Home Guard. Mother took in evacuees from London. They missed their families and the city. We had no air raid shelter, so on hearing the sirens Mother used to take us to the nearby adit of a mine and there we would stay until the all-clear went. One night when we emerged, there was a great light in the sky: it was Plymouth burning.

From time to time Willie, the pedlar, would come round with his tray of bootlaces and cottons for sale. He lived with his mother in a cottage down by the river in Gunnislake. When he died, it was, people said, as a wealthy man. Another regular visitor was Jeffrey, the baker, with his horse-drawn cart laden with bread and buns and mouth-watering cream cakes. He came to our house late in the day because he knew Mother could not afford much and he had some stale buns left over which he was prepared to dispose of cheaply.

I never put my name down to go on a school trip because I knew my parents could not afford it. From time to time, when we had a day off, Mother would pack up a picnic in a basket and we would walk down the path to a place on the river at White Sands but which we called the Beach. Here we would paddle and swim in the river. My older brother taught me how to swim: he just threw me in and said, "Now swim!" Sometimes he would tickle a trout for our supper. I tried to do the

same but I was never successful. We used to go down to Morwellham Rocks. Daring young men would climb up and jump into the river. My brother had an old motorbike. Once he said to me, "Do you want a ride, Maid? On your own?" He showed me what to do and I set off up the hill. The bike had no footrest or brakes. Half way up the hill I met father carrying a lantern. My foot caught the lantern and whisked it out of his hand. I carried on with it up the hill until my ride ended in the hedge. Another form of recreation for us children was to go to a caravan in the garden of a big house. This caravan had been turned into a small cinema and we used to watch silent films, some starring Charlie Chaplin.

My brother used to go rabbiting. Mother would say, "Don't forget to bring one back!" Once I begged to go with him. He set up the net and went to put his ferret into the burrow. A rabbit came out of the hole straight into the net. When it squealed, I had to let it go. My brother was very cross and so was my mother when we got home without anything.

One year Father said he was going to Tavistock Goose Fair. I begged to be allowed to go with him. At first he said no, but I persisted and in the end he relented. He set off at a brisk walk with me trotting along behind. When we got there he went straight to the boxing booth where soldiers and others took on the fairground people, and told me to stay outside.

Mother used to work in the market gardens picking potatoes, strawberries and whatever else there was in season. Sometimes Father would give me a half-crown and a basket and say, "Go down to Latchley, Maid, and buy some Victoria plums – and mind you don't eat any on the way back!" "No, Father," I would say. The way was long and the basket heavy, but slightly less heavy when I returned home. "You didn't eat any, did you, Maid?" he would say, but I could see there was a twinkle in his eye.

Father had a cobbler's last and he used to repair our boots and shoes, driving hobnails into the soles to make them last longer. From time to time he would say, "Hold your foot up, Maid!" and he would inspect my shoes to see if they needed repairing. When I was first married and had left home, I would cut out pieces of cardboard to put into my shoes to cover up the holes. The cardboard did not last long, particularly in bad weather.

When I was fourteen, I left school on a Friday afternoon. The following Monday morning Mother said, "You go and find a job and don't come back until you've found one." I walked down to Calstock and asked for a job at the basket factory opposite the station. The manager said that there were no jobs going but when he saw the look of disappointment on my face, he relented and I started work. Here the men would cut up timber into long thin strips and the women would weave the strips to make baskets for the fruit-pickers in the valley. The wood was rough. Our hands would soon be bleeding from all the splinters. It was piece work and half my wages went to Mother. Every day I would walk to Calstock and back again in the evening.

Environmentalist or Hypocrite?
William Morris and Arsenic – Guilty or not proven?
Poisonous Mines, Wallpapers and Seamstresses.
Part I: the case for the prosecution
by Patrick O'Sullivan

This was a "riveting" lecture by Andrew Meharg, professor of biochemistry at the University of Aberdeen. As stated in his abstract: "William Morris was a progenitor of the modern environmental movement, but also a man of his time; his fortune was based on some of the most polluting mines in Britain, and his widespread fame on interior décor constructed from toxic salts. He also employed one of the most notorious of the murderesses of the nineteenth century. The juxtaposition between Morris's political ideas and the way in which he appears to have conducted his business, therefore makes for interesting discussion, to say the least."

The mine in question, of course, was Devon Great Consols near Tavistock, in which , in 1845, Morris's father purchased 272 shares, becoming a director in 1846. The initial wealth, which was very great, was based on copper, of which Devon Great Consols soon became the largest source in Europe, but when, during the 1860s, the market price of that mineral fell, the directors took to mining and processing mine waste for arsenic, until then considered mostly a rather inconvenient impurity. According to Frank Booker (1971), the industrial historian of the Tamar Valley, *circa* 72,000 tons of arsenic were produced over fifty-five years[1].

The ore, mainly mispickel or "mundic," arsenopyrite [FeAsS], was heated to high temperature (calcined – an old alchemist's word) in a series of flues along which it travelled as arsenic oxide vapour, eventually condensing as a white powder, arsenic trioxide (As_2O_3). From here it was collected by surface workers employing the most rudimentary safety gear (cotton nose plugs or later cotton masks and hessian sacks tied around their feet to prevent blisters) and much of it sent down the River Tamar from Morwellham to the cotton fields of the American South where it was used against the boll weevil. Devon Great Consols became the world's largest source of arsenic (one third to one half of global supply). Today the spoil heaps at Wheal Anna Maria are covered only with heather (ling) and "scraggy grass". But their soils contain 10% arsenic and 9% copper and the derelict flues are still full of what notices at the site describe as "lethal arsenic".

If only they had found the non-lethal kind! For the problem was that arsenic was used not only as a pesticide but also a pigment used in domestic wallpapers – mostly either as Scheele's Green (copper arsenite, $CuHAsO_3$) or emerald green (also named Paris Green or French Green, copper acetoarsenite, $[(Cu)_3As_2O_3Cu(C_2H_2)_2]$). From the 1830s, these pigments replaced earlier, less vivid dyes based on copper carbonate, a change apparently encouraged by the switch to oil lamps and gaslight which enabled a darker décor. By 1858, *The Times* estimated that the walls of British homes contained 100 million square miles (*ca* 260106km^2) of arsenic-rich wallpapers and that a 100^2 room might contain 2.5 kg of arsenic.

Arsenical pigments were also used in food colouring (in icing sugar and sweets), in clothing and other fabrics, and the white arsenic trioxide in cosmetics ("Dr Simms complexion wafers"), both as face whitener and blusher (caused by its toxic effects), a useful dual property. But by the 1860s, about the same time as the switch mainly to arsenic production at Devon Great Consols, health

problems emerged, and *The Lancet* embarked on a campaign against the use of arsenic in wallpapers, using what would surely be today uncharacteristically florid language:

"In the most emphatic manner, we feel it to be a duty to call the attention of medical practitioners to the recent lamentable case of fatal poisoning, occasioned by the atrocious practice of colouring hanging-papers with arsenic pigments."(Paul Bartrip 1860)

The Kinnaird Commission (reported 1864) was appointed to investigate conditions in tin, lead and copper mines and recorded the unhealthy state of most arsenic workers aged thirty-five and over. Domestic use of arsenic had already been restricted somewhat (1857), but in 1871, by which time Morris had become director of Devon Great Consols, the *British Medical Journal* noted that arsenical wallpapers were still "ubiquitous in all kinds of homes", from the very richest to the poorest.

The main health problem appeared to be that in damp houses (and in Victorian times, whose house was not damp, except those of the "swinish" rich?), moulds fed on the wallpapers, reducing arsenical pigments to the toxic gas trimethylarsine ($[CH_3]_3As$), which was then breathed in by the inhabitants. Even the most exalted were not exempt – there is a rumour of Napoleon being poisoned by arsenic from wallpapers in his damp quarters on St Helena (though not everyone agrees), and as late as the 1950s, Claire Booth Luce found it necessary to quit her ambassadorial residence in Rome, as she too was experiencing symptoms of arsenic poisoning although in this case the cause was house dust. By the late 1870s, some wallpaper manufacturers (e.g. Jeffrey's) began to advertise non-arsenical wallpapers, and Morris and Co. eventually followed suit in 1883, rather late in the day, apparently. By the end of the 19th Century, arsenical pigments were replaced by others based on zinc oxide and cobalt green (ZnO & CoO) – still containing toxic heavy metals but not producing volatile compounds.

