

The Trevithick Society

2017 AGM

Programme Notes

Compiled by

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for the study of Cornish industrial archaeology and history

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Cover illustration: Abbey Weir on the River Tavy, Tavistock.

AGM 2017 Programme Tavistock area

- 1. Friday May 11th afternoon 2pm**
Walk around Tavistock
- 2. Friday May 11th 7.30pm**
Talk: Robert Waterhouse, The Tavistock Canal
- 3. Saturday May 12th morning**
The Robey Trust
- 4. Saturday May 12th afternoon**
Tavistock Canal walk with Robert Waterhouse
- 5. Saturday May 12th afternoon and evening**
Bedford Arms Hotel: 7.00 for 7.30 Annual Dinner
- 6. Sunday May 13th morning**
Kit Hill, joint meeting with the Dartmoor Tinworking Research group



Friday May 11th afternoon

Tavistock

The area around Tavistock (formerly Tavistoke), where the River Tavy runs wide and shallow allowing it to be easily crossed, and near the secure high ground of Dartmoor, was inhabited long before the historical record. The surrounding area is littered with archaeological remains from the Bronze and Iron Ages and it is believed a hamlet existed on the site of the present town long before the town's official history began, with the founding of the Abbey in 961.

The abbey of Saint Mary and Saint Rumon was founded by Ordgar, Earl of Devon. After destruction by Danish raiders in 997 it was restored, and among its famous abbots was Aldred, who crowned Harold II and William I, and died Archbishop of York.

In 1105 a Royal Charter was granted by Henry I to the monks of Tavistock to run a weekly "Pannier Market" (so called after the baskets used to carry goods) on a Friday, which still takes place today. In 1116 a three-day fair was also granted to mark the feast of Saint Rumon, another tradition that is still maintained in the shape of the annual "Goosey" fair on the second Wednesday in October.

By 1185 Tavistock had achieved borough status and in 1295 became a parliamentary borough, sending two members to parliament. The abbey church was rebuilt in 1285. In 1305, with the growing importance of the area as one of Europe's richest sources of tin, Tavistock was one of the four stannary towns appointed by charter of Edward I.

The greater part of the abbey was rebuilt in 1457-58. Around 1540 (some sources state 1542 as the exact year), Sir Francis Drake was born at Crowndale Farm, just to the west of what is now Tavistock College. A Blue Plaque is mounted on the current farmhouse, behind which Drake is believed to have been born, the original farmhouse having been dismantled and the stone transported for use in Lew Trenchard. He became a prominent figure of his age, a champion of Queen Elizabeth, the first Englishman to circumnavigate the world from 1577 to 1580 and one of the English commanders in the famously decisive victory against the Spanish Armada in 1588.

The famous statue of Drake on Plymouth Hoe is a copy of that on a roundabout on the A386 at the western end of the town, with panels not replicated on the Hoe copy. Drake later made his home at Buckland Abbey, about 8 miles (13 km) away towards Plymouth, jointly owned/run by Plymouth City Council and the National Trust, and now a museum to Drake.

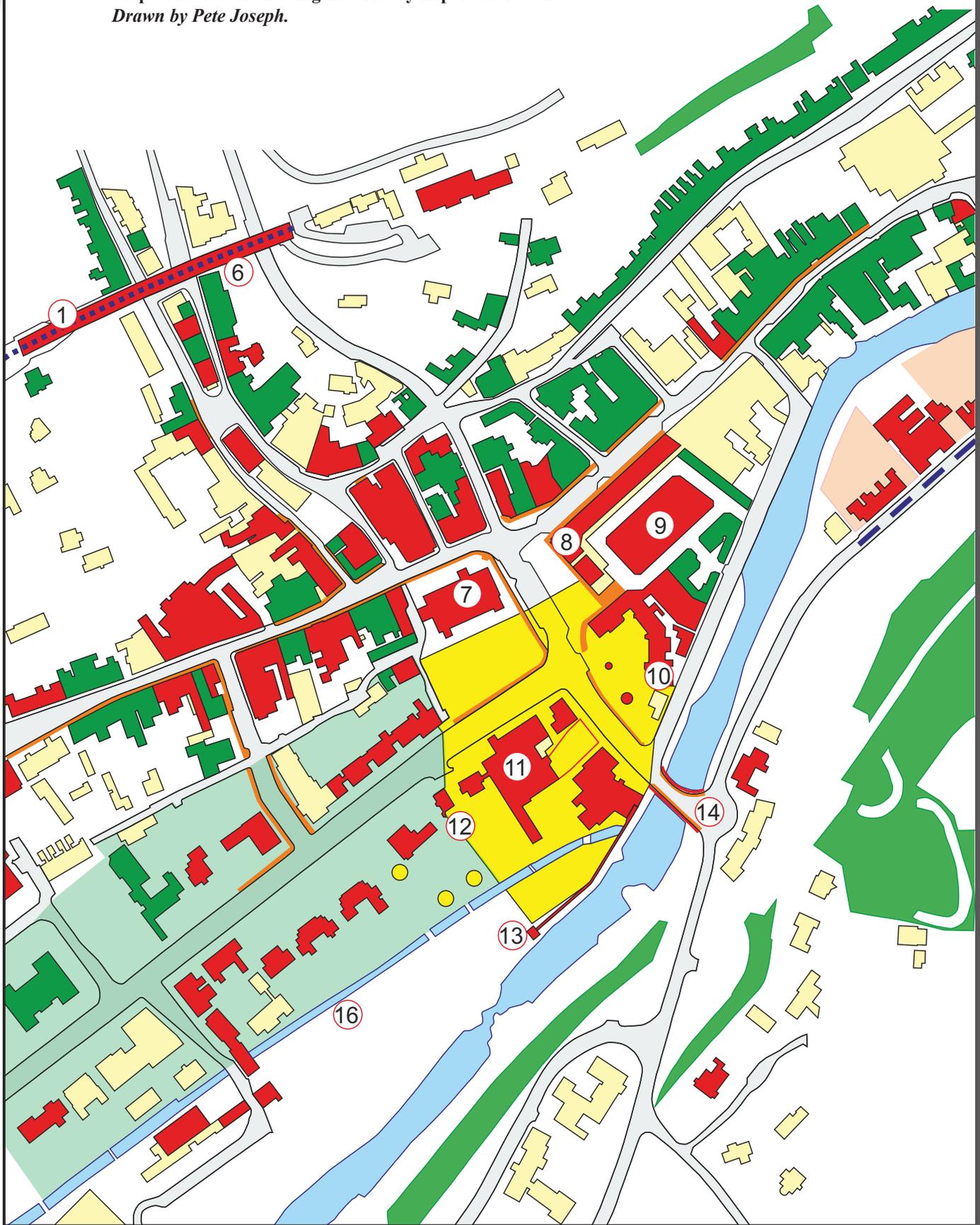
In 1552 two fairs, on 23 April and 28 November, were granted by Edward VI to the Earl of Bedford, then lord of the manor. The woollen industry decayed at Tavistock and was attributed by the inhabitants in 1641 to the dread of the Turks at sea and of Popish Plots at home.

