Archaeology Wales

Blaenavon Forgotten Landscapes Project

Conservation Management Plan

By
Dr Amelia Pannett MIFA

Report No. 1046

Archaeology Wales Limited,
Rhos Helyg, Cwm Belan,
Llanidloes, Powys SY18 6QF
Telephone: 01686 440371
E-mail: admin@arch-wales.co.uk

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Prepared For: Steven Rogers

Edited by:	Authorised by:
Signed:	Signed:
Position:	Position:
Date:	Date:

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Rhos Helyg, Cwm Belan,
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Summary

In December 2011, Archaeology Wales was commissioned by the Blaenavon Forgotten Landscapes Partnership to compile a Conservation Management Plan for three sites within the Blaenavon Industrial Landscape World Heritage Site. These three sites are associated with Hill Pits mine, and comprise the pithead workings at the mine, the brake engine for the tramway incline linking the mine with the Blaenavon ironworks, and an explosives magazine on Garn Road. The aim of the project was to compile a detailed history of the sites, assess their current state of preservation and their ecological potential and identify vulnerabilities that threaten the long term preservation of the sites. This information was used to inform a set of conservation proposals that includes guidelines for works to be carried out and a proposed timetable.

1. Introduction and Background Information

1.1 Introduction

In December 2011, Archaeology Wales was commissioned by the Blaenavon Forgotten Landscapes Partnership to compile a Conservation Management Plan for three sites associated with Hill Pits, within the Blaenavon Industrial Landscape World Heritage Site. The three sites were:

1. Garn Road powder store (NGR: SO 23912 09847)
2. Hill Pits tramway incline engine brake (NGR: SO 24314 09847)
3. Hill Pits pithead workings and cottages (NGR: SO 23912 10249)

The work involved historical research, a standing building survey, a condition survey and a Phase 1 ecological survey for the three sites. The aim of the work was to compile a detailed history of the sites, record their current state, assess potential vulnerabilities, determine their ecological potential and provide recommendations for their long term conservation and management.

The work was carried out by Dr Amelia Pannett of Archaeology Wales (historical research, building recording and condition survey), Dr Neil Phillips of APAC Ltd (standing building survey) and Dan Wenczek of Bearwood Associates (ecological survey).

1.2 Site Description

The three sites are located to the north-west of Blaenavon town, on the slopes of The Blorenge mountain (NGR: SO 2400 0990 centre). The sites are positioned some distance apart (figs. 1 and 2), but form part of the interconnected industrial landscape associated with the Blaenavon ironworks.

The Garn Road powder store is located 70m north of Garn Road at 380m AOD. It lies in an area of flat, waterlogged land adjacent to the line of a former tramway. The surrounding landscape is characterised by small enclosed fields of pasture and spoil tips from nearby mine workings. The powder house is Grade II listed.

Hill Pits tram incline engine brake is located 450m to the north-west of the powder house at 420m AOD. It is located adjacent to the line of the tramway leading from Hill Pits to the ironworks in Blaenavon, at the top of the incline which slopes steeply away to the south-east. The site lies in an area of rough grazing in a landscape

characterised by mining infrastructure and spoil tips. The incline brake is a Scheduled Ancient Monument.

Hill Pits is located 600m to the north-west of the tramway incline brake at 427m AOD. The site lies below and to the west of the line of the tramway, sheltered by the rise of the made ground on which the tramway was built. The site comprises the upstanding remains of the chimney (Grade II listed), two capped shafts, the remains of the engine house, the remains of a terrace of workers cottages and four enclosed fields associated with the cottages. The surrounding landscape is characterised by rough grazing, mining infrastructure and spoil tips.

1.3 Summary history of the local area

The industrial history of the Blaenavon area dates from 1787, when three businessmen from the Midlands arrived in south Wales and leased 12,000 acres of land from the Marquess of Abergavenny (Wakelin 2006). Their intention was to set up a large ironworking complex on the edge of the coalfields, to take advantage of the abundant local coal and ironstone resource. The population of the area at this time comprised a small, dispersed community living in upland farms, with no defined population centre.

By 1792, the Blaenavon ironworks consisted of three steam-powered blast furnaces working ironstone mined from the surrounding hillsides. A series of mines was set up across the land leased from the Lordship of Abergavenny, connected to the ironworks through a network of horse drawn tramways (Wakelin 2006), From their inception, the ironworks were one of the most productive in the world, producing 4318 tons of iron per year by 1796 (Wakelin 2006). The town of Blaenavon started to grow around the ironworks, as the company built houses to accommodate its workers and their families. By 1798 the Blaenavon Iron and Coal Company employed 350 people and the population of Blaenavon was around 1000 (Wakelin 2006).

The Blaenavon Iron and Coal Company suffered from fluctuations in the price of iron throughout the early nineteenth century and there were strikes amongst the workforce when the company imposed strict wage cuts on the workforce (Wakelin 2006). Nevertheless, the ironworks continued to expand into the nineteenth century, and the company continued to extend its exploitation of the local resources, opening up new mines on the hills above Blaenavon throughout the early and mid 1800s. By 1858 the ironworks was producing 26,872 tons of iron a year in 5 furnaces, and the population of the town had grown to more than 10,000 (Wakelin 2006).

By the 1870s the company was struggling against the growth of imported iron more suitable for the manufacture of the new superior metal, steel (Wakelin 2006). The company renamed itself the Blaenavon Iron and Steel Company in 1870 and started investing in steel manufacturing technology. The mines in the hills surrounding the town continued to supply raw materials for the manufacture of pig iron in the blast furnaces, and the company employed two scientists to discover how to use the phosphorous rich iron from Blaenavon in the production of steel. This was achieved in 1878, but proved the catalyst for the decline of iron production at Blaenavon as it enabled the rapid expansion of the European iron industry. At the end of the nineteenth century the Blaenavon company had turned its focus away from iron

production to the mining of steam coal, and subsequently became the largest producers of coal in Wales (Wakelin 2006).

The twentieth century saw the gradual decline of the coal industry in Blaenavon. With the loss of local industry came the loss of nearly half of the population and the inevitable decline of the town (Wakelin 2006). The end of the twentieth century saw the rebirth of the town as a tourist attraction, as the value of the mining and industrial heritage started to be realised. In 2000 the town and much of its surroundings was designated a World Heritage Site in recognition of the significance of the towns industrial past.

2. Issues and Constraints

There are a number of Issues and Constraints that affect any conservation, repair and restoration of Hill Pits, the Tramway Incline Brake and the Powder House, and statutory consents will be required prior to the onset of some of the proposed works. The issues and constraints are listed below, with full details set out in Appendix 3.

1. World Heritage Site Status – the whole of the study area lies within the UNESCO listed Blaenavon Industrial Landscape World Heritage Site
2. Listed Buildings – the Powder House and Hill Pits Chimney are Grade II Listed Buildings. Listed Building consent will be required prior to any work on either structure.
3. Scheduled Ancient Monument – the Tramway Incline Brake Engine is a Scheduled Ancient Monument. Scheduled Monument Consent will be required prior to any work being carried out.
4. Biodiversity, Habitat and Protected Species – local action plans and wildlife legislation concern species that may be found on the sites
5. Local Development Plan – Torfaen Council's LDP sets out policies regarding the protection of the heritage resource
6. Rights of way and other access agreements – there is a Public Right of Way through Hill Pits and an established Permissive Route along the tramway.

3. Historic Background

The history of the sites included in this study, Garn Road Powder House, the Tramway Incline Brake and Hill Pits, is inextricably linked to the history of coal and iron working in the hills around Blaenavon. This area is known to have been exploited for coal and ironstone since at least the seventeenth century (Wakelin 2006), but these workings were to support small-scale local industry. In 1787, a partnership of businessmen from the Midlands leased a huge tract of land from Lord Abergavenny, known as 'Lord Abergavenny's Hills', on which they built a substantial new ironworks. The ironworks were to be steam powered and contained multiple furnaces and from the onset of production they ranked as one of the most productive ironworks in the world (Wakelin 2006).

The ironworks themselves were located on the edge of the coal measures and were supplied by a series of small coal mines scattered over the neighbouring hills. These mines were connected to the ironworks through a series of tramways. Hill Pits was one such small mine, sunk to provide both ironstone and coal to the nearby ironworks. The mine was sunk by the Blaenavon Iron and Coal Co. in the late 1830s and recorded as being open for production by 1844 (Barber 2002). Prior to the

establishment of the mine, the land had been part of the commons grazing. Deakin's map of 1819, depicting the holdings of the Blaenavon Co., shows the site of Hill Pits within an area marked 'Crop of the Black Pins' that formed part of the leasehold from the Lordship of Abergavenny. The small farm of Tir Abraham Harry is located immediately to the east of Hill Pits. This small farmstead sits within a small area of enclosed land and is probably characteristic of the type of settlement present on these hills prior to the onset of mining and ironworking.

The Tithe Map for Llanfoist Parish, surveyed in the late 1830s and published in 1840, shows Hill Pits around the time of its inception (fig. 3). By this time, the two mine shafts had been sunk and the engine house, chimney, reservoir and workers cottages built. The tramway linking the mine to the ironworks at Blaenavon had also been constructed (no. 307a) – this was a single track from the mine to the top of the incline where it became a duel line, returning again to a single line at the base of the incline. The incline brake is not depicted on the map, which suggests that it had not yet been built. Tir Abraham Harry is shown on the map (no. 309), together with the enclosed land associated with the farm (no's. 307 and 308). Interestingly, the tramway cuts through the Tir Abraham Harry enclosure, separating around a third of the land from the farm – this land would later be covered by spoil tips. The farm and the enclosed land are listed on the Tithe Apportionment as belonging to the Blaenavon Iron and Coal Co., tenanted by John Williams. The tramway and structures at Hill Pits are also listed as belonging to the company, while the site is surrounded by common land. The well-established state of the mine in 1840 demonstrates that it was already in production by this stage, although the surrounding landscape had yet to be covered by spoil tips.

Hill Pits was established primarily to supply ironstone to the ironworks, but also mined coal both to supply its own engine house, and to help improve the financial situation of the Blaenavon Iron and Coal Co. during slumps in the iron trade (Barber 2002). The mine had initially been conceived as a means of bringing extraction closer to the ironworks and reducing the Blaenavon Iron and Coal Co.'s expenditure on haulage (Van Laun 1979). The mine worked the Old Coal and Bydelog seams for steam coal and the Bottom Vein Mine seam for ironstone (Van Laun 1979), and was initially a success, as was reported by the company in 1844:

> "the situation of the Hill Pits has proved most favourable, the veins of coal and ironstone lying very flat, thus making the roads convenient to get materials from the bottom of the pits and rendering the haulage in all directions comparatively light." (Van Laun 1979)

The OS map of 1880 (fig. 4 and 5) provides details about the layout of the pithead workings on the site at their greatest extent. The map shows the two shafts located on the northern side of the site, with an engine house and chimney to the south. The shafts were each connected to a tramroad, which joined the main tramroad linking the pit to the ironworks in Blaenavon. A third tramroad passed to the south of the shafts. All three linked to sidings to the west of the shafts. A branch of tramroad linked the shafts to the engine house, demonstrating that the steam engine would have been fed from coal mined on site.

The engine house is depicted as three separate buildings immediately to the south of the chimney. While the map does not give details about the function of each of these

buildings, excavations by Van Laun in the 1970s revealed that the central building had functioned as a boiler house, with a flue connecting into the chimney (Van Laun 1979). The western building, he suggested, had been the location of the winding engine (Van Laun 1979), while the third building may have been a coal store. The chimney is a spectacular construction, built from carefully worked stone blocks it rises for nearly 6m and is capped by a course of rounded stone blocks. Above this would have been a chimney stack, probably brick-built, which does not survive. The chimney appears more substantial than would have been necessary and could perhaps have been deliberately designed as such to make a statement about the Company's wealth and status. The chimney is Grade II listed.

To the east of the engine house was a row of four cottages, presumably housing for the mines workforce. To the south of the cottages was a series of small buildings, probably sheds and outhouses, and four small enclosed fields. These would have allowed the families living and working at Hill Pits to enjoy some measure of self-sufficiency, keeping some animals and growing small amounts of crops.

The Hill Pits site sat within a landscape scarred by industrial working. The OS map of 1880 marks the location of an old shaft to the north of Hill Pits, while much of the ground the pithead workings were constructed on appears to comprise made ground. Surrounding Hill Pits was an expanse of spoil tips, created by the mining activities at both Hill Pits and earlier sites in the landscape.

The pit was linked to the ironworks in Blaenavon by a single track tramway, built on a raised platform of mining spoil and waste. The tramway passed a weighing machine before splitting to become a two line track prior to its descent of the incline. At the top of the incline was a counterbalanced brake engine which controlled the speed of carts travelling down the incline (fig. 4). The counterbalanced mechanism allowed empty carts to be pulled up the incline using the weight of the full ones travelling down. A band brake on the wheel connecting the two carts controlled the speed of the carts, with the brake being controlled by a brakesman. The brake engine was partly excavated in the 1970s by Van Laun and lies on the eastern side of the tramroad. A full description of how the brake engine worked can be found in Van Laun's 1979 article in Industrial Archaeology Review, and will not be repeated here (See fig. 18 for Van Laun's plan of the engine mechanism). In his discussion Van Laun states:

> "The design of the brake engine is sophisticated considering its routine task and its construction well engineered. It appears to have been made within the (Blaenavon Iron and Coal) Company, probably to their own designs, since excavation did not reveal any manufacturer's name or make on the components and even the square nuts were forged. The general construction gives the distinct impression of solidarity and strength but the brake mechanism and its attendant features show an ingenuity perhaps not strictly required for the task in hand."
>
> "…the high order of design, manufacture and construction points to an enlightened engineering outlook within the Company at this time." (Van Laun 1979, 273).

Much of the ironwork for the brake mechanism survives intact, including the band brake and a series of gears and levers used to operate the engine. While engines of this type would not have been uncommon in the coal fields of south Wales, this site is

unique in retaining much of the original brake mechanism (Blaenavon Partnership 1999). The site is a Scheduled Ancient Monument (MM222).

A small building was located to the east of the brake engine, connected to the mechanism by a culvert and a series of rods (fig. 6; Van Laun 1979). This structure would have provided shelter for the brakesman operating the brake engine. It was positioned to allow extensive views along the tramroad towards Hill Pits, and down the tramway incline (Van Laun 1979). The tramway continued past the brake engine and down the incline where it joined a number of other tramlines all connecting with the ironworks (see fig. 3).