Several questions remain, however, including: "As the son of the founders of Devon Great Consols, and later himself a director, did William Morris benefit from the wealth generated by arsenic production at the mine?" "Was he aware of the health issues involved?" Regarding the first, Professor Meharg suggested that the Morris family fortune derived from Devon Great Consols, both copper and arsenic, was the equivalent, at modern prices, of £17.4 million, and it is indeed the case (according to Penelope Fitzgerald, for example,) that Burne-Jones, a man from much humbler background, was staggered, on first visiting, by the luxury in which the Morris family lived. As to whether Morris actually acquiesced in, or even approved of, arsenic production at Devon Great Consols, a letter to his mother of 1871 (or maybe 1872) states that "we had the new contract for arsenic, and got a very good price for it"(Kelvin 1987) rather indicates the latter. And as to whether he was aware of the associated health issues, it is difficult to conclude other than that he must have been. His uncle, Thomas Morris, the "resident director" at Devon Great Consols, was questioned by the Kinnaird Commisssion, and throughout the 1870s *The Times* ran a campaign aimed directly at Devon Great Consols, which is described in 1875 as "containing enough arsenic to poison the entire world".

However, there is a further case that, rather than passive awareness, Morris's real attitude was one of denial. For example, on 3 October, 1885, he wrote to Thomas Wardle, the owner of two silk-dyeing factories in Leek where he had learned the craft of vegetable dyeing techniques, "as to the arsenic scare, a greater folly is hardly possible to imagine; the doctors were being bitten by witch

fever." Three days later, in connection with a complaint that a customer had been poisoned by arsenic, he again wrote to Wardle that "it is …. too much to prove that the Nicholson family were poisoned by wallpaper; for if they had, a great number of people would be in the same plight, and we should be sure to hear of it."(Kelvin 1987) It is indeed difficult to believe that Morris was unaware of the toxic properties of arsenic, as it turns out that he ended up employing someone described by Professor Meharg, in an amazing sub-plot, as "one of the most notorious murderesses of the nineteenth century."

As indicated, domestic use of arsenic, mainly as rat poison, was already somewhat restricted, but it was still widely available and used by many 19th and 20th Century murderers until more easy forensic detection became available during the 1890s. In 1857, Madeleine Smith, a young Glaswegian, was accused of murdering her French lover, but owing to her family's influence, her case was found not proven. After that, she fled to the south coast of England, where she met and in 1861 married George Wardle, Morris's business manager, and became a seamstress working for Morris, Marshall, Faulkner & Co and later treasurer and librarian of the Bloomsbury branch of the Socialist League (Wardle 2011). Meanwhile, "The handsome dividends came regularly (in) …..., bringing with them nothing to indicate the miseries at the bottom of the cramped and ill-ventilated shafts from which they had their source." (Thompson 1976).

Analytical studies by Professor Meharg of early Morris wallpapers held at the Sanderson archive (e.g. *Trellis*), using the semi-quantitative technique of (portable) X-ray fluorescence, indicate that such wallpapers are indeed rich in arsenic and other toxic pigments (e.g. vermillion [cinnabar], red mercuric sulphide (HgS). The same archive also shows that "the Firm" did indeed purchase French Green. Morris tried other greens later in his life, but use of arsenic is "very much part of his Firm", at least as far as wallpapers is concerned – on textiles, vegetable dyes were used.

A third, more fundamental question is, therefore: "In using arsenic and benefitting from its production (and apparently denying its effects), was William Morris, one of the leading socialists of the 19th Century, a hypocrite?" In other words was the man who wrote, "Is money to be gathered? Cut down the pleasant trees among the houses, pull down ancient and venerable buildings for the money that a few square yards of London dirt will fetch; blacken rivers, hide the sun and poison the air with smoke and worse, and it's nobody's business to see to it or mend it: that is all that modern commerce, that counting-house forgetful of the workshop, will do for us herein"(Morton 1979) no better than any other Victorian "master"?

Again the circumstantial case seems clear. On one of Morris's rare recorded visits to Tavistock in February, 1881, to visit his sister, Alice, and her husband, Reginald Gill, it is not thought that he bothered to travel the few extra miles to view Devon Great Consols or the even shorter distance to his uncle Thomas's house, Abbotsfield, on the western edge of the town. Nor did he attend his uncle's funeral in 1883 (but neither did a number of the Morris family), although he may have visited him at his home at Dawlish, while his wife, Janey, was staying in Torbay during November and December, 1870 (Salmon & Baker 1996). Therefore it seems justifiable to conclude *prima facie* that William Morris, "a man of his time," surely knew all about arsenic and its dangerous properties, but chose to ignore them.

The story of William Morris and his deadly arsenical wallpaper first came to prominence in 2003 when Professor Meharg published a brief summary of his findings in *Nature* (42, 2003, p. 688),

a similar article the next year in *Spectroscopy Europe* (16 [4], 2004, pp. 16-19) and then a book (2005) which dealt in part and in more detail with issues surrounding arsenic poisoning in Victorian England. The story was rapidly taken up by the wider media, so that today, typing "William Morris arsenic wallpapers" into a well-known search engine generates *ca* 2,700 hits. The matter is not quite so straightforward as some of these sources portray, however, so that before a final verdict on Morris's conduct is reached, certain other information may need to be taken into account.

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Fig. 19: Trellis pattern wallpaper, 1862. *Image Wiliam Morris Society*

Calstock Parish and the *Titanic*

by John Snell

One hundred years ago on the 14th April, 1912, on its maiden voyage the *Titanic* hit an iceberg and sank with a large loss of life. Calstock Parish, like many other parts of the United Kingdom, had a connection with this tragedy. Frank Booker in his excellent book, *The Industrial Archaeology of the Tamar Valley*, describes Gunnislake old railway station as a scene of many a tearful farewell. In the 1900s, as the local industries closed down, many men left the valley to seek work abroad. At the station they would say farewell to their loved ones. Men left to seek work in many parts of the world, but the main destinations were Canada, U.S.A. and South Africa. On the Sunday before the men left, special services would be held in the local churches and chapels. The men would be blessed and the last hymn to be sung was always "God be with you until we meet again."

It was in early April of 1912 that four men left Gunnislake. They had booked passages with Jeremiah Youlton who was a White Star Shipping Agent in Fore Street, Gunnislake. The house is still there today next to the Public Hall. Frederick Pengelly who was born at Chilsworthy Beam in 1893 was a first cousin to my Dad. He was travelling to Butte, Montana. His ticket was number 28665 and cost him £10.10s. William Ware of King Street, Gunnislake, was twenty-two years old and was also travelling to Butte, Montana, on ticket number 28666 at a cost of £10.10s. Ware had returned home from South Africa in February, 1912. Both Pengelly and Ware were due to sail on another steamer but because of a coal strike they were transferred to the *Titanic.*

Fig. 21: Mr Youlton's Shipping Agency, New Bridge Hill, Gunnislake, c. 1920. In 1921 Mr Snell's father booked a passage to Canada. He went to work in the Hollinger gold mine in Timmins, Ontario. *Photo courtesy of Calstock Parish Archive*

Fig. 22: Mr Youlton's Shipping Agency,Fore Street, Gunnislake, c. 1912. Standing in front of an advertisement for a White Star liner are Mr Youlton's brother (third from the left) and Mr J. Youlton (far right). William Ware may also be in the picture. *Photo courtesy of John Snell*.

Harry Gale, aged thirty-eight, was born at Rising Sun, Harrowbarrow. Together with his brother Shadrach, aged thirty-three, who had also been born at Rising Sun, he travelled on ticket number 28664 at a cost of £21. They were intending to go to Idaho Springs, Colorado. Shadrach had travelled to Idaho Springs in the early 1900s and on returning home had encouraged his brother, Harry, to return with him. The tickets covered second class passengers.

