

# **The Trevithick Society**

**2022 AGM**

## **Programme Notes**



**Compiled by**

**Pete Joseph & Graham Thorne**





## **AGM 2022 Programme Upton Towans, St Day and Devoran**

- 1. Friday May 20th afternoon 2pm**  
Upton Towans
- 2. Friday May 20th 6.00pm**  
Kresen Kernow, behind the scenes visit
- 3. Saturday May 21st 10am**  
Poldice Mine
- 5. Saturday May 21st 1pm**  
Mount Wellington Mine
- 5. Saturday May 21st 5pm AGM and Annual Dinner**  
The Countryman, Peace  
4.30 for 5.00 AGM and 7.00 for 7.30 Annual Dinner
- 6. Sunday May 22nd 10am**  
Devoran

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**Cover illustration: Interior of the nitric acid factory at Upton Towans. Photo: Kevin Camidge**





**Friday May 1st afternoon**

## **National Explosives, Upton Towans**

Following the invention of nitroglycerine the next step in the development of explosives was the invention of dynamite, patented by Alfred Nobel in 1867. This was the world's first safely usable high explosive and was made from a mixture of nitroglycerine, sorbents (absorbents of adsorbents) and stabilisers. Because dynamite required detonation it was necessary for Nobel to devise a safe means of doing this, which resulted in the percussion cap.

By the late 1870s the Kennall Gunpowder Company was aware that money could be made by turning to the high explosives which had started to make inroads into its mining business. In addition Nobel's British dynamite patent was due to expire on 6th May 1881. This opportunity led many companies to draw up plans for factories to compete with Nobel. However, as a dynamite operators' 'ring' was already in existence and controlling dynamite prices, this would be more difficult than they presumed.

Kennall had started to import and market dynamite made in Belgium by the Metagne company, though this was to have some repercussions later, particularly with regard to Levant Mine. Presumably through this experience, the decision was eventually taken by the Kennall company to commence making the explosive itself; the question was, where could this take place?

In July 1883 a special meeting of Phillack Local Board was held to consider an application of the Kennall Vale Gunpowder Company for a licence from the Camborne petty sessions to erect a dynamite factory on Upton Towans. The application was opposed by William Hosken, (partner in HTP) of Loggan's Mill. This plan was abandoned but reappeared at the end of the 1880s, partly in response to an upturn in Cornish mining. Unfortunately the original documents of the National Explosives Company Limited have not survived, so we have no list of the original directors, shareholders or a memorandum of association. The first mention of National was in April 1888 when it was stated that the company had been formed with a capital of £100,000 in £1 shares.

At the beginning of April 1889 James Julian, of Truro, had been given the contract for putting up the new buildings. Work would commence shortly and the factory would require 1,500 tons of bricks. Tenders for the machinery had been received and the order for machinery, engines and pitwork went to Holman Brothers in Camborne. A 25hp engine was to be used to pump from Boiling Well Engine Shaft in the southern part of the site. Water was pumped to the three cast-iron tanks, of 65,000, 30,000 and 25,000 gallons respectively. The two largest capacity tanks would be 70 feet above the shaft collar; water would be distributed about the site through 6-inch pipes and would also be available for fire-fighting. At eight strokes per minute the engine would be raising 13,000 gallons per hour.

Except for cartridging huts, the danger buildings would be at least 50 yards apart. The distance between each building in the danger area was determined by the maximum quantity of explosive that would be in it; conversely, the amount of explosive which could be held in any building would depend on the minimum distance it would have from its neighbours. Two stacks, each 86 feet high, were to be constructed; the site would eventually have many more, with six being 150 feet high. The company had engaged Henderson & Sons of Truro as surveyors and George H. Eustace of Hayle as the local engineer. The designer of the works was the very eminent and experienced chemical engineer and explosives expert Oscar Guttman, a Hungarian.

Rather than having military-type discipline Guttman decided to trust his employees. As the first staff were local people, with no previous experience of making explosives, Guttman personally trained them, selecting each to be most suited for the work to be done. It seems that once the core of the staff had been trained to Guttman's satisfaction, training then devolved to this cadre. The role of chief chemist and manager of the danger area was William Bate. It is not known if there was any particular reason for choosing Bate or if it was just a lucky decision. In his early twenties, he was a trained chemist born in Liverpool. Bate was to become well-liked by the staff, so much so that he would be known as "Billy Bate". While the staff were satisfied and had a certain amount of freedom (some even brought their dogs to work!) they were in no doubt that they had to obey the numerous

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regulations. The foreman of the wet section, where the nitroglycerine was made, was Francis Simon while Elisha Trewartha led the dry section, where dynamite was made by mixing nitroglycerine with kieselghur; the foreman of the acid factory was Josiah Sampson.

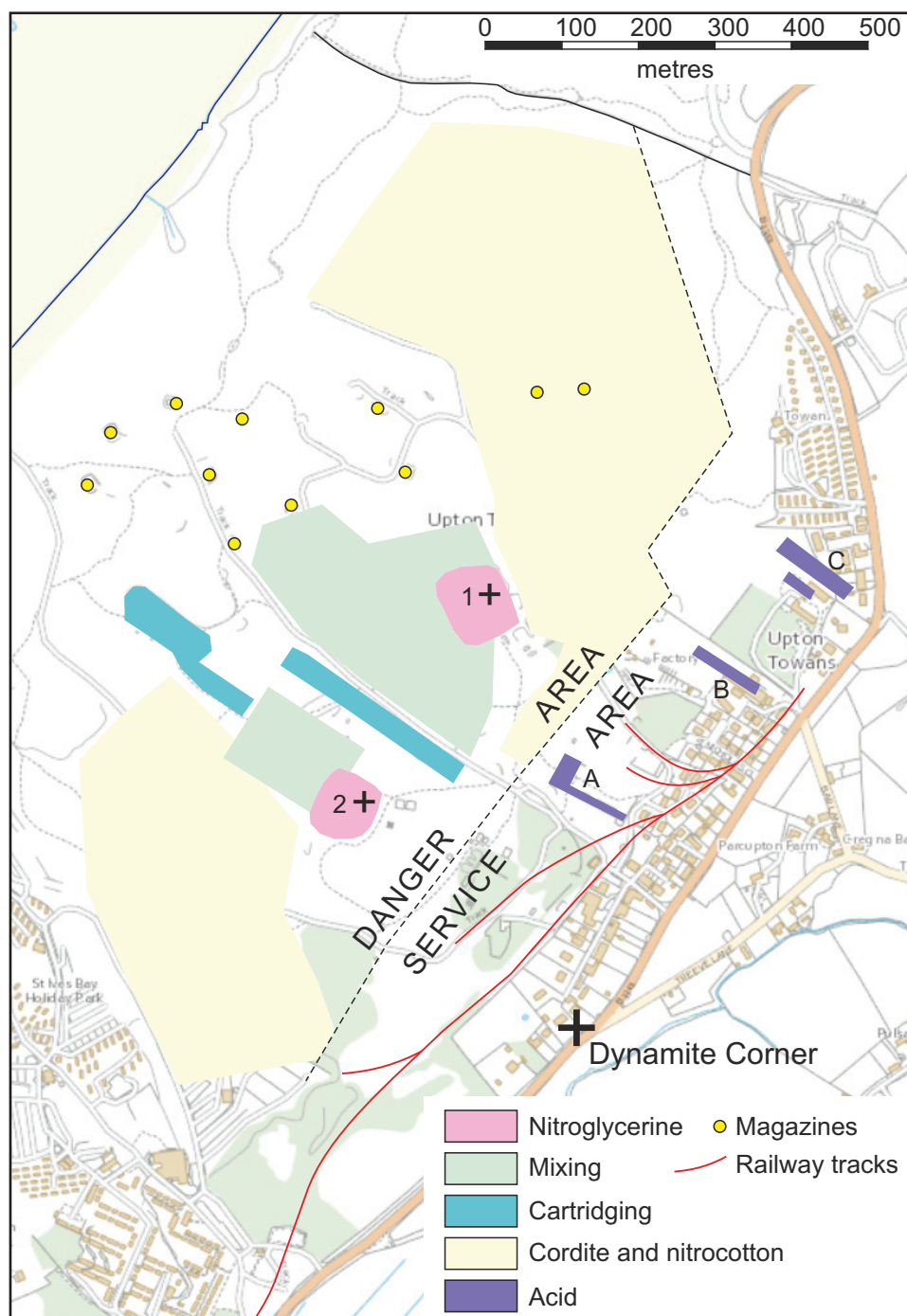
Ironically, while a plan of each and every one of these buildings was required for the licensing process, none is known to have survived, the only plans existing are those included in the special accident reports by the Inspectorate of Explosives. The usual practice in the UK is to identify the nitrating, separating and washing houses of the nitroglycerine plant as the 'A', 'B' and 'C' houses respectively. For reasons unknown National did not conform to this. At Hayle the two nitrating houses were H1 and H2, the separating houses J1 and J2, the wash house L1, and the precipitating and storage houses M1 and M2. The secondary separator houses were Q1 and Q2, and the deposit of washings O1. It seems likely that National was following the Continental scheme of numbering, rather than the British, although a key to the Continental system has yet to be found. A difference between National and the Continent however was that in the latter it was common to combine buildings, for example having nitrating, separating and washing all in one building. The British licensing scheme, where limits on the amounts of explosives in specific buildings were specified, meant that the buildings had to be separate from each other.



The only detailed map of the National Explosives factory, the 25-inch OS sheet LXX.10, published 1907.  
The expansion of the works caused by the Great War was along the western boundary.