In the 17th century great quantities of cloth were sold at the Friday market and four fairs were held at the feasts of Saint Michael, Epiphany, Saint Mark, and the Decollation of John the Baptist. The charter of Charles II instituted a Tuesday market, fairs on the Thursday after Whitsunday and at the feast of Saint Swithin. The town continued to prosper in the charge of the abbots, acquiring one of England's first printing presses in 1525. Tavistock remained an important centre of both trade and religion until the Dissolution of the Monasteries — the abbey was demolished in 1539, leaving the ruins still to be seen around the centre of the town. From this time on, the dominant force in the town became the Russell family, Earls and later Dukes of Bedford, who took over much of the land following the Dissolution.

Under the stewardship of the Russells the town remained prosperous, surviving the Black Death in 1625 (though 52 townspeople died). In the English Civil War starting 1642, the town was at first held by the Parliamentarians (Francis Russell, the 4th Earl of Bedford was a leading figure in the parliamentary movement), before later hosting King Charles I and his Royalist

Friday May 11th afternoon

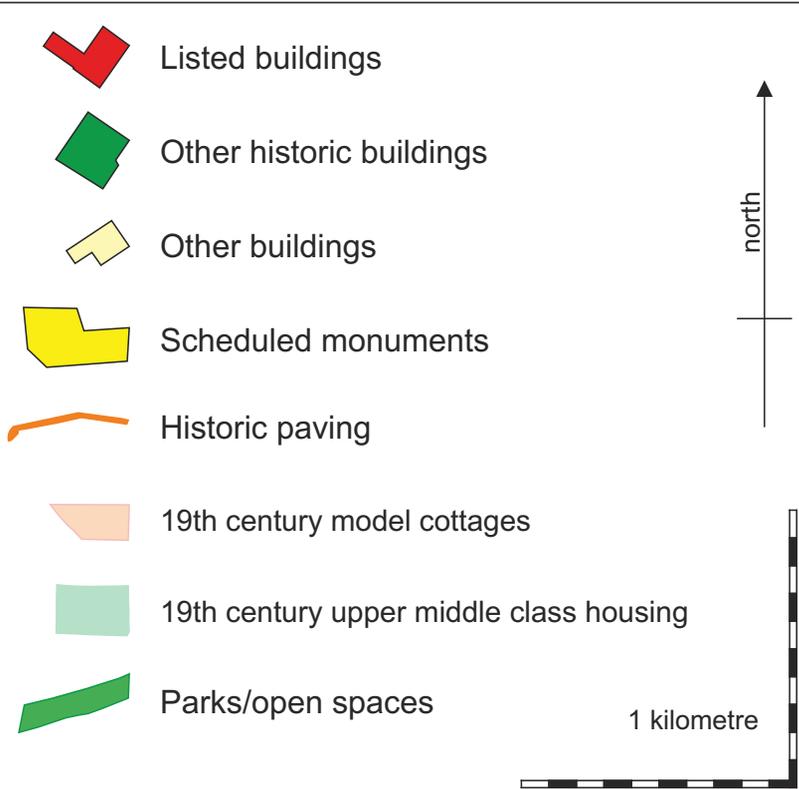
Map of Tavistock showing historically important features.
Drawn by Pete Joseph.



Friday May 11th afternoon



1. Former railway line
2. Tavy Foundry
3. Tavistock Foundry
4. Brooklands
5. Ferrum House
6. Railway viaduct
7. St Eustachius Church
8. Town Hall
9. Pannier market
10. Guildhall
11. Bedford Hotel
12. Betty Gimball's Tower
13. Still House
14. Abbey Bridge
15. Vigo Bridge
16. Tavistock Canal



Friday May 11th afternoon



Bedford Square: the Town Hall.

troops in 1643 after the defeat of the Parliamentary forces at the Battle of Bradock Down. In 1694 William Russell, 5th Earl of Bedford became the first Duke of Bedford.

Tavistock is tied from late medieval times with the Russells, the family name of the Earls of Bedford and since 1694, the Dukes of Bedford. This is clearly seen from the history of the town. The second title of the Duke of Bedford is the Marquess of Tavistock, taken as the courtesy title of the eldest son and heir to the dukedom, and illustrates the importance of this Devon town, its hinterland and the minerals beneath it to the family's fortunes. It is believed that the Russell family retains considerable interests in the locality. Most recently, Robin, the short-lived 14th Duke, as Marquess of Tavistock, was a frequent visitor to the town along with his wife, Henrietta. Andrew Russell is the 15th Duke of Bedford and Marquess of Tavistock.

Mines producing copper, manganese, lead, silver and tin had opened in the neighbourhood and the town played host to a considerable trade of cattle and corn, and industries in brewing and iron-founding. By the 17th century, tin was on the wane and the town relied more heavily on the cloth trade.

By 1800, cloth was heading the same way as tin had done a century earlier, but copper was starting to be seriously mined in the area, to such an extent that by 1817 the Tavistock Canal had been dug to carry copper to Morwellham Quay on the River Tamar, where it could be loaded into sailing ships weighing up to 200 tonnes. In 1822 the old fairs were abolished in favour of six fairs on the second Wednesday in May, July, September, October, November and December.

In the mid-nineteenth century, with nearby Devon Great Consols mine at Blanchdown one of the biggest copper mining operations in the world, Tavistock was booming again, reputedly earning the 7th Duke of Bedford alone over £2,000,000. A statue in copper of the 7th Duke stands in Guildhall Square. The Duke built a 50,000 imperial gallon (230 m³) reservoir to supply the town in 1845, as well as a hundred miners' houses at the southern end of town, between 1845 and 1855. There is a strong, recognisable vernacular "Bedford style" of design, exemplified most strikingly in Tavistock's Town Hall and "Bedford Cottages" ubiquitous across Tavistock and

Friday May 11th afternoon

much of the local area to the north and west, where the Bedfords had their estate and summer “cottage” at Endsleigh House and Gardens, which since 2005 is the Hotel Endsleigh run by Alex Polizzi.

Tavistock was deprived of one member of Parliament in 1867 and finally disenfranchised in 1885. The railway came to the town in 1859, with the town being connected to the Great Western Railway. At around this time the centre of town was substantially and ruthlessly remodelled by the 7th Duke of Bedford, including the construction of the current Town Hall and Pannier Market buildings, and the widening of the Abbey Bridge, first built in 1764, and a new Drake Road ramped up northwards from Bedford Square to the LSWR station. Tavistock North railway station opened to much acclaim and fanfare in 1890. The population had peaked at around 9,000. By 1901 the population had halved, recorded as 4,728. In 1968, following the Beeching Report Tavistock Station closed its doors, and in 1999 English Heritage listed the building as Grade II.

Kelly College, a co-educational public school, amalgamated with Mount House to form Mount Kelly Foundation, to the north-east of the town, was founded by Admiral Benedictus Marwood Kelly, and opened in 1877 for the education of his descendants and the orphan sons of naval officers, and is a pastiche of the Bedford and High Victorian styles of building.