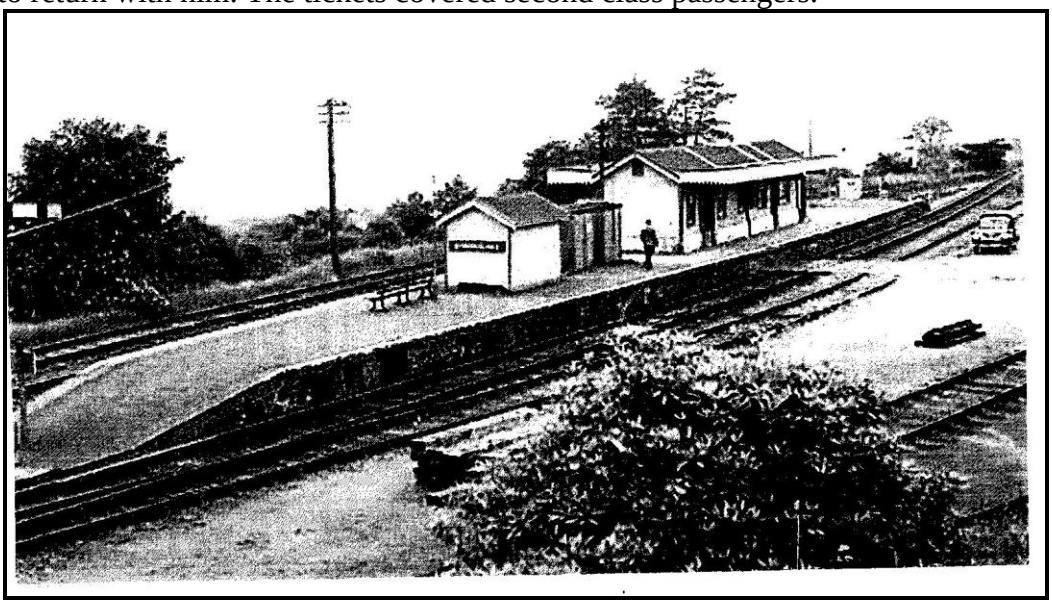

Fig. 23: The old railway station, Gunnislake, "the scene of many a tearful farewell." *Photo courtesy of John Snell*.

The *Titanic* left Southampton on the 10th April, 1912. The liner hit the iceberg at 11.40 p.m. on the 14th April and sank at 2.20 a.m. on the 15th April, 1912. The four local men were drowned. Their bodies were never recovered. In Calstock Church Yard there is a memorial to the Gale brothers.

Legend of this disaster has reached mythological proportions and still continues to fascinate millions worldwide. It was a very sad happening, but it does mean that Calstock Parish and the Tamar Valley have a connection with the tragedy of the *Titanic*.

In 1985 a US naval research vessel found the wreckage of the *Titanic*. She lies in the North Atlantic Ocean at a depth of about 2.5 miles. Her position is about 1,900 miles from Southampton, her port of departure, and 1,500 miles from her destination, New York. She lies 375 miles south-east of St Johns, Newfoundland. The bow points towards New York.

Sources:

Encyclopedia, *Titanic*
Titanic and her Sisters, Olympic and Britannic, Tom McCluskie, Parkgate Books
The Industrial Archaeology of the Tamar Valley, Frank Booker, David and Charles
Miss Mary Veale's *Exercise Book*
Calstock Parish Archives

To supplement his article Mr Snell has sent us a photocopy of a page from the composition book of one who must be our youngest contributor, Mary Veale, his mother then aged eleven. Unfortunately it has not been possible to reproduce her contemporary account in her own neat handwriting with any clarity, but here follows a verbatim transcript from her exercise book written in 1912 in Class 1 of Gunnislake Council School:

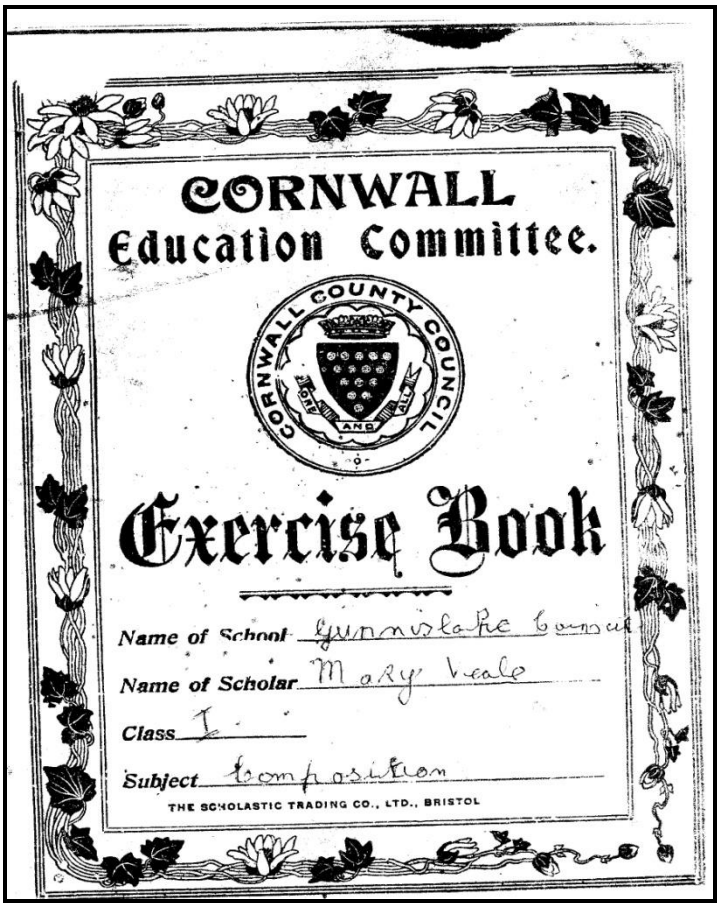

Fig. 24: Mary Veale's Exercise Book. *Courtesy of John Snell*

The loss of the Titanic

The Titanic was wrecked on Sunday April the 14th. She was on her first maiden voyage to America. She was the largest ship in the world and it was said that she would not sink. But on Sunday night April 14th she struck a hugh ice-berg. There were on board of the Titanic 2,340 passeners and there was only 705 saved. Soon as the Titanic struck the ice-berg she sent a lot of wireless telegraps around and one of the ships caught one and the ship was called the Caparthia and as soon as she heard of it she sailed right to it. A lot of passengers that were on board of the Titanic went on the Caparthia and they were saved but they were nearly all women and children. While the Titanic was sinking the band played "Nearer my God to thee."
For her effort Mary scored eight marks out of ten.

A Family in the Valley, Part 1

by Michael Mashford

Although I was born just a few miles from the mouth of the Tamar in the small fishing village of Cawsand, I spent the early years of my childhood living only a few yards from the river at Cremyll. On my father's side of the family there have been at least six generations living in the valley and earning their livelihoods from the river.

As early as 1738 the family had a foot firmly planted in the area. To be precise, he was Thomas Foote who was baptised on 28th May that year and married Jenny Rowe on 7th December 1773, at Bere Ferrers. Together they had five children but their second son, Thomas, lived for only five years. Their first child was born in 1776 at Bere Ferrers and was named William, a name which featured prominently for several generations in the Foote family. By the age of twenty eight William had met a girl from Calstock Town called Sarah Buden, and they married also at Bere Ferrers on 7th February 1804. William and Sarah continued to live at Bere Ferrers and by 1812 they were a family of six with three daughters and one son, but in April of that year tragedy struck. On 17th April Mary Ann, aged six, and Thomas, aged five, died. Four days later the young baby, Maria, died and less than two weeks later the eldest child, Jane, aged eight also died. Within three weeks William and Sarah had lost all four of their children. How and why they died is still a mystery as I have not found anything in the records that indicates a possible cause.

Shortly after this tragedy William and Mary moved away from Bere Ferrers to live in Calstock but Sarah was already pregnant and on 22nd November 1812, she gave birth to a son, whom they named William. Two more children were born at Calstock, Mary in 1819 and Thomas in 1822. I do not know what William's occupation was but he lived only to the age of fifty nine and his death was recorded on 11th March 1835, at Gawton Quay. Sarah, however, lived to the ripe old age of eighty-four and died back in Bere Ferrers on 21st January 1855. Young William was born at a very interesting and busy time for the Tamar Valley with copper and tin mines opening up throughout the area. The canal connecting Tavistock with the busy river port of Morwellham was also nine years into its construction and before he reached his fifth birthday, it was officially opened on 17th June 1817. The canal, the mining and the Tamar were to play a major part in the lives and careers of the Foote family for the following hundred years or so.