The working history of Hill Pits and the tramway incline brake is little documented, however the OS map shows that by 1880 the line of the tramway from Hill Pits stopped just beyond the foot of the incline (fig. 4). The line of an 'Old Tramway' which linked into the ironworks is depicted, indicating that the final mile or so had gone out of use by the late nineteenth century. In 1894 it was recorded that the coal levels at Hill Pits were being worked through Tunnel Pit, suggesting that the pithead workings had gone out of use. Following 1894 there is no further mention of Hill Pits and on the 1901 OS map the site is labelled as 'disused'. Van Laun (1979) suggests that the mine may have been transformed from an ironstone and coal mine to a coal mine sometime in the 1850s after the Blaenavon Iron and Coal Co. ceased to be a major player in the iron trade. He suggests that the reduction in the length of the tramway might have been associated with this change in focus, with the tramway and incline brake going out of use only a few years after their construction (Van Laun 1979). Van Laun proposes that once coal started being mined exclusively at Hill Pits, the transport system was redesigned, with coal taken via a new tramway heading north to Llanfoist for export on the Brecknock and Abergavenny canal (Van Laun 1979). If this is indeed the case then the Hill Pits mine, the tramway and the sophisticated incline engine brake can be viewed as expensive follies built by a company desperate to continue its dominance of the iron trade, but ultimately failing.

Despite the decline of the Hill Pits mine, the cottages continued to be occupied until the 1970s. Voting records reveal that all four cottages remained inhabited in 1961, and the OS map of 1970 depicts the cottages as roofed. It is likely that the enclosure fields also remained in use until the eventual abandonment of the cottages sometime in the early 1970s.

The Garn Road Powder House is depicted on the OS map of 1880 as a small, square, double walled structure to the north of the line of the old tramway (fig. 4 and 7). This structure is thought to be a magazine for the storage of gunpowder associated with the mine workings. There is little documentary evidence to establish when this site was constructed, but it is thought to be late nineteenth century as it is not marked on the Tithe map for Llanwenarth Parish. The buildings function is also not recorded, however its design has led to it being interpreted as an explosives store. John van Laun photographed the structure in the 1970s (fig. 8). The photographs reveal that the complex had comprised one large structure with a second, smaller, structure to the south, both of which were enclosed within a high wall. The large structure was stone-built with a slate tile roof, while the smaller structure was brick-built with a slate tile roof. One of the photographs shows the door to the smaller structure with the word 'Magazine' painted on in white (fig. 9). The photographs show that the structure had

started to fall into disrepair by this stage, but that it retained its roof suggesting that it had not been out of use for a prolonged period of time.

4. Standing Building Recording and Condition Survey

In February 2012 a walkover survey was carried out to assess the condition of the three sites covered by the Conservation Management Plan. The survey was carried out after moderate snow fall, which had masked some aspects of the sites, however the main structural elements were visible.

4.1 Description of condition and assessment of vulnerability

Powder House, Garn Road

Site Description

The Powder House is thought to have been built in the mid to late nineteenth century as an explosives store associated with one or several of the Blaenavon Iron and Coal Company's mines in the local area (RCAHMW 2012). The building is depicted on the OS map of 1880. It is Grade II listed.

The Powder House is located on the northern side of Garn Road, 500m north-west of the Iron Works in Blaenavon town (fig. 1). It lies in a boggy hollow adjacent to a track and the line of a former tramway at 380m AOD. Immediately to the north of the site is a moderately sized natural pond, while a small stream runs to the west of the structure (fig. 10).

The structure comprises three distinct elements: a main powder store building, a small secondary building (possible where fuses were kept) and an external wall surrounding both buildings. The main powder store measures 7m north/south by 5m east/west and stands to approximately 3.5m at the northern end (fig. 11). The building is entered through a door in the northern wall (fig. 12). Immediately inside the door is a small room measuring 4m by 1m, which connects with the main powder storage area (fig. 10). This larger room measures 4.64m by 3.81m and has the remains of a brick-built barrel vaulted roof, surviving as up to 11 courses of bricks arching inwards from the top of the stone and lime mortar-built external walls (fig. 13 and 14). The northern wall of the room is largely intact, surviving to a height of 3.7m on the western side. It was constructed using both bricks and stone and mortared with lime. The southern wall survives only to a height of approximately 0.5m. The northern, external, stone-built wall of the structure survives to a height of approximately 3.7m and is gabled. Three metal ties have been built into the structure of the building, connecting the western and eastern walls (fig. 11, 12 and 15). These are held in place with large oval metal plates. The evidence suggests that the structure would originally have comprised a barrel-vaulted storeroom contained within a gabled building. On the southern side of the main building are the remains of a small brick-built structure with a wooden framed window facing north. This structure measures approximately 1m north/south by 2m east/west and survives to a height of approximately 1m. The remains of a wall approximately 2m high survive on the eastern side of the site. This wall is thought to have originally surrounded both the main building and the small brick built structure.

The structural elements of the site are in an extremely poor state of repair. The site is largely overgrown with brambles, and water has pooled at the north-western end of the structure and flows down the western side (fig.12 and 15). Collapsed rubble, bricks and tiles fill the main powder house, obscuring the lower courses of walling,

and a tree has seeded within this rubble (fig. 16). More rubble fills the area to the south of the main structure, surrounding the smaller brick building. The quantity of rubble masks much of the lower sections of the walls of both the main powder store and the smaller building. The northern wall of the main powder store is bowing inwards and leaning outwards, and the north-western corner has collapsed exposing the inner rubble core of the wall (fig. 11 and 12). The southern wall of the structure is largely missing and the barrel-vaulted internal roof has collapsed. The western wall has partly collapsed at the southern end, while the eastern wall is missing most of the facing stones resulting in the core of the wall being exposed (fig. 11). The smaller, brick-built structure survives only as the northern and southern walls. The wall that once enclosed all the buildings on the site now only survives on the eastern side, although a section of it has also collapsed. It has undergone some repair in recent years, and has been partly re-pointed using cement (fig. 17).

Specific Vulnerabilities

The Powder House structure is suffering from a number of specific threats to its stability and long term preservation. These are:

1. Collapse of the walls and erosion of the mortar and brick work.
2. Erosion of the lime mortar through frost action and rain.
3. Water pooling to the north of the structure and flowing down the western side.
4. Vegetation swamping the structural remains.

Tramway Incline Brake

The Tramway Incline Brake dates from the 1840s, and controlled the speed of the trams moving up and down the counter-balanced incline. The site is depicted on the OS map of 1880. It is a Scheduled Ancient Monument (MM222).

The incline brake is located to the north of Garn Road, 1km north-west of the Iron works (fig. 1). It lies immediately adjacent to the line of the tramway, at the top of the incline linking the line from Hill Pits and that leading to the ironworks. It lies on flat grassy ground at 420m AOD, and was positioned to allow clear views towards both Hill Pits and the bottom of the incline.

The site comprises two separate elements connected by a gully. The remains of the main brake apparatus are located within a sunken structure measuring approximately 4.5m by 3.6m and up to 1.3m deep (fig. 18, 19 and 20). The structure is faced by stone walls mortared with lime, into which twelve corroded iron girders have been built. Two girders are positioned in each corner, with a single girder positioned in the middle of each side. Further iron framework is positioned on the base of the structure, on top of which are the remains of the brake mechanism. On the southern side of the brake mechanism is an iron rod, extending eastwards towards the remains of the brakeman's house. This rod runs for 4m, and is contained within a linear gully lined with stone walls mortared in lime. The gully is 0.5m wide and 0.4m deep, although it would originally have been approximately 1m deep. The gully turns 90° west 6m from the eastern edge of the sunken structure, and joins a second stone built structure. This stone-built structure measures 4.33m north/south by 3.59m east/west. Up to three courses of intact walling are visible, with the majority of the building masked by rubble and vegetation (fig. 21).

The structure housing the brake mechanism is largely sound, having undergone repairs in 2010. This included repointing of sections of the stonework and vegetation removal. The top of the walls are, however, starting to come loose again, and sections of the mortar are crumbling. The metalwork is continuing to corrode, and sections of it have been lost since the 1970s. Vegetation is encroaching on the top of the sunken walls, and weeds are growing in the base of the structure. The gully linking the mechanism with the brakeman's house is partly filled with rubble and vegetation, which has buried the brake rod. The brakeman's house is largely rubble filled and overgrown with vegetation.

The Tramway Incline Brake is suffering from three specific threats to its long term preservation:

1. Erosion of the lime mortar leading to instability of the walls
2. Encroachment by vegetation
3. Corrosion of the metalwork, particularly the remains of the mechanism.

Hill Pits

Hill Pits dates from 1840, and was opened by the Blaenavon Iron and Coal Co. to mine coal and ironstone for use in the Iron works. The site was in use for 56 years, closing in 1896. The cottages remained occupied until the 1970s.

Hill Pits lies 500m north-west of the Tramway Incline Brake, on the south-western side of the Tramway (fig. 1). The site comprises several structures:

- Engine House Chimney
- Engine House
- Workers cottages
- Two mine shafts
- Enclosed fields associated with the workers cottages

The structures are spread out over approximately 2 acres, and the site is bounded by spoil tips to the south, east and west (fig. 22). A series of tram lines connect the different working areas of the site, with the shafts connected to the main tramway that leads to the Iron works in Blaenavon. The site lies within an area of rough grazing at 430m AOD. Sheep and horses graze the ground, keeping the grass under control. Each element of the site will be discussed separately.

Engine House Chimney

The chimney is located towards the centre of the Hill Pits site, at the northern end of the engine house. It is 2.3m wide at the base and 5.8m high, and constructed from dressed sandstone blocks that rise to a plinth at the top (fig. 23). An upper plinth made from rounded dressed sandstone forms the top of the modern structure, but a chimney stack, probably brick-built, would originally have stood above the stone base. The chimney is Grade II listed.

The chimney is in a good state of preservation, having been repaired in 2007/2008. The repair work involved the removal and careful rebuilding of the upper courses of masonry and the plinths, together with extensive re-pointing of the masonry. The structure was pined together using four CINTEC anchors (see fig. 23). A number of gaps were left in the masonry to allow bats to access the interior of the stack.

There are no specific threats to the long-term preservation of the chimney.

Engine House

The remains of the engine house are located immediately to the south of the chimney (fig. 24). The 1880 OS map of the site shows there to have been two large rectangular buildings, with a square building adjoining on the western side, however is it not possible to conclusively identify any of these structures. The area of the engine house comprises several hollows and several piles of vegetation covered rubble, with only one stretch of walling evident. This lies on the western edge of the engine house site, and probably formed the outer wall of the square building. The wall is almost entirely hidden below the turf, although a couple of sandstone blocks can be seen.

At the northern end of the engine house area, immediately to the south of the chimney, the outline of a narrow flue can be seen in the turf. At the northern end of this flue are the remains of an iron damper slide comprising a square iron plate with brickwork behind. This feature was exposed by John van Laun during excavations in 1979.

There are no specific threats to the long-term preservation of the engine house.

Workers Cottages

The remains of the workers cottages lie to the south-east of the chimney. The OS map of 1880 shows there to have been four cottages in a terrace orientated roughly east-west. On the ground to the south of the cottages a series of smaller structures are recorded, all of which are probably outhouses or storage sheds associated with the cottages.

The area of the cottages is largely rubble-covered and bounded to the north by raised ground (probably made ground). The area of the cottages measures 15m east/west by 4m north/south. A retaining wall constructed from sandstone blocks mortared within lime, runs around the northern, western and eastern sides of the cottages. This wall stands to a maximum height of around 1.5m, or 11 courses (fig. 25). At the eastern end are the remains of a larger structure, standing apart from the terrace of cottages (fig. 22). This is thought to be the remains of another cottage that went out of use by 1880, as it is not shown on any of the maps.

Within the rubble spread, three of the north-south orientated cottage walls can be identified, with the rear cottage wall also partly visible. These walls are constructed from squared sandstone blocks and are 0.5m wide and faced on both sides with a rubble core. The rear wall of the houses is positioned approximately 0.5m from the retaining wall demonstrating that an alley ran around the cottages, probably to facilitate drainage. Indeed, at the south-eastern corner of the cottages water flows from the alley between the cottage wall and the retaining wall, and the remains of a probable drain can be discerned. The area in front of the cottages is extremely boggy, with both flowing and standing water.

Specific threats to the long-term preservation of the cottages are:

- Erosion of the bank to the rear of the retaining wall causing instability.
- Erosion of the mortar within the retaining wall causing collapse.
- Water flowing through the cottage area and pooling on ground to the south.

Mine shafts

The two mine shafts are located to the north of the chimney. Both are capped, but only one is fenced off. The southern of the two is not fenced off and survives as a circular depression.

There are no specific threats to the long-term preservation of the mine shafts.

Enclosed fields associated with the cottages

The enclosed fields are located 20m south of the cottages, surrounded on the north-east and eastern side by the rise of spoil tips and made ground on which the tramway is built. There are five fields, four of which are depicted on the OS map of 1880, with one having been subdivided at a later date. The field system forms a rough diamond shape measuring 90m north/south by 45m east/west.

The fields are enclosed by substantial drystone walls almost 1m thick and around 1.2m high. The walls are overgrown with vegetation, and old hawthorns grow on some of the walls, indicating that they would all have originally been topped by trees. The fields are largely boggy and overgrown with rushes and contain rusting metal from agricultural machinery.

A drainage ditch runs around the outer edge of the field walls on the northern and eastern sides, connecting with a stream to the south of the site. This is substantial but overgrown. It is likely that this ditch is connected to the drain thought to flow around the cottages (identified on the south-eastern corner) and was designed to channel water away from the fields.

Specific threats to the long-term preservation of the enclosure fields are:

- Water flowing through and pooling within the fields.

5. Ecological Survey

5.1 Introduction

The ecological assessment focussed on the following points:

- Determining the potential of the area of the proposed archaeological/development work to support protected species and valuable habitats, of which account must be taken prior to and during the planned works, in accordance with the *Wildlife and Countryside Act 1981*, the *Conservation (Natural Habitats, &c.)(Amendments) Regulations 1994 & 2007*, the *Protection of Badgers Act 1992* and the *Countryside & Rights of Way Act 2000*.
- With regard to Planning Policy Statement 9 (PPS9), it is now a requirement for local planning authorities to maintain and enhance, and restore and add to, biodiversity. Paragraph 14 of this document states ‘Development proposals provide many opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, local planning authorities should maximise such opportunities in and around developments, using planning obligations where appropriate’.
- The site visits focussed on assessing the potential of the site to support species and habitats of value and note, which are considered to be of principal

importance for the conservation of biodiversity, with reference to the Planning Policy Statement 9: Biodiversity & Geological Conservation (ODPM, 2005), especially those given protection under British and European wildlife legislation as stated above.

