

Tamar

Journal of the Friends of the Tamar Valley
Number 35 – 2013



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CONTENTS

Editorial	2-5	
A Family in the Valley, Part 2: Mashford’s Boatyard		
<i>Michael Mashford</i>	6-9	
The Railway and Locomotives of the Devon Great Consols Mine		
<i>John Snell</i>	10-11	
Environmentalist or Hypocrite? William Morris and Arsenic – guilty or not proven? Part II: the ‘Defence’ of William Morris		
<i>Patrick Sullivan</i>	12-30	
The Weir Quay Smelters		
<i>Colin Buck</i>	31-53	
The Historic Daffodils of the Tamar Valley		
<i>Dr Frances M Howard, FLS</i>	54-61	
Recent Heritage Projects in the Tamar Valley		
<i>Samantha Barnes, Tamar Valley AONB Project Officer</i>	62-63	
Friends of the Tamar Valley: meetings and committee members.....		64

EDITORIAL

This 35th edition of *Tamar* presents a blend of articles that vary considerably in length and detail. However, they all reflect their authors' fascination for, and understanding of, the Tamar Valley. Hopefully, their combined effect will be both entertaining and informative.

One of the hallmarks of *Tamar* over the years has been a fine input based on personal and family memories of life in the valley and its surroundings. For 2012, Michael Mashford wrote a fascinating piece about his Foote family ancestors (notably the Tamar steamboat captain William Henry Foote). This year's article takes his family story forward with a focus on the Mashford family, whose name is still indelibly linked to local boat building and repair. Mile also includes some of his personal memories of the Tamar area.

Bere Alston resident John Snell is renowned for his intimate, life-long knowledge of the Tamar Valley, not least its railways. I am delighted that John has again been able to contribute to this year's *Tamar*, on the 'railway and locomotives of the Devon Great Consols Mine', despite having had some medical problems recently.

The 2012 *Tamar* included the first part of Patrick O'Sullivan's admirably detailed and absorbing exploration of the relationship between William Morris (the renowned writer, textile designer, artist and socialist thinker) and the Devon Great Consols Mine, in which his family had a significant financial interest. Having reviewed the 'case for the prosecution' in 2012, Patrick now presents a strong defence of Morris against claims that he was complicit in the negative consequences of the mine's operations, not least via its production of arsenic. As editor of the *Journal of William Morris Studies* and also as a professional environmental scientist, the author brings impressive commitment and authority to his review of the evidence.

The second of the two lengthier articles in this edition of *Tamar* comes from Colin Buck, whose remarkably detailed and authoritative studies should be familiar from earlier editions of the journal. As a professional industrial archaeologist, Colin has developed a knowledge and expertise about key mining-related sites in the Tamar Valley that is second to none. Here, he offers

a thorough examination of the two metal smelters that operated in the 19th century at Weir Quay, on the Bere Peninsula. The article is based on a meticulous ‘impact and conservation assessment’ survey and report of the smelter sites that Colin conducted several years ago for Devon County Council. It should be noted that the article does not attempt to reflect recent developments at the ‘upper’ site by its current owner.

Frances Howard’s presentation on ‘historical daffodils in the Tamar Valley’ (accompanied by delightful photos by David Pearce) reminds us - should that be necessary - how our local environment is intimately linked to the wider world. Writing with her characteristic expertise and passion, Frances shows how some of the daffodil varieties that became so familiar in the Tamar Valley’s flower trade can be traced back to the work of pioneering plantsmen such as John Gerard and, notably, the ‘Royal Botanist’, John Parkinson (1567-1650).

This year’s journal is completed by an update on recent heritage and archaeological projects in the Tamar Valley area. Samantha Barnes, Tamar Valley AONB Project Officer with special responsibility for heritage, reminds us how there have been some truly exciting archaeological revelations in and around the valley in recent years, not least the remarkable discovery of the Roman fort above Calstock. While *Tamar* has documented the wonderfully varied so extensively over the past 35 years, it is clear that the story is far from told – past or present!

To close – some ‘editorial messages’. First (and very important!), the committee of the Friends of the Tamar Valley would like to thank Corinna Woodall and her team at the Tamar Valley AONB for their ongoing support, including assistance towards the production of *Tamar*, as well as by hosting the Friends’ monthly meetings at the Tamar Valley Centre at Drakewalls (first Friday of each month!). The Friends hope that the positive relationship with the AONB and also the Tamar Community Trust (*see short item on the Trust below*) will continue to develop in future years.

Second, I am all too aware that this edition has appeared very late in its designated year; my apologies for this. However, initial work on the 2014 *Tamar* is now under way, and every effort will be made to ensure that it

emerges somewhat earlier in the year! There is still space for contributions for 2014; I would be delighted to receive any potential articles, or suggestions for content. I would like *Tamar* to remain a nicely ‘flexible’ annual journal that can include diverse articles with Tamar Valley connections. As with the current edition, these can range from quite short and ‘personal’ items through to more detailed research reports. Although the valley’s rich heritage is will undoubtedly be an appealing focus, current issues and topics are very welcome, as are photos and other illustrations.

Finally, I should like to confirm that 2013 saw a change at the helm of the Friends of the Tamar Valley. John Chilvers stepped down as Chair of the Friends; we are really grateful for his many years of hard work and superb dedication to the Tamar Valley cause. Fortunately, Jane Kiely has kindly agreed to bring her very considerable energy, enthusiasm and organisational skills ‘to the bridge’ as our new Chair.

Clive Charlton, Editor, *Tamar*

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TAMAR COMMUNITY TRUST

The Trust was initially set up with charitable status in 2009 and was seen as the body which could mutually support and work in conjunction with the Tamar Valley AONB. With the declining levels of financial support from both local and central government it was felt that an organisation such as the Trust would be able to attract more sources of funding such as private investment, community grants and Gift Aid.

The Trust has been fortunate enough to have been given a ten-year land and maintenance agreement on two projects with local landowners and West Devon Borough Council to manage and maintain the trails and walkways in the valley. The Trust's ongoing aims are to develop and improve the economic viability of the Tamar Valley and its community but without having a detrimental impact on its beauty or heritage.

John Page, Chairman, Tamar Community Trust
email: info@tamartrust.org.uk

A Family in the Valley, Part 2: Mashford's Boatyard

Michael Mashford

My grandparents, Sam and May Mashford, lived in Noss Mayo for a few years after their marriage but moved to Saltash in about 1913 where they took over 5 Home Park. When war broke out in 1914, Sam was sent to Inverness to work in the dockyard and returned to Saltash only after it ended in 1918. This was also the year in which my great great grandfather, William Henry Foote, the steamboat captain, passed away. On 19th November he died aged 65 and was buried at St Stephens, Saltash. In 1919 Sam sold the house in Saltash and moved to Padstow where he started a boatbuilding business in partnership with a friend called Brabyn. However, this partnership did not last, and Sam moved back with his family in 1921 to Saltash where he started up his own boatyard. It was situated on the quay just upstream from the Royal Albert Bridge where today the car and boat park at Brunel Green are found. In June 1922 when my father, Arthur, was born the family were living on a houseboat moored on the Tamar near the yard so my dad's birth certificate shows that he was actually born in his granny Foote's house at Home Park. Sam and his brother, Sid, worked the business up in Saltash some fifteen years, and one novel way of advertising was by painting the family name, MASHFORD, on the roof of the shed so that it could be seen all passengers on the trains crossing on Brunel's bridge. In the mid 1930's the family moved a few more miles downstream and relocated the boatyard to Cremyll. Sam and family lived in one of Lord Mt Edgcumbe's properties at Empacombe, and my dad started work at the yard in 1936 at the age of fourteen.

The actual site of the yard, originally known as Frank's Quarry, had been used for the construction of wooden vessels since the late eighteenth century. During the war years the yard built six Fairmile B class motor launches and seventeen MFV's for the Admiralty. Much of the timber came from the Cotehele Estate and was towed down-river by the yard motorboat. Due to the extra work created by the Admiralty contract, the yard had to employ many more hands so the total work-force doubled to about sixty. As boatbuilding was a reserved occupation, my dad was not called up to serve in the Forces but remained working at the yard for the duration of the war. During the blitz on Plymouth in April 1941, several incendiary bombs fell on Cremyll and Mt.

Edgcumbe. One fell just outside the boatyard and severely damaged the village landmark of Tower Cottage whilst Mt. Edgcumbe itself received a direct hit and was completely gutted by fire. After the war the yard built and repaired many local fishing trawlers and luxury wooden yachts as well as maintaining and refitting lifeboats for the RNLI for all of Devon and Cornwall.

My parents met at a dance during the war years as my mother lived only a few miles from Cremyll in the village of Cawsand. They married in the summer of 1947 and I was born in August the following year. After a few years living in Cawsand, we moved to Cremyll and lived in a caravan just outside the yard gates. My granddad was then living very close in a large house or so it seemed to me compared to our little caravan. His house was between the Edgcumbe Arms and Mrs Wilson's sweet shop. He was retired then so had plenty of time to share with me, and I used to like to watch as he worked on his intricate marquetry pictures. He taught me to row a boat when I was about five or six years old and built me my first dinghy. He grew his own tobacco in a small allotment next to the church, which he dried in sheds at the back of his house and would then use to smoke his pipe. There were only ten or so children living in Cremyll then and we had to make our own amusement, but Granddad, or Uncle Sam as the other children called him, would always be on hand to fix up some swings or climbing frames. I well remember playing in the yard on one of the boats. It was a replica of the *Golden Hind* used by film companies but to us it was a perfect pirate ship complete with cannons. One of my friends was Ian Crawford whose father then owned the Millbrook Steamboat Company. The Company ran the Cremyll Ferry as well as several pleasure boats which plied the Tamar to Calstock from the Barbican. They also owned a large fleet of buses which covered all the local routes in the Rame peninsula. My fascination with boats and ships also began in the years living at Cremyll. I would stand in awe as the huge aircraft carriers, HMS *Eagle* or HMS *Ark Royal* and the cruisers HMS *Tiger* and HMS *Blake* were towed to Devonport. Very often the decks were lined from bow to stern with sailors and the bands played rousing tunes. Although I did not realise then that boats were in my blood, seeing all the naval vessels at close quarters formed a lasting impression on me and I have been interested in ships ever since.

At Christmas the family always gathered at my granddad's house, and he would always produce a very old photograph album with a musical box in the back section. It contained many old pictures of his family and friends, but I was too young then to appreciate the photos as I was more interested where the music was coming from. One of those photos was of his friend, Jack Adams. Unfortunately my granddad died when I was twelve so I never got to ask him, many questions I would have liked to about his early life, his family and friends. I remember first meeting Jack Adams when I was about twenty and I visited him with my parents at his home in Morwellham. He was living then in his little cottage where his family had lived for generations. In 1949 Jack started working for the Tamar and Plymouth Fisheries as water bailiff, a job which he loved. He was responsible for the four local rivers, the Tamar, Tavy, Walkham and Lynher in protecting their fish stocks, monitoring pollution and, of course, checking for poachers. He was bailiff for twenty-four years until his retirement in 1972 and was such a well-liked and respected character with a wealth of local knowledge about the history of the area and the river that he gained the nickname of Mr Tamar. As a young man he served an apprenticeship with the local boatbuilder, James Goss, at his yard opposite Calstock, which would have been quite appropriate as the Adams family were very well known as master mariners and barge owners. Jack's father, William Henry Adams was commonly known as Captain Bill and his grandfather James Adams was Captain Jim. They were masters and shareholders of the local barges *Gwendoline*, *Edith*, *Mayblossom* and *The Sirdar*. It was, in fact, Captain Jim who, as a young boy, with his stepbrother, William Hobbs, went to school at Morwellham with the young William Henry Foote. So it seems that the Adams family remained friends with the Footes and the Mashfords for over one hundred years. Unfortunately a few months after Jack retired he suffered a stroke which robbed him of his eyesight and only three years later he passed away in Tavistock Hospital.

The story comes full circle when some thirteen years ago my wife, Janet, and I moved to Tavistock to live, little knowing then of the long association my early ancestors had with this area. Living very close to the canal, I have regularly walked our dogs along the towpath to Crowndale and I often try to imagine what this now tranquil spot would have been like during the heyday of the mining era. Another local place I visited only recently was the "lost"

village of New Quay. Very little remains now of this once bustling port, although the remains of the lime-kilns and some low, overgrown walls of the cottages are still visible. The shell of the blacksmith's house is also quite recognisable. The main thing which struck me was the peace and tranquillity of the place. Far from the main road, the sound of a distant tractor and the gentle swish of the river Tamar only a few yards away breaking the silence, the muddy brown water of the river fast flowing by on its long journey from North Cornwall to Plymouth Sound and the open sea. With not even a rowing boat or canoe to be seen, it was difficult to imagine barges, ketches and schooners coming and going from ports near and far on every tide. Now only the birds and wildlife inhabit this deserted and forgotten spot, certainly a far cry from the hustle and bustle of the New Quay my ancestors knew some one hundred and fifty years ago.