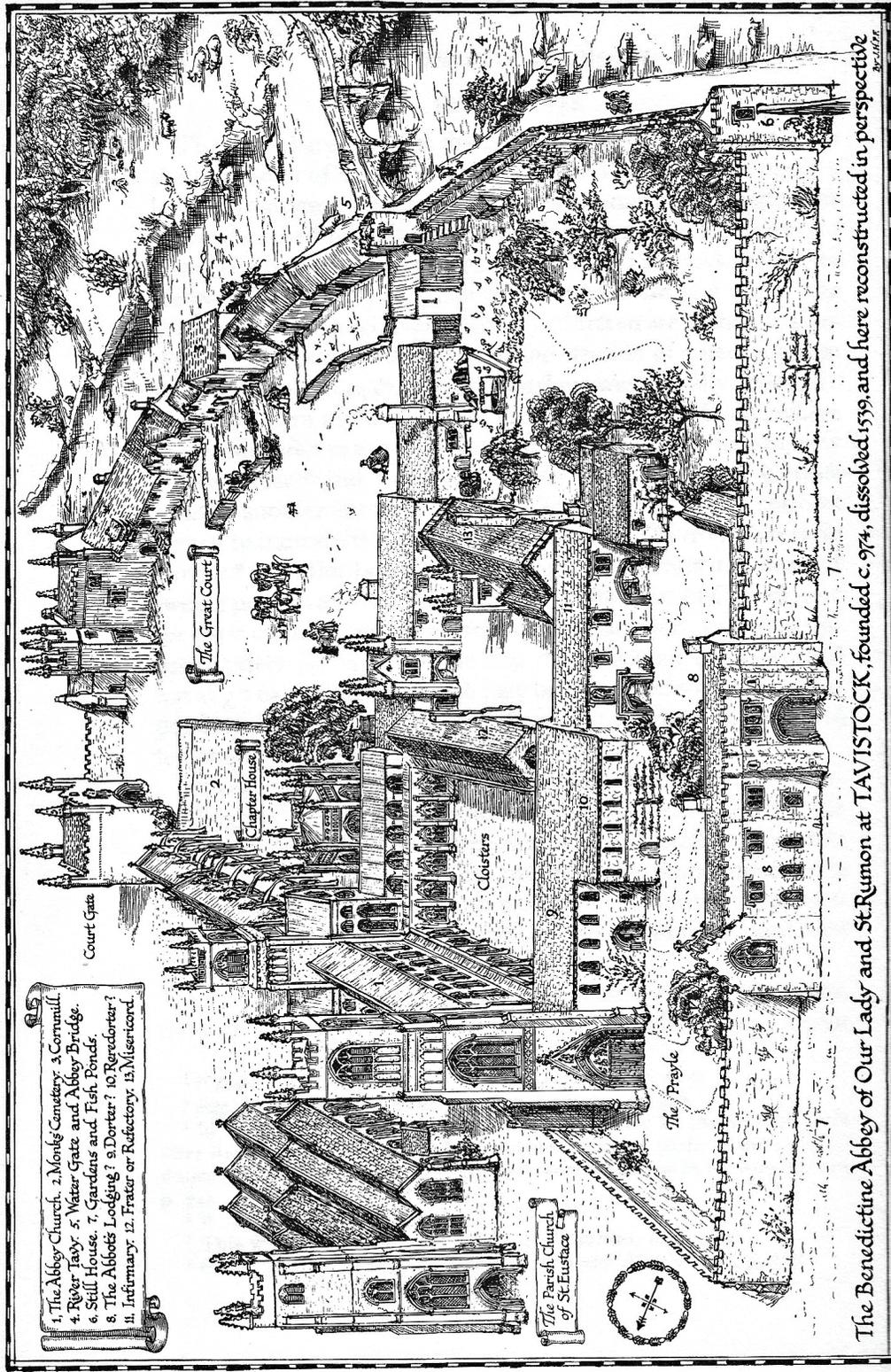
In 1911, the Bedford influence on the town came to an end after over 450 years, when the family sold most of their holdings in the area to meet death duties. The Bedford name can still be seen in many place names around the town. The council cannot raise capital or income from the landholding and most of its budget on managing the properties.

West Devon Borough Council is based in Tavistock, about 500 metres north of Bedford Square at Kilworthy Park. There is a small police station under part of the Bedford building



Abbey Bridge and Abbey Weir on the River Tavy. *Wikipedia.*

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The Benedictine Abbey of Our Lady and St. Rumon at TAVISTOCK, founded c. 974, dissolved 1539, and here reconstructed in perspective

Tavistock Abbey; first printed in H. P. R. Finberg (1951), *Tavistock Abbey*, reprinted by David and Charles 1969

complex on Bedford Square but the adjacent historic Magistrates Court has been closed and the nearest criminal court is now at Plymouth.

In 1933 the long-disused canal was put to use providing hydroelectric power for the area. A war memorial in Bedford Square commemorates many, but not all, of the townsfolk killed in the First and Second World Wars. Many families across Britain exercised their right not to have their family members named on these public memorials. In 2006, an attempt to move the memorial

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to a site in the graveyard of the Parish Church but was blocked by local opposition; this has not happened.

Tavistock had two railway stations, both now closed. Tavistock South was the Great Western Railway's station, on the route between Launceston and Plymouth. This was closed and mostly dismantled between 1962 and 1965. The station was sited to the south of Bedford Square, just over the bridge and to the right — now a council depot: no trace of the station remains. Tavistock North was the Plymouth, Devonport and South Western Junction Railway's station, operated by the London and South Western Railway, on the route between Lydford and Plymouth via Bere Alston. This opened on 2 June 1890 and closed on 6 May 1968. The main station building survives as railway-themed bed and breakfast accommodation while the extensive goods yard is now known as Kilworthy Park and houses the offices of West Devon Borough Council. The railway for around a mile south of Tavistock North station is open to the public as a footpath and nature reserve and it is possible to walk across the viaducts that overlook the town.

The trackbed of the Tavistock North route is almost intact to Bere Alston where it joins today's Tamar Valley Line. There has been discussion regarding the re-opening of a rail link for a number of years. Engineering assessment shows the rail-bed, bridges and tunnels to be in sound condition. In 2008 a housing developer offered to rebuild the railway to Bere Alston (from a new station slightly south of the town) if agreement for him to build 800 properties could be concluded. This has also encouraged speculation about restoring the Tavistock-Okehampton rail link, which could provide an alternative to the Devon coastal main line to link the South West Region with the rest of the country. In December 2010 the developer published an update on the possibility of re-instating the line between Tavistock and Bere Alston and hence providing a train service between Tavistock and Plymouth. In April 2010 the Liberal Democrats had suggested that a Tavistock-Plymouth service could be included in the rail expansion plans should they win the 2010 General Election.