5.1.1 Biological Records

A search of biological records was not commissioned by Archaeology Wales Ltd. It is recommended that a search of biological records be commissioned by Archaeology Wales Ltd. or a voluntary organisation working on the project, as the next step in ecological evaluation of the site.

Bearwood Associates Limited completed a search for sites of ecological importance, within a 10km radius, using the 'Protected Sites' search facility, on the website of The Countryside Council for Wales (CCW), and the 'Multi-Agency Geographical Information for the Countryside website' (MAGIC). The results are set out in section 1.6 Ecological Context and section 3.2 Data Search (below).

5.1.2 Survey Constraints

The comprehensiveness of any ecological assessment will be limited by the season in which the site visit(s) is undertaken. To confirm the presence or absence of all protected species usually requires multiple visits, at suitable times of the year. The initial site visits would focus on assessing the potential of the site to support species of note, which are considered to be of principle importance for the conservation of biodiversity, with reference to Planning Policy Statement 9: Biodiversity & Geological Conservation (ODPM, 2005), especially those given protection under British and European wildlife legislation.

This report cannot therefore be considered to provide a comprehensive analysis of the ecological interest of the site. However, it does provide an evaluation of the ecological interest present on the day of the visit and highlights areas where further survey work may be required.

5.1.3 Ecological Context

This report presents results of initial ecological surveys and walkover surveys for protected animal species of three important industrial sites – Hill's Pit (chimney, cottages and gardens), Hill's Pit brake wheel and Hill's Pit powder house – at the Blaenavon World Heritage Site, Blaenavon, Torfaen County Borough Council.

Hill's Pit (chimney, cottages and gardens) comprises the lower parts of the chimney, of the steam winding house, that once contained the steam winding engine, that powered the winding gear, over the head frame, above the actual pit shaft/s (the latter blocked and a short distance to the north of the chimney). A short distance to the east of the chimney, and set on lower ground are the buried and partially buried, lower parts of a series of small, stone built cottages, set into the side on an incline, to the north. Immediately south of the cottage remains, and set on still lower ground, is a series of small, embanked gardens, or paddocks, or enclosures. It is thought that these were used by the occupants of the cottages for agricultural purposes. All of these archaeological features are situated in a man-made gully, now surrounded on most sides by steep-sloped pit-banks, of waste coal and iron-stone debris. The resulting gully seems once to have had a drainage ditch, which ran around its eastern side, immediately below the eastern pit-bank. This has become defunct with the result that

much of the area of the embanked gardens, or paddocks, or enclosures are now permanently wet or inundated. The principle habitats of this site are the archaeological remains or structures themselves, and their surrounding wet and dry grassland.

Hill's Pit brake wheel comprises the sunken remains of the actual, metal brake wheel (for controlling the movement of rail-cars on the side of the mountain) and the buried, and partially buried, lower parts of the surrounding and adjoining stone brake wheel house. The archaeological remains are situated at the brow of an incline, and are surrounded by grassland and gorse scrub, much of it probably arising from pit-banks, of waste coal and iron-stone debris. The principle habitats of this site are the archaeological remains or structures themselves, and their surrounding grassland and gorse scrub.

Hill's Pit powder house comprises the partially collapsed remains of a single-storey, double-walled, stone building, thought to be the remains of the gun-powder safe-storage facility for the pits. The powder house is situated on relatively low ground, below the pit-banks, to the north. A defunct drain runs past the northern side of the powder house, creating significant inundation of areas immediately surrounding the structure, to the north and west. The powder house structure itself is roof-less and partially collapsed, filling the interior with approximately 1 metre of stone rubble. All of the areas around, and within, the powder house show signs of occupation, and disturbance, with bramble and elder scrub in profusion.

Beyond the boundaries of the three, assessed, archaeological sites, the wider landscape is dominated by the remains of heavy industry, the mining of coal and iron-stone for local iron smelting, which was practised in this area between the 18th and 20th centuries. The whole site is covered by successive layers of mining spoil and pit-banks of coal and iron-stone. Interspersed with the pit-banks are areas of upland grassland, remnants of the pre-industrial, agricultural landscape. The whole forms a complicated matrix of grassland and scrub habitats, spread over both the industrial and pre-industrial, agricultural substrates. Amongst these grassland areas are other, integral features such as: gullies, ditches, inundated areas, pools, rubble exposures, land-slips and further archaeological and structural remains.

The sites themselves have no biodiversity or ecological designations.

There are a number of designated sites, for biodiversity, within 5km of the sites. Mynydd Llangatwg SSSI (species-rich, base-rich grassland, blanket mire and dry heath) lies about 3½km to the north-west. Cwm Clydach SSSI (Ancient and species-rich beech Woodland) lies about 2½km to the north-west. Gilwern Hill SSSI (limestone grassland, quarries and woodland) lies about 1½km to the north. Cwm Llanwenarth Meadows SSSI (species-rich, unimproved meadows) lies about 2½km to the north-east. Blorenge SSSI (sub-montane heath and limestone grassland) lies about 3½km to the east. There is also an Usk Bat SAC, near Pwll-du, about 2km to the north-east. The Brecon Beacons National Park boundary is less than 1km to the north and north-east of the sites.

5.2 Methodology

5.2.1 Extended Phase 1 Habitat survey

The botanical surveys in this report centre on the Phase 1 Habitat survey approach (JNCC 2003) as extended for use in environmental impact assessment (Institute of Environmental Assessment 1995). This involves the following elements.

- Habitat mapping using a set of standard colour codes to indicate habitat types on a Phase 1 Habitat Map.
- Description of features of ecological or nature conservation interest in notes relating to numbered locations on the Phase 1 Habitat Map, called target notes (for habitat and features of possible botanical interest) and animal notes (for features relating to animals including protected vertebrates).

Basic Phase 1 Habitat Survey methods are described in detail in Joint Nature Conservation Committee (2003). There are no firm guidelines to specify what extended Phase 1 Habitat Survey involves, but Institute of Environmental Assessment (1995) suggests that it simply involves more extensive and detailed target notes.

Winter is not an ideal time of year for botanical recording since many plant species are not in evidence, and others are represented only by degraded remains. The target notes in this report therefore contain less botanical information than might be expected in a spring or summer Phase 1 Habitat Survey. The botanical information is however adequate for the basic description of habitat types, and for the appraisal of further survey requirements. The surveyor drew on previous experience to identify to species-level the majority of plant material in evidence, and to allow the designation of the habitats to NVC types. The out of season survey will not have affected the reliability of the Phase 1 Habitat Map in any degree – common habitat types were involved and are recognisable at this time of year.

Plant names in text are given with scientific names first, followed by the English names in brackets. Doubtful identifications are preceded by ‘cf.’ placed before the specific name, where the plant is very probably the species indicated, but it is impossible to distinguish it from similar members of the genus absolutely.

5.2.2 Animal Walkover Survey

The habitat was assessed for suitability for those protected vertebrates that could potentially occur in the region. Obvious signs and incidental sightings of protected species would have been noted had they been encountered, but walk-over surveys do not generally confirm species presence or absence and should not be regarded as proof of an absence.

The likelihood of species using the site, or homogenous blocks of habitat identified, was assessed. Consideration was given to the geographical region and habitat type and it is believed that the following species might reasonably be encountered:

- Badger
- Bats

- Birds
- Common reptiles
- Great crested newt
- Otter
-

The field surveys were conducted by Daniel Wenczek of Bearwood Associates Limited on 6th and 13th February 2012. Weather conditions at the time of both survey visits were low cloud and cold, and about -1°C and 8°C respectively. The site visit conducted on 6th February 2012 was hampered by a patchy covering of snow on the ground, creating the necessity of a return visit on 13th February 2012.

Details of the initial survey method for each species are given below.

Badger
An appraisal of the site was carried out to identify areas that might be used by Badgers (*Meles meles*). Evidence of activities such as digging setts, foraging was looked for and other signs of Badgers including setts, incidental foraging signs, paths and latrines, would be recorded if encountered.

Bats

- **Foraging:** areas of habitat were assessed for their suitability for foraging or commuting bats. A general preference for sheltered areas and insect-rich habitats, such as woodland, scrub, hedges, watercourses, ponds, lakes, and more species-rich or rough grassland is shown by all bats, but these can vary from species to species.

- **Roosting:** trees, buildings and other structures were noted if they appear to have particular interest for roosting bats. This involved consideration of the age and condition of the tree or structure, and identifying features that roosting bats may favour (e.g. holes, cracks and cavities that might be used as bat-entrance points or roost sites).

Any actual signs of bats or other evidence found (such as visual sightings, faeces, urine, odour and feeding remains), is also recorded.

Birds
The suitability of the habitat/s for birds, to feed, shelter or nest was assessed. Where relevant habitat did occur, incidental evidence identifying the presence of birds, including nests, droppings, pellets and feathers was recorded. Visual sightings of species are recorded and particular attention is paid to the time of year and the bird's breeding seasons.

Dormice
The suitability of the habitat/s for Common dormouse (*Muscardinus avellanarius*); taking into account factors such as habitat type and diversity, food-plants, age of habitat, cover and three-dimensional structure was assessed. Ideal dormouse habitat includes mature hedgerows or woodland with a wide diversity of woody species including food plants and a thick shrub layer. If appropriate habitat occurs, incidental evidence identifying the presence of dormice, including nests and gnawed nuts is recorded.

Common Reptiles
The suitability of the site for common reptiles, particularly for providing suitable basking areas (e.g. south-facing slopes), hibernation sites (e.g. banks, walls, piles of rotting vegetation) and opportunities for foraging (rough grassland and scrub) was assessed. If appropriate habitat occurs, incidental evidence pertaining to the presence of reptiles, including tracks and sloughed skin, is recorded.

Common lizards (*Lacerta vivipara*) are found throughout England in a range of habitats from grasslands, woodland edges, brownfield sites, heathlands and dunes.

Slow worms (*Anguis fragilis*) use similar habitats to Common lizards and are often found in rank grassland, gardens and derelict land. They are the most frequent reptile in urban areas.

Grass snakes (*Natrix natrix*) are the frequently seen species of snake in urban areas. They are often found close to ponds, lakes and rivers.

Adders (*Vipera berus*) are found on heathland, moors, meadows, woodland glades and urban fringe sites.

Smooth snake (*Coronella austriaca*) and Sand lizard (*Lacerta agilis*) are our two rarest species of reptile. Both are found on heathland and dunes in England: Smooth snake on lowland heathland, from Dorset to Surrey; Sand lizard on lowland heathland and dunes, mainly in Dorset and the Sefton Coast of Merseyside (English Nature, 2004). Neither of these species is likely to be found on the site described in this report.

Great Crested Newt
The suitability of the site as terrestrial habitat for Great crested newt (*Triturus cristatus*) was assessed. Ordnance Survey maps and aerial photography were used to identify potential breeding sites, such as ponds or other water bodies both on the site and within 500m, which may be potentially suitable for Great crested newts. Absence of ponds and waterbodies found using Ordnance Survey maps and aerial photography does not mean total absence of these features; small garden ponds may exist, within 500m of the development site, which may be unmapped and unknown to the author.

Otter
The suitability of the site as habitat for otters (*Lutra lutra*) was assessed. This included both riparian and aquatic habitats as well as any features within the relevant area that would provide natal den, holt or lying up (couches) sites. In addition to rivers, otters also inhabit small streams, ditches, ponds, lakes, canals and marshes. They are also found in coastal areas and estuaries. Where appropriate habitat occurs, evidence of the presence of otters, such as feeding remains, spraints, anal jelly, and tracks, was recorded.

5.2.3 Criteria for assessment

The scientific value of habitats for nature conservation is assessed according to widely accepted criteria of which the most important are naturalness, extent, rarity and diversity.

- A list of priority habitat types has been identified in connection with UK implementation of the Habitats Directive 92/43/EEC (1992). Other

important habitats and species are identified in National and Local Biodiversity Action Plans.

- Special importance attaches to ancient semi-natural habitats that depend for their survival on traditional types of land management, especially where these have suffered large reductions over the last fifty years due to agricultural or silvicultural intensification and extensification. Habitats in these categories are discussed in Rackham (1986).

Significant species were identified as follow:

- Species protected by European directives.
- Species protected by the *Wildlife and Countryside Act 1981* (as amended).
- Red Data Book species (Wiggington 1999)
- Species targeted in UK Biodiversity Action Plans and the Torfaen Biodiversity Action Plan.
- Species listed as scarce or notable in literature issued by conservation organisations or learned societies.

5.3 Results

At between 410 – 430m altitudes, the sites could generally be described as being situated within upland, moorland habitats. However, this general description belies the actual complexity of habitats present at and around the three sites and in the wider landscape. The principle habitat types found at the three Hill's Pit sites are calcifugous grassland (TN01) and dwarf shrub heath (upland) (TN03) on industrial substrates (colliery spoil or pit-banks); rush pasture and wet-flushes or drains (TN02) and calcifugous grassland (TN01) on pre-industrial substrates; stone built structures (TN04); and boundary features (TN05). The habitats, particularly the grassland, dwarf shrub heath and rush pasture tend to be present in mosaic, intermixed according to very localised variations in edaphic properties.

Beyond the boundaries of the Hill's Pit sites, in the wider landscape of Cefn Garn yr erw, the hill on which Hill's Pit is located, the above mentioned habitats are also common, as well as other features such as drains and streams, and open water reservoirs or pools, boulder screes, pasture fields and domestic gardens.

5.3.1 Habitats

Grassland

The vast majority of the area of the Hill's Pit (chimney, cottages and gardens) and Hill's Pit brake wheel sites is grassland. There are two main types of grassland: **NVC U1 *Festuca ovina – Agrostis capillaris – Rumex acetosella* grassland** in drier areas, and **NVC MG10 *Holcus lanatus – Juncus effusus* rush-pasture** in water-logged and inundated areas. In areas with gentle slopes and plateau topography, outside of, but surrounding, the three assessed sites, and in areas where the pre-industrial, agricultural soil substrates still exert themselves, other grassland types, such as **NVC U6 *Juncus squarrosus – Festina ovina* grassland** are common. All of the grassland habitat types tend to be in intimate mosaic with each other and other habitat types, such as dwarf shrub heath, due to very localised variations in edaphic properties, mostly caused by the historic dumping of dry and free-draining, colliery spoil, as pit-banks, onto much more water-logged, pre-existing upland grassland habitats. The colliery spoil itself varies considerably depending on its main constituents, be it coal

waste, iron-stone and other mineral extraction waste; yet all of it tends to be free-draining and acidic.