The Railway and Locomotives of the Devon Great Consols Mine

John Snell

Devon Great Consols was a 'mine of mines'. The mine produced around 736,000 tons of copper and 72,000 tons of arsenic, a large market for which was the cotton-growing areas of the U.S.A., where arsenic was used to combat the boll weevil pest. It was also the only mine in Devon and Cornwall to have its own standard gauge railway.

In the earlier years of operation from 1844, copper ore was taken from Devon Great Consols to the export port at Morwellham by pack horse. This was a slow and costly operation, so a better form of transportation was needed as production increased. The mine was a very rich one, which at one time provided much of the world's copper needs. The Duke of Bedford gave the mine permission in March 1857 to build a standard gauge railway, and construction work soon started. The line was around four miles long and was laid with 39lb per yard rail laid on wooden sleepers.

The railway started near Wheal Maria and ran to the top of the incline above Morwellham, passing close to Chimney Rock. It passed under the Gunnislake-Tavistock road near Gulworthy cottages and under the 'Old Hill' (as the earlier, steep road up from New Bridge was known). The first train ran in November 1858. A fully laden train took 20 minutes for the journey. There was a half-mile incline from the end of the line down to the port at Morwellham. Wagons were attached to a wire rope around a drum and powered by a stationary steam engine. The incline was single track, with a passing place mid way. Two descending wagons were balanced by two that were ascending.

The railway had about 60 ore and timber wagons in use by the 1860s. An ore wagon weighed 2 tons 5 cwt and could carry a 3.5 ton load. Timber wagons were used to take large baulks of timber to the saw mills at Wheal Josiah. The mine also had a number of narrow gauge iron ways. In 1856, a small 2ft 6ins track gauge locomotive was built for the mine by Nicholls, Williams and Co. at the Bedford Iron Foundry in Tavistock. This was something of an achievement for a local firm with no previous locomotive-building experience. For the standard gauge sections, two engines were built by Gilkes Wilson and

Co. of Middlesbrough. One arrived in November 1858 and the second in June 1859. These two engines worked the railway for around 20 years, after which they were replaced by two 0-4-0 tank engines named 'Hugo' and 'Ada', constructed by John Spittle of Newport, Monmouthshire. The earlier engines were probably scrapped.

When the mine finally closed in 1901, Hugo was under repair in South Wales and ended its days there. Ada was bought by the contractor who was building the Bere Alston to Callington branch line, in 1904. For a time it worked at Pearson's Quarry in Gunnislake. My late mother remembered seeing it there. Her dad (my granddad Veal) worked at the quarry as a stone cutter and she used to take food to him there. The engine would have hauled granite from the quarry to Gunnislake station. The siding from the quarry was near the Body's Court end of Station Road, Gunnislake. Ada then went to Merrivale Quarry on Dartmoor, before being sold to the Belgian government in 1915. Sadly, the engine was destroyed by German gunfire on the fields of Flanders.

In the 1920s, some small-scale working was carried out at the Devon Great Consols mine site. A 2ft gauge light railway was built in connection with this. It was about two miles long and was used to transport small amounts of tin and wolfram from Wheal Frementor to a crushing plant at Bedford United Mine. The line was worked by a petrol-drive Simplex engine. My uncle Richard (Dick) Veal and Stan Williams, both from Gunnislake, regularly worked on this light railway.

Reference: Hateley, R. 2012. *Industrial Railways and Locomotives of South Western England*, Industrial Railway Society.

Environmentalist or Hypocrite? William Morris and Arsenic – Guilty or not proven? Part II: The ‘Defence’ of William Morris

Patrick O’Sullivan

INTRODUCTION

Part 1 of this article (O’Sullivan, 2012) dealt with the ‘case’ – such as it is – against the nineteenth century poet, designer, businessman and socialist William Morris (1834-1896) – a case made mainly by Professor Andrew Meharg (2003 *et seq.*) – that as a socialist, but also shareholder in, and a director of, the Devon Great Consols copper and later arsenic mine near Tavistock, Morris benefitted financially from the low wages and poor working conditions at the mine. In particular, he is said to have paid little regard to the harmful effects upon some of its surface workers of production of arsenic, a substance which his firm (Morris & Co.) also employed in its wallpapers (see also Ball, 2003; Whorton, 2012). It has also been said – *pace* Morris’s more recent status as a pioneer environmentalist – that effluent from Devon Great Consols destroyed the salmon fishery of the River Tamar.

Morris has therefore been accused of ‘hypocrisy’, in that as a socialist, he gave numerous speeches and wrote many essays and articles about the evils of Victorian capitalism, and yet was at the same time a director of one company which employed people in harsh and dangerous conditions for which it paid them very little (and which also polluted its local environment), and of another which showed no hesitation in supplying its customers with wallpapers containing a substance which poisoned them, probably made them very ill, and perhaps, in some cases, led to their slow and painful death. Regarding these latter actions, Morris is said to have remained ‘silent as a stone’, ‘showing (no) remorse’, and ‘failing to confess’ (Meharg, 2005, pp. 137, 144, 147).

In fact, as we shall see, Morris relinquished all interest in Devon Great Consols some seven years before becoming a socialist (Harvey & Press, 1990; N. Salmon, 1996). Although Morris & Co.’s designs were not pronounced arsenic-free until 1885 – somewhat later than those of other manufacturers (e.g. Jeffrey & Co., 1879) – the last Morris wallpaper to incorporate the element *as a pigment* was *India* (1872). Production by arsenical wallpapers

hung in damp rooms of a deadly poisonous gas which poisoned Morris's customers has also recently been shown to be an 'urban myth' (Cullen & Bentley, 2005), and evidence as to 'destruction' of the Tamar salmon fishery by waste from Devon Great Consols is at least inconclusive. More positively, Morris's experience as director of the mine may not only have influenced his socialism (Boos & O'Sullivan, 2012), but also his early environmental ideas. Passages in his 'utopian romance' *News from Nowhere* (1890-91) may refer both to the landscape and to the environment of the mine.

THE MORRIS FAMILY AND DEVON GREAT CONSOLS

As is well known, William Morris came from a very well-off family, the major source of whose wealth was his father William Morris senior's speculation in Devon Great Consols. Two members of the Morris family (William Morris senior, and his brother Thomas Morris) were founders and directors of the mine; from the outset, the family held an approximate 30% stake (304 shares) which it maintained almost until closure. Three other family members also served on its Board – another of Morris's uncles, Francis Morris, who took over when William Morris senior died in 1847 (see below), Morris himself (a director from 1871 to 1877), and (Hugh) Stanley Morris, his brother, who succeeded him.

After the first full year of operations (1845-6), the original £1 shares in the mine were worth £800 each, and the first annual dividend was £7,622, or £71 per share (Goodridge, 1964). As *per* the UK National Archives Currency Converter,¹ at modern prices (2005) these sums represent respectively a share price of *ca* £ 41,125, and annual dividends of *ca* £920,000, or of *ca* £3650 per share. Thus, within eighteen months of investing in the mine, William Morris senior became – by modern standards – a millionaire. And on his sudden and early death, his estate – one of the top 1% of those declared intestate that year (1847) – was valued at £60,000 (*ca* £3.5 million). Two thirds of this sum (£40,000; *ca* £2.3 million) represented his stake in Devon Great Consols (Harvey & Press, 1990).

¹ www.nationalarchives.gov.uk/currency/: as consulted February 2012. Modern equivalents to nineteenth century prices are shown in *italic font*.

Emma Shelton Morris, his widow, was obliged to liquidate some of these assets in order to pay off her husband's trading debts, selling twenty two shares in 1850, and fifty in 1851, realising some £20,000 (*ca* £1.17 million) which she used subsequently to support herself and her nine children, the eldest of whom (Morris's eldest sister, Henrietta) was by now fifteen. She retained her remaining shares (*ca* 200?), which during the 1850s and 1860s generated a regular annual income of *ca* £51 per share (*ca* £115,000; Harvey & Press, 1991). These sums were redistributed over the years, however, as she endowed each of her nine children, sons and daughters alike, at their majority, with thirteen shares.

Upon reaching his own maturity (1855), Morris therefore received his thirteen shares from his mother, which during the late 1850s and 1860s produced him an annual income of *ca* £380 (*ca* £17,000; Harvey & Press, 1990; 1991). In 1871 he became a director of the mine, a position he held until 1875. Much has been made of Morris's income from Devon Great Consols, and the 'fabulous' wealth it produced (Meharg, 2005, p. 135), most of which may be the fault – as with so much else in Morris's life – of the poet and painter Dante Gabriel Rossetti, who, shortly after meeting Morris in 1856, described him – no doubt somewhat wishfully – as 'a millionaire and buys pictures!' (MacCarthy, 1994, p. 123).

Harvey & Press (1991, Table 1, p. 24) give a more sober account, and show that Morris's net income over the twenty-three years during which he held, bought and sold shares (1855-1877) was £8,803 (*ca* £392,000), or (as we have seen) *ca* £380 (*ca* £17,000) per annum. Thus although Morris was made financially secure by his ownership of Devon Great Consols shares, unlike his father, he did *not* become a millionaire, although he was, of course, much better off than the other members of his student 'set' at Oxford, or of the young artists with whom he then surrounded himself – Rossetti, William Holman Hunt, Ford Madox Brown, Edward Burne-Jones – and of course the vast majority of his later political comrades, most of whom were working people. What Morris's shares in Devon Great Consols in fact brought him was the not the income of a millionaire, but that of the majority of professional persons in mid-Victorian Britain (Hobsbawm, 1999).

During 1861-2, Morris sold two of his original thirteen shares – an act for which his relatives thought him 'wicked and mad' (Blunt, 1922, p. 283) – in

order to help establish his business (Morris, Marshall, Faulkner & Co., later Morris & Co., or ‘the Firm’), but these were bought by his mother and given to his brother Stanley, thus keeping them in family. For some fifteen years he relied substantially upon his share income in order to subsidise his design work. Board members were expected to buy further shares, so that when he became a director in 1871, he bought fourteen, and one more in 1872, costing him in total £1660 (*ca* £76,000). Later (1874-77), he made a considerable loss when selling *all* his shares, for only £755 (*ca* £35,000). After his last Board meeting in 1875, he reportedly went home and ceremoniously sat on his director’s top hat (Mackail, 1899, Vol. 1, p. 223).

By the mid 1870s, with declining copper prices, imports from abroad, and the failure to find tin, Devon Great Consols no longer provided Morris with reliable income. What had been regular financial support during his twenties and early thirties fell quite rapidly during his late thirties to almost nothing at all. As a result, in 1875, he decided to reorganise ‘the Firm’ – until that time run as a kind of ‘gentleman’s collective’, involving (among others) Madox Brown, Burne-Jones and Rossetti – from Morris, Marshall, Faulkner & Co, under his sole ownership to Morris & Co, an episode which biographers describe as ‘saddening and disillusioning’, and which earned him the disapproval, and even the enmity, of some of his oldest friends (MacCarthy, 1994, p. 347). He sold his last shares in 1877.

About this time (1876) Morris first became interested in politics, in the shape of The Eastern Question Association, formed to oppose Disraeli’s support of the Turkish Empire against Russian intervention on behalf of oppressed Slavic peoples in the Balkans, and also the Society for the Protection of Ancient Buildings (S.P.A.B.), formed in 1877 to oppose what its members regarded as insensitive ‘restoration’ of medieval and other buildings by architects such as George Gilbert Scott (and still extant). However, on entering politics, Morris first (1879) joined the National Liberal League, a radical offshoot of the Liberal Party, and did not take up socialism until January 1883, when he joined the Democratic (later the *Social* Democratic) Federation, an early socialist organisation (Salmon, 1996; Thompson, 1976).

WORKING CONDITIONS AT DEVON GREAT CONSOLS

As various authors (Anon., 1864; Booker, 1971; Buck, 2003; Goodridge, 1964; Latham, 2001; H.C. Salmon, 1860; Murchison, 1850; Woodcock, 1993) tell us, Devon Great Consols considered itself a model employer: by mid-nineteenth century standards, this may indeed have been the case. Especially during the more prosperous years (1844-1864), its directors employed a resident doctor (chosen by the mine workers themselves), and provided baths, heated changing and drying rooms, clothing lockers, hot water for tea and coffee, ovens supervised by surface workers for heating meals, and warm rooms in which to eat them. They also engaged a schoolteacher for the younger children, and ran a (contributory) 'sick club' for ill and injured miners.

Within the mine, iron tamping tools for drilling blast holes were forbidden (as they caused sparks), and copper-tipped tools used instead; gunpowder was strictly rationed. As well as wet, the mine was, like many in the region, very hot at depth – up to 30° C – although linking shafts ('winzes') were used to keep the 'levels' ventilated. These were connected by near vertical ladders, up which men were obliged to climb for up to half an hour at the end of the shift. Later, two 'man engines' – on which men rode up and down the rods used to transmit power from the surface to the pumps below – were installed in the deepest levels (Le Marchant, 1989).