Initially National did not have its own manufactory for sulphuric acid, which was brought to the site in carboys by road from Gwinear Road Station. Nitric acid was made on site from the beginning, Oscar Guttmann being an expert in its manufacture. The two acids were mixed in the service area then blown to the top of Jack Straw's Hill by means of an acid montejus, also known as an acid egg. The mixed acid was stored in tanks at the top of the Hill in the Castle, and the initial phases of making explosives, nitration to create nitroglycerine, then separating and filtering to remove water and acids from the nitroglycerine, took place by allowing the nitroglycerine to flow under gravity in lead-lined

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Map of the National Explosives factory the processes carried out in different areas.  
+1 = Jack Straw's Hill; +2 = New Nitro Hill.

timber troughs. Glycerine was purchased from candle and soapmakers in drums and taken to the top of the hill on a small bogie. Here it was kept in a tank heated by steam to keep it thin enough for use.

On 17th July 1889 the SS *Prompt* arrived in Hayle to load explosives. Despite the fact that the factory was still being constructed it seems that some dynamite was being made. At the beginning of August John William Wilkinson took over as manager; he had transferred from Kennall Vale where he had been manager for 20 years. Almost nothing is currently known about Wilkinson, especially, having been born in Calcutta in 1840, how he got to manage a gunpowder works in Cornwall.

The first mention of the uniforms worn by National's employees was in January 1891. Men wore scarlet jackets and grey trousers and women scarlet Norfolk jackets and grey skirts, all made from



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non-flammable material, “the whole being set off by a scarlet tam o’shanter”. Only carpet slippers or special nail free boots were allowed in the danger buildings and special boards were placed across the bottoms of the doorways to ensure the workers avoided carrying grit into the buildings. The workers, men and women, were searched by the foremen and forewomen to ensure that no unauthorised articles (such as pins and matches) were taken into the danger area. Workers were also obliged to change into suitable footwear at the beginning of each shift.

In the early years most of the materials were delivered across the site by runners carrying wooden boxes attached by shoulder straps. By 1889 a 9km long 2-foot gauge iron tramway was built across the site. Hand-pushed trolleys ran along this, having four wheels grouped close to each other around



Part of the service area: possible small magazine in the foreground and filter room with associated water tank loadings in centre. Beyond that are concrete loadings for heavy machinery. The nitric acid factory and the remaining stack are in the background.

the centre of gravity of the trolley to make them more manoeuvrable. Near the danger buildings the rails were made of wood in order to reduce the risk of friction sparks causing ignitions or even explosions.

The factory was reported to be producing about three tons of dynamite daily towards the end of 1890. A duplication of equipment, presumably the dual system working from Jack Straw’s Hill, would ensure that work could continue uninterrupted by any

accident it also ensured that a larger output could be achieved by working both sections simultaneously. In the dry section of the danger area the dynamite was made by hand mixing the calcined kieselghur and nitroglycerine, the explosive being cartridged by girls working in several small huts to the west.

In November 1890 National acquired a small steam coaster to transport explosives; it seems that business was increasing. The new vessel was the SS Jeanne; after being refitted she could carry 40 to 50 tons of cargo, dynamite out and raw materials in.

In March 1890 and September 1891 amending licences were taken out in to make alterations and extensions to the factory to enable the company to manufacture explosives made from gelatinised nitroglycerine, such as blasting gelatine, gelatine dynamite and gelignite. The first two were regarded as considerably stronger and more powerful than dynamite, and were more efficacious for blasting in exceptionally hard rock. Gelignite was somewhat stronger than dynamite, but its chief advantage was in that the fumes it gave off during blasting were less noxious. These explosives were generally known in the trade as gelatine compounds and were much more difficult to manufacture than dynamite.

Financial problems in 1892 prompted a series of amendments to the company’s structure and in January 1893 the company was restructured; the new company having been registered on January 3rd. In October 1894 National acquired a government contract for manufacturing cordite. This was a



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speculative venture on the part of the company as cordite was then a comparatively new compound; it was to prove a wise decision. The contract would run for three years and National would supply 600 tons per annum. This arrived at a lucky time for Hayle as it increased employment at a time when Harvey's foundry was running down and laying off workers. 330-400 people were then employed at National, mostly young women, but this would now increase.

In January 1895 a new 'factory' was built, actually a new press range within the current cordite section to the north of the nitric acid factory, built amongst the towans. P2, the new cordite press building, was actually built adjacent to, and at a right-angle to, P1, the original press building.

On Tuesday 4th September 1894, at about 8.45am a fatal accident took place which resulted in the deaths of two men, Samuel Pick Craze and James Perry, who were working alone in mixing house N1, about 250m northwest of the stack. The men were in charge of a mixing machine, similar to those used for kneading dough for bread, to mix nitroglycerine and nitro-cotton (guncotton). These ingredients were to make gelatine dynamite No. 2 (later called gelignite). For reasons not known an explosion took place which comprehensively destroyed the building and its occupants. Bearing in mind that the building contained a total of 520lbs of partly mixed nitroglycerine and nitro-cotton and 240lbs of nitroglycerine, 760lbs (340 kilos) in all, it is not surprising that the blast was heard at Lands End, Marazion, Penzance and Redruth.

In 1896 the cordite factory was enlarged again. This was useful to the local community, bearing in mind the continual loss of jobs at Hayle from the contraction of Harvey's foundry. The pay at National was good, averaging 3s to 5s per week more than elsewhere. About 250 people were then employed (considerably lower than in previous reports) and twenty-five new employees would be added to the cordite department. This enlargement would have entailed the construction of building P3, just to the northeast of P1 and P2.

Another fatal accident took place on 19th October 1899, in mixing house N2, about 365m just west of northwest from the stack. In this house a mixture of dry nitro-cotton and gelatine was put into lead-lined, water-heated vessels called a "jellying tanks" for the manufacture of blasting gelatine or gelignite. The explosion here killed 15-year-old William Harvey and injured a man called Stephens though James Prisk, foreman, managed to avoid injury.

At the beginning of March 1900 the SS *Lizard* arrived in Hayle. She was built in London, shipyard not known, "to the order of the National Explosives Company". She replaced the Jeanne and Captain Richard Noall was transferred to her command. She arrived from London with a cargo of sodium nitrate (for nitric acid manufacture); she was described as a "smart-looking craft".



House for two Holman Brothers twin horizontal engines, used for operating the pumps in Boiling Well Engine Shaft.

Saturday 4th Au-



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August 1900 was a special day for National as it was decided to hold a huge fete on the Towans. It was an enormous event, involving over 600 people, and included a number of sporting competitions for the staff; each event had five prizes, the total aggregate value being £38. The day commenced at 10am, with luncheon at 12.30 and a dinner in the evening; it proved to be a great success. In September 1901 500 members of staff were taken on a day out to Falmouth for the bank holiday. The fete held the previous year was never repeated, for reasons which can only be conjectured. Once again a special train was laid on.

On January 4th 1904 an explosion took place, the most damaging accident to take place at Upton



Loadings for mixed acid tanks on top of Jack Straw's Hill, the start of the manufacturing process at National. The concrete works is in the background.

Towans. Two buildings (precipitating house M1 and final washing house L1, 369 feet apart) were destroyed, four men were killed and many other workers were injured. A considerable amount of damage occurred at the factory while broken windows and other damage was done to the local area, notably in St Ives, though this lay three miles away. The sound of the explosion resulting from the detona-

tion of 4,200lbs of nitroglycerine, was recorded as far away as North Devon and even felt by the driver of the GWR up train between Hayle and Gwinear Road, whose 30-40 ton engine was shaken.

During 1905, in response to the increase in cordite production, a new nitroglycerine hill was built immediately northwest of the engine shaft of Boiling Well Mine. While this had a different layout to Jack Straw's Hill to the northeast it performed the same task. The new layout was designed to be safer than the original, where the great explosion of 1904 occurred. This proved to be the case and no accidents took place on the new hill for the rest of the life of the factory. An important safety feature was that the rooms were warmed by hot water pipes to ensure that the temperature was always above the freezing point of nitroglycerine. Three National explosives were added to the Authorised List in 1905. These were Haylite No. 1 (the 'No. 1' was dropped the following year), National Gelignite and Towanite.

By November 1906 it was said that National was "being operated on a larger scale than when the hands were slackened some months ago" and 500 people were employed. There was now little if any unemployment in the area and work had even been given to some casuals from Plymouth and elsewhere. The cordite section was particularly busy.

Sometime during 1906 a new sulphuric acid factory was completed. This was an extensive range of buildings, the site measuring about 130m by 60m northwest to southeast, about 120m due north of the entrance to the present concrete works. It seems that this was in response to the cost of importing the acid; the new factory was designed to burn "Spanish rock" (pyrite,  $\text{FeS}_2$ ) to produce sulphur dioxide. This was then reacted with air, water spray and nitrogen oxides in long lead-lined chambers to form the sulphuric acid.

At the ordinary meeting in June 1907 a trading loss of £13,704 was announced by Athol Thorne.

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This was again attributed to the extreme competition for Government orders, as well as in the general blasting trade, which had been carried on at a loss. They had been obliged to sell their product at less than the actual cost in order to keep the factory working. The directors had felt that they were entitled to expect that, on the termination of the war in South Africa, the country would have opened up to British manufacturers, but the duties were still too high to enable National to compete with local firms. Because of this the directors had come up with yet another plan to reorganise National. A new company would be formed, to which the whole undertaking of the existing company would be transferred. The factory closed at the end of the first week in July 1907 although by that time only it only had about fifty workers, mostly employed on care and maintenance. This implies that the factory had been run down for some time prior to the reorganisation.

The new directors held a private meeting at the factory in August 1908 to consider its reopening. As a result of the announcement that it would restart in September, flags were hoisted. In late August several men were taken on at the factory. A consignment of material arrived by steamer and traction engines were busy on August 31st, hauling it to the works. Two weeks later 150 people were working.