NVC U1 *Festuca ovina – Agrostis capillaris – Rumex acetosella* grassland is found in drier locations such as the sides and flatter crests of colliery spoil pit-banks (TN01), drier areas of pre-industrial substrates (TN01), the sides and tops of buried and partially buried structures (TN04) and boundary features (TN05). Diagnostic plant species, noted from field survey, include: *Festuca ovina, Agrostis capillaris, Rumex acetosella, Hieracium pilosella, Taraxacum officinale* agg. and *Cerastium fontanum*. At the Hill's Pit powder house site *Ulex europaeus* is also present. Mosses and lichens are an important element in this sward type; diagnostic species, noted from field survey include: (lichens) *Cladonia arbuscula, Cladonia impexa, Cladonia fimbriata, Cladonia uncialis, Cladonia gracilis, Cornicularia aculeata* and *Peltigera canina*; and (mosses) *Polytrichum piliferum, Brachythecium albicans, Hypnum cupressiforme s.l.* and *Rhytidiadelphus squarrosus*.

NVC MG10 *Holcus lanatus – Juncus effusus* rush-pasture (TN02) is found in locations at the bases of the colliery spoil pit-banks, such as ditches and other lower lying areas, and where these ditches have become impeded and defunct, causing inundation of surrounding areas. This grassland type is principally found in the series of small, embanked gardens, or paddocks, or enclosures, at the Hill's Pit (chimney, cottages and gardens) site and at the Hill's Pit powder house site. Diagnostic species, noted from field survey, include: *Juncus effusus, Juncus inflexus, Holcus lanatus, Ranunculus repens* and *Cardamine pratensis*.

Alongside tracks and other disturbed, muddy areas, there are elements of **NVC U6 *Juncus squarrosus – Festina ovina* grassland**. Diagnostic species of this grassland type, noted from field survey include: *Juncus squarrosus, Festuca ovina, Agrostis canina, Carex* cf. *nigra* and *Deschampsia flexuosa*. Around pool to the northeast of the Hill's Pit (chimney, cottages and gardens) site wetter, marginal areas have abundant *Eriophorum* cf. *augustifolium*. While this is an important habitat in areas adjacent to the three assessment sites, it is not present in large areas in the actual sites themselves.

For the purposes of this survey, the grassland has been mapped according to the protocol set out in the section J1.2 of the 'Handbook for Phase 1 habitat survey' (JNCC 2003).

Dwarf shrub heathland

Closely surrounding the Hill's Pit (chimney, cottages and gardens) site, on the driest areas of colliery spoil pit bank, but not actually impacting on any of the archaeological remains, are areas of **NVC H12 *Calluna vulgaris – Vaccinium myrtillus* heath** (TN03). This habitat type often occupies in close proximity to or intimately intermixed with the **NVC U1 *Festuca ovina – Agrostis capillaris – Rumex acetosella* grassland** described above; the local occurrence of either type being the result of localised variations in edaphic properties. Diagnostic species, noted from field survey, include: *Calluna vulgaris, Vaccinium myrtillus, Empetrum nigrum ssp. nigrum, Festuca ovina, Agrostis capillaris, Hypnum cupressiforme s. l., Cladonia arbuscula, Cladonia impexa, Cladonia fimbriata, Cladonia uncialis, Cladonia gracilis* and *Polytrichum piliferum*.

For the purposes of this survey, the grassland has been mapped according to the protocol set out in the section J1.2 of the 'Handbook for Phase 1 habitat survey' (JNCC 2003).

Buildings, structures and boundary features

There are a variety of structures (TN04 and TN05) present at all three of the assessed sites. These are described within there landscape and ecological context in part 1.6 above. A detailed description of the buildings and structures is beyond the scope of this ecological report, and should be sought in the archaeological report/s.

From the ecological perspective, and with regard to protected species of vertebrates, all of the structures contain crevices and fissures suitable for a variety of species of fauna, as well as protected species of vertebrates.

All of the buildings (TN04) are constructed using local dressed or undressed stone. Some are mere buried, or partially buried, foundations or lower courses. Some, such as the chimney at the Hill's Pit (chimney, cottages and gardens) site, and at the up-standing remains at the Hill's Pit powder house site, are substantial structures. Furthermore, heaps of stone rubble, resulting from the collapse of structures, are also valuable potential habitats.

Enclosing most of the small, embanked gardens, or paddocks, or enclosures, at the Hill's Pit (chimney, cottages and gardens) site are low boundary features, the construction of these is unknown to the assessor/author of this report (TN05). Some of these are topped by a series of neglected and over-grown *Crataegus monogyna* hedgerow trees.

In conjunction with the structures themselves, other habitats are also present. These include **NVC U1 *Festuca ovina – Agrostis capillaris – Rumex acetosella* grassland** found around and on some of the structures at the Hill's Pit (chimney, cottages and gardens) site and the Hill's pit brake wheel site; **NVC MG10 *Holcus lanatus – Juncus effusus* rush-pasture** found around the Hill's Pit (chimney, cottages and gardens) site and the Hill's powder house site; and scrub habitats, associated with disturbance, containing species such as: *Sambucus nigra*, *Salix* spp., and *Rubus fruticosus* agg., found at the Hill's Pit powder house site.

5.3.2 Animal Surveys

All of the habitats found at the three sites are species-poor, ubiquitous and present a low level of botanical diversity. However, there is potential for many of these habitats to be suitable for protected species of vertebrates.

Animal Notes were made for habitats suitable for protected species of vertebrate and these were given in *Appendix IV*. Locations of *Animal Notes* are illustrated in *Animal Notes Map 01-03* (Appendix IV).

Badger

No evidence of Badger activity was recorded during the walkover field survey works.

The grassland (TN01 and TN02) and heathland (TN03) habitats are suitable for badgers as foraging habitat.

There are areas of habitat suitable for sett building within, and in areas immediately adjacent to, the three site areas, although no badger setts were noted during the walkover field survey works.

Bats

No evidence of bats was noted during the walkover field survey works.

The grassland (TN01 and TN02) and heathland (TN03) habitats would provide habitats suitable for foraging bats.

Some of more substantial structures, such as the upstanding structures at the Hill's Pit powder house site and the chimney at the Hill's Pit (chimney, cottages and gardens) site, would provide suitable refugia and roosting habitat, although the former would be cold and damp and largely sub-optimal.

Birds

Only two species of bird were recorded during the survey. These were: *Ardea cinerea* (Grey heron) and *Alauda arvensis* (Skylark). Wheatears are known to nest in the Hill Pits Chimney during the summer months, although no evidence for them was identified.

There are a wide range of habitats that are likely to support a range of ground-nesting birds: the grassland habitats (TN01 and TN02) and heathland habitats (TN03) could be used by foraging birds. Surrounding moorland habitats would also be important for ground-nesting birds.

The grassland habitats (TN01 and TN02) and heathland habitats (TN03) and surrounding moorland habitats would also be important foraging habitat.

Common Reptiles

No evidence of reptiles was found during the walkover field survey works.

There are areas of suitable foraging habitat, mainly for Grass snake, Common lizard, Adder and Slow worm. These habitats are the grassland habitats (TN01 and TN02) and heathland habitats (TN03), as well as the surrounding moorland habitats and pools. The warm, dark slopes of the colliery spoil pit-banks makes suitable habitat for basking reptiles. The close proximity to the three assessed sites to watercourses/waterbodies makes the habitat suitable for, and potentially attractive to, Grass snakes. The buildings, structures, rock heaps (TN04), and boulder screes on surrounding land, are areas of suitable refugia for reptiles.

Great Crested Newt

No evidence of Great crested newts was found during the walkover field survey works. Great crested newts are generally most common in lowland areas, and are not especially likely to be found in this upland location.

However, there are areas of suitable foraging habitat, Great crested newt as well as other species of amphibian, such as Smooth newt, Palmate newt, Common toad and Common frog. These habitats are the grassland habitats (TN01 and TN02) and heathland habitats (TN03), as well as the surrounding moorland habitats, watercourses/waterbodies and pools. The buildings, structures, rock heaps (TN04),

and boulder screes on surrounding land, are areas of suitable refugia for reptiles. The multitude of closely spaced, small to large pools, drains and other water-courses constitutes an inter-related matrix of habitats that are suitable for all amphibians as breeding habitats.

There are no permanent ponds or water bodies within the three assessed sites, although there are some seasonally inundated areas (TN02). However, there are a number of ponds located within a short distance of all of the sites, especially the Hill's Pit (chimney, cottages and gardens) site. About 14 ponds or waterbodies were noted from desk-based study of Ordnance Survey maps, within 1km of the proposed development site; it is likely that there are more, smaller ponds not shown on the Ordnance Survey maps.

Otter

No evidence of the presence of otters was found during the survey.

There are areas of suitable, foraging habitat for otters, but there are no opportunities for couch, holt and den habitat. Suitable foraging habitat includes all areas of rough grassland (TN01 and TN02), heathland (TN03) and moorland. There are also multitude of closely spaced, small to large pools, drains and other water-courses that constitute an inter-related matrix of habitats that are suitable for foraging and

5.4 Evaluation and Conclusions

5.4.1 Habitats

Grassland

The grassland habitat types at the three assessed sites are ubiquitous vegetation types that are common throughout the British uplands.

NVC U1 *Festuca ovina – Agrostis capillaris – Rumex acetosella* grassland is characteristic of base-poor, oligotrophic and summer parched soils in the warm, dry lowlands of southern Britain, although locally congenial conditions can extend its range into scattered localities within oceanic south-west Britain and around upland fringes. This grassland is species-poor, but could provide suitable foraging habitats and nesting habitats for a range of birds, bats, reptiles, amphibians and Otters.

NVC MG10 *Holcus lanatus – Juncus effusus* rush-pasture is characteristic of strongly impeded drainage in a wide range of mineral soils, of varying pH, throughout the British lowlands and upland fringes. This grassland is species-poor and generally of low value for nature conservation, although at Hill's Pits it could provide suitable foraging habitats and habitats for a range of birds, bats, reptiles, amphibians and Otters. At both sites the wet, inundated areas are caused by the interference with historic drainage systems. At the Hill's Pit (chimney, cottages and gardens) site the series of small, embanked gardens, or paddocks, or enclosures have become inundated; the boundary features around their edges forming a series of unintentional dams that serve to increase the inundation. The ditch that skirts the enclosures has become blocked at its northern end, close to the cottages, and the water now largely flows into the enclosures, as well as in the ditch around their overall eastern and southern flanks.

Dwarf shrub heathland

NVC H12 *Calluna vulgaris* – *Vaccinium myrtillus* heath is a typical sub-shrub community of acidic to circumneutral, free-draining mineral soils, throughout the cold and wet sub-montane zone, generally between 200m and 600m. While this habitat is species-poor it could provide suitable foraging, nesting and basking habitats for a range of birds, bats, reptiles, amphibians and Otters.

Buildings, structures and boundary features

These features could provide suitable refugia and nesting habitats for a range of birds, bats, reptiles and amphibians.

The remnant *Crataegus monogyna* hedgerows, on the boundary features (TN05) at the Hill's Pit (chimney, cottages and gardens) site, could provide nesting and foraging habitat for some species of birds, although this would be largely sub-optimal because the bushes tend to be rather sparse and open in their crowns. In addition, the boundary features (TN05) could be used as basking habitat by reptiles.

5.4.2 Conclusions

Although the survey was not conducted at an ideal time of year, it is adequate for the preliminary assessment of the nature conservation potential of the habitats involved.

The grassland habitats (TN01 and TN02) and heathland habitats (TN03) comprise common vegetation types that are species-poor, but could provide valuable foraging, nesting, refugia, basking and breeding habitats for a number of species of Badgers, birds, bats, reptiles, Great crested newt (and other amphibians) and Otters, including some species of protected vertebrates.

The buildings (TN04) could provide suitable refugia and nesting habitat for a range of birds, bats, reptiles and amphibians.

The boundary features (TN05) could be used as basking habitat by reptiles.

However, in view of the small size of the three assessed sites, and their context within much larger areas of similar habitat types, particularly with regard to habitats represented by TN01, TN02 and TN03, the individual importance of these habitats should not be over-stressed. Further investigation, of the habitats, with regard to protected species of vertebrates – especially bats and herpetofauna – and in relation to any potential negative impacts of proposed archaeological works, would be wise. Such investigation should involve a full data search of biological records for the sites, and immediate surrounding areas, and a scoping visit by a herpetologist.

Protected vertebrates

There are habitats suitable for protected species of vertebrate, including Badgers, bats, nesting birds, common reptiles, Great crested newts and Otters.

Badgers

No evidence of Badger activity was noted during the walkover survey visit.

Bat Foraging

The grassland habitats (AN01/TN01 and AN02/TN02) and heathland habitats (AN03/TN03), as well as off-site, but nearby, moorland habitats, and waterbodies would provide potential foraging habitat for bats.

Bat Roosting

The chimney (AN06) at the Hill's Pit (chimney, cottages and gardens) site, and the up-standing structures (AN07) at the Hill's Pit powder house site could provide suitable roosting habitats, although the latter would be sub-optimal because it is rather cold and damp.

Birds

The grassland habitats (AN01/TN01 and AN02/TN02) and heathland habitats (AN03/TN03), as well as off-site, but nearby, moorland and wetland habitats, could provide suitable nesting and foraging habitats for birds.

The up-standing structures, such as the chimney (AN06) at the Hill's Pit (chimney, cottages and gardens) site, and the up-standing structures (AN07) at the Hill's Pit powder house site could provide suitable nesting habitat for birds. The chimney is known to support nesting Wheatears in the summer months.

The remnant *Crataegus monogyna* hedgerows on the boundary features (AN05/TN05) at the Hill's Pit (chimney, cottages and gardens) site, could provide nesting and foraging habitat for some species of birds, although this would be largely sub-optimal because the bushes tend to be rather sparse and open in their crowns.

Common Reptiles

No reptiles, or evidence of reptiles, were seen during the survey. There are areas of suitable foraging habitat, mainly for Grass snake, Common lizard, Adder and Slow worm. These habitats are the grassland habitats (AN01/TN01 and AN02/TN02) and heathland habitats (AN03/TN03), as well as the surrounding moorland habitats and pools. The warm, dark slopes of the colliery spoil pit-banks makes suitable habitat for basking reptiles. The close proximity to the three assessed sites to watercourses/waterbodies makes the habitat suitable for, and potentially attractive to, Grass snakes. The buildings, structures, rock heaps (AN04/TN04, AN06 and AN07), and boulder screes on surrounding land, are areas of suitable refugia for reptiles.

Great Crested Newt

No evidence of Great crested newts was found during the walkover field survey works. Great crested newts are generally most common in lowland areas, and are not especially likely to be found in this upland location.