William became a bargeman, at first working with the tub boats on the canal and later moving up to the much larger sailing barges on the river. Tub boats were described in a report in 1888 as being 30 feet long, five feet wide and made of riveted iron. The first barge was launched on the canal on Easter Monday of 1811 and in total nine were built between then and 1817. On the day of the canal's grand opening on the 24th June 1817, some three hundred guests were towed along its full length in these boats. These tub boats were considered to be some of the earliest boats ever to have been built of wrought iron and although none has survived to this day, a rudder made of this metal was found in the canal tunnel in 1976; since when several more wrought iron plates have been found. The boats would have carried slate as well as silver, lead and copper ores from the mines

around Tavistock to be shipped out worldwide from Morwellham. They would return with cargoes of limestone, coal, timber and iron back to Tavistock. During a very successful period of forty years the canal was profitable and a total of over a million tons of cargo was transported. As the boats had no power of their own, several would have been linked together to be hauled along the canal by horsepower. This was certainly the case on the nearby Bude Canal where the tub boats were a little shorter at twenty feet and about six inches wider and carried a payload of some twenty tons. As many as six of these boats were linked together, making a train of one hundred and twenty feet in length towed by horses. The Bude Canal was originally planned to connect that town on the north coast of Cornwall to the River Tamar but it was never completed, its southerly arm only reaching as far as Launceston.

William's younger brother, Thomas, also started a career on the barges according to the 1851 census. However, ten years later the census showed that he had become a baker and was living with his wife, Elizabeth and their children at Bake House in Calstock. At the time of the 1881 census Thomas' occupation was given as "baker and flour merchant."

At the age of 24 William married Ann Couch from North Hill near Launceston. This was in October 1836 and by 1841 the census shows that they were living at the tiny hamlet of New Quay on the Devon bank of the river. In 1841 the population of New Quay was 35 but as the mining in the area grew so too did this little village. It reached its peak in the early 1860's with a total population of 68 according to the 1861 census. In fact the very existence of the village was due to the mining industry as its larger neighbour, the port of Morwellham a mile further upstream, was unable to cope with the increasing quantities of ore being processed and shipped out of the valley. The years between 1844 and 1870 were the most prosperous for the copper mines of the area due in the main to the discovery of the Devon Great Consols Mine at Blanchdown near Tavistock. In the year 1856 this mine produced a total of 29,000 tons per annum for the next ten years or so. Such large quantities of minerals were being transported to Morwellham during these boom years that its quays were overflowing and more were constructed downstream at New Quay and Gawton.

The settlement of New Quay expanded greatly in those years having its own inn and quay, overseer and of course, its own blacksmith. The Foote family grew and changed during these years but William stayed in his little cottage in New Quay for the next 40 years and was recorded in every census for that little village from 1841 through to 1881. A short terrace of cottages was situated next to the Blacksmith's House, each cottage consisting of just two rooms. There was a privy at each end of the terrace. A report in 1862 stated that the cottages were deficient of the proper number of bedrooms and had no sculleries, so one wonders what the actual living conditions must have been like for the Foote family when there were sometimes up to seven occupants.

The only other family who were to remain in New Quay for almost 40 years was in fact the blacksmith, John Redstone, his wife, Mary Ann and their eight children. John Redstone moved to New Quay in the late 1830's and lived in the comparatively large house next to the row of tiny cottages. It was recorded in the 1861 census that there were some 21 people staying in that house.

John and Mary were not living in New Quay at that time as they had moved a mile upstream to Morwellham, where at the age of seventy, he had changed his occupation and was now a ship's chandler. Because of the decline in the mining industry from the mid 1860's four of the Redstone's sons, who had all worked as blacksmiths in the valley, had emigrated, three moving to New Zealand and one to America. The only son who remained in the area was James, for many years a carpenter. He had moved from New Quay to Morwellham by 1871, although by 1881 he too had changed his occupation and was then a bargeman, one of his boats being the *Commerce*. The only house in New Quay today of which the remains are still recognisable is the Redstones', the Blacksmith's House.

Meanwhile, back with the Foote family in 1841, William and Ann had two children, Thomas and Mary. Also with them on the night of the census was William's mother, Sarah, who was then 70 years old. In the next ten years four more children were born and William was still supporting his family whilst working on the barges. Only eight years later in 1859 William's wife, Ann, died at the relatively young age of 47 but in those years she had given birth to three more children, Emma, William Henry and Harry. On the night that the 1861 census was taken, William was at home with his four youngest children and his housekeeper, Betsy Chubb, a widow who was also the sister of his deceased wife, Ann. William's elder children had left home, his eldest son, Thomas, following in his father's footsteps as a bargeman. One of his daughters, Sarah, aged 14, was living only a few yards away at the New Quay Inn where she was employed as a servant. The four young children at home ranged in age from Ann aged eleven, to Harry aged three. However, there was no school in New Quay, so Ann, Emma and William Henry would have walked a mile or so along the river bank to Morwellham. This was a well trodden path in those days as there was not even a local shop in New Quay so its residents would also have needed to walk to the larger and busier village of Morwellham for most of their needs. From Morwellham there was a riverside drive used by the Duke of Bedford, which stretched all the way to Endsleigh near Milton Abbot. This route was used by Queen Victoria when she visited the area in 1856.

The children's walk to school would have always been eventful as sailing schooners and barges were constantly moving up and down the river on each tide. Ships of up to 300 tons would bring timber from the forests of Canada and the Baltic countries and carry away loads of ore to the smelting works of South Wales. The school at Morwellham boasted two teachers and could take up to 50 pupils. William Henry was then aged five and two other boys, who would have been at the school at the same time, were William Hobbs, also five, and his step-brother, William Adams aged ten. These two boys lived with their parents and another brother and sister at 1 Morwellham Cottages. We shall discover more about them later. Considering his family tradition and living in such close proximity to the Tamar and its ships, William Henry was destined for a career on the river. In fact, by the age of 15 William had already become a bargeman. The census of 1871 shows that he was the only one of the children still living at home at New Quay. William's father had by then already married Betsy Chubb, his sister-in-law, who had reverted to her given name of Elizabeth. The two room cottage next door was now occupied by another Foote family, William's elder brother, Thomas, his wife and their four young children.