The *Report* of the 'Kinnaird Commission' (1864) may be used to augment this account, and to illustrate that even though Devon Great Consols may have been a better employer than other mines, conditions were still harsh, especially by modern standards. Data for the Southwest as a whole show that whereas general male life expectancy at the time was 66 years, for miners it was 38 (p. 18). Factors contributing to this appalling figure included poor diet, poor home living conditions ('a want of privies', p. 22), dust in the mines, and the lack of warm, dry changing facilities following eight hour shifts in hot, wet conditions (but not drink, miners being generally 'a very temperate class of men'; p. 20). The most significant factor leading to miners' poor health was a kind of emphysema caused by climbing ladders. Few mines paid sick benefit to men who fell ill long term, but even so, many younger miners considered it a matter

of honour to make the entire climb to the surface at the end of an eight hour shift without once pausing for breath (Proctor, 1999).

Thomas Morris, Morris's uncle, and the Resident Director of the mine, testified (p. 18) that at Devon Great Consols, men over 40 were considered 'old' for working underground, and were instead employed in the shallower levels. A minority regularly climbed 212 fathoms (*ca* 390 m) after their shift, but most worked at depths between 60 and 140 fathoms (110-255 m; pp. 20-21). Eight hour shifts were worked, after which men took thirty minutes to climb up to 'grass' (p. 27). Some illegally hitched rides on 'kibbles' used to haul ore out of the mine, but most faced a daily climb of *ca* 100 fathoms (*ca* 180 m; p. 21). Men could lose up to 4 kg in bodyweight during an 8-10 hour shift (p. 282).

Mr Morris agreed (p. 23) that man-engines might be advantageous in deeper mines, but did not think it necessary to introduce them above 150-200 fathoms (275-365 m). Instead, the policy at Devon Great Consols was to hire younger men who could cope with arduous conditions. Another was to make sure the mine was well-ventilated (testimony by James Richards, p. 47), especially as some candles contained arsenic used to harden tallow. Later, two man-engines were introduced (Le Marchant, 1989), and owners, captains and doctors from several other mines agreed that these, where they could practicably be installed, greatly improved miners' health. However, according to others, they also enabled employers to economise on labour costs (by *ca* 15%), as more experienced, older men could now go underground, and spend less time climbing in and out of the mine. Three men could now do the work of four (p. 25).

Thus the Morris family, and Morris in particular, especially during the key early stages of his career as designer and poet, benefited greatly from their share income generated by a labour force whose working conditions were, by modern standards, truly appalling, but which, by those of the nineteenth century, may have been better than at many other mines. However, it must be noted that most of Morris's income from Devon Great Consols accrued *before* he became interested in politics (1876), and all of it well before he took up socialism (1883).

As to conditions at Morris's own workshops at Merton Abbey, east of London, contemporary accounts (*The Spectator*, 23 November 1883; *The Century Illustrated Magazine*, July 1886; MacCarthy, 1994, pp. 431-432) describe them as 'full of sunlight and colour'. It is important to remember that Morris & Co. did not run a *factory*, with a production line, but a *workshop*, where goods were made by the same highly-skilled person from start to finish. Although 'the Firm' was not run as a cooperative, there was a profit-sharing scheme among the senior employees, and Morris & Co. paid 'above the rate' not in order better to exploit its workers, but so that they possessed greater liberty as to disposal of their time. Thus, as one former employee later testified 'No one, having worked for Mr Morris, would willingly have joined any other workshop' (Thompson, 1976, pp. 321-322).

MORRIS AND ARSENIC

By the later 1860s, copper at Devon Great Consols began to be worked out, and with development of new sources overseas, world copper prices fell, and the mine began to lose profitability. But the lodes, as at other mines in the Southwest, were lined with 'mispickel' (arsenopyrite [arsenic sulphide]; FeAsS), which until then had been left *in situ*. During 1866-8 it was decided that while copper would still be extracted, production would switch mainly to arsenic. By 1870, Devon Great Consols was already providing half the world's supply, eventually yielding some 72,279 tons (66,708 t). Annual output overtook copper production by about 1880, and peaked during the 1880s at ca 3200-3300 tons (ca 3000 t), with highest annual receipts of £26,000 (£1.25-1.5 million; Burt *et al.* 1984).

Ore was 'calcined' and condensed on site, producing the white crystalline powder arsenic trioxide ('white arsenic'; As₂O₃). Conditions for surface workers who shovelled the crystals out of condensers were primitive: mouth-masks and hessian sacking covering their ears, feet and ankles were all the protection available to most of them. Disease among those who worked in arsenic extraction, including damage to the nervous system and the skin ('arsenic pock'), jaundice, internal bleeding, and cancers of the lungs, liver, kidneys, bladder and scrotum, was generally rife (Whorton, 2012). Such pathologies also affected other workers exposed to arsenic dust, or to arsenic fumes - wallpaper stainers, wallpaper hangers and their labourers, and young

girls employed making artificial flowers. However, there is no evidence that any of Morris's wallpaper printers at Merton Abbey were ever adversely affected.

Arsenic was used very widely at the time as rat poison, and as a vivid green pigment in paints, wallpapers, documents, toys, confectionery and sweet wrappers, playing cards, curtains, hats, artificial flowers, ball gowns and socks. 'Medicinal' uses included 'Dr Simms complexion wafers' – employed simultaneously as both blusher and skin whitener – and Fowler's Solution – for treating malaria, eczema and psoriasis, asthma, chorea, rheumatic fever, anaemia, leukaemia and Hodgkin's disease (Whorton, 2012). In the circumstances, particularly the rudimentary health and safety conditions, it is perhaps not surprising that Meharg (2003 *et seq.*) castigates Morris for his connection to arsenic production at Devon Great Consols.

However, Meharg's *main* criticism appears to be that in marketing wallpapers rich in 'arsenic green' (copper arsenite; CuHAsO_3) – those very actions about which he remained 'silent as a stone', 'showing (no) remorse', and 'failing to confess' (2005, pp. 137, 144, 147) – Morris was also responsible for poisoning his customers. But Cullen and Bentley (2005) describe how the 'scientific' basis for the existence of a deadly gas given off in damp rooms by arsenical wallpapers – mainly by the action of moulds (for which there was in fact very little empirical evidence) – emerged not by means of careful and systematic study, but *via* a process of reinforcement.

According to their account, in 1839 the pioneering German chemist Leopold Gmelin (1788-1853), observed a 'mouse-like' odour in rooms containing arsenical wallpapers, especially those facing north, which he attributed to an unidentified volatile arsenic compound. This story, which Gmelin published not in a scientific journal but in a local newspaper (the *Karlsruher Zeitung*), was then taken up by doctors in Britain, and during the 1860s and 1870s, a vigorous campaign against the use of arsenic in wallpapers was mounted by *The Times*, the *British Medical Journal*, and *The Lancet*, which on 24 November 1860 stated:

'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’.

Some years later (1875), *The Times* described Devon Great Consols as ‘containing enough arsenic to poison the entire world’. However, Thomas Wakely (1795-1862), then editor of *The Lancet*, was not an entirely disinterested campaigner, in that, along with one of his principal journalists, he suspected that his own family had been poisoned by wallpapers (Bartrip, 1994).

However, in this matter, Morris did not always help himself. For example, in 1872, he wrote to his mother:

‘... today we had the new contract for arsenic, and got a very good price for it’. (Kelvin, 1984, p. 171)

Years later, he remained unrepentant:

‘As to the arsenic scare a greater folly it is hardly possible to imagine: the doctors were bitten as people bitten by witch fever ... My belief ... is that doctors find their patients ailing [,] don’t know what’s the matter with them, and in despair put it down to the wall papers, when they probably ought to put it down to the water closet, which I believe to be the source of all illness’.

‘Of course, it is proving too much to prove that that the Nicholson’s (*sic*) were poisoned by wall-papers: for if they were[,], a great many other people would be in the same plight & we should be sure to hear of it. ... And by the by, as Nicholson is a tee-totaller[,], he probably imbibes more sewage than other people: though you mustn’t tell him I said so. (Kelvin, 1987, pp. 463, 464)

By 1891, the Italian physician Bartolomeo Gosio (1863-1944) had isolated several fungi which he observed gave off a garlic odour (i.e. *not* ‘mouselike’), liberating a gas (‘Gosio gas’) which he identified as dimethylarsine ($[\text{CH}_3]_2\text{As}$), and which he assumed, as it is an arsenic compound, to be toxic. During the 1930s, Frederick Challenger (1887-1983) identified this gas as trimethylarsine (TMAs; $[\text{CH}_3]_3\text{As}$). He too assumed it to be toxic, even though

it had long been shown (by the Swedish bacteriologist Huss, 1914) not to be. Cullen & Bentley conclude:

‘There is no good evidence that TMAs had actually been formed in any room coated with arsenical-containing wallpaper. Gas production on wallpaper is unlikely. ... (as) the fungal process is inefficient, (and) the organisms do not grow well at high arsenic concentrations ... The amount of TMAs produced is very small even under optimal growth conditions. ... All of the above reasons pale into insignificance in view of the very low toxicity of TMAs by inhalation or by mouth.

It is ... remotely possible that some volatile arsenic compound may have been present as required by the toxic gas hypothesis ... (but) it is now very clear that illness could not have been due to TMAs. ... It appears to us most likely that TMAs is not and never was a silent poison or killer. ...

It seems a pity that we should now have to abandon this *fascinating urban legend*. (pp. 11-15; Italics added)

Therefore, although Morris remained unrepentant in doubting the ‘scare’ regarding ‘poisonous wallpapers’, it seems that he may, even if not for the best of reasons, have been correct.

DEVON GREAT CONSOLS AND THE TAMAR SALMON FISHERY

Frank Booker (1971, p. 159) states that ‘The water pumped from (Devon Great Consols) was so poisonous that it nearly killed off the regional salmon fishery’. This comment, which is not supported any evidence, is transposed by Meharg (2005, p. 145) to read ‘The run-off from Devon Great Consols destroyed the salmon fishery of the River Tamar’. One possible set of sources for these statements appears to be the *Annual Report(s) of the Inspectors of Salmon Fisheries of England & Wales* (1861-1876), especially the *Second Annual Report* (1863).

For example, in evidence given at Plymouth on 3 December 1860, a Mr Joseph Proctor of Stonehouse testified that he had rented the Tamar salmon fishery for about 30 years before the opening of Devon Great Consols (1844), operating a fish trap at the Head Weir at Calstock, and that he used to make

£200-£300 (*ca* £16,000-£24,000) profit per annum until the fishery collapsed in a single year following the opening of the mine. Although he had never seen a fish killed by mine water, he brought an action against the mine, but failed to win his case – ‘too many guns for me’ (*Second Annual Report*, p. 458). More important perhaps was the point that he collected his water samples from just below the mine, rather than from where its waste discharged into the Tamar (see below).

At the same session, several other witnesses stated that, rather than mine effluent, the real cause of the decline of the Tamar salmon fishery was a weir installed at Latchley, just upstream of the mine, in order to draw water from the river to power its numerous water wheels. This weir had originally been built by South Maria, a mine on the Cornish side, but was taken over by Devon Great Consols in 1849. Another obstacle (*First Annual Report*, 1861, p. 470) may have been the canal built upstream from the Head Weir by the Tamar Manure Navigation Company.

On behalf of the mine, Thomas Morris, its Resident Director, denied that salmon could not get over the weir. He declared that Devon Great Consols had improved it, ‘and ... shall be very happy to do anything we can ... to facilitate the fish going up’ (*Second Annual Report*, p. 456). He also suggested, perhaps unwisely, that the decrease of fish was due to increased boat traffic in the river, at least some of which (5-6 vessels per day; Booker 1971) was of course caused by expansion of the mine.

Asked about the about the effects of mine waters on the river, Mr Morris agreed that it was indeed about 12 to 13 years since the amount of waste entering it had increased; the same period over which the fishery had declined. However, waste from Devon Great Consols did not enter the Tamar directly below the mine, but ran in a leat for 2.5 miles (4 km), with a series of catch pits, ‘so as to cause as little annoyance to the river as possible’ (p. 36, p. 457).