On Tuesday 2nd August 1910 Oscar Guttmann was involved in a car crash in Brussels, where he had been a member of the British jury at the International Exhibition; he had become a naturalised British citizen in 1894. While being taken to the Gare du Nord, his taxi cab was hit by another vehicle and Guttmann was thrown out, sustaining serious head injuries. He was taken to the Hospital of St Pierre "in a state of insensibility" and died the following morning.

The period of the Great War was one of a major expansion at National, for obvious reasons. However for the same reasons little information can be found about it; trying to locate information on wartime events is surely one of the most frustrating issues for historians. Shortly after the war commenced the site was surrounded by a barbed-wire fence. Initially the factory was guarded by a Company from the 7th Battalion Royal Fusiliers, commanded by a Lieutenant Milne. In October it was replaced by about a hundred men from the National Reserve, under the command of Captain William Thomas. In December the guarding unit at National was described as the 1st National Reserve Company, which had been enrolled in Cornwall, and was attached to the 4th Battalion the Duke of Cornwall's Light Infantry.

In autumn 1916 the surveyor for Phillack Urban Council reported that he had received a letter stating that the Admiralty had requested the Great Western Railway to put in hand a branch line between Hayle Station and National and that the work should be prosecuted "with all possible expedition".

On 20th December that year, at about 8.10 am, the northern part of the site was rocked by an enormous explosion at building D4, a nitro-cotton drying stove. The building was completely destroyed in the blast, and the three people working in it, May Bella Stoneman, Harriet Isabella Rogers and James Perry, foreman of the guncotton section, were killed instantly. James Cock, working about 70 yards from D4, was also killed. The building held 4,800lbs of guncotton in different states of drying; pieces of the building were scattered over a distance of 100 yards, the only things left being the bricks of the heater and engine loadings and some of the heavier parts of the equipment.

Permission to commence work on the new branch line to National was finally given in December 1916; this would start at North Quay. The necessary material for the work was already at Hayle and on the 17th a gang of men under Inspector Tregenza of the Great Western Railway, was busy removing the rails and sleepers at Undercliff, on the line from North Quay, and replacing them with more robust ones. During 1917 Peckett and Sons built and delivered a new 0-4-0 saddle tank locomotive, works number 1448, for the new branch line, which had been presumably been completed but was not reported on in the press. It is not known when the branch line was completed; from North Quay the line used the existing track which terminated nearly opposite what is now Holloway Terrace. This part of the track is now marked by a footpath. The National branch was taken off a little to the west of the terminus and ran at the rear of what is now a terrace on Loggan's Road. It then followed the line of the road and entered the National site at the southern end of the old arsenic works, just inside the



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entrance to the St Ives Bay Holiday Park. The line of the track is still well-defined behind the houses north of Dynamite Corner and reached northeast to just beyond the sulphuric acid factory, though this end has now been built over. Spur lines serviced the boiler houses at the west end of the site and at the southern end of the nitric acid/nitrocotton works.

Following the great expansion of explosives production for the Great War there were too many companies for peacetime. National like the other companies found it impossible to go back to operating as a purely commercial concern and in 1918 the decision was made to rationalise the British explosives industry. Consequently National, Bickford-Smith and fifteen other concerns amalgamated to form Explosive Trades Limited; this later became Nobel Industries Limited which, in turn, became part of the Nobel Division of ICI. One result of the formation of this company was the closure of National though a voluntary winding-up.

With no obvious and immediate alternative use for the factory, sales of equipment commenced in January 1920. At the beginning of May the main part of the equipment was advertised for sale, including a horizontal tandem steam-driven air compressor, ex-Tuckermill Foundry; a number of pumps of varying capacities; a coupled compound engine and compressor by Robey & Co.; a steam winch by Thomas Ward & Co.; two horizontal compound steam-driven jet-condensing two-stage air compressors from



One of the several remaining concrete magazines at the seaward end of the site. Windows, or hatches can be seen in the gable wall as well as slots in the walls for the battens which supported the timber sheets which lined the walls. While there is no protecting embankments the building was built in a slight depression.

of Newport, Gwent. The wireworks was owned by J. C. Hill but acquired in 1925 by the Whitehead Iron & Steel Co., after which the company became Whitehead, Hill and Co. The works had started a railway in about 1877 and eventually used three 0-4-0 saddle tank locos, Perseverance, Hill and Whitehead. Perseverance was purchased new from Manning, Wardle & Co of Leeds and worked until 1925. National's engine was bought to replace Perseverance and renamed Hill. Whitehead arrived in 1936 or 1937 from Berthlwyd Colliery, Swansea; despite being older than Hill the latter was used to keep Whitehead running. Until the 1950s the engines were used for shunting within the works but at this time the company became involved in brick production and acquired a works to the south at Llandowlais. The two sites were connected by a railway line and the engines, which worked six months on and six months off, transported coal to the brickworks. In June 1966 Hill was partially dismantled in the engineering shops of the wireworks and scrapped when the line closed six months later. No photographs of Hill have been found, despite numerous enquiries.

Holman Brothers; centrifuges, iron tanks and refrigerating equipment. Sales of machinery, plant and buildings took place on July 10th, 11th, 12th, 13th and 14th of 1922. On Saturday, December 23rd, the 150-foot tall stack of one of the acid factories was thrown down.

The locomotive was not sold until 1924. Its destination was Oakfield Wireworks, to the north



## Poldice Mine

Poldice mine is situated 1 km east of St Day and is part of the area now under the stewardship of the Poldice Valley Trust. Although no engine houses are preserved on the site it does retain well preserved mills, from the 19th and 20th centuries, and is overlooked from the north by the engine houses of Unity Wood, Creegbrowse and Killifreth mines. Further north lie the extensive workings of Wheal Busy, to the east, by Mount Wellington Mine and to the south-east, are the extensive remains of the United and Consolidated Mines.

The area has been important in the development of transport. In 1809 work began on Cornwall's first significant tramway line from Portreath, which reached Poldice Mine (at the Crofthandy terminus) in 1819. In the same year a branch was built to connect with Wheal Maid and the United and Consolidated Mines. This route is now part of the Mineral Tramways footpath system, connecting with the mines of the Great Flat Lode south of Camborne and Redruth. Twelveheads, to the east, was on part of the Redruth and Chasewater Railway, although the Twelveheads to Chasewater branch was never built. The area has also long been famous for its minerals, particularly the copper secondaries. The most important localities for these were Wheal Gorland and Wheal Unity.

Poldice Mine is one of the oldest workings in Gwennap, and probably in Cornwall. The earliest reference to this sett may be a dispute between two Gwennap men before the Consistory Court at Exeter in 1512, when John Busveal witnessed a quarrel between parties "near Poldyth in Wen-nap" during which "Michael said to Nicholas 'Thou art a



The Poldice arsenic works: Brunton calciners on the right, mills centre and first labyrinth on the left. The 20th century mill is just to the right

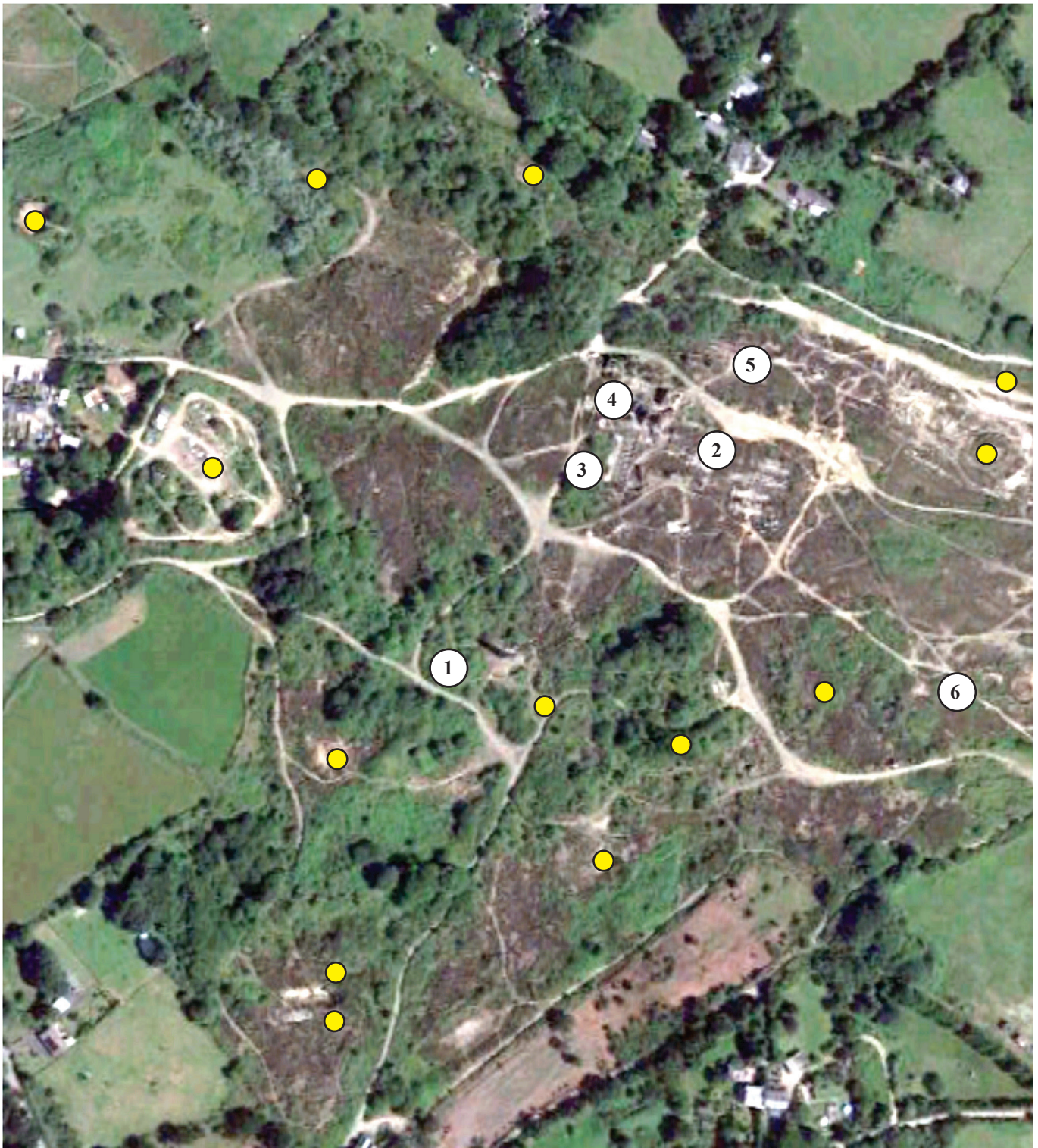
theff and yu stolys my Tynne'; *scilicet in lingua materna, hoc est in Cornysh*" (spoken in the mother tongue, which is Cornish). Another dispute is recorded in 1678, this time over a water-course. This had still not been settled by 1681, when a petition before the Lord Warden of the Stannaries stated that the mine had produced £1,200 per year for Henry VIII. In 1685 the mine was described by Hals as "that unparalleled and inexhaustible tin work which for about forty years space hath employed from eight hundred to a thousand men and boys labouring for tin....where they have produced for that time, yearly, at least £20,000 worth of that commodity". Although the mine was still an important tin-work in the early 1700s it was described in 1726 as "once profitable but now wrought so deep that there is no great benefit to be expected".