However, there are areas of suitable foraging habitat, Great crested newt as well as other species of amphibian, such as Smooth newt, Palmate newt, Common toad and Common frog. These habitats are the grassland habitats (AN01/TN01 and AN02/TN02) and heathland habitats (AN03/TN03), as well as the surrounding moorland habitats, watercourses/waterbodies and pools. The buildings, structures, rock heaps (AN04/TN04), and boulder screes on surrounding land, are areas of suitable refugia for reptiles. The multitude of closely spaced, small to large pools,

drains and other water-courses constitutes an inter-related matrix of habitats that are suitable for all amphibians as breeding habitats.

There are no permanent ponds or water bodies within the three assessed sites, although there are some seasonally inundated areas (AN02/TN02). However, there are a number of ponds located within a short distance of all of the sites, especially the Hill's Pit (chimney, cottages and gardens) site. About 14 ponds or waterbodies were noted from desk-based study of Ordnance Survey maps, within 1km of the proposed development site; it is likely that there are more, smaller ponds not shown on the Ordnance Survey maps.

However, it should also be noted that if Great crested newts are using ponds within 500 m, then they could be using habitat on the site. In this case further investigation of ponds within 500 m would be needed, to ensure that appropriate steps are taken to avoid impacts upon newts or their habitat.

Otter

No evidence of the presence of otters was found during the survey.

There are areas of suitable, foraging habitat for otters, but there are no opportunities for couch, holt and den habitat. Suitable foraging habitat includes all areas of rough grassland (AN01/TN01 and AN02TN02), heathland (AN03/TN03) and moorland. There are also multitude of closely spaced, small to large pools, drains and other water-courses that constitute an inter-related matrix of habitats that are suitable for foraging and translocating.

6. Conservation Management Proposals

6.1 Conservation Principles

The following principles are proposed which will guide the future conservation, repair and restoration of the structural elements of the three sites:

- all decisions regarding the repair, conservation and restoration of the buildings within the sites will be made with two specific aims, that of ensuring their long-term preservation and their accessibility.
- all decisions about repairs or restoration to the historic fabric will be made from an informed standpoint, based on research and interpretation and in accordance with current statutory and advisory guidance and using best conservation practice.
- Cadw and the Torfaen Council will be consulted during the planning for any conservation, restoration or repair works.
- listed building consent and scheduled ancient monument consent will be secured for any works to protected structures.
- there will be archaeological input into the planning and implementation of all conservation, repair and restoration work.
- a detailed assessment of protected species and habitats will be carried out prior to any conservation work to ensure that no animals or habitat areas are disturbed.
- specialists in traditional building techniques will be consulted for guidance on the use of traditional building materials.
- specialist contractors with a working knowledge of the historic environment will be employed to carry out specific conservation works, where necessary.

- Volunteers will be trained in appropriate skills to ensure a sustainable approach to the monitoring and care of structures.
- Habitat creation and enhancement and biodiversity will be considered during all conservation works.

6.2 Conservation Proposals for Historical Features

Proposals are set out for each of the different structures within the three sites, to conserve, repair and restore their historic character and significance.

Powder House, Garn Road

Due to the poor state of repair of the Powder House and the number of immediate threats to its stability, this site should be considered to be the **NUMBER ONE CONSERVATION PRIORITY**.

The site requires fencing off as soon as possible to prevent access – the instability of the walls could result in further collapse if they are leant or climbed on.

The structure is beyond repair or consolidation and consideration should be given to complete rebuilding. An assessment by a structural engineer and conservation architect should be carried out, and plans drawn up for the rebuilding of the structure. These should be based on the surviving images of the structure when it was standing (figs. 8, 9 and 26) and should reuse as many of the original materials as possible (particularly the bricks).

Work is required to improve the drainage of the site and to prevent water pooling at the northern end. The water currently flows out of the nearby pond, forming an extension to the pond adjacent to the building, before flowing down the eastern side of the structure towards a drain to the south. Consultation with a specialist drainage contractor will be necessary to establish the best way to encourage water away from the building and into the local drainage network. A simple solution, involving minimal intervention, should be sought, such as a culvert linking the pond with the drains – this could be achieved using the volunteer workforce under specialist guidance.

The erection of an interpretation board close to the structure is suggested, to enable visitors to understand its history. The board should document the restoration of the structure as well as its involvement in the Blaenavon mining industry. This should be written and designed by the volunteers.

Once the major structural works have been carried out an on-going programme of vegetation clearance and monitoring of the structure will be required to ensure that further deterioration does not occur.

Tramway Incline Brake

Necessary conservation work on the incline brake and the structures associated with it is relatively modest, requiring only seasonal clearance of vegetation from the site and the re-pointing of the top of the walls within the sunken structure. This work can be achieved by the volunteer workforce following appropriate training (see below).

Work to conserve the metalwork of the brake mechanism will also need to be carried out. It is recommended that this comprises the application of a mineral oil to the corroded metalwork on an annual basis. This work can be carried out by the volunteer workforce.

It is suggested that some of the rubble and the vegetation is removed from inside the brakeman's house. This would make the structure more visible and easier to interpret. This can be carried out by the volunteer workforce following archaeological guidance.

The erection of an interpretation board close to the structure is suggested, to enable visitors to understand its history. The board should document the history of the site and the role it played in the Blaenavon mining industry. This should be written and designed by the volunteers.

Hill Pits

The erection of an interpretation board within the Hill Pits site is suggested, to enable visitors to understand its history. The board should document the history of the site, its role within the Blaenavon mining industry, and the restoration of the structures. The OS 1st Edition map should be reproduced on the board as this provides the best indication of the layout of the site at the height of its operational life. The interpretation board should be written and designed by the volunteers.

Engine House Chimney

The chimney is in a good state of repair and therefore no conservation work is required. It is suggested that an annual inspection of the structure is carried out to assess for deterioration and the seeding of trees or woody vegetation within the block work. Any such vegetation should be removed as soon as possible to prevent it becoming established.

Engine House

The remains of the engine house are largely buried below the turf and only visible as earthworks. As such there is little conservation work to be carried out at the site, although an annual inspection is recommended to ensure that there has been no deterioration of the structures.

Workers Cottages

The ruins of the workers cottages are largely obscured by rubble and vegetation, although the retaining wall running around the back of the houses is partly exposed along its full length. This wall has evidently undergone some repairs in the recent past, with sections of the wall re-pointed with concrete mortar. This was poorly executed, however, and much of the mortar is cracking and falling out of the stonework. This concrete mortar should be removed and the whole wall re-pointed in lime mortar to prevent further collapse.

On the north-western side of the cottages, behind the retaining wall, a section of the made ground is starting to erode, probably due to animals sheltering in the lee of the slope. This will continue to erode and could undermine the stability of the made ground in this area. It is suggested that the section of retaining wall to the rear of the houses is rebuilt using materials sourced from the site.

It is suggested that the rubble is removed from within the footprints of the buildings to expose the layout of the terrace and facilitate interpretation. The exposed wall footings should be consolidated and re-pointed where necessary, using traditional materials. Rubble should also be removed from within the alley running between the houses and the retaining wall and the drain in the south-east corner cleared and repaired as necessary. Restoring the drainage around the cottages should stop water pooling to the south of the site, which will also dry the land out and prevent growth of rushes. Cutting the rushes is not recommended as this will reinvigorate their growth and cause them to spread further.

All of the suggested works can be achieved by the volunteer workforce following appropriate training (see below), however it is suggested that an archaeologist is on site for the clearing of the drain. It may also be necessary to consult with a specialist drainage engineer to advise on how to reinstate the drain.

Once the conservation/consolidation works have been finished, an annual inspection should be carried out to ensure that further deterioration of the site does not occur.

Mine Shafts
The unfenced mine shaft should be fenced off and a regular inspection carried out of both shafts to ensure there is no deterioration or collapse of the capping. This should be carried out following discussions with the Coal Authority, who maintain responsibility for the shafts.

Enclosure fields associated with the cottages
The walls surrounding the fields are largely sound and do not require any conservation work. The drainage ditch surrounding the fields should be cleared to allow water to flow around the walls and into the stream to the south, rather than collecting within the fields. This should be done by the volunteer workforce in conjunction with the works to reinstate the drainage around the cottages, and may require advice from a specialist drainage contractor. Reinstating the drainage system will allow the fields to dry out which will prevent the rushes from growing. Cutting the rushes is not recommended as this will reinvigorate their growth and cause them to spread further.

The large pieces of corroded metalwork in the fields should be removed as they present a health and safety hazard.

Once the drainage has been sorted out the site should be subject to a regular inspection to ensure that the flow of water around the fields is maintained.

6.3 Enhancement and Protection of Site Ecology

6.3.1 General

There is limited scope for provision of features of ecological value, which can enhance the site beyond their current value. Suggestions are given here as to how to enhancement of the ecological value of the site could be achieved.

6.3.2 Habitat Creation

Rock and rubble heaps

Large heaps of rocks and rubble, possibly created using excavated building materials from the archaeological sites could be created, in safe and discreet locations to provide refugia for species of reptiles and amphibians.

Bird boxes, Bat bricks and boxes, and Insect hibernacula

A range of bird boxes, bat bricks (that are installed as an integral part of the fabric of a building), bat boxes and insect hibernacula are commercially available, and can provide habitats for birds, bats and various invertebrate species. Incorporating a small number of these can improve its value for wildlife.

6.3.3 Habitat Enhancement

Management and retention of heathland habitat

In time the heathland habitats will naturally revert or succeed into secondary scrub and woodland habitats that would probably be of less value for protected species of vertebrate. Successional developments can usually be held in check by appropriate management. A brief management plan for heathland habitats could be drawn up by a suitably qualified ecologist.

Further assessment and survey works

Further investigation, of the habitats, with regard to protected species of vertebrates – especially bats and herpetofauna – and in relation to any potential negative impacts of proposed archaeological works, would be wise. Such investigation should involve a full data search of biological records for the sites, and immediate surrounding areas, and a scoping visit by a herpetologist. Information arising from these exercises should be fed-back into future, ecological management planning.

7. Statement of Significance and Conclusions

7.1 Statement of Significance

The three sites considered in this report each played significant roles in the exploitation of the industrial landscape around Blaenavon. Each of the three sites has some statutory protection, with the Garn Road Powder House and the Hill Pits chimney both Grade II listed, and the Tramway Incline Brake a Scheduled Ancient Monument. The also sites lie within the Blaenavon Industrial Landscape World Heritage Site, the nomination document for which describes the landscape:

> "There is no better place in the world for understanding the social, economic and technological process of industrialisation" (Torfaen County Borough Council 1999)

The extensive surviving remains of the pithead workings, workers cottages and their small agricultural enclosures are unique within the Blaenavon World Heritage Site. These remains provide tangible evidence of how people lived and worked at a small mining site located away from the main centre of industry and population in the mid and late nineteenth century. The chimney at Hill Pits is a monument to industry, and to the follies of investing in a declining technology. It is strikingly more elaborate than other chimneys in the Blaenavon area, having been constructed from carefully worked stone. The tramway linking Hill Pits with the ironworks at Blaenavon is contemporary with the mine, and the incline brake represents a unique survival of a

mechanism for controlling the movement of wagons. This provides significant information about the complexities of the technologies employed in the tramways in the Blaenavon area.

While the history of the Garn Road Powder House is not fully understood, the site would have played a key role in the mine workings within the local area. The standing remains of the structure, together with the photographic evidence from the 1970s reveal that it would probably have been used to store explosives, perhaps for use at Hill Pits – its location adjacent to the tramway linking to Hill Pits may suggest this. It is thought to be the only explosives store in the World Heritage Site.

The three sites tell a significant story about the industrial history of Blaenavon that is distinct from the one presented at either Big Pit or the ironworks, but no less important.

7.2 Conclusion

This report presents the findings of desk-based research into the history of Hill Pits, the Tramway Incline Brake and the Garn Road Powder House, together with up to date measured surveys of the sites, a condition survey and an ecological survey. This data provides an over view of the sites as they currently exist, and highlights vulnerabilities that could affect their long term preservation. The Garn Road Powder House is considered to be the most vulnerable of the sites and is in need of complete reconstruction. The structure for the Incline Brake is generally sound, however conservation of the metalwork is recommended to stop the corrosion of the braking mechanism. The pithead workings, cottages and enclosures at Hill Pits are also generally sound, although drainage issue present a moderate threat to the long term preservation of the site.

All three sites would benefit from interpretation boards on site, to allow visitors to appreciate the heritage of the landscape and the role the individual sites played in Blaenavon's industrial history.

The ecological survey has identified that a number of different habitats within the survey area, all of which have the potential to support protected species. Further work is required to fully understand the biodiversity of the sites, however, it is clear that potential impacts on the ecology of the sites must be considered during the planning for all proposed works.

8. Acknowledgements and Sources

8.1 Acknowledgements

Thanks to the volunteers who turned out in such cold weather to assist with the surveys, particularly Dennis Hopkins, Andy Brown, Tom Allen and Gavin King. Thanks also to the land owner for allowing us access to carry out our surveys and to Steven Rogers for his assistance throughout.