Before effluent left the mine, dissolved copper was precipitated out electrolytically using spent horseshoes, a process producing almost pure metal, which was therefore very lucrative (Anon., 1864; Bawden, 1914). On entering the main river, waste water, which would still have been quite acid, and perhaps turbid, was diluted by a factor of 20 (*Second Annual Report*, p. 36). According to a separate report compiled for the Bedford Estate, ‘Every

precaution (was) taken to ensure as little injury to the fish as possible' (Buck, 2003, p. 22). As to Mr Proctor's court case, Thomas Morris stated that

'... at the time that the action was brought it was proved that the water from the mines did not damage the river because (it) had such a long distance to run ... They showed (that) a sample of water taken at the mine was very bad, (but) we showed (that) a sample (from) ... where it entered the river ... was not bad at all'. (*Second Annual Report*, p. 458)

Several other mines together discharged almost as much waste into the Tamar, but with 'no effort ... to purify the refuse from any of them'. However, if they were to employ the same treatment methods as Devon Great Consols, 'there can be no doubt but that the fisheries would become far more valuable'. (p. 37)

Shortly after the action, the lease of the fishery was transferred from Mr Proctor to Devon Great Consols, in the persons of Thomas Morris and W.A. Thomas, co-founder of the mine, and Chairman of the Board, 1844-1880. When asked 'Is not all question as to ... deterioration of the fishery now at an end, because the same parties represent the fishery and the mine?', Thomas Morris answered 'Yes' (p. 458). This deal, innocent as it may have been, does seem a little suspicious. However, John Benson, the Duke of Bedford's steward, was adamant that decline of the fishery was not due to mine waste, or to steamers, or even the new weir, but instead to mismanagement by those who fished the Head Weir (i.e. Mr Proctor); 'The only surprising thing is that it lasted so long' (p. 461). Another witness, Mr Mortimer Collier of Plymouth, agreed:

'... when (fish traps) fall into the hands of grasping men who care nothing about stocking the river, they catch all the fish they can ... I believe that is the reason for the scarcity of salmon in this river'. (p. 460)

Some of Mr Proctor's own statements suggest that he was also no great conservationist: 'We did not kill salmon at the Weir Head ... until they came to deposit their spawn', (but there) '(w)e had a trap on purpose to take them all'. He also never allowed one fish to pass the Head Weir in the open season: 'We paid for the fishery, and we had the right to take the whole of the fish that we could ...' (pp. 459-60).

Further *Annual Reports* may be used to pursue this topic. By the time of the *Third Annual Report* (1864), ‘a decided improvement’ in the Tamar had taken place, with many fish now found in the upper waters (p. 7). In the *Sixth Annual Report* (1867), Devon Great Consols is singled out for its ‘excellent example’ – ‘No other mining company ... (in that district) has used any effectual measures’ (pp. 4, 54) – and again in the *Seventh Annual Report* (1867-8) for its ‘praiseworthy example’ (p. 72). In the *Ninth Annual Report* (1870), Drakewalls mine, on the Cornish bank above Gunnislake, is identified as particularly serious polluter (p. 25).

In the *Thirteenth Annual Report* (1874), the problem of blockage of the passage of salmon by Latchley Weir, identified some fifteen years earlier, is finally reported as solved (p. 66). From a low during the early 1860s, numbers of salmon in the Tamar continued to rise with successive reports until 1876, when they were described as ‘stationary’ (*Fifteenth Annual Report*, p. 6). Poor management of the close season was identified as the cause, rather than mine waste. Therefore it seems clear that culpability for the observed mid-nineteenth century decline of the Tamar salmon fishery is not as clear cut as Booker, or indeed Meharg, imply, and also that once the matter began to be addressed, the fishery rapidly recovered.

DEVON GREAT CONSOLS AND NEWS FROM NOWHERE

News from Nowhere, Morris’s ‘utopian romance’ of 1890-91 (Redmond, 1970) contains what many modern radical environmentalists consider to be an almost perfect description of an ‘ecological’ society (O’Sullivan, 1991; 2011). There, Morris anticipated many aspects of modern green thought – alternative technology, renewable energy, simplicity of lifestyle, community self-reliance, production ‘locally for local need’, prolonging the life of goods in order to reduce resource depletion, reduction of waste, and above all the key role of ‘work’ in allowing people (both men and women) to express their essential humanity in a free and sustainable society. The rivers are clean and pollution-free, as is the air, and much land has gone back to forest, even though the population (of England?) is still some 40 million. All this has been made possible by the abolition of the profit motive and competitive free-market, which Morris thought led not to efficiency, but to over-production and waste. And here he wrote:

‘... whatever coal or mineral we need is brought to grass (*sic*) and sent whither it is needed with as little as possible of dirt, confusion, and the distressing of quiet people's lives. One is tempted to believe from what one has read of the condition of those districts in the nineteenth century, that those who had them under their power worried, befouled, and degraded men out of malice prepense: but it was not so; like the miseducation of which we were talking just now, it came of their dreadful poverty. They were obliged to put up with everything, and even pretend that they liked it; whereas we can now deal with things reasonably, and refuse to be saddled with what we do not want’. (Redmond, 1970, p. 58)

This passage not only uses a Devon and Cornwall term (‘brought to grass’) for raising ore to the surface, but also reads very like a contemporary description of the mine:

‘... the surface of Devon Great Consols is, considering the extent of the mines, but little disfigured with burrows, and does not show those peculiar features of mining desolation characteristic of the great mines ... The work and buildings are in many places closely surrounded by thick woods ... At Wheal Maria, one would never suspect from the surface that it had been one of the most productive mines in the West’. (H.C. Salmon, 1860, p. 518)

Therefore, despite assertions that Morris never visited the mine (Meharg, 2005) it seems that he may have used his experience as director to increase the authenticity of his fictional description, employing both an example of local technical terminology, and a depiction of ‘a mine in a wood’ which quite closely matches contemporary accounts of Devon Great Consols (see also Anon. 1864).

Apart from mysterious ‘force barges’ sailing silently up the Thames, power in Nowhere is supplied either by human labour, horses, or by water. Steam engines, which were anathema to Morris, are not mentioned. Six of these operated at Devon Great Consols, however, but also 33 water wheels, so that ‘probably no other mine of its complexity made (such) efficient use of water (power) ... as did Devon Great Consols’ (Rowe, 1984, p. 39). Water mills in Nowhere (largely the Thames Valley) are used not only to grind corn, but for other, unspecified ‘various purposes’ (Redmond, 1970, p. 169). They therefore

could easily have been used to power workshops, as at Morris's own works at Merton Abbey – which even at the end of the nineteenth century still employed water power rather than steam – or even to generate electricity, which, in 1891, the same year of publication of *News from Nowhere* (as a book), had just been introduced to Britain. Either way, his experience of Devon Great Consols may well have demonstrated to Morris that water power can be used to run much more extensive and much more complex workings than most of us would believe today – an important lesson for those of us still attempting to develop a *truly* 'alternative' technology (one which increases personal and local autonomy; O'Sullivan, 2013)

CONCLUSIONS

There is no doubt that William Morris, as a shareholder, and later a director of Devon Great Consols, received great financial benefit from the dividends, fees and profits generated by the mine. However, unlike his father, he did not become a millionaire, and did not really possess the 'fabulous wealth' depicted by Meharg (2005). But he did clearly share in the collective culpability of all mine owners, directors and shareholders of the period for the truly appalling working conditions found at Devon Great Consols and other mines (although whether they were in any way *more* culpable than anyone who has ever owned shares in a limited liability company, especially a mining company, is debatable). By 1877, however, six years before he became a socialist, Morris had severed all formal contact with the mine. Thus, while his culpability as shareholder and director is beyond doubt, his alleged hypocrisy *as a socialist* cannot be substantiated.

By using arsenical pigments in his wallpapers, Morris also benefitted from the use of exploited labour under harsh conditions, not just at Devon Great Consols, but at other Devon and Cornwall mines. However, it seems that despite 'showing (no) remorse', he was entirely correct – although perhaps not for the right reasons – in refusing to accept the prevailing belief that such wallpapers poisoned his customers. Although Morris & Co. continued to sell arsenical wallpapers until 1885, two years or so after Morris took up socialism, the last *design* which included such pigments was produced in 1872.

Allegations that ‘run-off from Devon Great Consols destroyed the salmon fishery of the River Tamar’ (Meharg, 2005, p. 145) are not consistent with several Parliamentary Reports of the time which, after initially identifying part of the problem as obstruction of passage of salmon by weirs – only one of which was owned by the mine – praise Devon Great Consols and its owners for their efforts not to pollute the river, as an example to other employers. Instead of being ‘destroyed’, the fishery recovered from the early 1860s to the late 1870s, by which time Morris had severed his connection with the mine. Rather than ignoring Devon Great Consols, Morris may have used it in *News from Nowhere* as an example of how low impact technology may be used to power quite substantial and complex installations, in a truly ‘green’ society’.

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The Weir Quay Smelters

Colin Buck

INTRODUCTION

In the 19th century, during a substantial revival and expansion of the Tamar Valley mines, profitable deep lead-silver lodes were located below the much older shallow workings (benefiting from the new technology of efficient steam engines to pump the mines at depth). In the 1820s, a small lead smelter was built at Weir Quay on the Bere Peninsula in Devon. In 1845, a nearby mining company purchased the site and substantially re-equipped and re-modelled it. The water berth nearby at Weir Quay had been deepened to take vessels of 400 tons, bringing South Wales coal, and ore from Spain, France, Wales and N. Ireland. After a number of different company manifestations, the smelter closed in 1890.

Additionally, tin ores from Tamar Valley mines (including Drakewalls, Gunnislake) were smelted at the adjacent Union Tin Smelting Works, immediately to the east. Built in 1849, this specialised in the smelting of tin ores reduced from other lead-based ore constituents. This small smelter finally closed in the late 1890s, yet today, the site is virtually unchanged from its original design (except for the removal of the smelter chimneys); its main smelter and office buildings are still roofed.

This article provides an account of the evolution and structure of the two Weir Quay smelters, based on a detailed assessment of the site undertaken several years ago (Buck, 2008). The research drew on published histories and journal articles, documents, plans, photographs and other published material held by the Cornwall County Records Office, the Devon County Records Office, Plymouth Local Studies Library, the Westcountry Studies Library and the Historic Environment Services of both Cornwall and Devon, as well as recent historical surveys of the complex. Field recording was based on a mixture of photography and annotated sketch recording with detailed notes.

LOCATION AND SETTING

The two smelters are located close to Weir Quay (spelt 'Ware' in the 19th century), adjacent to the Devon bank of the River Tamar. The Tamar Lead

Smelter is closest to the Quay, and is on the northern side of the road leading down to the quay from Bere Alston. The 'Union' Tin Smelter is adjacent to, but uphill from the lead smelter. Both sites have a perimeter wall bounding their south sides adjacent to the road. The eastern part of the lead smelter site is now converted into a house (Fern Cottage), whilst its western half is partially enclosed by its former line of offices/stores (also converted to a house), retaining its former entrance into the internal yards of the smelter. However, the Union smelter has not been inhabited recently, and retains its original buildings dating from 1849.

Although the area is now a predominantly rural landscape, the remains of South Tamar Consols to the south of Weir Quay, South Hooe mine to the north and Cleave mine to the southwest hint at the massive effect these 19th century mines had on the landscape and nearby communities. At Weir Quay itself, although parts of the smelters have been converted for domestic occupation, the area's character still retains a mid-19th century industrial feel, which is reflected in its designation as a Conservation Area.

SIGNIFICANCE OF THE WEIR QUAY SMELTERS

Weir Quay is an important, integral and iconic part of the Cornish Mining and West Devon World Heritage Site (WHS), which recognises the period of Cornish dominance of the mining world (c.1700-1860). The area is included in Area 10 of the WHS (the Tamar Valley and Tavistock) It has also been designated a Conservation Area, and lies within the Tamar Valley Area of Outstanding Natural Beauty (AONB). The Union tin smelter complex is Listed Grade II, although the adjacent lead smelter is not listed.

Cranstone (1991), contracted by English Heritage to undertake site assessments for a variety of industrial based sites, stated: *'The two smelting works (Tamar with Union) at Weir Quay are also of considerable national importance, since these sites plus Snailbeach New Cupola (Shropshire) are the three best survivals of reverberatory smelters in England, and the survival of the complete outline of the two adjacent complexes is unique'*.

As this description attests, the complex of two related smelters is extremely rare. The excellent state of preservation of the Union smelter is significant on a national scale, and is a component that contributes to the Outstanding Universal Value of the WHS. Certainly within Cornwall and West Devon there are no other smelter complexes extant, never mind with all the buildings retaining their original roof structure.

The tin smelter building in particular provides a strong visual link to the history of mining and smelting in this area. Its intact main smelter roof and associated counthouse/assay and store buildings are highly iconic features. However, the lead smelter site retains far less of its original form. It has lost its original roof, and its offices and workshops have been converted to domestic use, leaving an open space (the back yards/gardens of the converted houses), bounded by the rear retaining wall to the north.

BACKGROUND HISTORY OF THE BERE PENINSULA MINES

There are three main parallel north-south lead courses across the Bere Peninsula. The west lode included the later 19th century mines of South Hooe and North Hooe (both known as Tamar Consols), Ward Mine. The central lode included the 19th century mines of South Tamar Consols, Furzehill, Lockridge and Buttspill. The eastern lode is somewhat shorter and extends north from Lopwell up the Tavy valley. The main silver-lead production in the 19th century was from the central lode, followed by the western lode.

The lead ore in these lodes had a high silver content, which was richest near the surface; at deeper levels a greater percentage of lead predominated. Booker (1971) noted that *'some of the Bere mines... returned between 80 and 100 oz and even as much as 140 oz to the ton. The ore was remarkably free from impurities and in some workings was found associated with fluorspar, mined in considerable quantities in the 1870s for the manufacture of glass'*.