The County Adit was commenced in 1748 by John Williams of Scorrier, then manager of Poldice, and William Lemon, the chief adventurer, with the primary aim of passively draining the mines then working and to look for new lodes. From its portal near Point Mills in the Carnon Valley, it finally reached Poldice in the late 1760s, by which time the mine was over 100 fathoms deep in places. In 1764 Borlase noted that Poldice was "A very ancient mine, in 1758 106 fathoms deep, which has yielded £500,000 of tin within the memory of man and employing 1,200 at one time". Two Newcomen engines, of 66-inch and 60-inch cylinders, were erected in 1778 to raise water to the adit,



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the engines consuming 192 bushels of coal per day at a cost of £9. These were replaced soon after by two 63-inch Boulton and Watt engines, with a second pair in 1787. In 1793 it was proposed to erect a 66-inch double (compound) engine on the mine, but Boulton and Watt refused on account of the money owed them by the mine. In 1748 the mine had produced tin only, but by 1787 copper sales amounted to £11,315, compared with tin sales of £9,868; by 1788 the output of copper ores exceeded that of tin, though Poldice was marked on Martyn's 1848 map of Cornwall as a tin mine. In 1792 the mine produced 575 tons of copper ore in two months, sales for 1792-98 inclusive amounting to £151,471.

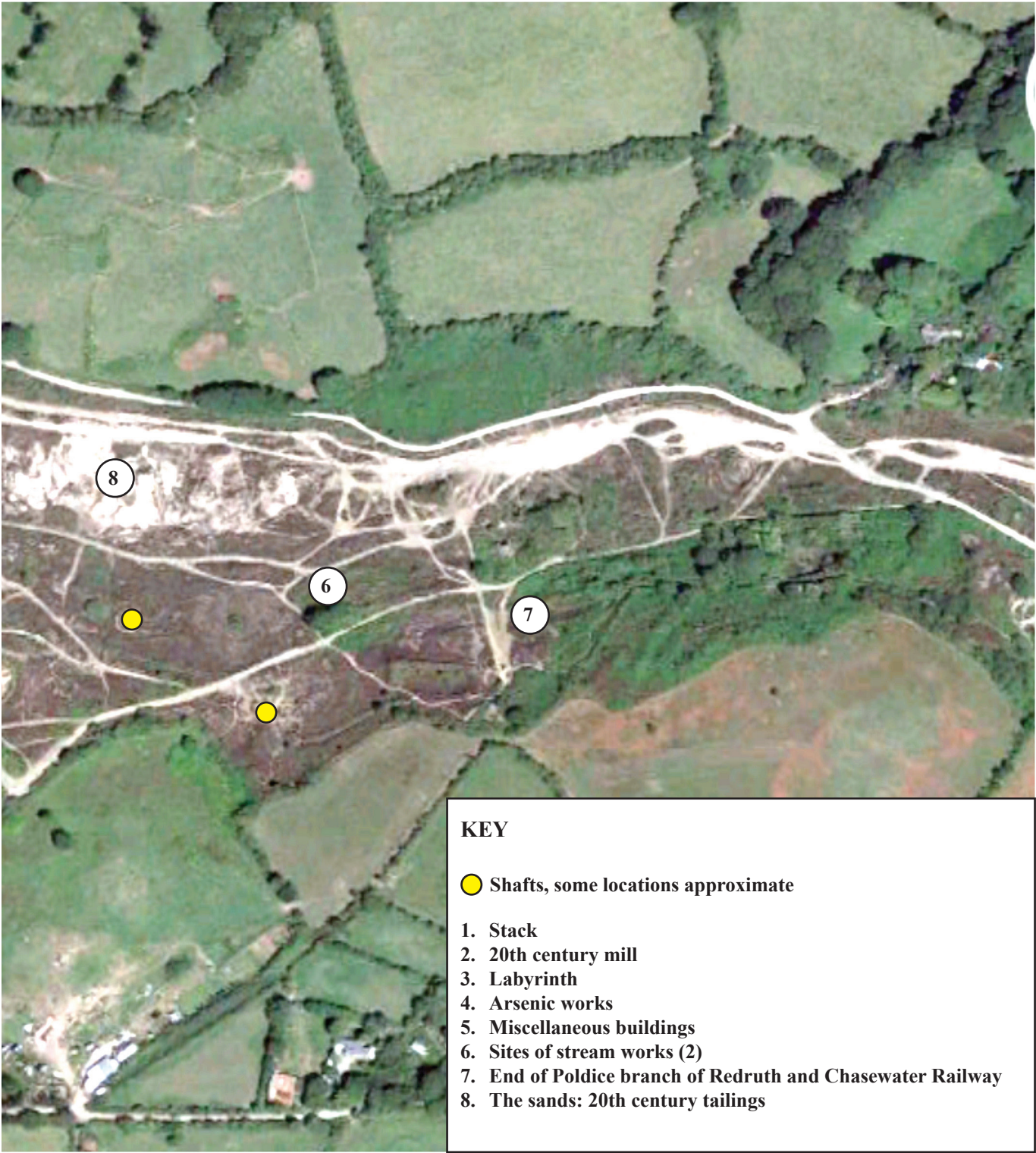




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By 1795 the high royalties being paid to Boulton and Watt for saving in fuel made by their engines were having a deleterious effect on the mine's profits when the price of copper was low. Payments then fell into arrears and attempts at the mine to build more efficient variations of the Boulton and Watt engine resulted in a legal case over patents which were found in favour of the Birmingham engine builders. Edward Bull was involved in this action with his direct-acting engine, even though he had never claimed the patent as his own.

During the period 1800-04 Poldice was amalgamated with Wheal Unity, during which time 41,196 tons of copper ore were raised, and sold for £392,676, realising a profit (including £6,780 for tin sales)



- KEY**
- Shafts, some locations approximate
  - 1. Stack
  - 2. 20th century mill
  - 3. Labyrinth
  - 4. Arsenic works
  - 5. Miscellaneous buildings
  - 6. Sites of stream works (2)
  - 7. End of Poldice branch of Redruth and Chasewater Railway
  - 8. The sands: 20th century tailings

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of £45,441. However, despite this output the mine was only 20 fathoms deeper in 1821 than it had been 60 years earlier. In 1809 the first “rail” of the Portreath Tramroad, financed by the Williams and Fox families, was laid by Francis Basset. This enabled materials to be carried to and from Portreath by horse-drawn wagons rather than on the backs of mules. The first section was completed by 1812 and by 1819 it reached Crofthandy, serving Poldice, Wheal Unity and Wheal Gorland.

In 1821 the mine had a 90-inch Simms-Woolf engine, the largest sized cylinder in Cornwall at the time; two others were erected at Consolidated Mines. In 1845 the engine was re-cylindered as an 85. The Redruth and Chasewater Railway, built by John Taylor to connect his United and Consolidated Mines to Redruth and the quays at Devoran passed the south-eastern section of Poldice in 1826.

In 1852 Poldice was amalgamated with Carharrack Mine and Wheal Maid and worked as St Day United and the following year a branch of the Redruth and Chasewater line reached the mine. A prospectus for the West Cornwall Consolidated Tin and Copper Mining Company appeared in the *Mining Journal* during June and July 1863. This represented an attempt to amalgamate Poldice with the Great Consolidated Mines, the United Mines, Unity Wood, Great Wheal Busy, the Clifford Mines, and Treskerby and North Treskerby. Unfortunately this appears to have been abortive, and this company is not heard of after July 1863, the individual mines still producing reports under their own names. This was a period of contraction of the Cornish copper industry.

In 1864 Wheals Unity, Gorland, Creegbrowse and Penkevil were added to the Poldice sett, shortly after which it was renamed Poldice United. The workings were 194 fathoms below adit (54 fathoms) by this time and 553 people were employed. Nine engines were at work on the mines, ranging from an 85-inch pumping engine to an 18-inch winder. The 85, former 90, was sold in 1867, for £700, to the Great Western Deep Coal Company in the Forest of Dean.