In July 2006 Tavistock was named the eastern Gateway to the Cornish Mining World Heritage Site, which runs westward through the Tamar Valley and Great Consols Mine, down the spine of Cornwall to Lands End. This £75 million project is likely to bring more tourists to Tavistock. A £1.1million World Heritage Site Interpretation Centre (planned for 2007) to be built in the area of the Guildhall, and overlooking the River Tavy has not been achieved.

Saturday May 12th morning

Robey Trust Engineering Works Museum, Tavistock

Pixon Lane, Tavistock
Devon, PL19 9RQ

Registered Educational Charity No. 1089025
Company Limited by Guarantee No. 4225304

It was the acquisition of a Tandem Roller that led to the creation of the Robey Trust in 1983. Damaged and corroded after 20 years in a playground, the roller was donated by Tavistock Town Council to the Robey Trust, formed to restore it to original condition and full working order, a task that took seven years.

Other engines, boilers and plant have been donated to, or purchased by, the Trust, which will continue to rescue and restore further examples of Robey manufacture as funds and manpower permit. In placing these engines and other exhibits on public display, the aim is to enhance awareness of the contribution which Robey made to the pre-eminent position of this country in mechanical engineering during a period of over a century.



Robey express tractor at the Great Dorset Steam Fair.

The acquisition of the Trust's own museum building was achieved in 1996 with assistance from the Heritage Lottery Fund. The money was used to purchase land and for the construction of a purpose built 'works' on the site. This is the New Perseverance Iron Works.

It is the long term strategy to develop the Works into a museum in the proper and legal sense so that restoration and demonstration of steam artefacts to the public can take place in a safe and accessible environment.

A further development in the evolution of the Trust was the granting of an application to become a private limited company by guarantee. A certificate of incorporation was issued on the 30th May 2001 in the name of 'The Robey Trust Limited'. An application was also made to the

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Robey traction engine at the Great Dorset Steam Fair

Charity Commission for the Company to become a Registered Charity. This was granted on the 24th October 2001. This is a major step forward for its organisation as it provides members with the powers of nominating and voting on the appointment of Directors and voting on Robey Trust Ltd matters.

Following some research into the history of Robey & Co. in 1984, the Trust now holds a growing archive of historical and technical publications, drawings and photographs and

is always pleased to receive items to add to the collection or to copy and return. A 'Robey Register' is being compiled to record details of Robey manufactures known to exist worldwide so members can often be furnished with information to assist them in their own research or restoration tasks.

Robey tandem roller.

The Trust meets most Thursdays and Saturdays between 11am and 5pm so if you wish to visit to see what they are all about then this is the best time. It is wise to phone Naomi Cornish (01822 259246) beforehand to save a wasted journey.



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The Tavistock Canal

Genesis

The Tavistock Canal owes its existence in large part to the local mining industry. Rising copper prices and the success of Wheal Friendship, opened in 1796/7, led to attempts to improve transport links in the area. In 1793 the Tamar Manure Navigation proposed a route from the River Tamar via Tavistock to connect with a canal from Crediton to Okehampton. Other branches would connect to Launceston and Hatherleigh. Nothing came of these proposals and the Tamar Manure Navigation, as built, consisted of a short cut by-passing Weir Head at Gunnislake by a single 80 foot lock.

In 1803 a meeting at Tavistock proposed a canal, essentially the Tavistock Canal as built, 4 miles in length from Tavistock to Morwellham. It was a tub boat canal 16 feet wide and three feet deep; there was also to be a branch serving slate quarries at Mill Hill. The cost was estimated at £40,000 and the canal had secured the blessing of the Duke of Bedford over whose land it ran. The main traffic sources on the canal was to be:

- Copper ore from Wheal Friendship and Wheal Crowndale
- Slate and limestone from Local quarries
- General goods to and from Tavistock
- The discovery of and drainage of new mineral lodes
- Provision of water power

The canal flowed from Tavistock, where water was abstracted from the River Tavy, to Morwellham. There were no locks and the main features of the canal were an aqueduct over the River Lumburn, a 2,540 yard tunnel under Morwell Down and a 237 foot inclined plane down to



The Tavistock Canal. *Photo Robert Waterhouse.*

Saturday May 12th afternoon

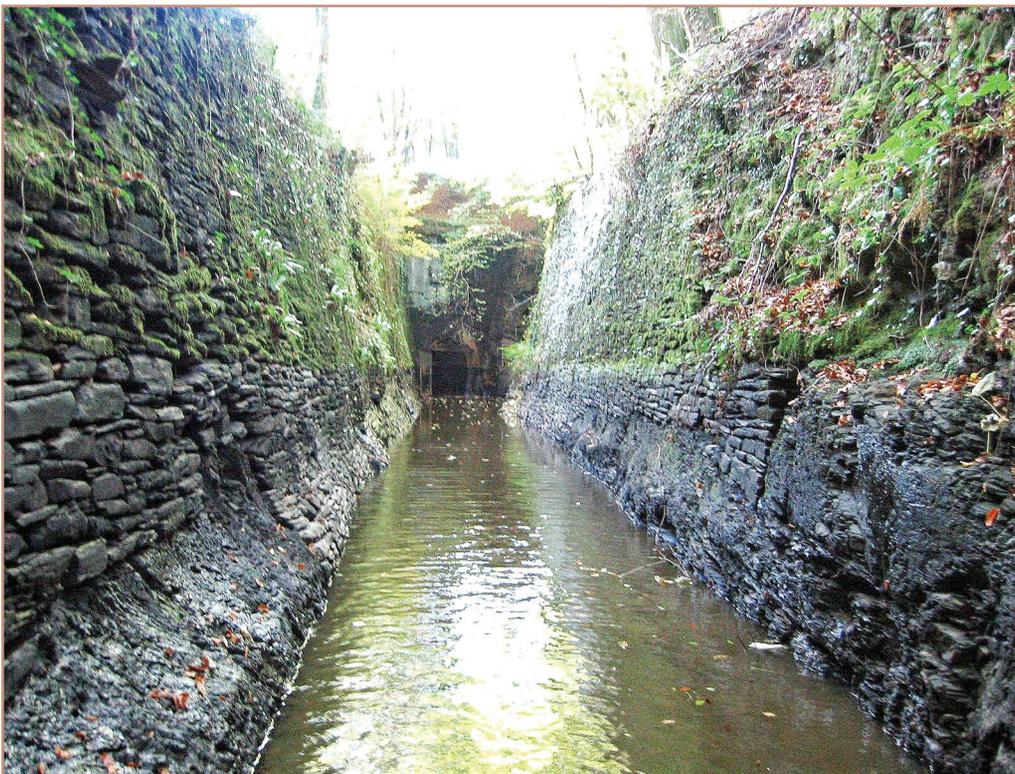
the quays at Morwellham.

The Duke of Bedford was “*requested to make a grant of a Mining Set, for working all Lodes discovered in the Course of the Canal, Embankment, Tunnel, and Collateral [Mill Hill] Branch, that the Proprietors of the Canal may have the right to dig for Copper, Tin, Lead, and all Metals and Minerals, to the extent of 500 Fathoms East, and the same distance West, of the Canal, upon each and every Lode discovered (providing his Grace’s Lands shall so far extend) paying one-tenth part of the produce to His Grace, and to have the same set for the term of forty-two years*”.