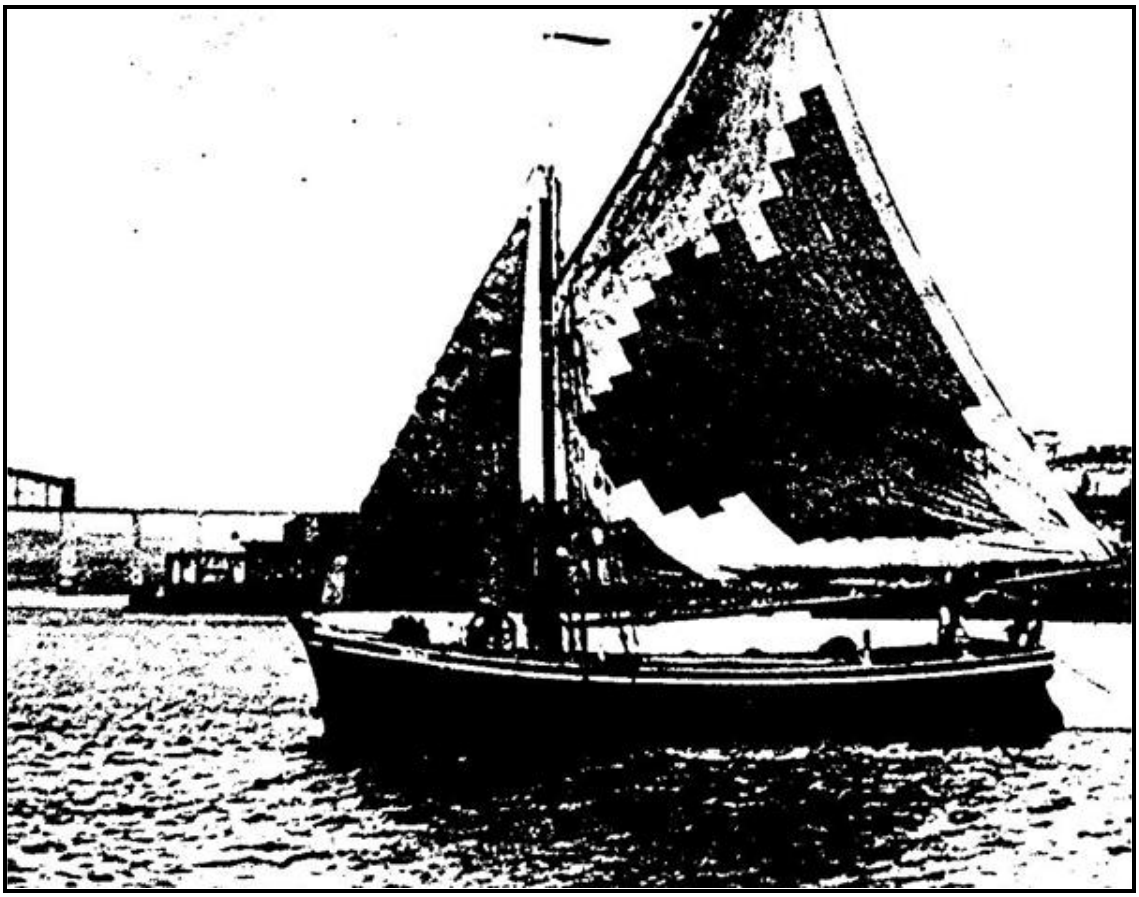

Fig. 25: Tamar barge, south of Saltash. *Photo courtesy of Michael Mashford*

However, William Henry was not to remain in tiny New Quay for much longer. His travels on the barges of the Tamar would have opened his eyes to the delights of the villages and towns on the lower reaches of the river. He would have called in at Calstock only a few miles downstream from New Quay many times and it was probably there that he met Emily Southey. Emily was the eldest daughter of Josiah and Thomasine Southey and was just six months older than William. They were both 18 years old when they were married at Tavistock Registry Office on 28th December 1873. The Southey family had lived in Calstock for many years. In 1851 the census showed that Josiah and two of his younger brothers were tin miners. Josiah's wife, Thomasine, later called Tamsin, was born in Bere Ferrers where her family, the Spragues, lived before they too moved to Calstock. In 1851 the two families lived next door to one another. That year's census showed that two of Thomasine's brothers were lead miners. William and Emily lived in Calstock after they married and they soon started to raise a family. Their first child was a son born two years later and he was named William Henry. A daughter, Annie, was born two years later followed by two more sons, Harry in 1878 and Ernest in 1880 but unfortunately young William died at the tender age of three in 1878. When the first two children were born, William's occupation was still bargeman but when the two later sons were born, he was described as a labourer. I do not know what job he was doing during those years but it was soon about to change. The era of the steam engine was taking full effect and many things

in the valley were changing forever. The 1881 census revealed that William, Emily and their children were living at Downs Court in Calstock but more interestingly, William was now described as being the captain of a steamer. In the same year William Snr and his wife, Betsy, were still at their cottage in New Quay and next door lived his son, Thomas, with his wife Harriet and their young family. A few months after the census was taken, William, Emily and family moved down-river to live in Saltash at 1 Brunel Terrace but sadly, within just a few months, the youngest son, Ernest, died aged just one year. Their house was only yards from the river bank in the shadow of Brunel's railway bridge. The opening of this bridge just 22 years earlier and Brunel's Great Western Railway brought the era of the steam train to the West Country. The rail lines extended to Tavistock and on to Calstock over the viaduct in 1908, effectively killing off altogether the Tavistock Canal, the sailing barges and, with the decline in the mining industry itself, the port of Morwellham and the quays at New Quay, Gawton etc.

Although much of the valley's produce was now transported by rail rather than by river, there was still a thriving industry on the Tamar as the age of the paddle steamer was entering its heyday. There had been a market boat service between Calstock and Devonport from as early as 1821 and by the late 1840's, a fleet of five paddle steamers was employed on regular ferry and excursion services. The years from the 1870's until the First World War broke out in 1914 were considered the Golden Age of steamer travel on the Tamar. On good week-days when the tides were right, as many as one thousand people a day visited Calstock where they could enjoy strawberries and cream at one of the many tea houses in the village. The steamer captains became an elite and envied group as the opportunity to take command of a river boat was much sought after and was considered a great honour. It was only after the war ended that there was a slow decline, until eventually the arrival of the motor coaches in the mid 1920's meant the virtual end of the paddle boats on the Tamar for ever.

According to the 1881 census, William Henry Foote was the skipper of a steamer when he was 25 years old and as this year coincided with the family's move to Saltash, I presume he was employed by the Saltash Steamboat Company at that time. I have no information about his first command but in April 1887, he was master of the *Eleanor*. He was skipper of this steamer for several years, at least until May 1887. This is confirmed by the information on the birth certificates of two of his daughters, Annie Maud in 1882 and May in 1887. The *Eleanor* was the only steamer in the Saltash fleet which was alcohol free and was therefore very popular with temperance societies and church groups for their summer excursions. The steamers from the Saltash and Calstock companies were chartered by Mr A. E. Rowe and they used the West Hoe Pier but were now under the management of Mr James McBryde. The reason for this change was that Mr William Gilbert, who owned the Saltash Steamboat Company, also held a major share in the West Hoe Pier. On the 10th September 1889, Mr McBryde held his first Mobilisation of the Fleet of the Saltash Steamboat Company with its four ships making excursions to the river Yealm, Cawsand Bay, the Eddystone Lighthouse and the Hamoaze and warships. A special evening trip was organised to the upper reaches of the Tamar to Weir Head for the *Princess Royal* accompanied by the *Eleanor* with a stop at Calstock for tea. On board the *Princess Royal* the band of the Sherwood Foresters entertained during

the evening. When these two steamers reached the Brunel Bridge on the return journey, they were met by the other two boats, the *Albert* and the *Prince* and the four steamers then sailed in line astern down river, making a display of coloured lights. When they arrived back in Plymouth, a grand display of rockets was set off from the Promenade Pier. According to the advertisement in the *Western Morning News* for this event, the *Princess Royal* was under the command of Captain Foote and the *Eleanor* under Captain Moyse. The *Albert* and *Prince* were skippered by Captains Martin and Quance respectively**.** In 1891 the Saltash Steamboat Company was substantially enlarged with addition of three more boats, the *Aerial*, *Empress* and *Alexandra*, as well as acquiring the landing rights on the upper Tamar and the assets of the Devon and Cornwall Tamar Steam Packet Companies, quays and buildings at Calstock. In this year William Gilbert now owned all the major paddle steamers on the Tamar. On the third annual review of the fleet in September the Captains were: *Alexandra* Capt. Foote; *Princess Royal* Capt. Martin; *Eleanor* Capt. Moyse; *Empress* Capt. Trenance; *Aerial* Capt. Whidbourne; *Albert* Capt. Quance.

The usual excursions on the rivers Tamar and Yealm were now supplemented by trips further afield to Looe and Salcombe. As a certified skipper, Captain William Henry Foote was entitled to take a steamer outside the confines of Plymouth Sound.

During the 1880's there was fierce competition between the various steamer companies with numerous incidents occurring which resulted in many legal battles in the courts. On 19th January 1892, two major rivals, Mr Gilbert and Mr John Parsons of the Millbrook Steamship Company, had settled their differences and merged their companies to form the Saltash, Three Towns and District Steamboat Company. These two men became the major shareholders of the new company; William Gilbert received a total of £20,850 for his eight boats, with John Parsons being paid £1,850 for his three.