During this period output of tin increased, finally exceeding that of copper in 1869. In February 1866 a resolution to abandon the sett was voted against, although in the following month it was resolved to ask the mineral lords for a remission of their dues. Later that year Richard Stevens, aged 16, missed his footing while working at the 90 fathom level at Bissoe Pool shaft and fell 40 fathoms to his death. He was the only financial support for his mother and sister, both widows, and two children. The mine's decline is shown in its disposal of equipment: between 1869 and 1872 some £12,000 worth of materials were sold to J. C. Lanyon of Redruth.

By 1870 the sett was known as Poldice Mines, was 210 fathoms deep and employed 400 people. In 1872 the mine bought a new 85-inch engine from the Perran Foundry at a cost of £2,250; this



Terminus of the overhead ropeway from Park an Chy; the Nissen stamps loadings are on the left.

was working by early 1873. However the mine was now reaching the end of its life; during the first three months of 1873 it lost £1,862. In May of that year it was decided to persevere for one more month, the decision to continue or not being down to Sir F. M. Williams who, through buying up relinquished shares, held 1,700 of the 2,000 which had been issued. It was



## Saturday May 2nd morning

probably during this period that arsenic production commenced, presumably in an attempt to increase the mine's financial returns. One of the Brunton calciners has a date stone of 1883, suggesting an expansion of the arsenic works.

With falling tin prices it was decided to abandon the sett in June, with just a few men kept to work in the Tolgullow section. Great troubles had been experienced with pumping and with chokes in the County Adit, a new 85-inch engine having been installed in January that year. Some work is presumed to have been done at the mine as it was abandoned again in 1889.

Small scale mining continued over the next few decades, and in 1890 alone over 5,100 tons of tinstone, taken from the waste dumps, was sold by groups of tributers from Poldice and other Gwennap mines (Unity, Gorland and Goongumpus). In

about 1900 the Poldice engines were bought as scrap by Lanyon & Son in Redruth, though during 1905-6 a small amount of ore was produced in conjunction with Wheals Cusgarne and Buller; in 1924-26 the dumps were reworked for tin, copper, tungsten and arsenic and the mine was drained to the 70 fathom level.

In 1926 the sett was acquired by Park an Chy Mine, just over a kilometre to the west, as a site for its ore dressing plant. The mill, on the south-east side of the arsenic works, was completed in early 1928 and equipped with 12 heads of Fraser and Chalmers stamps modified from the Nissen design. Other equipment included Hardinge Mills, Fraser and Chalmers shaking tables, Wetherill magnetic separators and hydraulic classifiers. Two Brunton calciners were used, parts of the old Poldice flues having been overhauled. Froth flotation also appears to have been carried out on the mine. The mill had a capacity of 120 tons per day, 100 tons of ore producing four tons of concentrate which averaged 20% Sn, 35%  $\text{As}_2\text{O}_3$ , 5%  $\text{WO}_3$  and 0.5% Cu. Underground activity had resumed by this time, in the hope of supplementing ore from Park-an-Chy, and the main shaft was cleared down to the 505 foot level by September of that year. Unfortunately results were not encouraging although shaft sinking and exploration (mostly in the Bissoe Pool section to the east) continued for some time after. In 1930 operations at both mines ceased, probably because of a lack of ore reserves, although mining was stated to have been two years ahead of the mill when it started work. The mill was finally dismantled in 1932. The dumps were reworked several times during the 1970s, possibly to supplement the mill at Mount Wellington.

Since the 1990s a series of consolidation and conservation works has taken place, initiated by the Poldice Valley Trust. This has limited access to the arsenic works but included restoration of the heathland where appropriate. A total of 16 shafts were made good, although some amount of damage may have taken place as the method involved 'coning', where the surrounding soil and loose rock was coned back at an angle of  $60^\circ$  from the shaft. Consequently any archaeology within this  $60^\circ$  radius (equalling a distance of 10-14m) is likely to have been lost. Oppie's Engine Shaft in particular



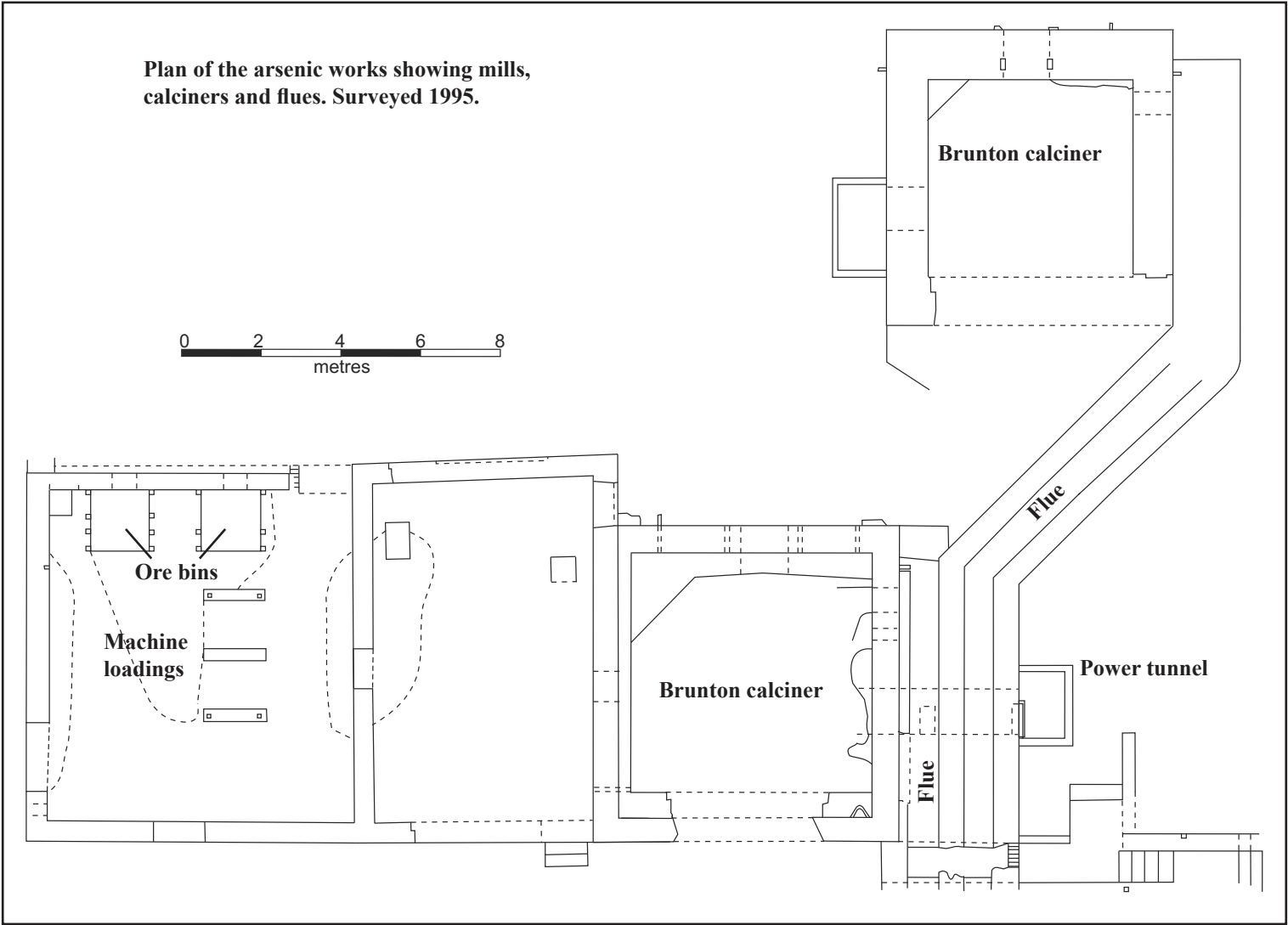
Looking down on the 20th century mill showing the typical cement-faced concrete floors and loadings. Gutters run parallel and across the floor. The stamps loadings are just to the right of the photo.

Saturday May 2nd morning

required a great deal of work as it measured about 35m by 20m at surface.

Production

Poldice:	
1815-49	108,698 tons 6.25% copper ore
1837-39, after 1852	1,252 tons black tin
not dated	12 tons sphalerite
	1,822 tons arsenopyrite
	873 tons arsenic
	51 tons pyrite
	321 tons ochre
St Day United:	
1852-93	22,900 tons 6% copper ore
	3,280 tons black tin
	124 tons arsenopyrite
	49 tons fluorspar