Interestingly the build estimate for the canal included provision for testing any lodes discovered. The Duke gave the land for the canal, granted mining rights and took up one-eighth of the shares.

Construction

Work began in 1803 under the direction of John Taylor, the 24 year old manager of Wheal Friendship. More of him later. Almost immediately a copper lode was struck at the Tavistock end of the tunnel. This became the basis of Wheal Crebor, with an entrance adjacent to the tunnel, using the water power of the canal. The canal committee managed Wheal Crebor until 1812. A canal company running a mine was quite unusual. Wheal Crebor’s best days were over by 1820 but activity there continued sporadically until around 1890.



View of the canal approach cutting, looking south-west towards the portal of the Morwelldown Tunnel.
Photo Robert Waterhouse.

Construction of the canal was painfully slow. By 1809 it was complete from Tavistock to the tunnel but only half the tunnel was complete. The working faces, including those heading out from shafts sunk on Morwell Down were only 12 feet high and 6 feet wide, severely restricting the numbers who could work. It was 1816 before the two ends were joined and another three years before the canal formally opened.

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The Tavistock Foundry, converted to housing. *Photo John Stickland.*

Operation

The inclined plane at Morwellham was operated by a waterwheel which used waste water from the canal. According to Hansford Worth, a local consulting engineer who inspected its remains in 1887, it was 25 to 30 feet in diameter and 3 feet breast. The exact method of operation is not completely clear. Despite assertions to the contrary the canal boats did not travel the incline. There were trucks on the incline with one set of wheels larger in diameter than the other by 4". An 1816 reference to trucks carrying iron boxes – an early form of containerisation – may not have materialised, as the trucks seem to have been able to be tipped. There were two lines of rails, initially of a channel section but later flat headed and the steepest gradient is quoted as 1 in 6.

The Mill Hill Branch was also completed in 1819; this was 2 miles long, rising 19½ feet and cost £8,000. An inclined plane was used again to gain height as water was at a premium.

History

The canal was a victim of its own prolonged gestation. By 1819 the local economy was in slump. The canal had cost some £62,000 and shareholders faced a call of £55 per share from the outset to cover this. Toll were reduced from the original intention and, according to Hadfield, the early years saw a profit of around £6000 per annum on the carriage of 15,000 to 20,000 tons. The 1830s saw a decline and in 1844 the canal was let to local carriers, Gill & Rundle.

When new slate quarries opened at Mill Hill in 1844, there was a need to reopen the branch which had been out of use for some years. Instead the company laid a tram road at a cost of £1,381. The quarries proved a disappointment and generated little traffic. In the early 1850s with the threat of the railway reaching Tavistock – it arrived in 1859 – the committee renewed the machinery on the inclined plane. They also enquired about a possible tug and installed a

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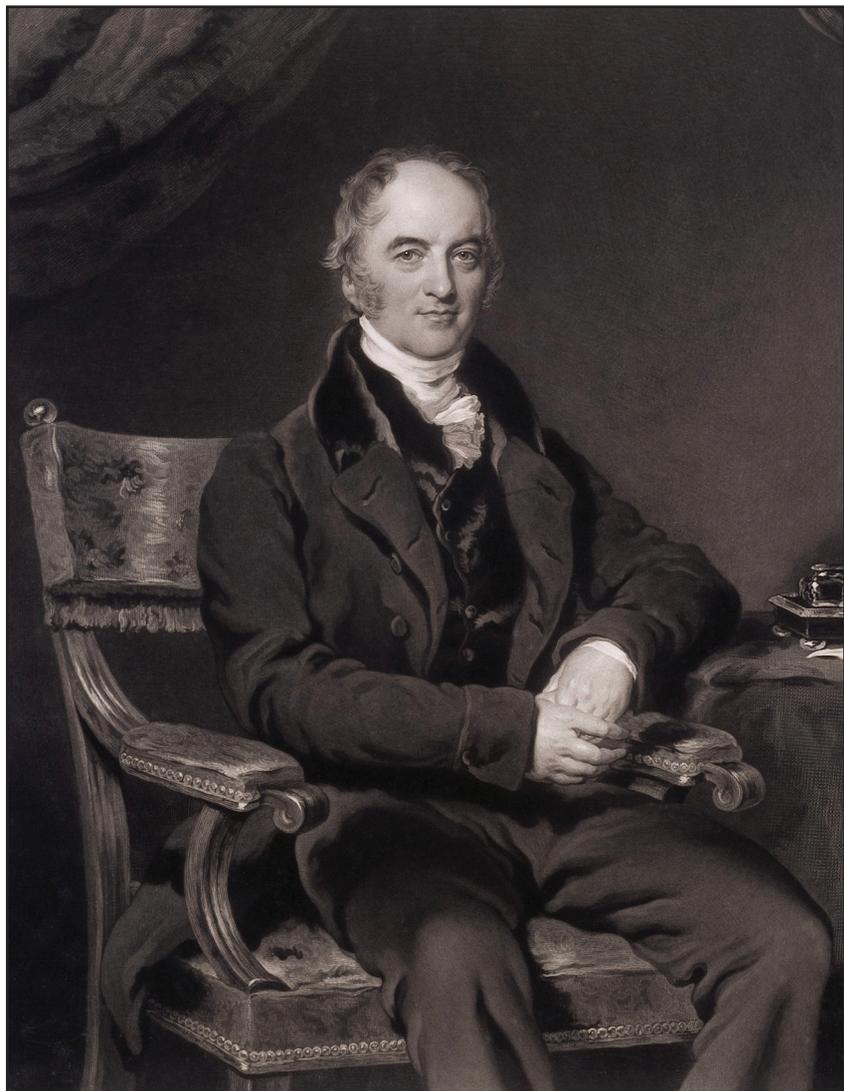
system to pull boats through the tunnel on a continuous wire rope, the power coming from two waterwheels. This was a failure due to friction of the rope within the cramped confines of the tunnel.

By 1866 the canal committee was asking the Duke of Bedford to reduce the dues on the Canal Dock at Morwellham. The Duke, says Hadfield, “*seems to have been evasive*”. In 1870 the shareholders offered to transfer the canal to the Duke and sell their shares to him at a price of £10. After prolonged negotiation, the Duke agreed in 1872 to buy in all the shares at a price of £8 and pay half the cost of an Act to transfer the canal to him. The Act was passed in 1873 authorising the sale for £3,200. There was no obligation on the Duke to maintain the canal. And there the story of the canal ends. It was listed as open in the 1883 Canal Returns – though this seems unlikely, but by 1898 it had disappeared and declined to an overgrown ditch. In 1933-4 the canal bed was cleared, and a new cut made from the south end of the tunnel to a reservoir above Morwellham. This fed a vertical pipe to a small, new hydro-electric power station on the quay below. This remains operational at the time of writing. The last few furlongs of the canal from the tunnel to the top of the incline can still be traced

John Taylor (1779-1863)

A towering figure in nineteenth century mining, John Taylor was born in Norwich. His family were cloth and yarn merchants but John was apprenticed as a land surveyor and civil engineer. In 1798 he visited Tavistock with members of the Martineau family who were related to the Taylors and fellow Unitarians. The Martineaus were shareholders in Wheal Friendship. Amazingly as a result of this visit John Taylor was appointed manager there at the age of 19. The appointment was an immediate success.