The mines on the Bere Peninsula were among a small number of royal silver mines in medieval England (the others being Combe Martin in north Devon, and the 'North Pennine mines'). The late 13th and 14th century workings of the Beer Ferrers mines were perhaps the first successful 'industrial' organised labour and capital intensive mining operations under a centralised management

in England. In the late 13th century William de Wymondham, the King Edward I's *factotum*, accounted to the Treasury 270 lbs of refined silver. In the following two years over 500 lbs and over 700 lbs were produced respectively. Around 300 men were employed in the 1290s (150 of whom were 'immigrants' and 150 local), plus 100 tanners employed on drainage work (*pers comm.*, P. F. Claughton).

For the next half century, silver production continued, either in royal hands or leased to private entrepreneurs. Mine drainage was improved by digging adits (or levels), and shafts from which ore was raised and workings pumped – the earliest documented mention of these mining techniques in English mines. It is likely that the River Tamar became an important route for the import of supplies and export of ore (probably quays at Calstock, Weir Quay and Lopwell) for primary and secondary smelting sites (Rippon, Claughton and Smart, 2009).

It is likely that mining continued on a reduced scale until the early 16th century, by which time the accessible lodes had been worked out to well below the water table and so were no longer viable. There was some lead/silver mining at Buttspill in the north of the Bere Peninsula in the late 17th century (*pers comm.* P. F. Claughton), but it was not until the 18th century that 'industrial' mine working resumed in the Tamar Valley, although this was mainly focussed on the mining and dressing of copper ores, sporadically funded by mining adventurers and entrepreneurs. In the 1720s Kahlmeter noted the 'Royal Lead Mine' had yielded silver from re-working old waste dumps (Brookes, 1986), whilst in the 1780s the first large-scale development of the sites later known as South Hooe Mine and South Tamar Consols occurred (north and south of Weir Quay respectively). Both were at the southern end of each of the principal silver-lead lodes.

HISTORY OF THE WEIR QUAY TAMAR AND UNION SMELTING WORKS

The history of both smelter sites is intricately associated with the output and fortunes of nearby mines – all of which produced silver-lead ores from depths far below those accessed in preceding centuries. However, a single person, Percival Norton Johnson, influenced the smelter works and adjacent mines to a

greater degree than anyone else, ensuring their survival for many years. He was a noted metallurgist and assayer (he was the discoverer of palladium), who became a Fellow of the Royal Society and was the founder of Johnson Matthey and Co. As owner of local mines, he introduced improved mining, ore dressing and silver-lead smelting techniques, and was also a local benefactor and philanthropist who invented a form of braille and constructed Johnson Square in Bere Alston for his workers (Gallup, 1993).

The following timeline of key events and phases illustrates the history, fortunes and failures of these two smelter sites.

1780s The first lead/silver smelter in the Weir Quay area was established by Gullett. Field evidence suggests it was a small reverberatory furnace located in the upper part of Cleave Wood (Smart and Claughton, 2008). During this decade ‘Beer Ferrers Mine’ advertised for ‘*20 good lusty hands*’ and in 1795 it was announced that 76,000 ounces of silver and 1,400 tons of lead ore had been returned from this mine in the previous seven years, realising a sum of £45,000 (Hamilton Jenkin, 2005).

1788 The workings were equipped with a 20” Boulton & Watt steam engine, which continued in use until late 1791, when it caught fire (Hamilton Jenkin, 2005).

1812 The Bere Alston mine changed hands to a company consisting entirely of London shareholders.

1820s A small silver-lead smelter with five furnaces was established at Weir Quay by the newly established Beeralston Mining Company to smelt the mine’s own ores (Gallup, 1991). This mine leased the nearby Birch and Cleave mines east and south of Weir Quay and Furzehill Mine (later East Tamar Mine). Two steam engines were erected on the former mines but were sold in 1821 (42” Boulton & Watt steam engine and 36” steam engine).

1821 The sale of Beeralston Mine included a lead smelting house (Barton, 1967), which was probably the Weir Quay smelter. It is doubtful if this mine included mine setts on the same lode on the north side of the peninsula (Green Valley/Buttspill/Tamar Valley Mine), where a small lead smelter at ‘Tuckers Marsh’ was leased in 1807 and 1813 (Brookes, 1986).

1835 Tamar Consols (South Hooe, North Hooe and Wheal Hancock) was acquired by the Tamar Silver Lead Mining Co. This company had been formed by Percival Norton Johnson (Director 1838-1854, Managing Director 1841-1855). By 1842, 55-60% lead and 60-65 oz silver was being produced to the ton (averaging 2500 tons monthly in 1844). The ore was presumably being smelted at Weir Quay. By 1844, German shaking tables for ore dressing were introduced by Johnspn, as well as underground ventilation and an incline shaft engine at Tamar Consols.

1839 The smelter was in the hands of Benjamin Somers, a lead smelter from Mendip (Claughton, 1998).

1844 The Parish Tithe Map (Fig.3) shows 'Ware Quay' south west of the smelting works (with dock and quay). 'Ware' (Mine) shows mine waste dumps and numerous buildings to the east of the quay. A single line of buildings (presumably housing the furnaces) can be seen down to the quay, set back from the road against the hillside and fronted by a yard. The chimney on the hill north-west of the smelter can also be seen on this map.

1845 The silver-lead smelting works were acquired by the Tamar Silver Lead Mining Co. for £9,600, which was raised by an issue of redeemable deposit certificates. The smelting works was probably expanded and modern furnaces installed soon after purchase, and remained a subsidiary of the Tamar Silver Lead Mining Co. until its sale in 1852/3 (Brookes, 1986). The deep-water berth at Weir Quay was improved to take vessels up to 400 tons and ore was imported for smelting from Spain, France, Newfoundland and Wales (Booker, 1971).

1846 Extracts from accounts of the Tamar Smelting Works show details of smelting treatment from several continents with very differing yields of silver: Tamar Silver Lead (63.5-106 oz per ton), Callington (48-63), Mexico No. 1 (1129) (sic), Mexico No. 3 (176), Wheal Betsy (9.5), Wheal Trelawney (37), East Tamar (42), East Wheal Rose (22), French ore from Brittany (21-58) and Irish ore (93-240). Customs and Excise files show lead ore imports from the Channel Islands and Isle of Man from 1835 to 1849 and from 1871 to 1880 (Gallup 1991).

1847 Investment in the smelting works by the Tamar Silver Lead Mining Co. resulted in *'7 calciners, 3 flowing, 3 blast, 4 refining and one reviving furnace, and are building two more calciners and one flowing furnace which ... are*

sufficient to smelt about 300 – 330 tons of ore per month, employing from 80 – 90 men’ (Barton 1967: 97). There were 21 furnaces in total at this date (two years before the tin smelter was built).

1849 Following the re-equipping and expansion of the lower silver-lead smelting works, the Union Tin Smelting Company was formed as a separate company by the Tamar Silver Lead Mining Co., to specialise in smelting tin (Barton, 1967). This was a ‘new build’ – the layout probably designed by Johnson. One of the four original steel columns supporting the main smelter building roof has ‘Distin & Chafe, Devonport, 1849’ cast upon its surface (Moss, 1990). The mining company’s accounts for August show a sum of £2,880 for selling the smelting works to the new company. The new tin smelter (although a separate company) appears to have been closely associated with the silver-lead smelting works of the Tamar Smelting Company and perhaps utilised some of its furnaces (both were owned by the same mining company). A letter from Johnson in 1849 used as an address ‘the Union Tin Smelting Works, Bere Alston’. During this year, a cholera outbreak in the district may well have affected the labour force of the local mines and Weir Quay smelting houses.

1850 In order to make the Tamar Smelting Company even more efficient, Johnson recommended that the Pattinson’s de-silvering process should be adopted, which lost only 1% of the metal in the smelting process, against 9-9.5% by the existing method. But this was against the wishes of a strong minority of shareholders, who felt the capital expenditure to be excessive. In addition, the silver/lead smelting works made a loss of about £3000 in October (Brookes, 1986), although 2216 tons of ore yielded £35,587 (Gallup, 1993) during the year.

1852 In January, funds to prop up the company were raised by auctioning shares. However in July, as a consequence of the further fall in the market price of lead, the mining company management finally resolved to sell the silver lead smelting works. It was put up for auction in October, against a background of increasingly poor returns.

1853 The lead smelting works were finally sold to the British and Colonial Smelting and Reduction Company, of which Johnson was a director (to be operated in conjunction with works at Millwall in London (Brookes, 1986), although he retained an interest in the Union Tin Smelting Works. In this year, *‘two plates of silver weighing 11,704 oz are noted as the production of two*

weeks smelting at the Tamar Works ... The Tamar works were particularly adapted for smelting low-grade ore’ (Booker, 1971: 245). In August the accounts of the Tamar Silver Lead Mining Co. show an item of £8,860.12s.2d for balance of the sale of the Tamar Smelting Works (Brookes, 1986).

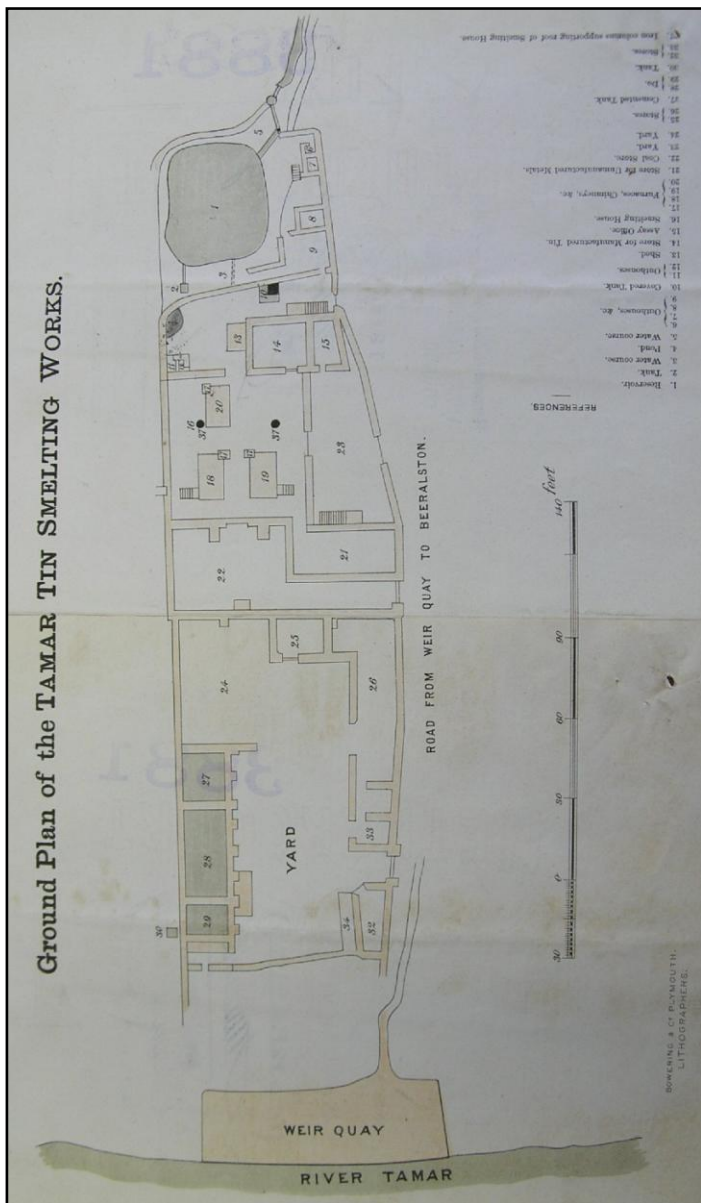
1854 The lead smelting works closed, precipitated by the bankruptcy of the principal partner, Peter Stainsby, Director of the Tamar Silver Lead Mining Co.

1855 The Union Smelter Works was advertised for sale on November 22nd 1855, the main smelting house described as being 60ft long and 56ft wide and containing two large furnaces *“computed to smelt 42 tons of tin ores a week” ... and a “large new refining kettle weighing 3 tons 15 cwt and calculated to refine 54 blocks of tin at a time”* (Booker 1977). However, tin smelting was continued by J.G. Tyrie (presumably a lessor, perhaps from this date) until his death in 1863’. Figure 1 (below) is a ground plan of the ‘*Tamar Tin Smelting Works*’ (undated), reflecting the description and dimensions given above.

1856 Brookes (1986) records the dramatic destruction of the South Tamar Consols mine, at which *‘an average of 144 men were employed underground and 130 men, women and children at surface... About eight o’ clock in the evening on 31st August 1856 the Tamar broke into the mine, subsequent inspection showing the water to have come through an orifice about 10’ x 4’, apparently due to a cross-course giving way. Various suggestions were made for plugging the hole and forking the mine, but the possibility of a two year delay and the additional cost of three or four thousand tons of coal and new pitwork were considered to be too great, and a meeting held in October resolved to wind up the company and to realise the assets’*.