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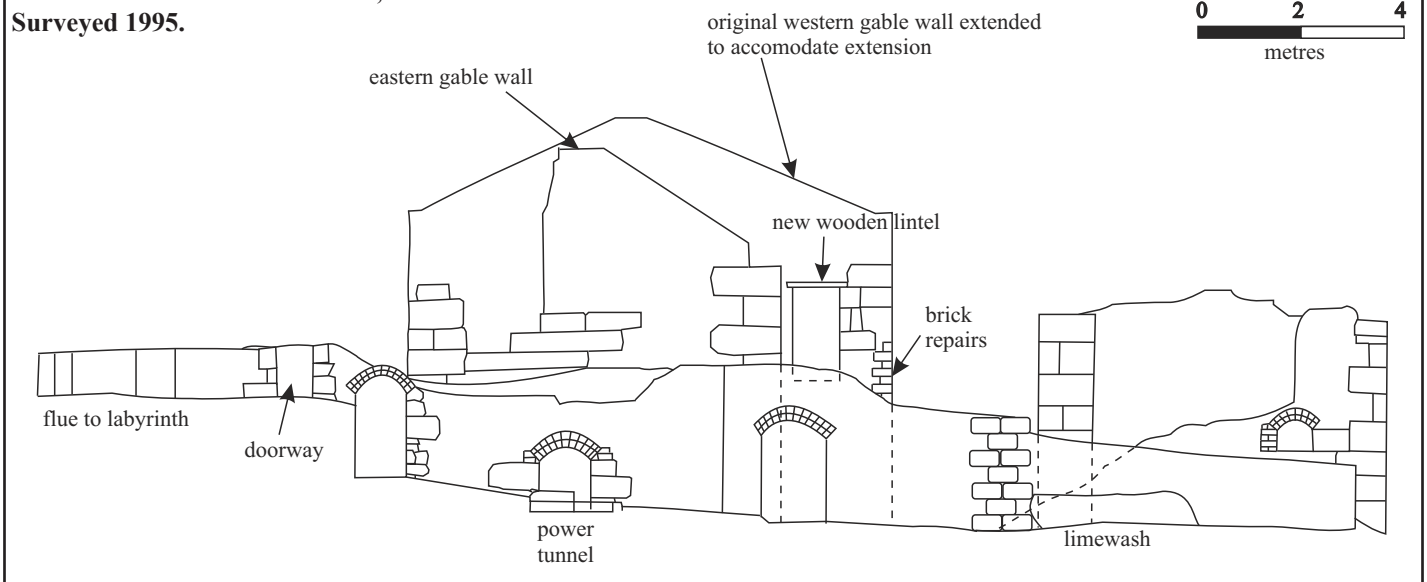
### Archaeology

Poldice Mine lies within an extensive arc of mines extending from Wheal Busy in the north, through Killifreth and United Wood and then on through Hale Mills to Wheal Fortune and Cusvey, although there is now very little to be seen at the latter. The central part of Poldice includes the 20th century dressing floor which processed ore from Park an Chy Mine. This is typical of the period, comprising cement-faced concrete loadings which held the shaking tables and other equipment. These are overlooked by the stamps loadings.

On the north-western end of this is an arsenic works which was operating in the late 19th century and in the 20th century, possibly also dealing with Park an Chy ore. The works is complete and complex as it contains two Brunton calciners which may be of different vintages. The two flues join together before entering the main labyrinth. Like at Botallack the flue is bridged to provide access from one side to the other. A second labyrinth can be seen to the south, with parts of the flue leading towards the stack. Three buddles can be seen to the west of the arsenic mill building, with another two in the yard below. In the valley a series of boundary stones can be seen. Another dressing floor, probably associated with a streamworks, lies about 500m to the east.

**Poldice Mine calciners and flues, south-east elevation.**

Surveyed 1995.





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## **Kensa Engineering, Mount Wellington Mine**

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Following the end of mining at Mount Wellington in 1990 the site languished; underground there were issues and on 16th January 1992 the UK's most infamous mine water outburst disaster occurred when 50 million litres of highly acidic untreated acidic mine water and sludge burst from the Nangiles adit at the Wheal Jane Mine site in Cornwall into the Carnon River. This resulted in a major pollution plume that discoloured the estuary with iron minerals and deposited high concentrations of cadmium and zinc. Cadmium levels reached 600 times the UK water quality standard. Prior to this the adit had been blocked, mine water treated with lime and pumped to the tailings dam at Wheal Jane. Unfortunately pumping stopped for technical reasons on 4th January; while the stoppage was being investigated the adit unblocked itself.



**The well-known haedframe over the engine shaft at Mount Wellington.**

which had already been vandalised, as a tribute to Cornish miners. A wildlife habitat was also to be included, though the priority was well-paid, permanent, jobs for locals. On 5th August 2003 planning permission was granted to Paul Isherwood, though existing buildings were to be retained, altered and refurbished. This did not go ahead; a review of the site took place in April 2004 with no result except the acknowledgement that it was unsuitable for a residential development. The top of the headframe was demolished in 2005.

On 15th January 2007 Mount Wellington was acquired by Richard Freeborn, owner of Kensa Engineering Ltd, and the mine was officially re-opened by Tim Smit from The Eden Project on 22nd January. Since May that year a number of companies have moved to the site. At that time the old engineering building was refurbished but, unfortunately, the Wheal Jane mill was demolished in August. In 2010 redundant concrete structures at Mount Wellington were also demolished. The

In 1998 Mount Wellington Mine was bought by David Shrigley of DRS Demolition from South Crofty PLC. DRS submitted planning applications for change of use for the Mount Wellington Mine site for conversion to a recycling centre for building materials, but all were refused. Revised plans from DRS were also refused in November the following year as were later plans for a concrete crushing plant following a vigorous campaign by local residents who were opposed to potential noise, dust and other pollution.

Plans to develop, or redevelop, the Mount Wellington site commenced in 2003, possibly as a response to it being increasingly vandalised. Previous “un-neighbourly” schemes had been opposed but the idea to turn the site into a science and technology park were acceptable. This would have kept some of the buildings, most of



**Saturday May 2nd afternoon**



**Mount Wellington: the entrance to the modern trading estate with the old sheave wheels now preserved.**

remains of the headframe were demolished in November and metalwork from the lime silo and conveyor belt was scrapped.

On 30th May 2012 a celebration was held to commemorate the 5th anniversary of Kensa Heat Pump's move to the Mount Wellington Mine site as its first tenant. The gathering included – for the first time in some decades - the combined Management Teams of all four modern Cornish tin mines – Geevor, South Crofty, Wheal Jane and Mount Wellington Mine.

The following year Geoquip, an international offshore engineering company, bought the assets of Ocean Fabrications and took over the leases on the site. The old offices in the dry were renovated, and a substantial new investment was placed in the mill building and its associated plant yard.

On Saturday 5th March 2016, St Piran's Day, the Cornish Radio Amateur Club made a special one-time-only broadcast at Mount Wellington Mine. The club obtained a Special Events Station Licence to activate the use of the Cornish mine as an amateur radio station and used the letter K as a locator in the station's call-sign. In 2017 Metal Surgery and Building With Frames replaced Geoquip in the mill and concentrator buildings respectively. In February 2020 is the first new building at Mount Wellington Mine since the 1970s was erected. This was a new specialist manufacturing facility, with offices above, designed to meet the specific needs of Kensa Heat Pumps.

The AGM programme will include visits to:

- Metal Surgery and the old mill building
- Building With Frames in the concentrator building
- Looking at the shaft cap with Roy Morton
- A tour of Kensa Engineering's factory

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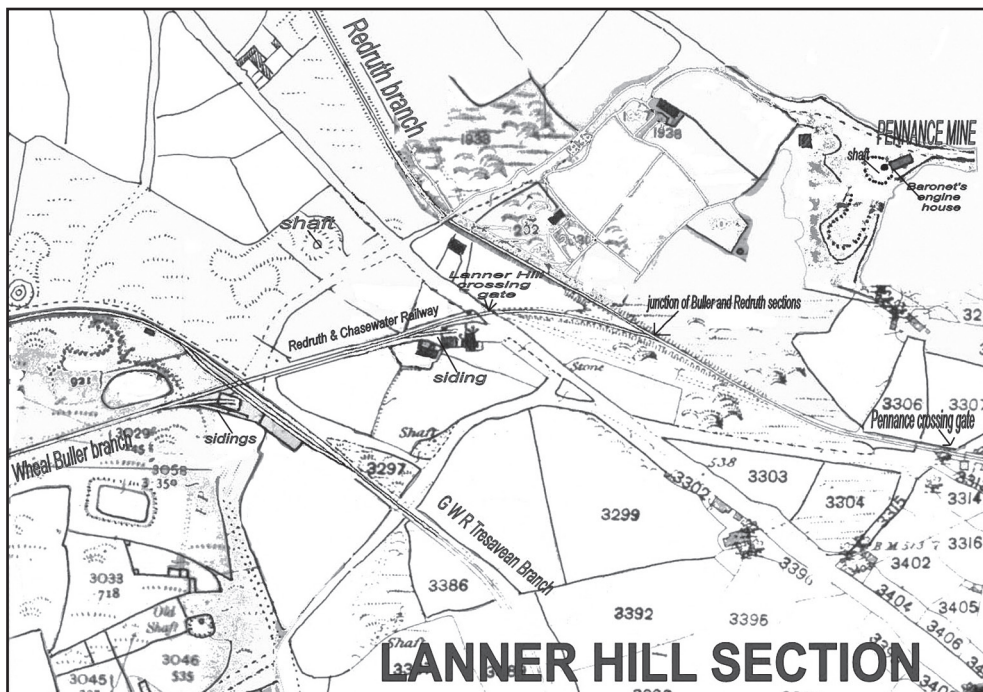
## Lanner Hill and Devoran: the Redruth & Chasewater Railway - Part 1

### The Railways of Lanner Hill

Unsurprisingly no passenger railways reached the windswept slopes of Lanner Hill but two interesting mineral lines converged there, serving the mines and other industries of the area

#### Hayle Railway: Tresavean Branch

From the west came the Tresavean Branch of the Hayle Railway, the main line of which ran from Hayle to Redruth. Built to standard gauge, and leaving the main line at what became known as Redruth Junction, it was some two and a half miles long terminating at Tresavean Mine. It gained height almost immediately by means of an 1100 yard double-tracked incline, rising at 1 in 15. The incline worked on the counter balance principle; on arrival at the bottom the train engine would uncouple and ascend the incline on its own. It then shunted outgoing wagons onto the incline to balance the coal wagons it had brought to the branch. Four loaded wagons, 84 tons equivalent was the maximum permitted load on the incline.