Within a year he was also the agent at Wheal Crowndale and had initiated massive improvements in working Wheal Friendship. This enthusiasm for new methods and technology was to mark his entire career. He lived at Holwell House, Whitchurch. It was no surprise when in 1803 he was appointed Engineer-in-charge of the **Mezzotint by Thomas Lawrence after Charles Turner. Wikipedia.**



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proposed Tavistock Canal. During construction Taylor installed water powered pumps to cope with flooding and new ventilation machinery. Throughout this period he remained manager at Wheals Friendship and Crowndale and developed Wheal Crebor. An inclined plane and haulage engine at the latter may well have influenced the use of such technology on the canal. On completion of the canal in 1817 he purchased shares in the enterprise which he retained for the rest of his life.

There is no room here to do justice to Taylor's subsequent and phenomenal career. This included mining in North Wales (Halkyn), Staffordshire (Ecton and Grassington), Cornwall (Consolidated, United, Crinnis, Polgooth), Alston Moor, Mexico, Central Wales and Derbyshire. Add to this his huge contributions to the scientific and technical aspects of mining and one can understand that at his death in 1863, he was referred to as the "Patriarch of British Mining".

Later in 2017 the Trevithick Society will be publishing the definitive history of the Tavistock Canal by Robert Waterhouse



The Tavy Foundry, at the end of the road from Princetown. *Photo John Stickland.*

Foundries

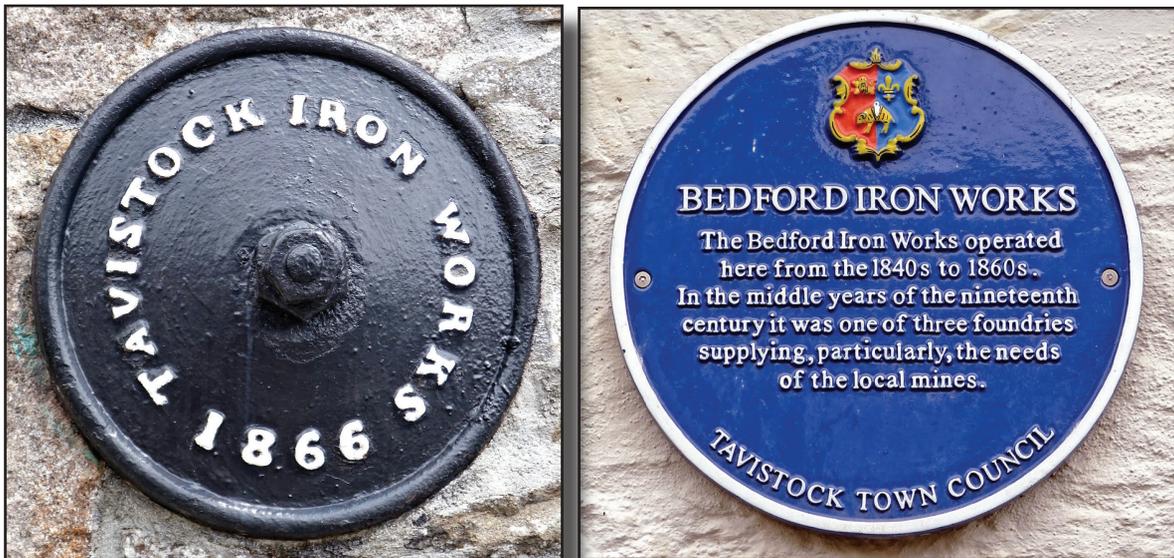
There were two significant foundries in Tavistock. The Tavistock Ironworks dated back to 1809 as the Mount Foundry Iron works of partners, Gill, Bray and Hornbrook. By 1818 John Gill, of Plymouth was sole owner and he was joined in the 1830s by John Rundle and briefly by Christopher Bridgman. At this time the name Tavistock Ironworks was adopted. The largest engine built here was a 50" for West Caradon to the design of Hocking & Loam. Known for a time in the 1860s as Gill & Co and then as the Tavistock Ironworks and Steel Ordnance Co, the company was taken over by local rivals, Nicholls, Williams in 1868.

The Bedford Iron Foundry of Nicholls, Williams had opened in 1848 in Bannawell Street They

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were very soon building engines of up to 50" cylinder and by the 1850s had secured additional capacity by leasing the Roseland Vale Foundry at Menheniot. They specialised in horizontal engines and small portables but also built at least one railway engine for the Devon Great Consols Railway. Their engines went to Tywanrhaile (22"), Great North Tolgus (45") and South Chiverton (60"). The sixty-inch was the largest engine built by Bedford Foundry with engines of that size also erected at Kelly Bray and Leawood (Walkhampton). The surviving engine-house at Hingston Down Mine, with its unusual parapet roof contained a 50" Bedford Foundry engine, erected there in 1905 from Devon Great Consols. Bedford also supplied, jointly with Perran Foundry, a 60" and other plant to the South Australian Copper Company, Strathalbyn.

On taking over the Tavistock Ironworks, Nicholls Williams transferred operations to the Tavistock Ironworks site and operated as Nicholls, Matthews & Co. As mining declined in the 1880s the business reverted to general foundry work as the Tavistock Ironworks of Joseph Mathews & Co.



Tie-bar plate on the wall of the Tavistock Foundry and blue plaque commemorating the Bedford Foundry. *Photos John Stickland.*

Sunday May 13th morning

Kit Hill Country Park

Introduction

Kit Hill (Bre Skowl in Cornish), at 334 metres high, dominates the area between Callington and the River Tamar in southeast Cornwall, England, UK. The word 'Kit' comes from Old English for kite, a reference to birds of prey, not necessarily kites. Buzzards and sparrowhawks can still be seen on the hill. It is one of five Marilyn hills (as opposed to the Scottish 'Monroes') in Cornwall, the four others are Watch Croft, Brown Willy, Carnmenellis and Hensbarrow Beacon.

Kit Hill Country Park (which includes the hill and surrounding areas), was given to the people of Cornwall in 1985 to mark the birth of Prince William, by his father, the Duke of Cornwall (Prince Charles). It is managed by Cornwall Council, and covers an area of about 400 acres (152 hectares), making it the most dominant landscape feature in East Cornwall. Kit Hill is the highest point in the Tamar Valley Area of Outstanding Natural Beauty.

The country rock of the hill is granite, part of the Cornubian batholith which stretches from Dartmoor to west of Scilly. The associated mineral deposits were mined extensively in the 18th and early 19th centuries.