1856 Johnson, possibly regretting his loss of involvement in smelting, maintained his interests in the Union Smelting Works and was instrumental in re-opening it (by forming a new company based in London), with new and improved management at the smelter. However, after this date he finally withdrew from mining interests, disillusioned. This smelter had four smelting furnaces and one refining furnace.

1857 Billings Industrial Directory for Devon states that N.A. Anthony was the Manager of the Union Tin Smelting Co., Tamar Works.



1863 Following Tyrie's death, there was no new occupier for the tin smelting works during the depression brought about by the American conflict (Barton, 1967).

1865 A new company, the Tamar Lead and Silver Smelting Co. Ltd, was advertised in papers and a company prospectus (see Fig 2), to reopen the Tamar smelting works. The engraving (which one assumes is contemporary with the company's prospectus of 1865), shows both smelter sites, but primarily the upper tin smelter.



Fig.2 Copy of an engraving from the 1865 Tamar Lead and Silver Smelting Company Prospectus (supplied by P.F Claughton)

The following description of the site (by the Exeter Flying Post 19/7/1865) appears to focus on the former lead smelting works, not the Union Tin Smelting Works. *'This company is established for the purchase and working of extensive smelting works, occupying an area of upwards of four acres, with convenient wharf and other premises attached, situate at Beerferries ... which are held for a term of twenty-one years The works have been established upwards of fifty years, and the smelting business has been carried on most successfully to within a very few years, when the then*

proprietors who were also largely engaged in mining, were obliged to stop... It is proposed that the Company shall purchase the lease of the works and premises, and all the rights of the owners for £8000 and in the event of the second issue of shares taking place, then, for the further sum of £2000 to be paid in shares or fully paid shares... The company will take the works from the 29th September last. The furnaces can be put into effective working at a moderate cost, and the latest improvements in the process of smelting will be adopted’.

In a letter dated 30th June 1864 at Calstock from Thomas Down, the following observations were made: *‘I went down to the Tamar Smelting Works at Beerferries, yesterday. I find there are: 7 Roasting or Calcining furnaces, most of them in a working condition; 5 Reverberatory Smelting furnaces, from which the bottoms and also the roof of most of them have been removed, and the side wall partially broken down. All the iron work appear to be on the spot, so that with a supply of fire brick they could soon be repaired and brought into a good working condition; 3 Refining furnaces, with test frames complete; 1 Reverberatory Reducing furnace, from which the bottom has been taken out... 1 Shell, or exterior work of a blast furnace.... 1 Small Scotch furnace, or slag hearth: Total 18 furnaces. The de-silvering department is in a very dilapidated state, most, if not all, the sound pots having been removed. The main flues leading from the works to chimney stack will require some repair, but the buildings are not much out of order. There are also two steam engines on the works (and also two cylinders), with all that is requisite to work two blast or slag furnaces’.*

1866 Percival Norton Johnson died.

1870 This year saw the re-establishment of the Tamar (Tin) Smelting Works of the old Union Smelting Company. The new company was named the Tamar Tin Smelting Company, with offices in Saltash (Barton, 1967). It is presumed that the (undated) ground plan of the Tamar Tin Smelting Works (Fig. 1, above) post-dates the formation of this company.

1872 The Tamar Metal Extraction Co. Ltd was formed by another group to take over what its prospectus termed the ‘Lower Tamar Lead Smelting Works’, together with the dumps (estimated to contain 100.000 tons) of the Tamar mines for re-treatment (Barton, 1967). However, this company shut down four years later.

1876 In April, the Nascent Copper Company was registered, with its office at the Tamar silver / lead smelting works at Weir Quay. The Nascent Company acquired the works, which in November 1874 had been leased by the Earl of Mt. Edgcumbe to Jacob Legassick *et al.* Licenses to work burrows and mining waste in the 'Parish of Beerferris' had already been granted in November 1872, and these were also acquired by the Nascent company, as was machinery and materials subject to a mortgage dated June 1876 (Brooke, 1988).

1883 This year saw the re-establishment of the Tamar (lead) Works, by a new limited company, of the premises re-started in 1872.

1885 The Nascent Copper Company seems to have achieved very little and was wound up by notice in the London Gazette in October (Brooke, 1988).

1890 The newly re-established Tamar smelting works appear to have closed, as it disappeared from the list of bidders at the tin ticketings (Barton, 1968).

1896 After closure, the Tamar smelting works were used by the Mt. Edgcumbe estate as a workshop until the end of the First World War (Gallup, 1991). The smelting vats of the tin smelter were used for the manufacture of jam from local Tamar Valley fruit suppliers.

1907 On the Second Edition 1:2500 OS map the two smelter sites are still named as one unit as the '*Tamar Smelting Works (disused)*'. The former Union Tin Smelter had changed very little in the intervening years since 1883. The lower lead smelter site had changed more; the large and small furnaces sited along the rear northern walled edge of the property had all gone by this date.

1920 The Tamar Lead Smelting Works was taken over by a local builder, Mr E Holloway, as his workshop until 1932, when it became a private dwelling. The buildings fronting the road down to the quay were turned into small cottages after this date, with their gardens at the rear including the former yard and furnace buildings.

1970s The Tin Smelting Works building was used as an agricultural store and chicken rearing house (Booker, 1977).

1990 David Cranstone (as contractor for English Heritage) assessed the site as part of a country-wide assessment to assess significant ore extraction

industries. The tin smelting works complex and the lower lead smelting complex remains were recognised as highly significant in England.

1993 The landowner obtained Listed Building Consent to convert the standing walls of Sites 32, 33 and 26 (former Stores adjacent to the road perimeter wall – see Fig. 1), to a workshop and machinery store.

1998 A brief visual survey by the author confirmed its then-unaltered exterior appearance (Buck, 1998), although internally all of the buildings were filled with much material (including cars and boats and outside, a lorry), obscuring possible ground floor and wall features.

Substantial work has been carried out by the owner of the tin smelter site in recent years. In 2003, the former Stores building was converted to a workshop following re-roofing and repointing/partial rebuilding of the walls. In 2007, Listed Building Consent was given for the conversion of the Assay House and Stores for residential use, subject to various conditions. In 2008, a conservation and impact assessment was undertaken by the author. Further restoration and rebuilding has continued to date.

SITE DESCRIPTION AND EVOLUTION (as per 2008 survey: site numbers as per Fig.1 above)

Union Tin Smelter complex

The Union Tin Smelter was built on ground that had been cleared and enclosed by 1844. This is corroborated by not only documentary evidence but also the dating evidence on one of the four original posts supporting the tie beams. The entire complex appears to date from 1849 – and was likely to have been designed by Percival Norton Johnson. The upper part of the site consisted of three main building elements: the smelter building, and two buildings on its south side, both of two floors. This is shown in detail on the ‘Ground Plan of the Tamar Tin Smelting Works’ (Fig.1). Adjacent to the buildings on the east side are the reservoir pond, outhouses and related leats. Further research may well show that the reservoir pond area (Sites 1–5), is contemporary with the original lead/silver smelter prior to the construction of the tin smelter, with power provided by a water wheel.

Immediately to the west of the main buildings is the coal yard and store (Site 22), whilst at a lower level (c 2.5m lower) is a lower yard with the single walled (and roofless) remains of buildings (Site 24) described as stores on the south side (abutting the perimeter wall), and on the north side abutting the north perimeter wall, the low walled remains of buildings that are described as 'cemented tanks' (Fig.1, Sites 27 – 29).

Most of the features shown in Fig. 5 are intact or denuded, with the exception of the internal chimneys (Site 17) and the brick furnaces (Sites 18 to 20), which have been removed long ago. The 1865 engraving (Fig.2) supports this comment. However, the condition of the site made it difficult to view and record the site in a detailed fashion in 2008.

Smelting House

Externally, with the exception of the removal of the two tall iron-banded square-profiled furnace chimneys shown on the 1865 engraving (Fig.2), this building has changed very little since its construction in 1849. When the chimneys were removed, a low, louvred opening was built to cover the gap (to the same style as adjacent ventilation openings). This can be seen in Fig. 3 (south elevation upper left louvre). Since 1977, the louvres have been repaired/replaced with galvanised steel sheeting.

The main change that has occurred to this site appears to be the extension of the smelter east wall from its position shown on both the 1865 engraving (Fig.2) and the later c1870-1883 ground plan, to the same line as the Assay Office and Tin Store (Sites 15 and 14) east wall, as shown on Fig.4 (1883 OS map, below).

The roof of the smelter building is of an interesting design. The original construction consisted of four main steel columns supporting a large timber frame of two main (east-west) tie beams, upon which five (north-south) 'A' frames were set. The four large 'A' frames are constructed of a lower tie beam, two queen posts, a central collar and an upper king post, as well as two struts. Two purlins have been constructed on each side of the main frame supports to support the roof rafters down to wall plate level.



Fig. 3 *The Union Tin Smelter Building (from the south) (Booker, 1977)*

When the building was extended, the roof design at the eastern end was changed to utilise an additional iron pipe (probably an old rising main pipe originally installed in a mine shaft), to support a large timber which replaced the original end wall of the building. The roof profile on its east side is now the same as the Assay Office and Tin Store. This extension occurred after the date of the ground plan (Fig. 1 above), but before 1883.

Unfortunately, due to the massive amount of material in the smelter building at the time of inspection, it was not possible to comment much further on any surviving features at ground level or to the walls. The sites of the former brick furnaces could be seen, although these are likely to have been removed when the smelter stopped work to remove any tin slag that had run to the bottom and between each of the bricks in the bed of the furnace. There were two wide doorway entrances in the southern end of the east wall, and two higher oval openings – presumably for ventilation. The west wall had a wide high doorway

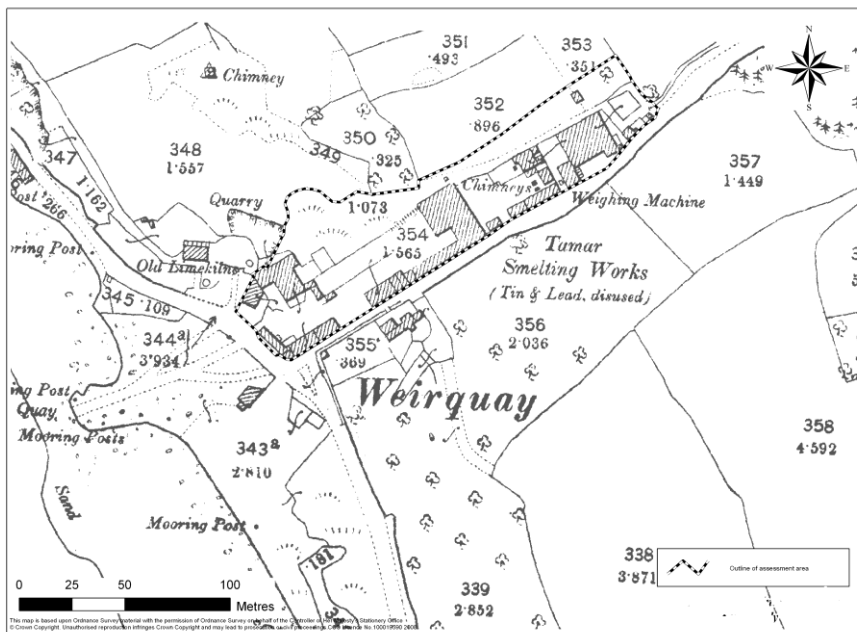


Fig.4 Extract from 1881 O.S. map

opening, above which was a circular opening (presumably for cross ventilation). The south wall had a central wide opening with wooden doors, either side of which were three widow openings – all of which appear to have had nine horizontal louvred slats. These would have been opened with a single control mechanism – again for ventilation

Two storey building (Site 21):

This building has been described by Booker (1977) as a ‘store-shed underneath assay office’. The undated ground plan (Fig.1) only shows the ground floor buildings of the smelter complex, but it describes the Assay Office as being Site 15 at the south end of the two-storeyed building on the east side of the smelter. What is not in doubt is that the ground floor building was a ‘Store for Unmanufactured Metals’ (Site 21 on Fig.1). It had a single doorway entrance direct from the road, and a single exit into the smelter building itself. There are two lower windows on the east (front) elevation (both with horizontal iron

bars), in front of wooden slats. The west and north sides have a single small window – but both are covered. This store was not accessed during the survey, and is full of material.

The floor above the ore store may originally have been the tin smelter offices. It was occupied as a flat when Frank Booker undertook his site survey in 1977, and was occupied for a short while by the owner. There are two double (original) sliding sash windows on the east elevation, and one on the north and south elevations. However, the latter is of later date. Brick infilling on the right side of the existing window shows the shape of an earlier opening which can in fact be seen on Fig.2, the 1865 engraving, as being a ‘box window’, protruding out from the wall, giving a view down the road, perhaps for sight of new ore deliveries. There may have been a pair of ‘box windows’, as there is brick infilling either side of the existing window, which is plainly of a later style. Presumably the timber components of the box windows failed. Both the west and north elevations contain a window opening.