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8.3 Cartographic Sources

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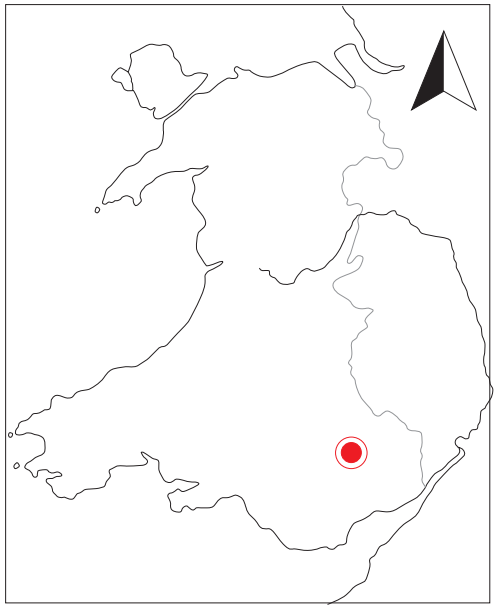
1821 Survey of the Barony of Abergavenny
1846 Tithe Map and Apportionment for Llanwenarth Parish
1880 OS 1st Edition County Series Map
1901 OS 2nd Edition County Series Map
1969-70 OS 1:25000 Map

ILLUSTRATIONS



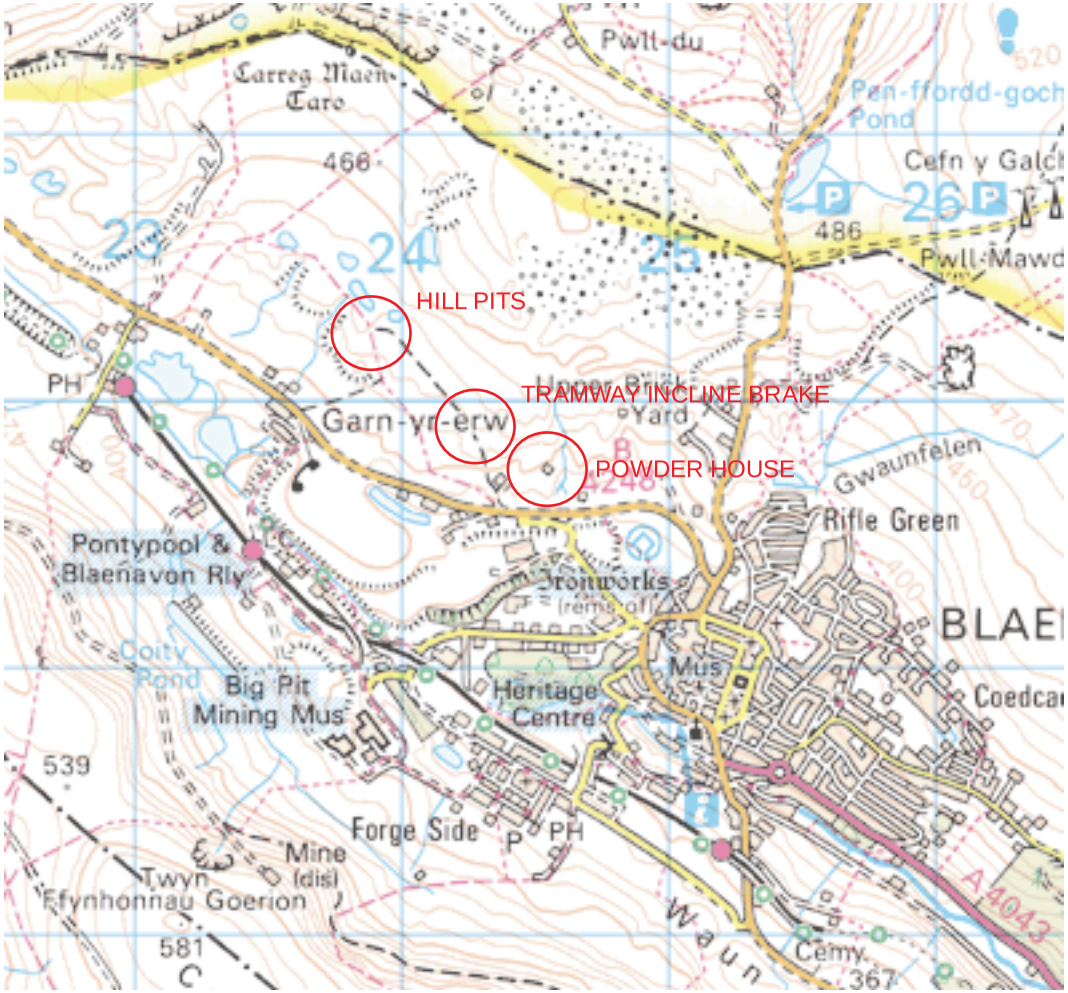


Fig. 1
Location of the three sites

Fig. 2
Google Earth image of the three sites within the industrial landscape of Blaenavon

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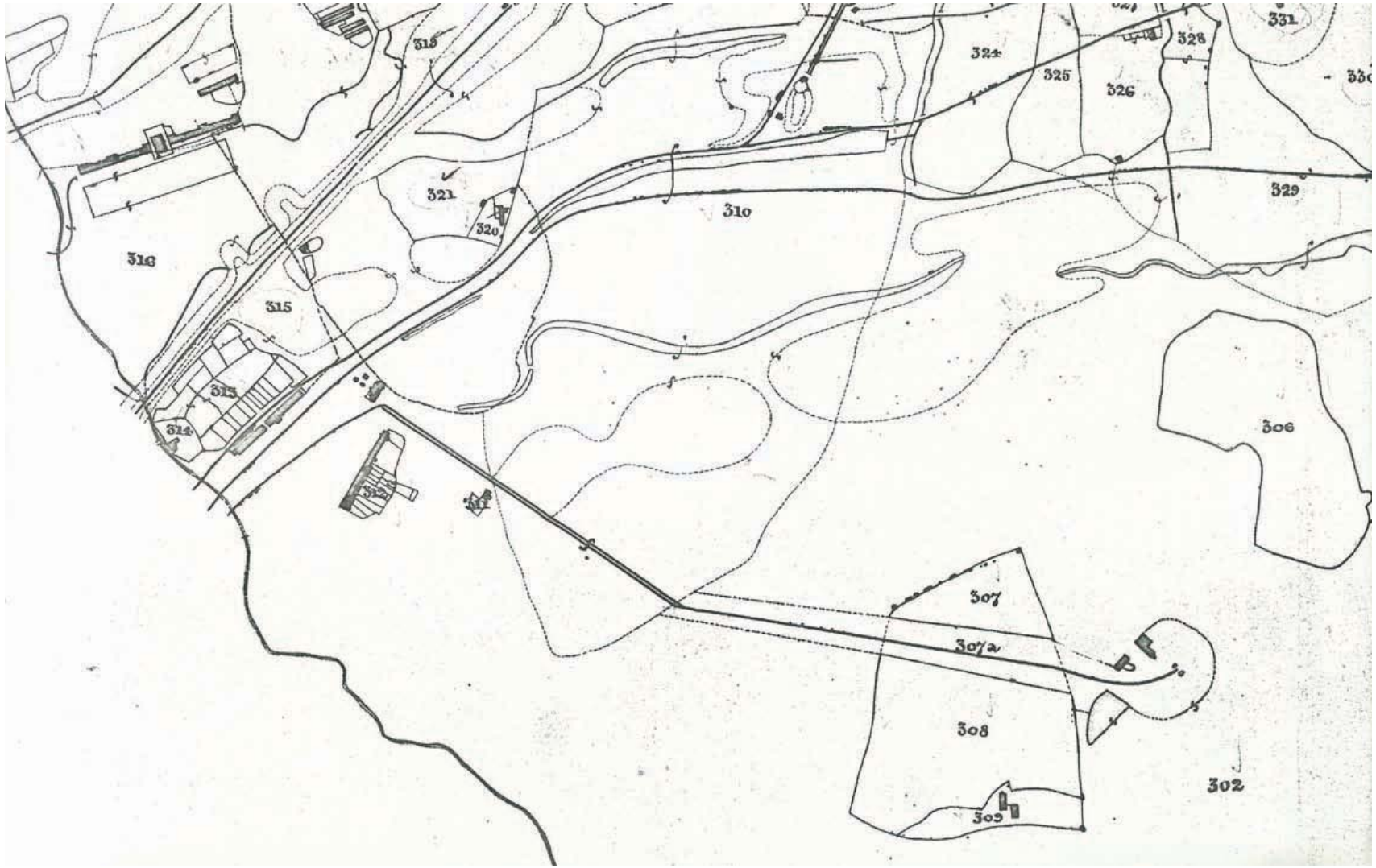
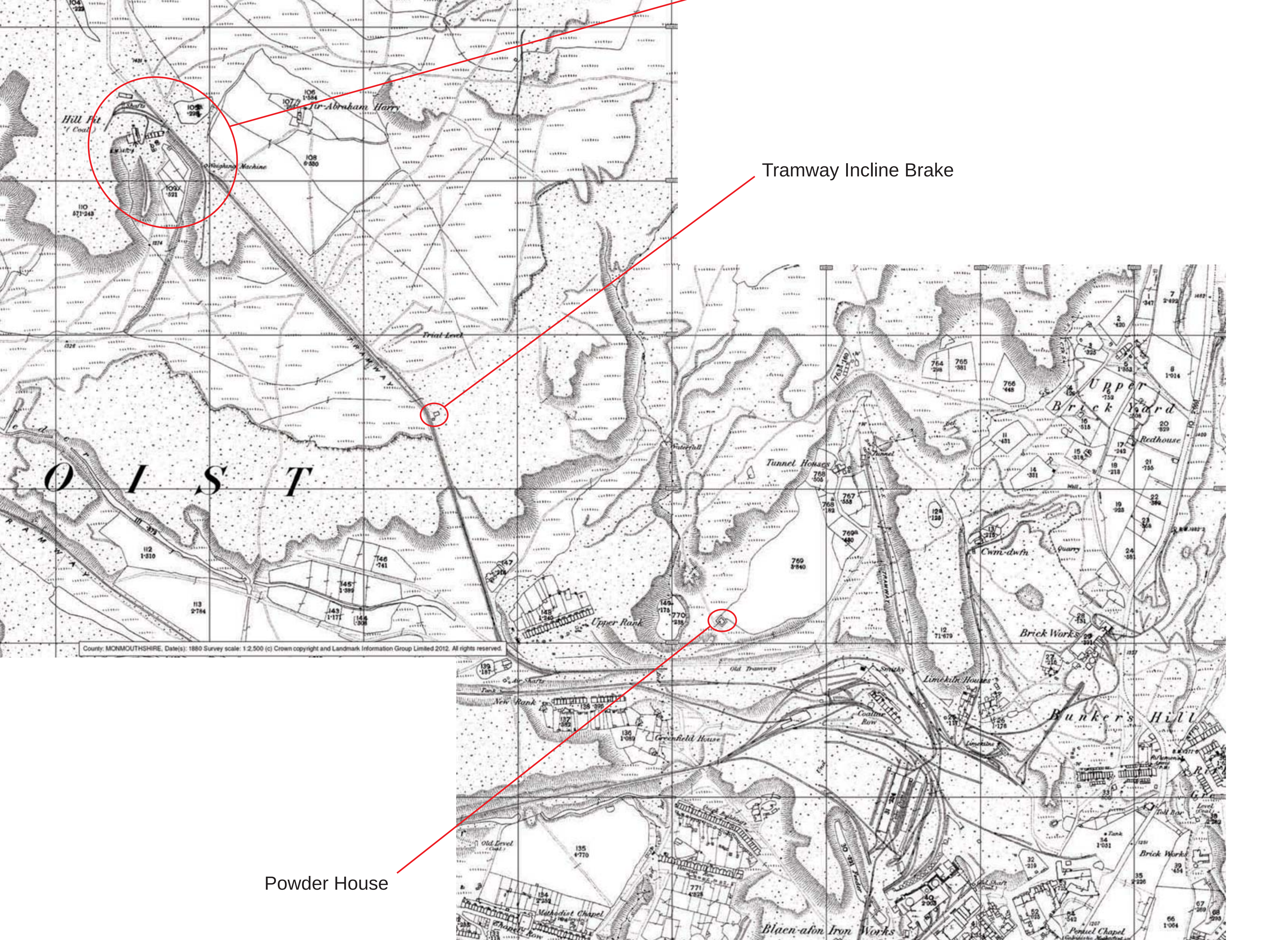


Fig. 3
1840 Tithe Map for Llanfoist Parish depicting Hill Pits, the tramway and the tramway incline