The cross over point of two rival railways. This view to the south-east is dominated track-wise by the GWR Tresavean Mine branch from Redruth Junction which has a siding going into the far GWR yard. The mainline skirts the left of the yard. Note the wooden sleepers used only on this section of the GWR branch. Ahead the R & C track crossed from left to right in front of its own yard to the right. Their yard was known as Coxes Yard and was rented out to Mr. Rowe from Stithians. Baines, the smelters at Bucketts Hill near Redruth, used this site to transport their items. It had two sidings (known as Lanner Hill sidings) one running back into it and another outside the wall. On average two wagons a week served here.

Railway. It ultimately became an outpost of the GWR and was officially closed on 1st January 1936. The rails were lifted in March 1938 almost exactly a century after the line's opening.

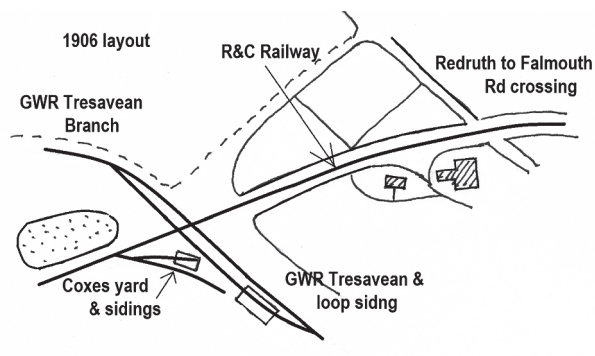
#### Redruth & Chasewater Railway

From almost the opposite direction came the Redruth and Chasewater Railway. Promoted by mining entrepreneur, John Taylor, this opened in 1826 as a horse drawn tram road of 4' gauge. Its main line, with which we are concerned, ran from Devoran to Wheal Buller. The line into Wheal Buller was subject to several changes during the life of the railway. A branch to Redruth opened in 1827. Despite undertaking major works the planned branch to Chasewater never materialised. As noted above, the

At the top of the incline was a siding and coal yard for Wheal Buller. Beyond this the siding was worked by horses. Three quarters of a mile later was a loop adjacent to Wheal Beauchamp where the branch crossed the Redruth & Chasewater Railway on the level. It was then a run of just over a mile to Tresavean Yard.

In 1852 the branch, with the rest of the Hayle Railway, passed to the West Cornwall

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Sketch map showing the cross over point of the Hayle and Redruth and Chasewater Railways at Lanner Hill.

line converged with, and crossed, the Tresavean Branch at Wheal Beauchamp but there was no through working or exchange of traffic due to the difference in gauges. The Redruth and Chasewater line was reconstructed for steam locomotives in 1854; it retained to the end its total independence and unique track gauge. The end came in 1915.



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**Lanner Hill and Devoran: the Redruth & Chasewater Railway - Part 2**

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The name Devoran is first recorded in 1278, 'Dev'r' being Cornish for water, and Devoran the plural, possibly referring to the various streams which unite here. The village is on the northeast bank of the Carnon River at its confluence with Restronguet Creek, a tidal creek which flows into Carrick Roads above Falmouth. Several farms, Devoran, Middle Devoran and Narabo) were set well back above the foreshore while scattered buildings around the quay and along the foreshore were probably associated with tin streaming rather than being a settlement as such.

The Carnon Company built large embankments on either side of Restronguet Creek from the old road bridge down almost to Chycoose, almost 1½ miles. The Carnon and Perran Rivers were diverted to run close to the shores so as to preserve navigation both to the Devoran side and the recently established Perran Foundry at Perran Wharf, only a mile away. By about 1800 the works began to reach the shore area owned by the Agar-Robartes family. The navigation channels, canal and quays which provided access and supplies were moved to keep up with the southern movement. Daniell's Quay at Point was constructed in the late 18th century, away from the tin-streaming works. While this was partly in connection with local trade and tin production it was mostly for the export of copper ore brought by packhorse from the Gwennap mines, while coal and limestone were imported.

In the winter of 1811, following the closure of the Carnon Streamworks, the seaward dam was breached and this allowed boats to come up on the inside of the embankments; it also led to the construction of a new quay, unsurprisingly called Devoran New Quay, which was served by a tidal canal within the streamworks embankments. A second quay was built at Point in 1811, which continued to expand the adjacent lead smelting works. An addition to Devoran at this time was the Crown and Anchor pub. The success of these quays attracted the attention of John Taylor, who had just acquired some of Cornwall's principal copper producing mines in the Bissoe-Gwennap area, and from 1820 became the driving force behind the Redruth and Chasewater Railway. This received Royal Assent in 1824 with Devoran as its principal port and depot. It was originally envisaged that the horse-drawn railway would run from Devoran to Redruth and Wheal Buller with branches to Twelveheads and Chacewater, though neither of the latter was constructed. Even more importantly for Devoran, there were extensive proposals for the restoration and improvement of Restronguet Creek and construction of new wharves utilising the old tin streaming embankments, particularly Narabo Wharf.

The opening of the railway in 1826 was an immediate success; in his first report to the directors John Taylor remarked already Narabo Wharf would not be large enough to handle the traffic. By 1832, the Railway Company had taken over Devoran Wharf and a map from that year shows three large wharves: Narabo, Devoran and Fox's (of Perran Foundry). The wharves remained principally the private concern of the Railway Company, leased from local landlords; the other commercial premises at Devoran, such as limekilns, public houses and merchants, were either on 'dry' land off the quays, or else had their own timber ponds and small wharfs between the railway wharfs.

While the initial stimulus undoubtedly came from the railway company, the role of the other interests in Devoran cannot be overstressed. For example the Mitchell family ran the smelters and quays at Point, the limekilns at Devoran and had a general trading business. The family was thus a major employer and business interest in Devoran. But the role of the Agar-Robartes Estate was of even more crucial importance.

A prospectus for a floating harbour and new town at Devoran was published by the Estate in 1832 and this made it clear that the intention was to extend the harbour beyond the narrow interest of the Railway Company and to open it up to general trade with public quays, facilitated by new rail and turnpike links. The creation of a new town was part of this economic development. In the end both aspects of the proposals failed to materialise to the extent envisaged, and the harbour in particular remained dominated by the railway company. There was, nevertheless, a considerable expansion in size and an increase in general and non-railway based trade on the quays as well as the trade carried by the railway itself.

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At Devoran copper ore from the mines was stored in hutches on the quays before being shipped to Wales for smelting. When John Taylor was refused a new lease of Consolidated Mines in 1839 it had sold 299,485 tons to a value of £2,099,485 and this was only one of the mines using Devoran to export ore. In 1835 the Consolidated and United Mines had 15 engines operating, using 15,000 tons of coal per year; all of this was imported through Devoran. Timber for the mines also came through the port. Deep water vessels were moored off Restronguet Point and the timber was rafted or poled up to Devoran and kept in timber ponds for transport to the mines.

By the time of the 1841 Tithe map, the roads are shown, but only one or two houses had been built beyond the clusters noted in 1832 (together with a Methodist meeting house). In 1809, there were probably scarcely a handful of people living in the area of what became Devoran. By 1841 the population had grown to 250, comprising a mix of porters, smiths, master mariners and watermen, tin workers and miners (and even some copper miners at Sand Cottages) as well as railway officers, mine and other agents, merchants and at least two families rising from trade into gentry (the Taylors and the Mitchells).

A general restructuring of the Redruth and Chase-water Railway came in 1852-4. A revised



**Copper ore hutches just off the river at the far south-east end of Devoran.**

Act enabled re-in-

vestment and conversion to steam-traction, although the proposed extension to Point would always remain horse drawn. Accompanying this was the complete re-laying of the track system, especially in Devoran, and a large-scale re-building programme for the various sheds, offices, stores and other ancillary buildings.

A hugely increased volume of imports and exports could now be shifted and while falling production at the mines (as well as Consolidated & United Mines sending their product on the tram road to Portreath) meant that quantities of ore travelling down to Devoran decreased, the amount of coal going up the line was significantly increasing. Other principal exports included arsenic pyrite, which had a short-lived boom in the 1840s and early 1850s, suddenly ending in 1854 due to the import of sulphur from Sicily.

The Mitchells continued to prosper as owners of limekilns and smelters in Devoran and Point, and as merchants and shipbuilders. The position of their house at Belmont overlooking the village reflects their status as a major employer in the village.

The technological advances in the railway led to an increase in activity on the wharves and this required not only labourers but also overseers, and all the support services that both groups required. While only a comparatively small number of people were employed here this was the impetus for a greater expansion for the village. One of the most notable elements in the population were those trades and professions associated with shipping – the largest single ‘trade’ was that of master mariner, and there were chandlers, rope-makers, shipbuilders and at least three ship owners.

At the same time general trade increased and Devoran became, to a smaller extent, the attractive residential settlement that the 1832 Agar-Robartes plan had envisaged. An 1856 trade directory refers to a weekly market for fruit and vegetables and a post office. Three public houses and two grocers



## Sunday May 3rd afternoon

also served the local populace and, by 1868, Devoran was described as *the large and hitherto thriving village*; by this time a large proportion of the population had little to do directly with the quays, but serviced the growing population of the village itself. The school was opened in 1846 under the auspices of the Church and was used for services by Feock until the new church was built in 1855. The Methodists were served by their own chapel, rebuilt on a much larger scale in 1861.

Devoran and the surrounding area started to decline from the late 1870s. The decline in Cornish mining, which started in the 1860s, meant that ore was no longer exported through the port, although coal was still imported. Clifford Amalgamated closed in 1870 and this resulted in a drop in employment amongst railway workers in particular. Then, in 1876, the very wet winter led to heavy floods and water breaking through the County Adit which released thousands of tons of silt into the Carnon River. Navigation to the upper sections of the river was never restored and the uppermost quays fell into disuse.