Three storey building (Sites 14 and 15):

This building was described by Booker (1977) as a ‘Count house with strong room underneath’. The undated ground plan (Fig.1) only shows the ground floor buildings of the smelter complex, but it describes the two rooms as being the Assay Office (Site 15), and the ‘Store for Manufactured Tin’ (Site 14). Accordingly, it had a single doorway entrance direct from the smelter. The walls are over 0.6m thick and the two (narrow) windows in the north wall still retain their vertical iron bars. There are two brick arched windows in the east wall with brick cills, both of which had later (i.e. 20th century) timber windows, which may well have replaced a similar form of window that is still extant in the store room (Site 21) on the east side (timber louvred windows inside external vertical iron bars). The floor (Site 14) consists of granite slabs which are in a good condition.

Site 15 is the Assay Office, a small room. This had a single doorway from the south yard (Site 23), and an external splayed window on the south elevation, which provided light for the Assay Office and the upper room (south end). There is a small window opening on the north wall (into Site 14). The main item of interest is where brick repairs to the east wall indicate that there was a

flue and small fireplace or perhaps oven set on a brick base, where the assayer could assay and test the tin ore etc, prior to smelting.

Detailed analysis of the upper floors indicates that the building has been changed and adapted during its lifetime. However, these changes occurred not long after its construction, and may well have occurred at the same time as the extension of the main smelter building east wall. With the primary construction date for all the buildings being 1849, the smelter extension has been dated to approximately c1870–1883.

The first floor appears to originally have had three rooms, two with a fireplace (a bedroom and living room), a third with a Cornish range (the kitchen), with exterior access via the stone steps and landing. The lath/plaster and timber partition between the room above the assay office and the middle room appears to be original, but the partition between the kitchen (the northern room) and the central room has been moved approximately 0.5m southwards (into the central room), to accommodate a stairwell up to the two small rooms on the second floor. The original partition adjoined a small section of wall between two windows, leaving the window near the exterior access to provide light for the short section of corridor and to provide light via a glazed opening (four panes), into the central room. Movement of the partition (and doorway to the kitchen) 0.5m to the south, resulted in it adjoining the east wall in the middle of the former corridor window opening.

The narrow staircase inserted into the south west corner of the kitchen provides access to two small rooms. It is perhaps appropriate to think that the construction of these two small rooms were a result of the necessity to create at least two bedrooms for a growing family. Perhaps N. A. Anthony, the Manager of the works in 1857, lived on-site and had his family in this house.

Upper Yards

The two yards close to the smelter (Site 22 to the west and Site 23 to the south) are both cobbled with longitudinal cobbles laid from the road edge to the main smelter openings. The OS 1883 OS map (Fig.4) labels the entrance section as ‘Weighing Machine’. This would have been used to weigh the coal/coke after it had been brought in from the Quay, prior to storage – for use in the two

reverberatory furnaces (via the large doorway opening in the west wall). The northern perimeter wall is approximately 3.2m high, with windows and doorway openings visible in the west retaining wall, marking the change in height of the lower (Site 24) and upper yards (Site 22). Of interest are two stone features that resemble buttresses, set against either side of the west wall main opening. These appear to have been constructed to house hot air or draught ducts that appear to be going under the cobbled yard, up the ‘buttress’ features and directly into each of the two reverberatory furnaces. The source of the hot air is not known.

Lower Yard with outhouses (Site 24):

The lower yard has southern perimeter walls approximately 2.5m to 3.0m high and northern walls of approximately 3.0m. The southern wall had stores built against it, whilst the northern wall had ‘cemented tanks’ attached at its western end. The walls for the tanks are partly obscured and mostly infilled, but are now only approximately 1.0m high. It appears that a secondary low structure has been built over Site 27 and part Site 24 (shown on the 1883 OS map (Fig.4) (partially obscured by the words ‘*Chimneys*’), which included a north-oriented flue (0.45m x 0.55m) at its western side, which then runs parallel to the north wall (underground) in an eastwards direction. The 1865 engraving (Fig.2) appears to show the tip of one or more chimneys, which were perhaps venting the fumes from drying chambers after further ore treatment or from coke ovens producing coke for the smelting process.

Tamar lead-silver smelter

The lead-silver smelter site has been divided into two halves. The eastern half is now owned by the occupier of Fern Cottage, and the lower site is owned by the occupier of Treyard. The archaeological evidence visible during the site survey in 2008 is described here for each in turn. However, it should be noted that for the main part there is very little surviving evidence for smelter structures in the inner core areas of each site – buildings which have survived (adjacent to the road perimeter wall), have been converted and extended for residential use.

Fern Cottage (Sites 42–51, Fig.5 below):

The most visible intact remnants of this eastern part of the lead smelter, are the converted (or re-roofed) components adjacent to the southern perimeter wall, and features cut into the eastern and northern boundaries of the site. The interior consists of relaid granite cobbles, with flower beds delineated by former granite floor slabs. With the exception of two large masonry towers (perhaps roof/crane or water wheel supports), close to the eastern end of the north boundary, there is no visible evidence of the large covered roof that occupied the eastern end of the site, as shown on the 1883 OS map (Fig.4).

P. F Claughton (1998) postulated that this part of the site housed the Pattinson de-silvering process from 1850. An opening was created some time ago, approximately 4.0m from the tin smelter south western boundary, for pedestrian and vehicular access.

Given the natural slope of the site from the east down to the quay, a slate killas retaining wall has been built next to the western boundary of the tin smelter. This is approximately 2.5m high, and contains four stone buttresses in the northern section of the wall. Fig.5 (below) shows the locations of furnaces that were located adjacent to this wall, (marked '43' on this plan) on the basis of the location of each flue which cuts into the retaining wall joining into a main flue that runs northwards within the wall. However, the number of furnace sites shown may not be exhaustive.

Given the map detail of the 1840s smelter layout, and the date of 1850 for the Pattinson de-silvering process, it appears that this eastern end of the site contained the newer smelting process. It is likely the retaining wall was re-built to house the new flues. The flue came up to surface at the junction with the east end of the northern wall and appears to go into the remains of a relatively small chamber in which the lead fumes condensed on the walls. The resulting material would have been re-processed to remove any metallic ores.

The east end of the north wall also, at locations also marked '43' shown on Fig.5, shows visible sites of flues (0.7–0.9m wide and c 1.0m high), going into the rear wall. In places the rear retaining wall has collapsed, and in places been repaired or rebuilt by the owner. A more detailed survey and removal of ivy etc would no doubt, reveal further sites of flues and therefore furnace sites. There are two large masonry structures (Site 44), near the north east corner of

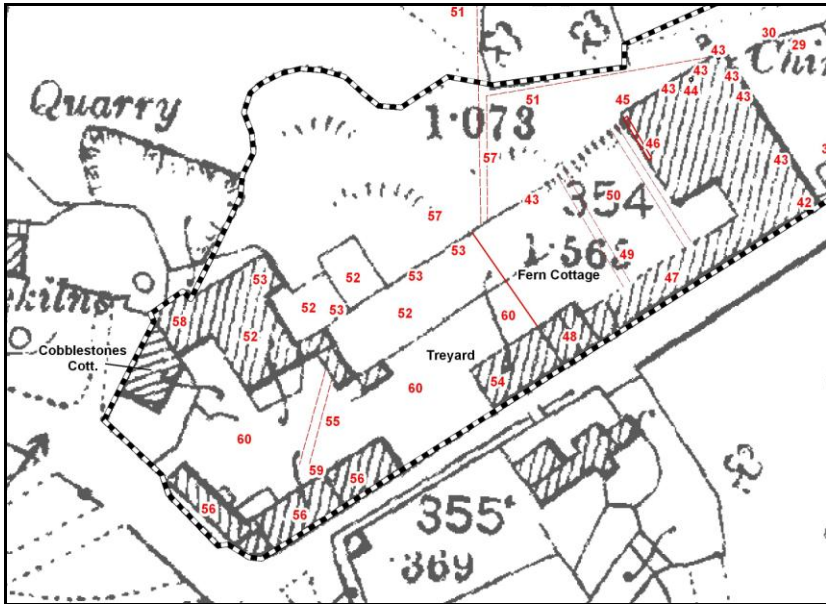


Fig.5 Extract of site survey inventory map (Buck, 2008)

the site. Both are 1.3m wide x 1.2m thick and approximately 3.0m high. They may be supports for a water wheel (as a power source).

The south side of the site was also roofed (Site 47). However it appears the front of these buildings was open, but supported by at least five stone masonry columns (0.92m wide x 0.6m thick and approximately 3.5m high), four of which are extant and supporting a garage of similar width and height dimension as the original. The functions of these buildings are not known, but they are likely to have stored coke and other items of a large volume.

The underground archaeological potential is often not visible at surface, but the owner stated that there are at least two underground flues, which went towards the north of the site and possibly connected to the other flues from the furnaces for venting exhaust fumes or perhaps a water supply.

The upper area of the site which housed the flues and condensing chambers was overgrown for years. The owner of Fern Cottage has cleared the ground,

but there is very little visible of the former flues. Either they are buried or (perhaps more likely), the brick flues have been robbed long ago as a building material. There are small tell-tale features at surface which may indicate the former site of the condensing chambers and main flue. It is not known if there was a single flue from all parts of the lead smelter that led up to the chimney, or two flues; however, the survey evidence appears to point to the former with a junction at SX 43345 65036, where it appears the main flue from the west set of furnaces met the main flue from the Pattinson furnaces, all of which has been robbed, leaving changes in slope as the only site evidence.

Treyard (Sites 52– 60):

The linear development of the former offices and workshops, against the road perimeter wall from the 1850s onwards, to its final phase as shown on Fig.4 (1883 OS map), is demonstrated to good effect by viewing the rooflines of the buildings from the road and the perimeter wall. However, conversion of these (mostly single storey) buildings for residential use has changed their character as seen from the inside of the site. All of the former buildings on the northern side of the site (a variety of different furnaces, aligned along the northern wall), have gone, leaving traces of the former furnaces where they adjoined their respective flues set in the rear retaining walls.

The northern retaining wall has been cut into the southern valley side of the smelter complex from an early date, providing the necessary space of a yard. Thus the western end of the retaining wall is approximately 4.5m high, cut into bedrock, and infilled with killas stone where necessary. It is likely that the furnaces were sited parallel to the retaining wall, their varying functions perhaps demonstrated by the variety of small amounts of masonry that are visible. There are remnants of two arched openings that may have had flues attached (with more recent rebuilding/alteration to provide steps to access the upper northern parts of the site where the flues would have traversed the side of the hill. There is no visible surface evidence of the flues as the site was not very accessible.

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The Historic Daffodils of the Tamar Valley

Dr Frances M Howard, FLS

Photos by David Pearce

It's the story all grandparents in the Tamar Valley tell their grandchildren: how once the steep slopes of the Rivers Tamar and Tavy were covered in swathes of daffodils, grown especially to provide early season cheer for the London market.

Legend has it that in 1862 a St Dominick man, James Walter Lawry, visited Covent Garden market in London and found that there were no strawberries there, yet back in the Tamar Valley, the season was nearly over. So he sent up his strawberries, got a premium price and then planted up 20 acres of strawberries and also daffodils. The opening, in 1890, of the London



and South Western Railway line on the Devon side of the Tamar Valley brought more competitive transport rates, which helped to expand the market for flowers 'up country'. This development coincided with the great surge in hybridisation during the pre-First World War years, producing colourful and sturdy '*incomparabilis*' daffodils such as 'Emperor' and 'Empress', which were perfect for mass cultivation in the local flower trade as they last well in vases, and could be sent up to London by rail.

However, when the Second World War came, the daffodil fields dating back to Victorian times were dug up and planted with vegetables for

the war effort. Thankfully, either through sentimentality or perhaps just practicality, farmers threw evicted daffodil bulbs into the hedges, which gave

us the glorious hedgerow displays we have in the Spring-time today (Fig.1, above).

But has anyone ever thought where those cultivated daffodils came from or how long they have been in the Tamar Valley? A quotation from John Gerard (1597) suggests that "*The common wilde Daffodill groweth wilde in fields and sides of woods in the West parts of England*" – so it is likely they have grown here since at least the Tudor era.

In the 17th century, there was a strong trade in narcissus from Spain, France and the Netherlands. We know this, as the flowers are described and illustrated in the important 'herbals' of John Parkinson (1629) and John Gerard (1633). Parkinson (1567-1650) was the 'Royal Botanist' and apothecary to Charles I and his queen, Henrietta Maria. He grew 484 different plants in his botanical garden at Long Acre in 'Convent Garden' (i.e. Covent Garden) and recorded his work in his publication '*Paradisi in Sole, Paradisus Terrestris*'. The title is a pun on his own name, translating as: '*Park-in-Sun's earthly paradise*' (a garden, or 'park', was conceived as paradise). Parkinson describes more than 20 different daffodils, although it is rather difficult to put modern Linnaean names to some of them. He had a network of botanist friends, especially members of the learned 'Flemish set' of plantsmen, including Mathias de l'Obel, author of the ground-breaking botanical commentary, '*Stirpium Adversaria*' of 1571 and John de Franqueville "from whose care is sprung the greatest stories [of rare plants] that is now flourishing in this Kingdom". They obtained seeds and bulbs from the shop of Charles de l'Écluse (Clusius), in Lille. Many of these were wild daffodils originating in Spain and the Pyrenees.