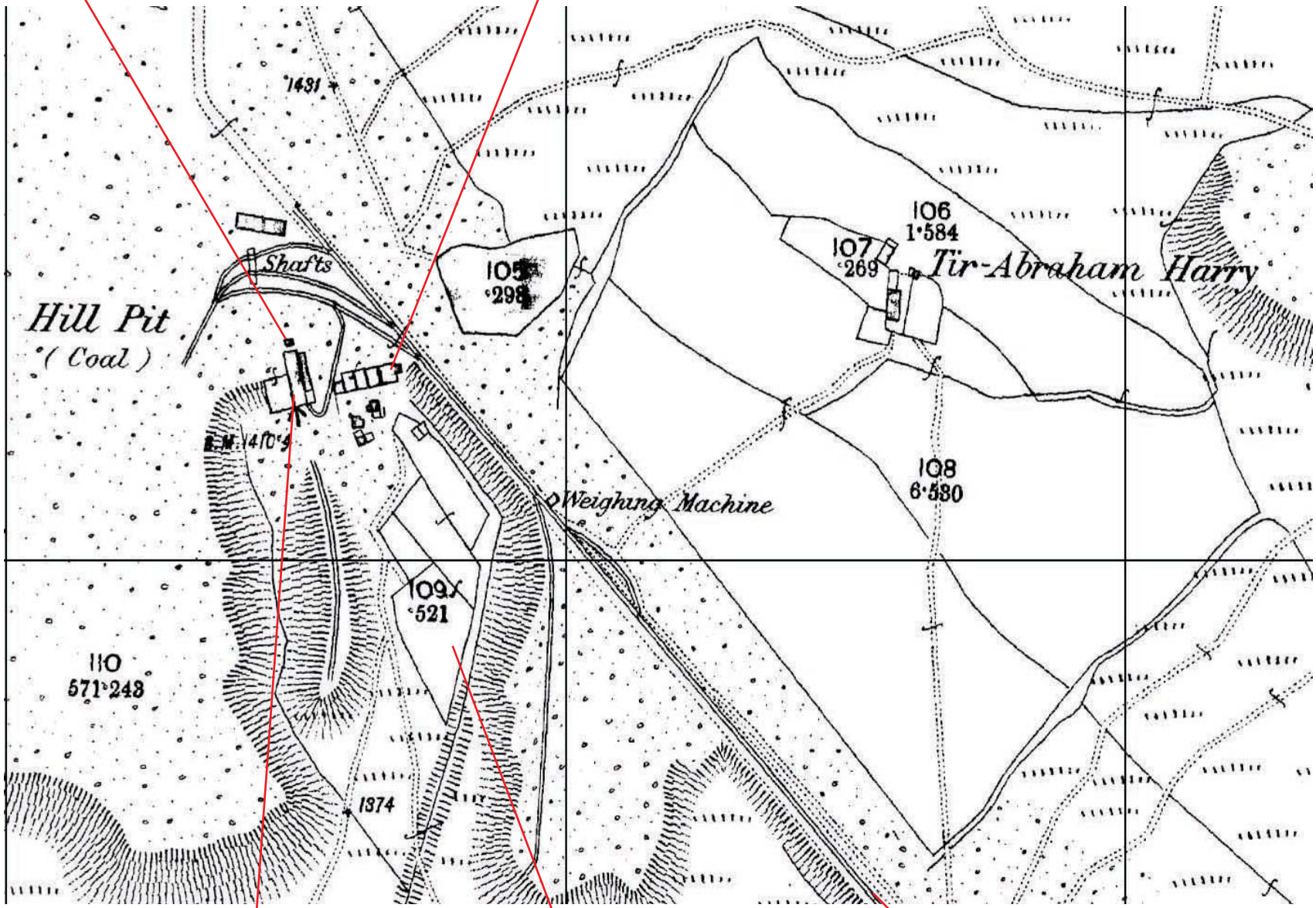


Fig. 5
OS map of 1880 showing Hill Pits

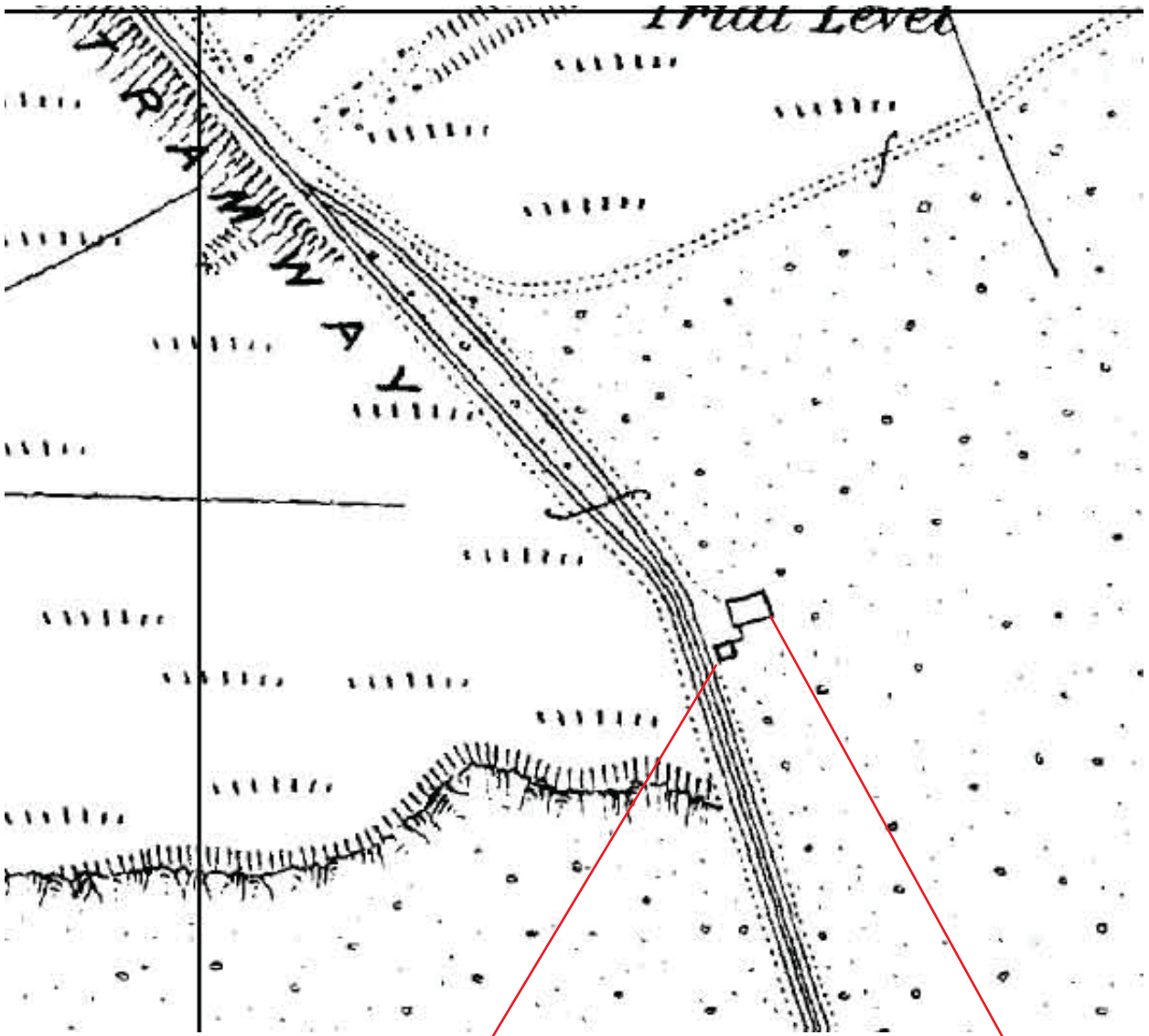


Fig. 6
OS map of 1880 showing the Incline Brake Engine

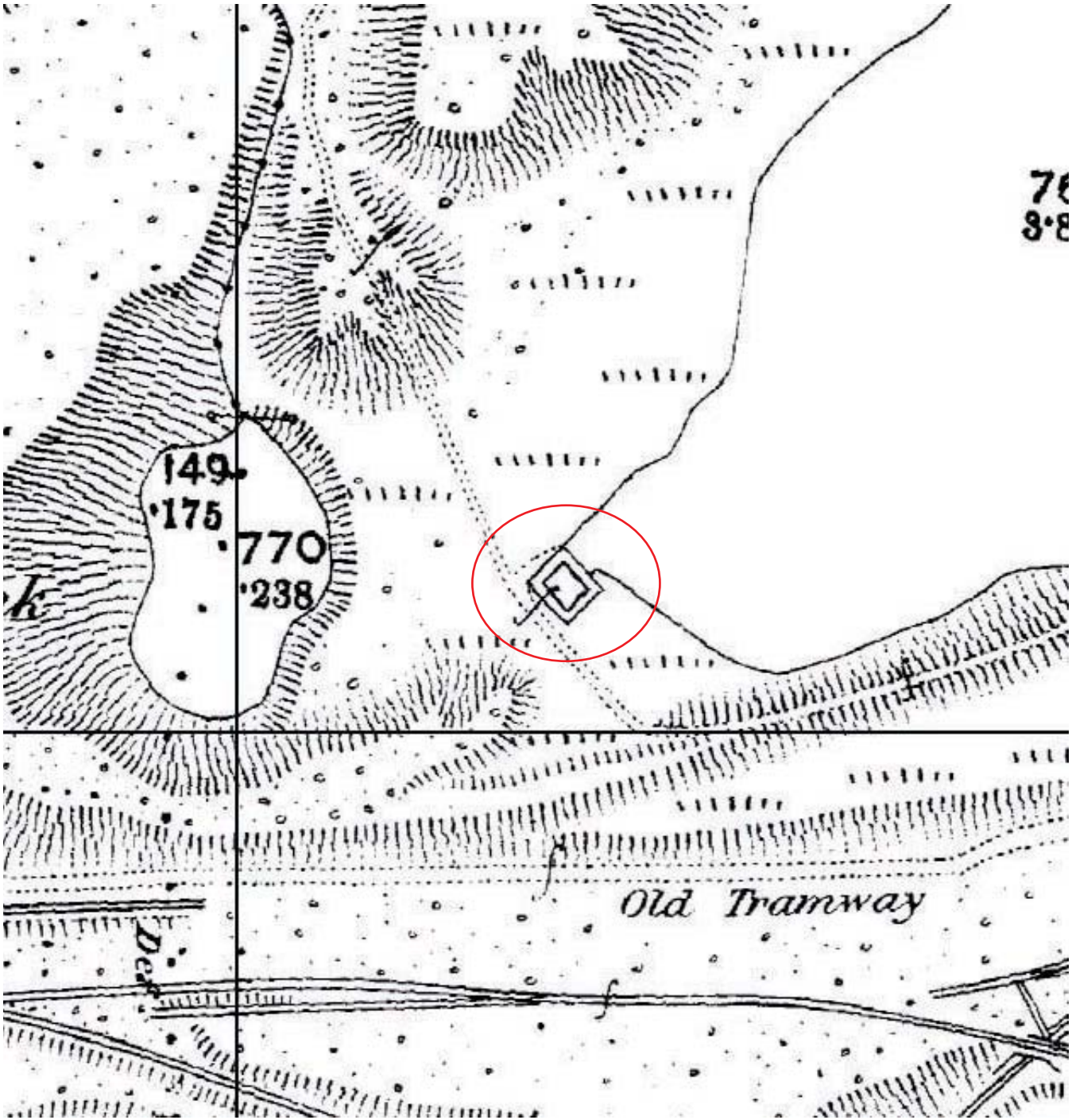


Fig. 7
OS map of 1880 showing the Powder House

Fig. 8
John van Laun's photographs of the Powder House taken in the 1970s.

(courtesy of Dennis Hopkins)

Fig. 9
John van Laun's photograph of the smaller structure on the Garn Road site. Note the word 'Magazine' written on the door

(courtesy of Dennis Hopkins)

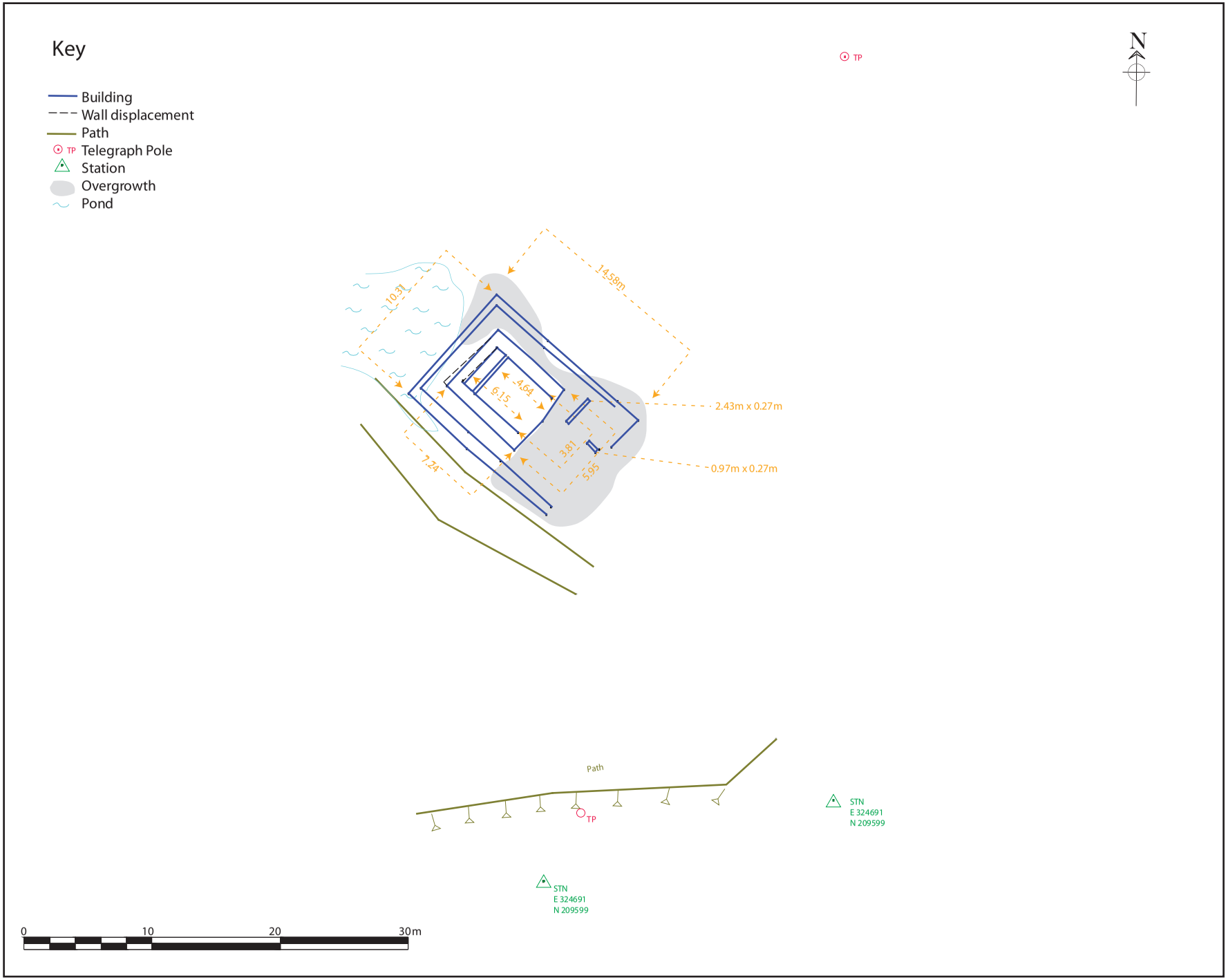


Fig. 10
Survey of the Garn Road Powder House

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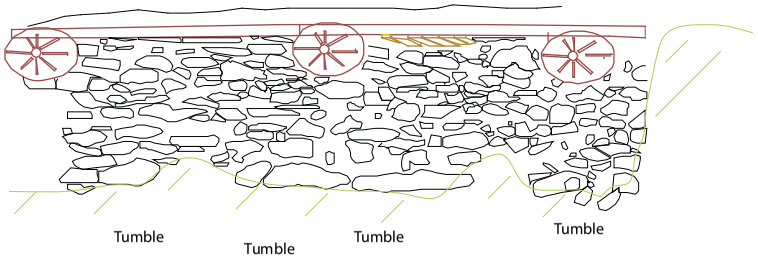
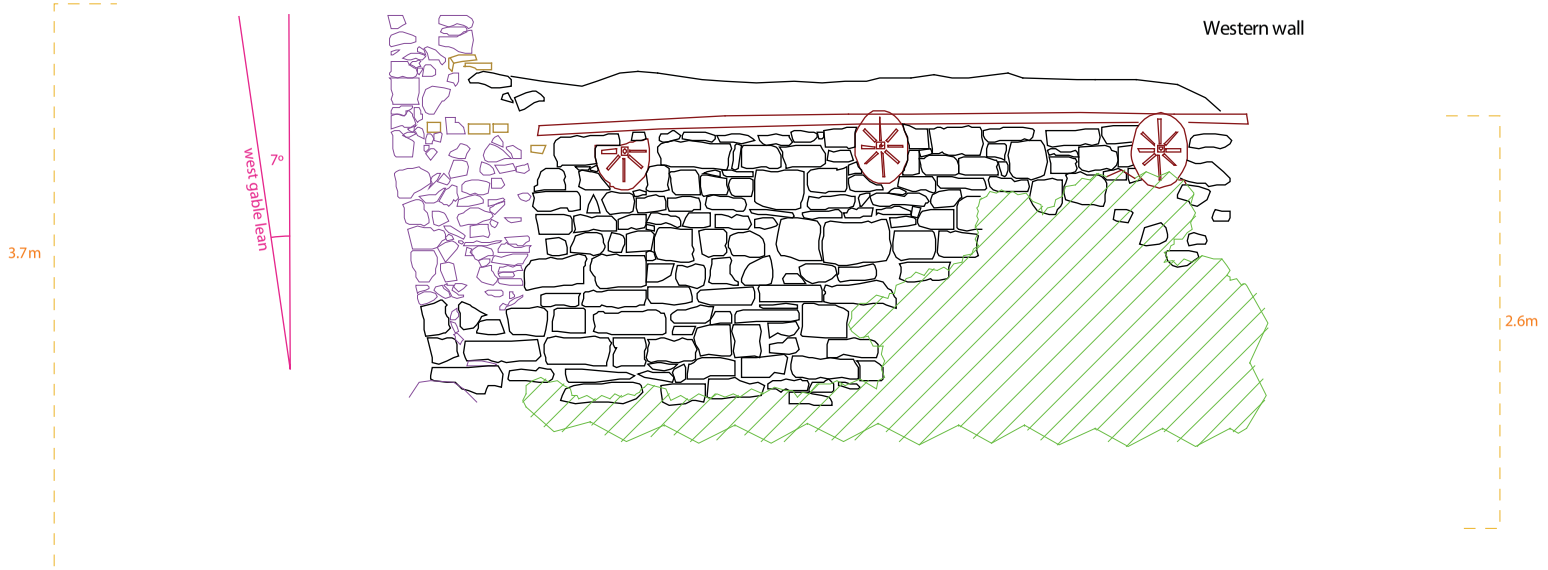
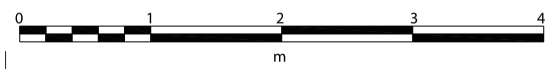