**The complex of sidings on the south side of Devoran. 25-inch OS sheet LXIV.13, published 1907.**

The railway kept going on limited trade, although it was reduced to one locomotive which only made two trips a day. During the 1890s the Basset Mines raised tin from the Great Flat Lode and this became the railway's main employment. It also carried bricks from Carharrack, and arsenic from Bissoe, although coal remained the heaviest traffic, both for the mines and for Redruth Gasworks. Unfortunately the number employed by the railway was reduced to just 23. The brickworks were still in operation and were linked to clay pits on the other side of the road and railway.

By 1901 the population had declined to a little over 1,000. While there were still ship owners, boat builders, a pilot and harbour master; there was now only one master mariner, compared to the 20 or so recorded only 20 years before, and an increasingly large population of 'private' residents. In World War 2 Visick's again expanded, building parts for Bailey Bridges and the munitions related industry. Throughout this period, large numbers of Devoran men worked in the docks at Falmouth. Visick's Foundry closed in 1986 and was converted into craft workshops while Perran Foundry became a store and distribution centre for animal feed from 1969, finally closing in 1987. Devoran's current role is chiefly as a residential village, serving Truro in particular, and Falmouth to a lesser extent.

Farther south are the settlements of Chycoose, Point and Penpol which lie around Penpol Creek. This area was a centre for lead, tin and arsenic smelting. The Penpol Smelting Works was built before 1827 by John Swan however in 1828 he was involved in a lawsuit with Viscount Falmouth and was made bankrupt. On September 22nd that year the works were advertised for sale at Pearce's Hotel,

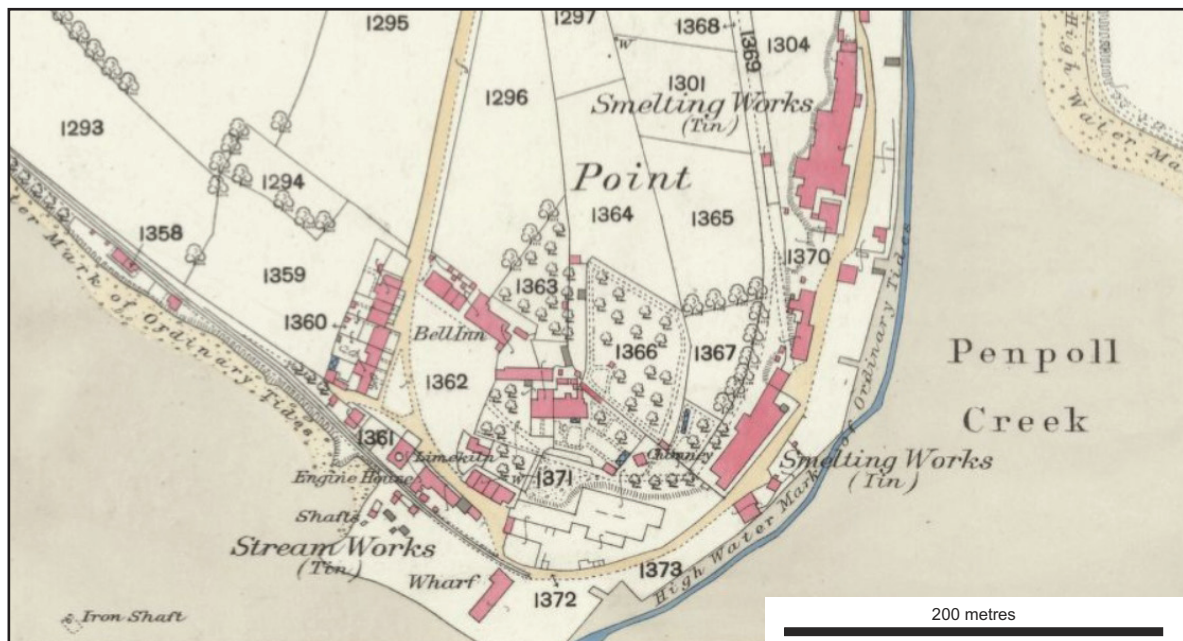


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Truro, where it was described as

the newly erected Lead Smelting Works contains Calcining Furnaces, 2 Flowing Furnaces, 3 Refining Furnaces, with all necessary Working Tools Moulds, Test Rings etc. and stock of bone ashes. In complete repair and calculated for smelting 180 tons of Lead a month.

In 1830 a lead smelting house lease was drawn up between Sir Charles Lemon and William Penrose of Tregie and R. & W. Michell, a Truro partnership with an interest in the Calenick Tin Smelting Works and was also a supplier of mining equipment. However William Penrose died suddenly on 28th March 1838 and the lease was changed. The Michell family continued, but with Penrose's widow Juliana in his place; William Stephens became part of the arrangement.



Map of the Point area showing the streamworks and the two tin smelters. 25-inch OS sheet LXIV.12, published 1880.

In 1870 and 1880 there are other leases between Arthur Tremayne of Carclew (who replaced Sir Charles Lemon following the latter's death in 1868) and the London based Penpol Tin Smelting Company, which had possession of all the land running down to the creek, together with the bone mill and the upper mill pool, except for a piece of land retained "for the purpose of building a schoolroom".

Arsenic flues were built before 1880 and two chimneys were built on the high land behind the works to vent the fumes. In 1924 Fred L. Morcom had a tribute pitch from the Tremaynes to carry away arsenic from these flues.

In the following years tin production in Cornwall declined and the company built a new smelting works near Liverpool. In 1921 they paid the Tremaynes £500 to be released from their repairing contract and left Penpol.

Tin streaming has taken place in the Carnon Valley on and off since the Bronze Age; the first 'modern' working of the deposit was in 1708. An antler pick found at the bottom of the tin-bearing material in about 1803 was dated in 2017 at Oxford to 3269 +/- 27 years BP, a calibrated date of between 1620-1497 years BCE. The Nebra Sky Disk, a bronze artefact decorated with gold found in Saxony in 1999, has been dated to 1600-1560 BCE (although recent research has cast some doubts on this). Isotopic analysis of the bronze suggests that Cornwall was the most likely source of the tin. The gold matches with historic gold finds from Devon.

The river was in previous periods navigable at least 2 miles inland, as far as Bissoe; in 1620

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vessels of 200 tons were able to make this journey. Unfortunately increased mining operations farther up the valley, notably in the United Downs-Poldice area, led to silting up of the Carnon River. The streamworks themselves migrated downstream however this is most likely because the upper streamworks were shallower and more easily worked, rather than an issue with sediment travelling downstream.

The Great Carnon Stream Works opened in 1785, probably near Carnon Bridge, and this involved various local landowners, including the Williams, Fox, Lemon and Agar-Robartes families. The Carnon Company built large embankments on either side of Restronguet Creek from the old road bridge down almost to Chycoose (almost 1½ miles in length). Both the Carnon and Perran Rivers were diverted to run close to the shores so as to preserve navigation to both the Devoran side and to the recently established Perran Foundry at Perran Wharf, only a mile from Devoran. By about 1800 the works began to reach the shore area owned by the Agar-Robartes; the navigation channels, canal and quays that provided access and supplies were moved to keep up with the southern movement.



The remains of the engine house at the Upper Carnon Mine.

The Carnon Streamworks closed in 1811, having made £50,000 over 26 years. Jenkin reported that: 'Its failure is severely felt by the poor labourers in that neighbourhood'. In 1823 a human skeleton was discovered beneath the remains of a cairn some 22 feet below the high water mark. Attempts to re-work tin reserves continued until in 1824 when the Carnon Stream Mine

commenced as a unified operation. An engine was erected on the shore and this pumped the shaft, made from cast-iron cylinders manufactured at the Perran Foundry, by flat rods. Unfortunately the main effect of this was to block the old inshore channel. Despite some initial success and expansion the operation ceased after only 6 years of operation, during which it had made £28,000. Complaints had been received from the Redruth and Chasewater Railway Company however that the workings were blocking navigation.

In 1833 another attempt to work tin from Restronguet Creek was made by a company called the Carnon Stream; an artificial island was built below Penpol Creek however mining was being carried out at two sites, the Upper and Lower Carnon Mines. Its peak year was in 1837 when 122 tons of black tin were sold for £6,291 and 212 men and boys were employed, but it closed in 1842 or 43 owing to low tin prices. Material sold from the Lower Mine at this time comprised a 40-inch pumping engine with three boilers, two horse-whims, and a 16-inch rotary engine which worked the stamps. Adjoining these on the foreshore lay the buddies, frames and a burning-house; much of this material was advertised again the following year. By the time of closure the returns had reached £52,615; after deducting working expenses of £65,692 and royalties of £2,923, this resulted in a net loss of some £16,000.

In 1871 the Restronguet Creek Tin Stream Company was formed to work a hitherto unwrought portion of the tin bed adjacent to Point, and approximately midway between the old Upper and Lower



Carnon Mines. A cast-iron cylinder, Charles' Shaft, was sunk 60 feet into the bed of the river to work the tin gravel. Collins recorded an output of 60 tons of black tin in 1873-4, when it employed 63 men and boys, but working appears to have been abandoned when the price of the metal dropped to £90 per ton in the following year. The Restronguet Tin Stream Co. (Limited) was wound up in 1878 and the materials, though not including the engine, were advertised for sale in 1879. These included a new 2 head pneumatic stamps, of Husband's patent, with shafts and fly-wheel.



A marvellous picture of the Restronguet Creek Tin Stream Company's works to the south-west of Point. Piles of sand, presumably waste, can be seen around the works; the stamps can be seen to the left of the engine house, with a long gantry where a man is pushing a small wagon of ore towards the stamps. Painting by T. May, 1874, at the Royal Cornwall Museum.



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