On page 71 of Parkinson's book (see Fig. 2 below) it is easy to recognise the daffodil labelled as '1' on the drawing, and recorded by Parkinson as 'Narcissus Nompareille – the 'incomparable daffodil', as the Division 1 type, *Narcissus hispanicus*. Genetically, almost all wild types of daffodil are diploid, with 14 chromosomes. However, *N. hispanicus* had already given rise spontaneously to *N. hispanicus maximus*, which is a triploid mutation. This means it has an extra set of chromosomes, which usually makes the petals thicker and overlapping (or 'imbricate'). *N. hispanicus maximus* was described by Parkinson as 'one faire great yellow flower, open at the mouth and turning

up the brimmes a little, which are somewhat crumpled'. Maximus is still common in our hedgerows – but the mutation that created it occurred as long ago as the 16th century and could have been seen by Sir Frances Drake. It was illustrated by Clusius - and he and de l'Obel met both Sir Walter Raleigh and Sir Francis Drake in London. Parkinson remarked of this flower that "it desires to be deep in the ground and will therefore run down". E. A. Bowles recommends that it is planted at least 8 inches deep in well-drained but rich soil, as its stalks can reach 30 inches.

The daffodil labelled '2' in Fig. 2 (below) is recorded as the 'Narcissus Mattenese - the lesser yellow Nompaille Daffodil'. It is obviously a Division 2 type and is thought to be *N. obvallaris*, the Tenby daffodil. It is a sturdy, tidy flower similar in colour to *N. hispanicus maximus* with concolourous golden



yellow flowers but is shorter (20-30 cm). The broad flat petals are not twisted and are also overlapping (imbricate). E. A. Bowles described it in his 'Handbook of Narcissus' (1934) as "very distinct, dwarf, early deep yellow, recognisable at a distance by its expanded six lobed trumpet and wide flat perianth springing at right angles from the wide upper part of the tube". It is the national flower of Wales, worn on St David's Day (March 1st). How long has this variety been here? It was also known as *N. lobularis* by Haworth in 1819 and sold as "lobs" by the Tamar Valley growers before the end of the 19th century. Until recently

no truly wild population was known, but it has now been identified in the Montes de Toledo, Spain. This is particularly interesting, as linkage analysis has shown that *N. obvallaris* is in fact Parkinson's 'pseudonarcissus hispanicus minor', the 'lesser Spanish bastard daffodil', so it must have been introduced before 1629.

Parkinson cherished his double daffodils and grew at least seven different types. Double daffodils are very rare in the wild in Spain, but common in England. It seems likely that the doubling mutation was facilitated by collection, transportation or storage in Europe. Parkinson was delighted to receive "the greater double yellow bastard daffodil" (*pseudonarcissus maximus aureus flore pleno*) from the collection of John Tradescant, the great English naturalist and gardener. The term 'bastard' is somewhat disconcerting, but probably means that many doubles are sterile (have no seeds), because of their hybrid origin and chromosomal numbers. However, Bowles states that Lyte's translation of 'bastard narcissus' in Rembert Dodoens' 'history of plants', the *Cruydeboeck* (1557) means 'resembling but not identical'.

The fine double daffodil now known as 'Van Sion' (Fig.3, right) was one of the mainstays of the Tamar Valley trade. According to E.A.Bowles (1934), John Parkinson obtained it from the London-resident Fleming, Vincent Sion, after he had succeeded in developing the flower in 1629. It is a double, grouped by flower form with *N. hispanicus* and the 'King Alfred' variety. It was known locally in the Tamar Valley as the "orchard daffodil", as it was often planted in clumps between cherry and apple trees, and is still delightfully persistent in fields, hedgerows. However, the variety is very variable. Some clumps have all the doubling neatly contained within the trumpet, while others burst open like shaggy powder puffs. They are also prone to greening, or 'viridescence'. Lady



Harriet Thistleton-Dyer, from Weir Cottage at Weir Quay, got quite distressed about this, and wrote to the Royal Botanic Gardens at Kew: "I am worried that the double daffs have some disease - all the same, and there are acres of them!". She was reassured by Sir William Hill that viridescence was common, and could be temperature- or drought-related.



Gerard obtained his double daffodil, *pseudonarcissus anglicus flore pleno*, from 'gardens in the West of England' - so there were evidently daffodil enthusiasts here in 1629. It may be the double form of the single form *N. pseudonarcissus*, our native Lent Lily or 'wild daffodil' (Fig.4, left), which was certainly present by the early 17th century. Gerard remarked that in 1597: 'The yellow English daffodil grew almost everywhere throughout England' and 'The common wilde Daffodill groweth wilde in fields and sides of

woods in the West parts of England'. Shakespeare (1566-1616) knew it well, as in his *Winter's Tale* (4.4.139-141): "...daffodils, that come before the swallow dares, and take the winds of March with beauty...".

In southern England daffodils do indeed bloom in late March - but usually earlier in the Tamar Valley. In 1601, Clusius said the Lent Lily grew so abundantly in meadows near London, that in 'Ceapside' (*sic*) all the shops were decorated with it. The typical form has pale yellow twisted, cream to sulphur yellow petals with a darker bright yellow corona that is only slightly expanded. The flower is solitary, horizontal or drooping with a two-edged stem 20-35 cm long, and glaucous (bluish-grey or -green), erect channelled leaves. This flower was immortalised by William Wordsworth in 1807, with his "host of golden daffodils".



What else has been in the Tamar Valley a long time? The very late daffodil *N. medioluteus* (*N. biflorus*) is known locally as 'Ones and Twos' (Fig.5, left). It was very well known to Parkinson in 1656. Even earlier, Gerard described "The common white daffodil with yellow circle they call the 'Kings Chalice' and 'Camels neck' as we do say of a thing with long spindle shinnes urging it from the long neck of the floure. It floureth in the month of Aprill, and sometimes sooner". This variety is a cross between *N. tazetta* and *N. poeticus* and probably originated in southern France. The distribution is similar to

N. pseudonarcissus, so it must have been introduced and naturalised all over Europe by the Middle Ages, or may be native in some places.

Jonquil daffodils were also illustrated by Parkinson (see Fig.6, below). 'Juncifolius' means 'rush-like leaves'; they are green, linear and channelled on the inner side. They show new leaves above ground after autumn watering. Blooming in April, the flowers are yellow or green, sweetly scented, often in umbels and with smallish coronas.

N. juncifolius luteus major is the tallest jonquil with the largest flowers. As a wild plant, it is confined to the damp meadows and river banks of the Douro and Guadalquivir rivers in Portugal, but has been cultivated in England since the 16th century.

The tazetta daffodil *N. bertolonii* was named in honour of the Italian botanist A. Bertoloni, author of the *Flora Italia*. Parkinson called it the 'Lesser Barbary daffodil' (it grows abundantly in Algeria, as well as other parts of the Mediterranean region). It is important for two reasons. First, it was introduced by the Muslims, who took armfuls to cemeteries on Fridays; the prophet Mohamed apparently claimed that 'he who has two loaves of bread, sells one to



buy a narcissus, because bread is food for the body, but narcissus is food for the soul'. The other reason is that the derivative variety 'Grand Soleil D'or', known locally as 'sols', were another pillar of the Tamar Valley flower trade, having first appeared in 1890. They can still be found in our local hedges.

The pheasants eye daffodil, *Narcissus poeticus*, has a very wide natural distribution right through the Alps into the Balkans and Greece. They have been in England since Tudor times, in both single and double forms. They are solitary flowers, sweetly scented with pure white petals and discoid coronas with a red or orange edge. This is the genetic source of the red or pink colour in later

hybridisation. Gerard described them as "*purpled or bordered about the edge of the said ring or circle with a pleasant purple colour*". Parkinson remarks that 'when crowded and starved producing single flowers, but if set singly, flowers would be goodly and double'. The doubles need deep rich soil in orchards, but are easily 'blinded' through changes of temperature, cold nights or hot dry days in the growing season.

Septimus Jackson of Clamoak, Weir Quay famously found the Tamar Double White mutation of a pheasant's eye in his hedge in 1880. Stocks of his 'Whitsun Lily' (Fig.7, below) built up and were very important in the pre- and interwar years. They were very strongly scented and with their long vase life, were sent to London by rail in special blue tissue-lined boxes. Sadly, along with so many other cultivated daffodils, they had to be uprooted for the war effort and although they were thrown into the hedges, never regained their

former vigour. Although some of the fields were replanted after 1945 with newer varieties such as Ice Follies, Carlton and Magnificence, the trade declined in the 1960s and only local shops and people are now supplied.

So this spring, take another look at the Tamar Valley hedgerows. Look especially for the light and airy daffodils with thin, twisted petals - they are definitely either native or very early introductions (in varieties developed after 1890, the petals overlap at the base). Thanks to botanical pioneers such as John Gerard and John Parkinson, many generations have enjoyed these long-established types of daffodil. You could even tell *your* grandchildren that they have been here since the reign of Elizabeth I and teach them to cherish them too.



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Recent Heritage Projects in the Tamar Valley
Samantha Barnes, Tamar Valley AONB Project Officer

In 2010 the Tamar Valley Area of Outstanding Natural Beauty (AONB) secured a £35,500 ‘Your Heritage’ grant from the Heritage Lottery Fund (HLF) to deliver a community heritage project in Calstock parish. The project aimed to enhance learning about the historic development of the parish, strengthening the recognition and importance of the unique history of the Tamar Valley.

Between October 2010 and December 2012 over 500 people from Calstock and the South West were engaged in a range of free events and training days. The project has left a legacy of skills, knowledge, enthusiasm, and even surprising results that have augmented the historic record and placed Calstock parish firmly on the archaeological map. Whilst the project delivered a range of events, the community archaeological training at Calstock Roman fort was the highlight for many.

Over ten days in October 2011 twenty enthusiastic volunteers descended on a field to the south east of St Andrew’s church near Calstock. The training involved excavation, recognition of context, and recording methods, and was provided by Dr Chris Smart and archaeologists from the University of Exeter.

Discovered by accident in 2007, three seasons of excavation provided evidence that the Roman fort was established in about AD 50/55 and was occupied for thirty years. The fort was about the same size as three football pitches and could house 500 soldiers. The excavations also revealed that the area had been occupied before the Romans arrived, in the Iron Age, and that settlement continued into the medieval period, about two hundred years before the church was built. The community excavation focused on the east side of the fort, looking for an earlier marching camp, the position of the access road, and a large Iron Age enclosure around the whole site. Two trenches were excavated in the field. The first trench, Trench C, was positioned to investigate a large enclosure ditch and its intersection with what was thought to be the road exiting the east gate of the fort. Roman pottery was removed from the ditch fill, suggesting that it was filled in during the Roman occupation was

possibly of earlier date. On excavating the two parallel ditches representing a possible road it became clear that this feature was not of Roman origin – following analysis of nineteenth-century maps and the discovery of post-medieval finds the ditches were probably those of an eighteenth-century hedge bank!

One of the most exciting and significant discoveries from the investigation was a number of prehistoric pits, one of which contained Late Neolithic or Early Bronze Age ‘grooved ware’ pottery. This type of pottery is rare in the Tamar Valley with the only comparable example found nearby at Harrowbarrow. Analysis of charcoal and burnt hazelnut shells from the pits confirmed human activity in this location from at least 2000BC. The second trench, Trench D, aimed at finding out more about a Roman marching camp ditch, pre-dating the construction of the fort. No dating evidence was found, but as the marching camp would have been short lived this was not particularly surprising. It did however show that the ditch had been quickly dug, and quickly backfilled. An industrial feature within this trench was a surprise discovery; on the geophysics the feature looked like a pit, but through excavation it was revealed as a terrace cut into the hill with the upper edge revetted with sandstone blocks. The whole feature was not excavated but its association with evidence of iron-smithing suggests it was a furnace. Radio-carbon dating has given a 9th century date.

There is still much to discover about the remarkable history of Church Hill, not least a reason as to why the Romans came to Calstock. The excavation results from 2007-10 will be published as a British Archaeological Report by the end of 2013.

For more information the project's events and their results, visit the Tamar Valley AONB's webpage dedicated to the project:

www.tamarvalley.org.uk/projects/parishproject/, or contact Samantha Barnes (Tamar Valley AONB Project Officer) on 01822 835032 or by email:

sbarnes@tamarvalley.org.uk. The success of the Calstock project has highlighted the interest in archaeology in the Valley, and we hope to run more archaeology and heritage events in the future. Sign up to the Tamar Valley AONB's e-bulletin through the website to keep up to date!

The Friends of the Tamar Valley

Meetings are held usually on the first Friday of every month at 7.30 pm at the Tamar Valley A.O.N.B. Centre, Drakewalls, Gunnislake, Cornwall.

Visits and walks are arranged for the summer months. The full programme of meetings is published in the Friends' Newsletter.

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