Evidence of prehistoric use is shown by the presence of Neolithic and Bronze Age barrows. The Anglo-Saxon Chronicle reports that in 835 (corrected by scholars to 838 AD) king Egbert of the West Saxons defeated an army of Vikings and Cornish at Hengestdun ("Stallion Hill"), which is usually interpreted as being at Hingston Down.

On the summit of Kit Hill is a Civil War redoubt as well as a folly built by Sir John Call of Whiteford, Stoke Climsland, built in the style of a low-walled Saxon castle.

The area around these is maintained by a ranger and volunteers, who also generally keep the vegetation on the hill under control.

Industry

Excelsior Mine

The Excelsior sett at one time embraced much of the Kit Hill area, just over a mile NE of Callington in Cornwall, but the name later came to be more closely associated with the Excelsior Tunnel, sometimes known as Kit Hill Tunnel.

The tunnel was driven SSW from a portal in Deerpark Wood with the intention of intersecting the North Engine Shaft of Kit Hill Mine (situated near the stack at the summit of the hill) at a point 660 feet below the surface. This would have drained the mine around the shaft and the $\frac{3}{4}$ mile long tunnel may have cut through a number of undiscovered tin and copper lodes that were believed to exist beneath Kit Hill.

Miners began driving the 8' x 8' tunnel in about 1880 but a shortage of funds led to the abandonment of the tunnel a few years later when it was only half way to the shaft. Work was recommenced on a smaller scale in the late 1930s under the auspices of a local chemist and tin miner Captain George Moor. An air compressor for working rock drills was installed near the entrance, with an air line to the working face 2,100 feet in, while there were hand-operated fans and their associated trunking to provide fresh air and to clear smoke from the tunnel after blasting. A single line tram road ran the length of the tunnel.

Captain Moor continued the tunnel southward for a short distance at a reduced size but it was then abandoned and attention switched to reworking the old mine dump area near the entrance for wolfram. This dump was worked out by 1941 and a small shaft was then sunk at the southern end of the wood which yielded some wolfram. By 1942 new plant had been installed on the site and

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it is recorded that at least two tons of wolfram were recovered. The project was, however, short lived and all mining ceased by 1946. There was some further development of the shaft by New Consols Mine at Luckett in the late 1940s or early 1950s but when the site was visited in 1954 it was found to be abandoned and no further mining has taken place since that date.

A similar tunnel was driven on the south side of Kit Hill for about half a mile with the intention originally of connecting with the Execelsior tunnel.

Kit Hill United

Latterly the sett included Kit Hill Mine, Kit Hill Great Consols, East Kit Hill Mine and South Kit Hill Mine (Cornwall Great Consols).

In the 15th and 16th centuries tin lodes were dug from the surface by long narrow open works and closely spaced pits. By the 18th century operations had commenced underground. The first machinery here was a windmill in the 1830s when the shaft was sunk 30 fathoms. The main



Stack built in 1858 for Kit Hill Great Consols/Kit Hill United. Photo Pete Joseph.

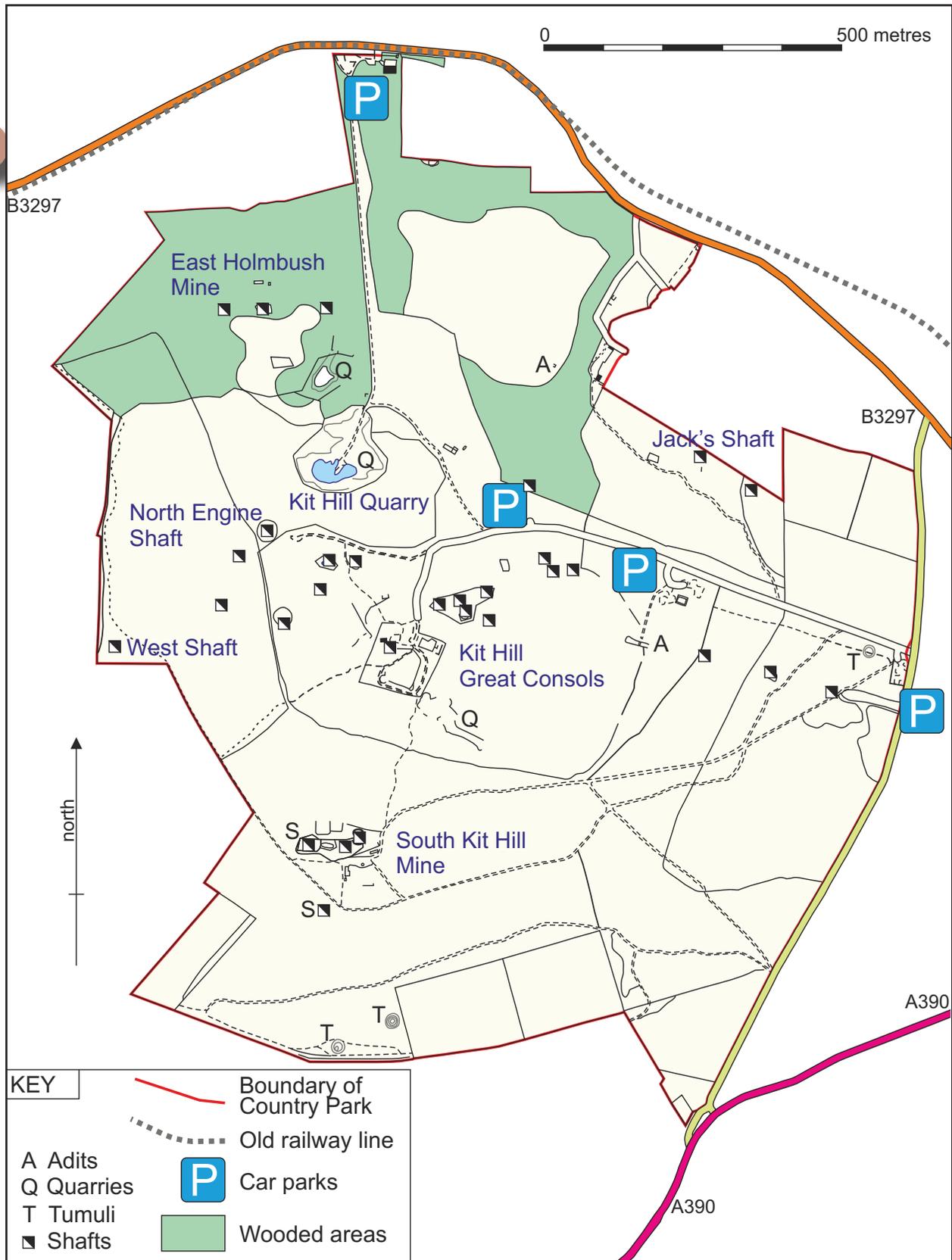
reworking commenced in 1852 under the name Kit Hill United and used a 30-inch beam engine. It wound from two shafts, pumped from two shafts by flat-rods and also worked the stamps.