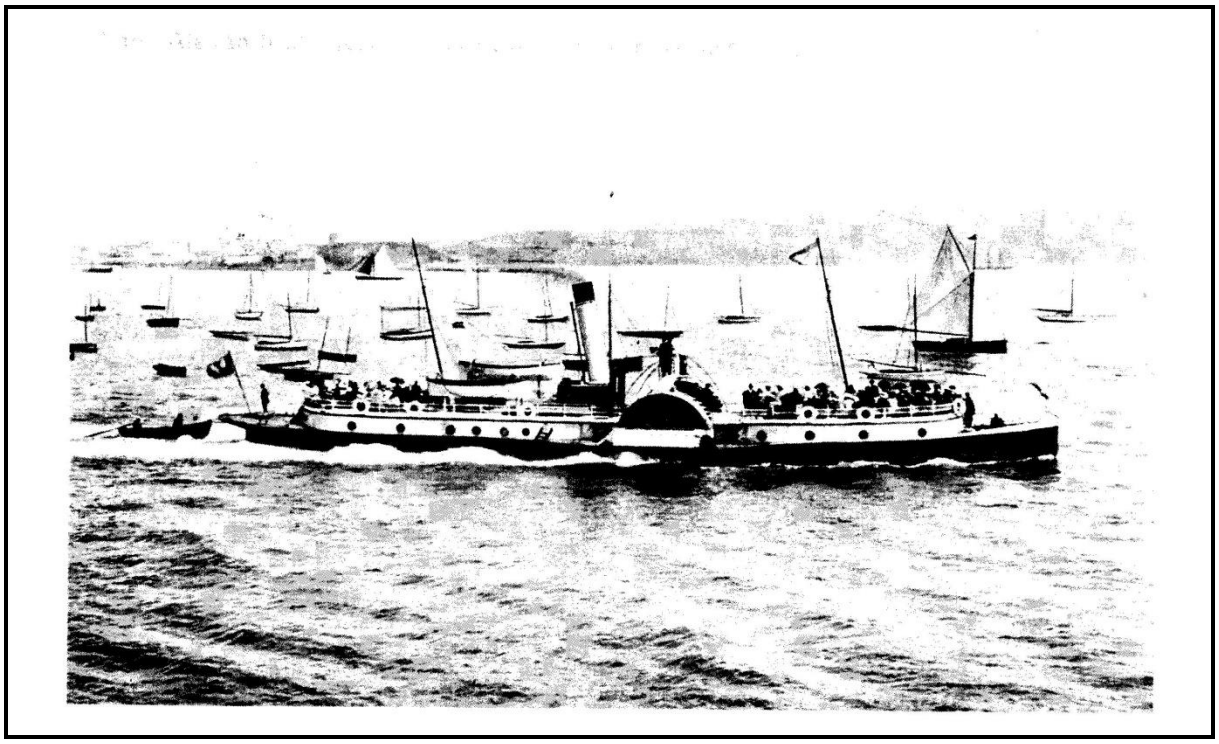

Fig. 26: The *Alexandra* at Saltash, Three Towns and District Steamboat Co. Ltd. *Photo courtesy of Michael Mashford.*

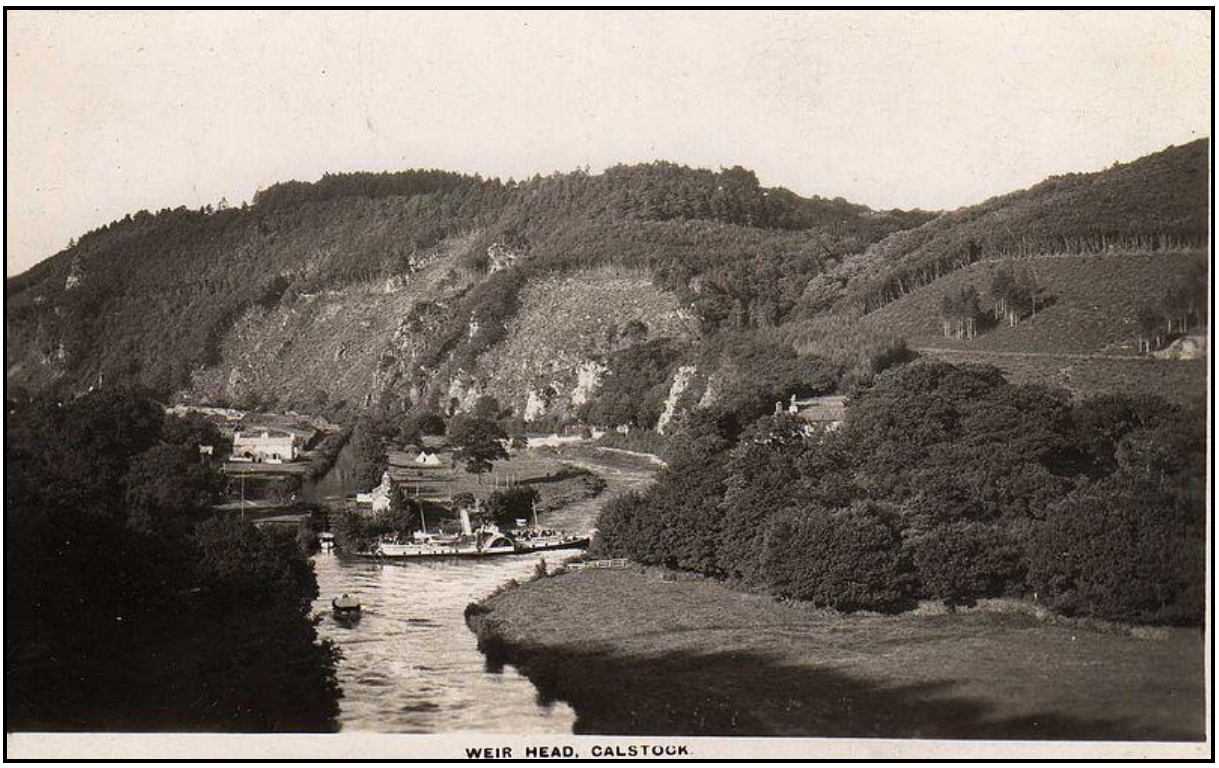

Fig. 27: The *Alexandra* at Weir Head, 1906. *Photo courtesy of Michael Mashford*

Mr William Gilbert was a local celebrity and entrepreneur, almost the Richard Branson of his day. Born in 1820, he bought his first boat, the *Victoria* for £600 in 1854, to run a ferry service between Saltash and Devonport. Shortly afterwards he purchased his second boat, the *Gipsy*, for the excursion trade and two years later this boat became the most popular one on the river. This was due to the visit in August 1856, of Queen Victoria, Prince Albert and their four children, to the Duke of Bedford at Endsleigh near Milton Abbot. Having disembarked from the royal yacht at Barnpool near Cremyll, the Queen and her family proceeded up the Tamar to Cotehele in the yacht's tender, the *Fairy*. As they approached Calstock, they realised that the *Fairy* drew too much water to proceed any further. The paddle-steamer *Gipsy* happened to be at Calstock and the royal party had no hesitation in embarking on board to travel up river to Morwellham, from where they continued their journey to Endsleigh by road. This royal seal of approval gave the Saltash Company a massive boost, so much so that shortly after Mr Gilbert ordered his third steamer to be built at a Stonehouse shipyard. This he named the *Fairy* in honour of the royal vessel and for the great opportunity the chance association had given his business.

Over the next thirty years his steamer company thrived and William Gilbert also became involved in other local businesses, namely the brewery, the gas company and the Saltash ferry. His popularity in Saltash was such that he became mayor of the town not once but three times in the years 1880, 1881 and 1885. In 1881 William Gilbert was living with his family in the Railway Hotel in Fore Street where his son, Frederick, was landlord. As well as being the mayor, he was also the coroner and chairman of the school board. Ten years later he was living at Fernleigh House and on the census was described as a steam ship owner and employer. In that year his company owned ten paddle steamers and was the largest on the Tamar.

In January of 1892 with the merger of the Saltash and Millbrook companies into the Saltash, Three Towns and District Steamboat Company Ltd, Messrs Gilbert and Parsons virtually monopolised all of the passenger steamer business on the river. They controlled landing rights at West Hoe, Cremyll and Millbrook Lake at the mouth of the Tamar to Cotehele, Calstock and Morwellham at the upper, navigable reaches as well as to many quays in between. Unfortunately William Gilbert died less than two years later in1893 at the age of seventy-four, and his shares in the steamboat company passed to his son Edwin who was then a solicitor in Eastbourne.

As for the Foote family in 1891, William and Emily were living at 1 Brunel Terrace in the shadow of Brunel's Royal Albert Bridge. They had been living there since they moved from Calstock ten years earlier. Living in the house with them were their son, Harry, and four daughters, Annie, Lily, May and Flossie. They also had a boarder, William Foote Senior, who had some forty years earlier left his little cottage in New Quay. His wife, Elizabeth (Betsy), had died in the early months of 1887 aged seventy-seven and was buried at St Stephen's Church.

William Henry Foote was the captain of a river steamer, and a *Western Morning News* advertisement for 2nd September, 1891, shows that his steamer was the *Alexandra*. As William was

now a fully qualified skipper he was allowed to take his craft outside the confines of the breakwater and Plymouth Sound. In the next ten years the family moved from Brunel Terrace to 5 Home Park, and four more children were born, but tragedy again struck in early 1895 when two daughters died at the same time, Flossie aged five and Emily Florence aged two. Sadly, William Senior also died later that year at the grand age of eighty-three and he also was buried at St Stephen's. Living next door to the Foote's at Number 4 was another steamer captain, William Moyse and his family. Captain Moyse was for many years in command of the *Eleanor*. By the turn of the century, May Foote had reached her teenage years and she would often accompany her father on the *Alexandra*. On one of the trips to the River Yealm she must have met Sam Mashford who then was living with his family at Ferry Cottage, Noss Mayo. Over the next few years their relationship grew, and they married in August, 1909. Sam was a boatbuilder who had served his apprenticeship at William Hocking's yard in East Stonehouse, Plymouth.

The most recent available census for 1911 revealed that William and Emily had fourteen children in total, but seven died, most by the age of five, several having lived for only a few months. In that year the family were living in Battery Cottage, Saltash, which was a property owned by the Steamboat Company. The former family house at 5 Home Park was occupied by daughters, Annie and Lily with their respective husbands, Alfred Boaden and Ernest Hawke and children, Elsie and Winnie Hawke. A year later on 24th May the Hawke family set sail from Plymouth on the *Corinthian* bound for Montreal, Canada. They later settled in Winnipeg, Ontario, where they had two more children, Sylvan and Gladys. The descendants of these four children are thriving and are spread widely across Canada and the USA.

However, Lily was not the first of the Foote family to leave their native shores. Way back in 1867 John Foote, his wife, Willmet, née Gendle, and their son, Barton John, left their home in Morwellham and emigrated to Australia. This was a time when many miners and others from the valley were leaving to find their fortunes abroad as the mining industry locally was in serious decline.

On 19th November 1918, William Henry Foote passed away aged sixty-three and was buried at St Stepehen's, Saltash.

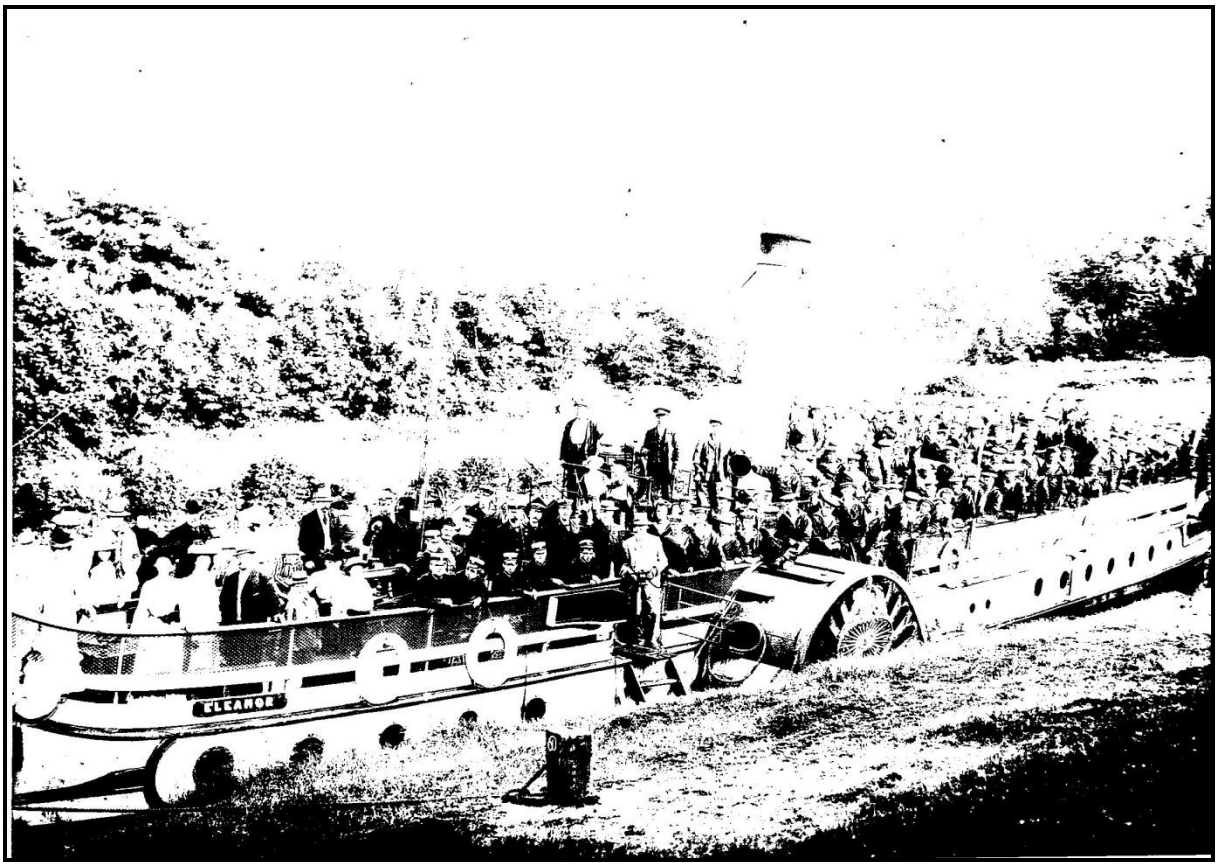

Fig. 28: Boys from the Royal Naval Training Ship, H.M.S. *Lion* enjoy an excursion *ca* 1902 up the Tamar on the paddle steamer, *Eleanor* with Captain Moyse at the helm. His neighbour at Saltash was William Henry Foote who was captain of *Eleanor* for about seven years before taking command of P.S. *Alexandra* in 1891. *Photo courtesy of Michael Mashford.*

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Gaskell-Brown, Cynthia: *A Lost Devon Village-New Quay*;
Kittridge, Alan: *Steamers and Ferries of the River Tamar and Three Towns District*;
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Western Morning News Archives, Plymouth Central Library.

THE DEVONSHIRE ASSOCIATION CELEBRATES

by Helen Harris

Things have changed since the Devonshire Association was founded in 1862, not least in western parts of Devon and the Tamar Valley. This year the Association (DA), with its many members across the county and beyond, is celebrating 150 years of existence with a wide programme of events.

Despite developments that have altered aspects of the general scene, the DA principles and objectives, now modernised, still apply. It is to a Cornishman, geologist William Pengelly, that the association owes its inception. Domiciled in Torquay, Pengelly involved himself in studies of local geology, palaeontology and anthropology, co-operating in the formation of Torquay's Natural History Society. His investigations of Kent's Cavern produced an impressive collection of prehistoric bones and flints, which are to be seen in Torquay Museum.

Inspired by the recent establishment of the British Association for the Advancement of Science, he and two friends – at that time of great discovery and initiative – had the idea for a similar body for Devon and they proposed the founding of the Devonshire Association 'for the Advancement of Science, Literature and the Arts'. An initial meeting was held in Plymouth in April 1862 and the proposal formally carried. The first meeting of the Association was held in Exeter in August of that year, with a membership of 69. Research papers were read, an inspiring address given by the first President, Sir John Bowring and an excursion made to Bovey Heathfield. It was decided that the DA should hold annual meetings at a different venue and with a new president each year and this practice has been maintained. It was also resolved to publish the research papers, together with the reports and records, in an annual volume of *Transactions*. These, as they grow in number, provide a huge resource of information about the county.