South Kit Hill Mine, opened in 1856, reached a maximum depth of over 100m. Around the chimney are the remains of the engine house, with its flywheel slots and six circular buddles. The ornate summit chimney, built in 1858 for the Kit Hill Great Consols / Kit Hill United mining complex, is a famous landmark. It stands on a pentagonal earthwork, which is thought to have been an 18th century folly. The chimney served a steam engine that pumped water and lifted ore from the deep mine workings, replacing a windmill that stood here in the 1830s. A flue, which carried the arsenical fumes, is crossed on the approach to the main mine shafts.

The large shaft here, North Engine Shaft or Old Crumbly, is over 200 metres deep. The smaller shafts, now protected by fencing, were used for ventilation and prospecting.

In 1864 the cylinder split due to overwork and the mine closed. Sporadic mining took place

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Map of Kit Hill showing the main features. *Drawn by Pete Joseph.*

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until 1881 when the sett was worked as Kit Hill Consols. A 30-inch rotative engine from the Bedford Foundry was installed on the summit in an engine house with a low hipped roof similar to that at Hingston Downs.

Mining ceased in 1884, at least partly due to the hardness of the granite.

East Kit Hill Mine

Little is known about this mine; it worked in the early 1850s but closed in 1856 and reopened in 1870. The ruined engine house and stack are thought to have worked Cornish stamps for crushing ore. The mine produced some tin, arsenic and tungsten.

Operation Orpheus

By the late 1950s, although the 'Cold War' was at its height, the eastern and western powers were attempting to limit the nuclear arms race, not least because of the huge financial cost to each side. Obviously it is essential for such a treaty to demonstrate that it was possible to detect surreptitious nuclear tests wherever they were carried out. However it was proposed by an American scientist that put forward the theory that it was possible to camouflage the seismic signal of an underground explosion so that it could be either made to look much smaller than it really was or missed altogether. It was therefore decided to carry out several tests using conventional explosives in order to prove, or not, this theory.

In 1959 the Atomic Energy Authority took over the Excelsior Tunnel, and used it for underground explosions. These activities were the first stage of Operation Orpheus and involved firing small charges in a 6 ft (1.8 m) diameter cavity in granite and shale at depths of 100 to 300 feet (91 m) in the tunnel. Phase two was carried out in Louisiana. Here, in the Operation Cowboy tests, charges of 3,000 lb (1,400 kg) were detonated in 30 ft (9.1 m) diameter cavities at depths of 800 ft (240 m) in a salt mine in. Finally, at Greenside Mine, 3,000 lb (1,400 kg) decoupled



East Kit Hill Mine. *Photo Pete Joseph.*

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test and a 1,100 lb (500 kg) coupled test would be carried out in andesite rock at a depth below surface of 1,700 ft (520 m) and the results compared. This lead and silver mine was still open when the tests were carried out but closed shortly afterwards. At the time it was in Westmoreland, but boundary changes mean it is now in Cumbria.

Tragically, two men were killed by noxious gasses following the first major explosion. The Inspector of Mines then stepped in and insisted on safety work, notably the installation of ventilation fans, be carried out; this delayed any further work by three months. However the work did confirm that what became known as the Latter Decoupling Theory was correct. This prevented talks on limiting nuclear tests, except for any in space.

Granite Quarrying

The granite industry on Kit Hill began as elsewhere with surface working for moorstone. Later small quarries for local use were opened on the south side of the hill. There are two major quarries on the north side of the hill; workings here began in 1872 and in the early years were operated by a bewildering number of companies. Kit Hill granite was used in six Thames bridges, in docks at Devonport and London and the Bishop Rock lighthouse. The final period of working was from 1910 to 1955. The north side quarries benefited from a connection by incline to the East Cornwall Mineral Railway (see below) which skirted the north side of the hill on its route from Calstock towards Callington.

The Incline

The incline, which can easily be traced on the north side of the hill, is some 1600 feet long and opened in 1872. It was self-acting and dropped 300 feet from the quarries to rail sidings at Downgate with gradients of 1 in 5 at the head and 1 in 8 at the foot. According to Bodman, the incline was single track below the passing loop and three-rail above. When opened the incline shared the 3' 6" gauge of the East Cornwall Mineral Railway. The railway was converted to standard gauge in 1908 but the incline remained at the narrower gauge until the 1930s with granite transferred by crane.

The Tamar, Kit Hill & Callington Railway

Construction of this railway started in 1864. The name was later changed to the East Cornwall Mineral Railway, and that line opened in 1872. The Gunnislake to Bere Alston section survives as part of the Tamar Valley Line.

Some remnants, mainly granite sleeper blocks, of the line can be found on the northern slopes of the Country Park site.

The East Cornwall Mineral Railway

This 3' 6" gauge mineral railway opened in May 1872. Its main purpose was to serve the copper and tin mines quarries and other industries along its route from quays at Calstock on the River Tamar to Callington. The link to the quay at Calstock was by way of a self-acting incline which preceded the railway, opening in 1859. This was 2310 feet long rising 350 feet at 1 in 6 with a substantial curve en route. A boy was therefore stationed at the half way point to watch for any problems. Once incorporated into the ECMR, horses were used on the quays at Calstock with steam locomotives above the incline. The motive power was provided by two 0-4-0STs from Neilson of Glasgow. These served the line until the early twentieth century.

By then the town of Callington was chafing at the fact that it had no rail connection. Various proposals were in the air most of which either involved a connection to the GWR at Saltash or a link to the London & South Western Railway which had reached Tavistock in 1876 and then ran into Plymouth over the GWR's Tavistock branch. In 1890 the grandly titled Plymouth, Devonport

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& South Western Junction Railway had opened from Lydford to Plymouth via Tavistock and Bere Alston giving the L&SWR independent access. The PD&SWJR's act required it to purchase the ECMR within a year of opening and this duly occurred in 1891. The possibility of a Saltash to Callington Railway re-emerged with the granting of a Light Railway Order in 1900. No work was done though the powers passed to the GWR in 1907. By this time work was in hand to upgrade the ECMR and convert it to standard gauge. The GWR contented itself with a Road Motor [Bus] service.

The rebuilt ECMR mainly followed the existing route. The incline at Calstock was bypassed by a new section of track which crossed the Tamar on a handsome concrete block viaduct and joined the PD&SWJR at Bere Alston. The Calstock quays were served by a huge steam powered vertical wagon lift beside the new viaduct. Intermediate stations were provided at Calstock and adjacent to the original ECMR goods depots at Gunnislake (Drakewalls), Latchley (Cox's Park), Stoke Climsland (Monk's Corner), Callington Road (Kelly Bray). Stoke Climsland was so far from that village as strain credibility and was soon renamed Lockett. A new halt opened at Chilsworthy. The terminus at Kelly Bray was a long walk from Callington; despite many representations an extension to the town was never built. The line beyond Gunnislake closed on 5th November 1966. The section from Bere Alston to Gunnislake clung on due mainly to inadequate road links to and from Plymouth and seems safe for the foreseeable future.

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