During the 150 years if its existence the Devonshire Association has held its Annual Meeting at Plymouth on eight occasions: in 1863, 1892, 1916, 1934, 1953, 1973, 1988 and 2002. Devonport was the venue in 1870. Tavistock has hosted the meeting seven times, in 1866, 1889, 1914, 1937, 1949, 1978 and 1996. The 2012 meeting (now called the Conference), covering four days, is being held appropriately at Torquay, including a special visit to Kent's Cavern.

Besides being the occasion for presentation of papers and reports, the meetings have always offered opportunities for socialising and for visits to places of interest. The Tamar Valley has featured regularly in the selection of excursions offered. In past days these, of course, were made in horse-drawn carriages, generally accompanied by suitable feasting; one can imagine the elegance of the clothes that would have been worn.

For example, in 1864, when the Meeting was held at Plymouth, a party of 70 travelled up the River Tamar to Pentillie, where a cold collation was served in a spacious tent set up in the grounds. In 1889, during the Tavistock Meeting, 62 members went in three large brakes to Devon Great Consols

Mine and Arsenic Works to see operations in progress. They then proceeded to Endsleigh - put at their disposal by the Duke of Bedford - where lunch was provided by the local committee.

At the previous Tavistock Meeting, in 1866, the president was the Rt. Hon the Earl Russell (Lord John Russell, son of the 6th Duke of Bedford) who was Prime Minister 1846-52 and 1865-6. This was at the time when the town of Tavistock had recently been reshaped by the 7th Duke, with mean streets and houses swept away and replaced with a new lay-out, the Square and fine buildings and housing as known today. The Pannier Market had been opened in 1862 and the Town Hall in 1864. Fitzford Church (now the Catholic church) was under construction and the town had had its first railway station in 1858. Around 1200 people were employed at Devon Great Consols Mine which was still producing half the world's copper. Foundries were in full production supplying the needs of industry and farming.

In 1928 decisions were made for establishment of local Branches. Plymouth was the first to be formed, in 1931, with 86 members and a programme of lectures and field meetings. Tavistock Branch was inaugurated in 1947 with 60 members, said to be 'showing remarkable activity'. There are currently eight Branches, still including Plymouth and Tavistock.

Also in 1928 the Meeting resolved to create sections for particular studies. At present these comprise: botany, buildings, entomology, geology, history, and literature and art. Two new ones are being added this year, for music and industrial archaeology. It was also resolved to publish the research papers, together with reports and records, in an annual volume of Transactions. These, as they grow in number, provide a huge resource of information about the county.

The Devonshire Association always welcomes new members. It is not necessary to have been born in Devon – or even to live in Devon – to become a member. All that is required is a love of and interest in the county, and a desire to learn more about it in pleasant congenial company.

For further information see the website: www.devonassoc.org.uk.

Meetings of Friends of the Tamar Valley – 2011

By Jane Kiely

2011 was our first full year as Friends of the Tamar Valley, and we started the year as we meant to go on with an inspirational talk by Jo Davies on 7th January entitled "Unfinished Business" – a tale of failure, determination and eventual success on the High Seas – an adventure whilst crossing the Mid-Atlantic. Her second attempt was successful, and Jo told us she was now planning to follow in the footsteps of Shackleton for the centenary of his journey to Antarctica in 1914 – watch this space!

Glyn Berrington, dressed in character as a bee-keeper complete with demonstration hive, gave us a wonderful talk on keeping bees. It proved to be a great evening for all those people who came and it also showed the great commitment needed to keep bees. We were regaled with details of all the different bees, their various rôles and castes as queens, workers and drones.

In March we were pleased to welcome Sue Allen from the Garden House at Buckland Monachorum. Sue had wonderful slides of this magic garden and took us on a virtual tour through all the seasons. Lionel Fortescue's maxim was "Nothing but the best," and this runs through everything at the Garden House to this day. The Fortescue Trust is now planning the Golden Jubilee Arboretum on a two-acre site to be developed with a lake, so what better year to visit this wonderful garden which is amongst the top twenty best gardens in Britain and is right on our doorstep? We had a guided tour with Sue in June to see the garden on probably the wettest day of the summer, which we all enjoyed despite the weather's best efforts, especially so whilst drying out in the restaurant, relishing the tea and watching the rain through the windows!

In April we had our A.G.M. followed by a great talk by Gerry Woodcock on Tavistock Abbey. Gerry is an inspiration as well as a fount of knowledge; with no slides to guide him he talks and is so interesting and entertaining. Five centuries is a lot to get into one evening, but Gerry managed it well.

Our last talk in May before the summer events was by Terry Faull who took us on a tour of the Tamar Valley, looking at the history of the landscape from Bude down to Plymouth Sound. Combined with great slides and an engaging manner, Terry gave us a delightful evening with a wonderful romp down the Valley.

In July we had a very enjoyable and successful boat trip down the Tamar from Calstock to Cotehele and then up almost to Gunnislake Weir. We had our full quota of people on board together with a waiting list of some twenty people. It was such a relaxing afternoon; the weather was just right, and once back in Calstock we all walked up to the Old Chapel for a very welcome cream tea and a chance to admire the amazing view from the window overlooking the River Tamar and its famous viaduct.

In August we had a four-mile walk from Calstock beside the Tamar to Okel Tor to see the old mining remains in this area which is now a wildlife reserve. There weren't many of us, but those who came enjoyed it together with seeing everyone set up for the motorbike show in Calstock, which had really brought the village to life. A meal in the Tamar Inn afterwards rounded the evening off well.

September saw us back at the Tamar Valley Centre for the first of our autumn talks. We were very pleased to welcome David Price who stepped in at the last minute to give us an amazing slide-show and talk on the wildlife between the rivers Tamar and Tavy. David's slides and presentation were just amazing and although he said he was using us as a guinea pig with some new technology, we were all enthralled and really didn't notice there was anything wrong. David walks around the Tamar, Tavy and Inny with his dogs and his camera and certainly catches some wonderful sights.

In October Jane Afflick of the National Trust at Cornish Mines and Engines, Pool near Redruth, gave a fascinating insight into the diverse and complex nature of Cornish engine houses with wonderful, iconic slides. We saw so many of the sites we know and love, especially around the St Just area in West Penwith, which had ten years of funding by the National Trust, Cornwall County Council etc. from 1995 to 2005 based on a 1992 survey to make the buildings safe. No-one wanted the preservation to look "new" and it is hard to see the joins. Also the work in the St Just Regeneration Project underpinned the bid for World Heritage status. 2008 saw the chimneys smoking in Carn Brea once more with thousands of people watching, and it is hoped to do this again.

In November we had a talk entitled "The Elusive Dormouse" with slides by Jen Bousfield on this enigmatic and much loved but rarely seen mammal, yet living with us here in the Tamar Valley – or is it? The answer is that no-one really knows as dormice spend so much of their time asleep. Jen began her talk by saying that she was a dormouse monitor, not an expert, but at the end of the evening we all felt that she was indeed an expert.

In December we welcomed Vicky Dillon from Cotehele to talk to us about the famous Cotehele Garland. Vicky had once again helped to build this with 33,000 blooms in it this year. The National Trust first decorated the hall in the 1950s for a party with a simple display of pittosporum and, like Topsy, it just grew and grew, and it now takes a year to plan each garland with a riot of colour. Of course, what flowers go into it each year depends on the weather and on what actually grows on the estate so it is a new spectacle every year.

Between Christmas and New Year a few brave souls turned up at Cotehele for a five-mile walk led by Cliff Lambert around the Cotehele Estate, using a newly created path. It was a particularly wet day, but everyone enjoyed the walk, the meal in the Barn Restaurant afterwards and, of course, the visit to the Cotehele Garland.

Those members who came to our talks and visits thoroughly enjoyed them, but it would be nice to see a few more members joining us. I think you will agree that there is a good variety to choose from, but please let us know if you have heard an interesting talk and think it would be enjoyed by the Friends of the Tamar Valley.

The Friends of the Tamar Valley

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Meetings are held usually on the first Friday of every month at 7.30 pm

at the A.O.N.B. Centre, Drakewalls, Gunnislake, Cornwall.

There are visits arranged for the summer months.

The full programme of meetings is published in the Newsletter.