Eastern wall



Western wall



KEY:

- Stone
- Brick
- Iron
- Overgrowth
- Wall fill

Fig. 11
Side wall elevations of Garn Road Powder House

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Fig. 12
The Powder House

Scale = 2m

Looking SE

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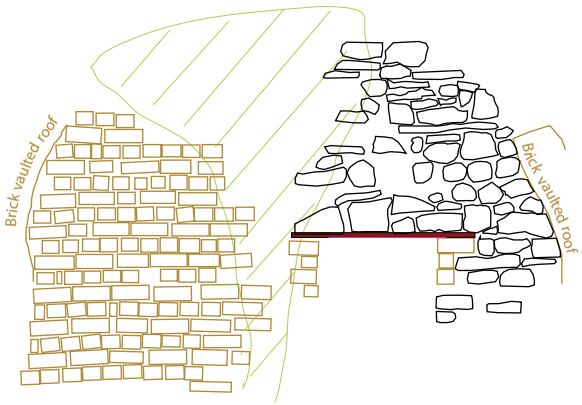
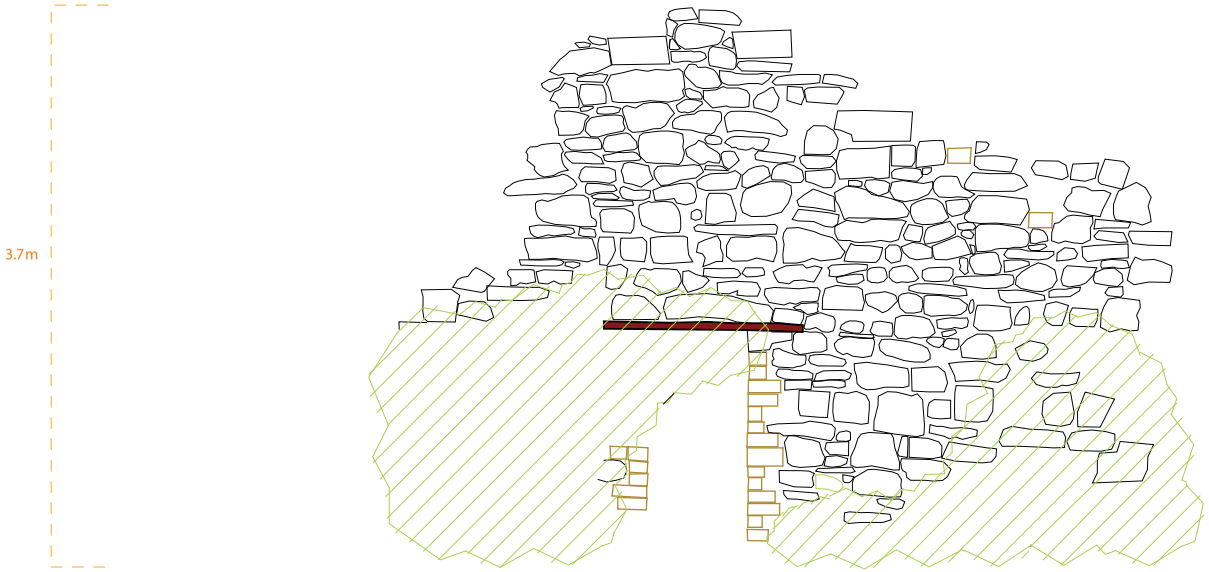
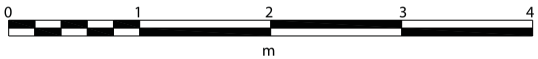


North wall interior

Estimated radius of roof vault 2.085m

North wall exterior





KEY:

- Stone
- Brick
- Iron
- Overgrowth

Fig. 13
Wall elevations
Garn Road
Powder House

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Fig. 14
Barrel-vaulted roof in main building at Garn Road Powder House

Looking N

Scale = 1m

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Fig. 15
Garn Road
Powder House

Scale = 2m

Looking NE

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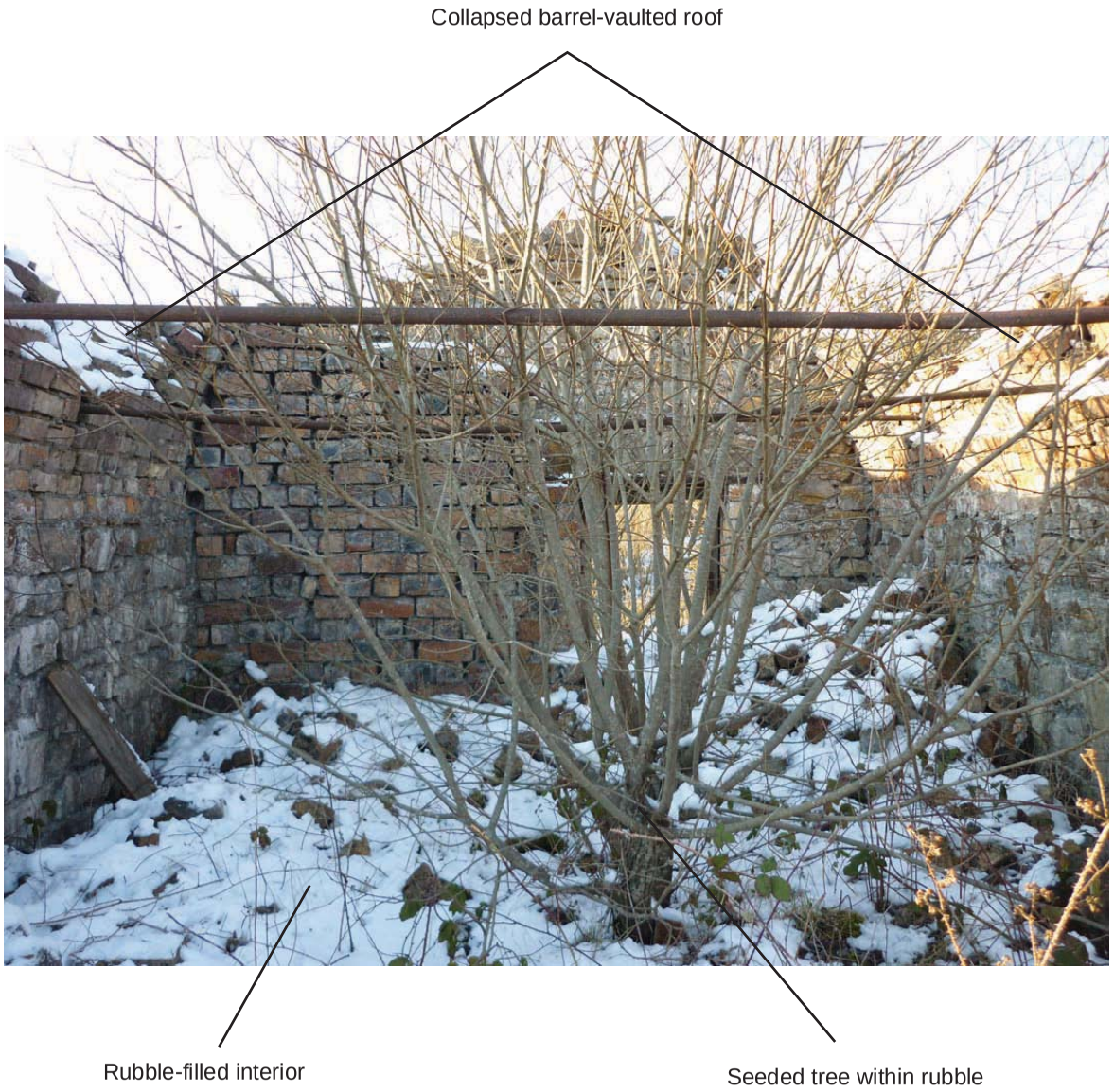

Fig. 16
Garn Road
Powder House

Scale = 2m

Looking N

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Fig. 17
Garn Road
Powder House

Scale = 1m

Looking N

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Key

- Stone walling
- Station
- Rubble
- Overgrowth

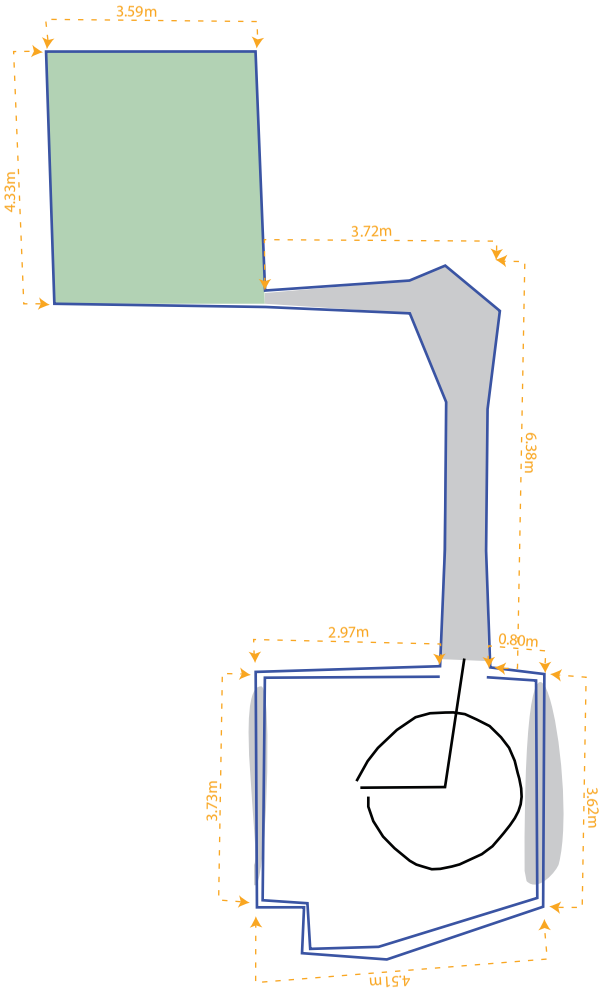

Fig. 18
Survey of the Tramway Incline Brake and Brakesman's House

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Fig. 19
The Tramway Incline Brake

Scale = 2m

Looking W

Fig. 20
The Tramway
Incline Brake

Scale = 2m

Looking S

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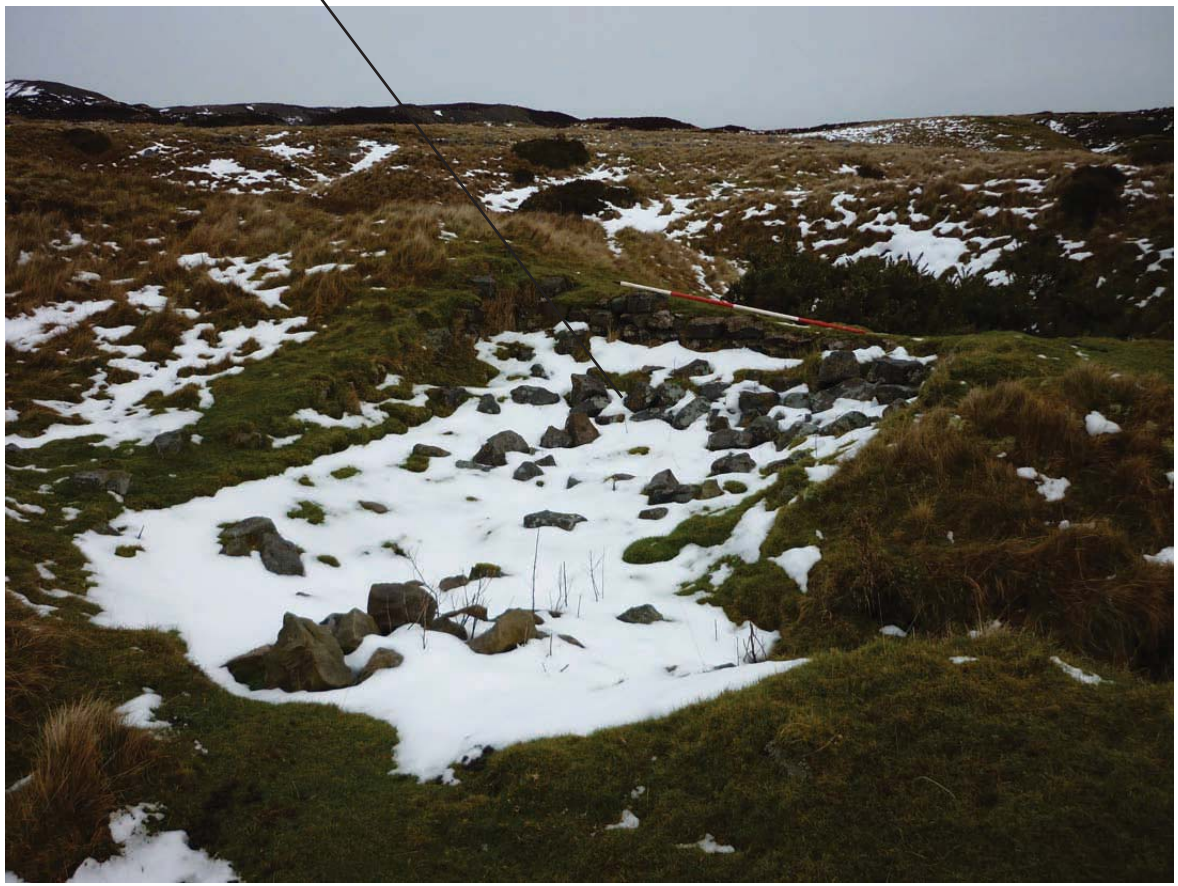

Fig. 21
The Tramway
Incline Brake

Scale = 2m

Looking W

ARCHAEOLOGY WALES
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wall
nk

y enclosure walls

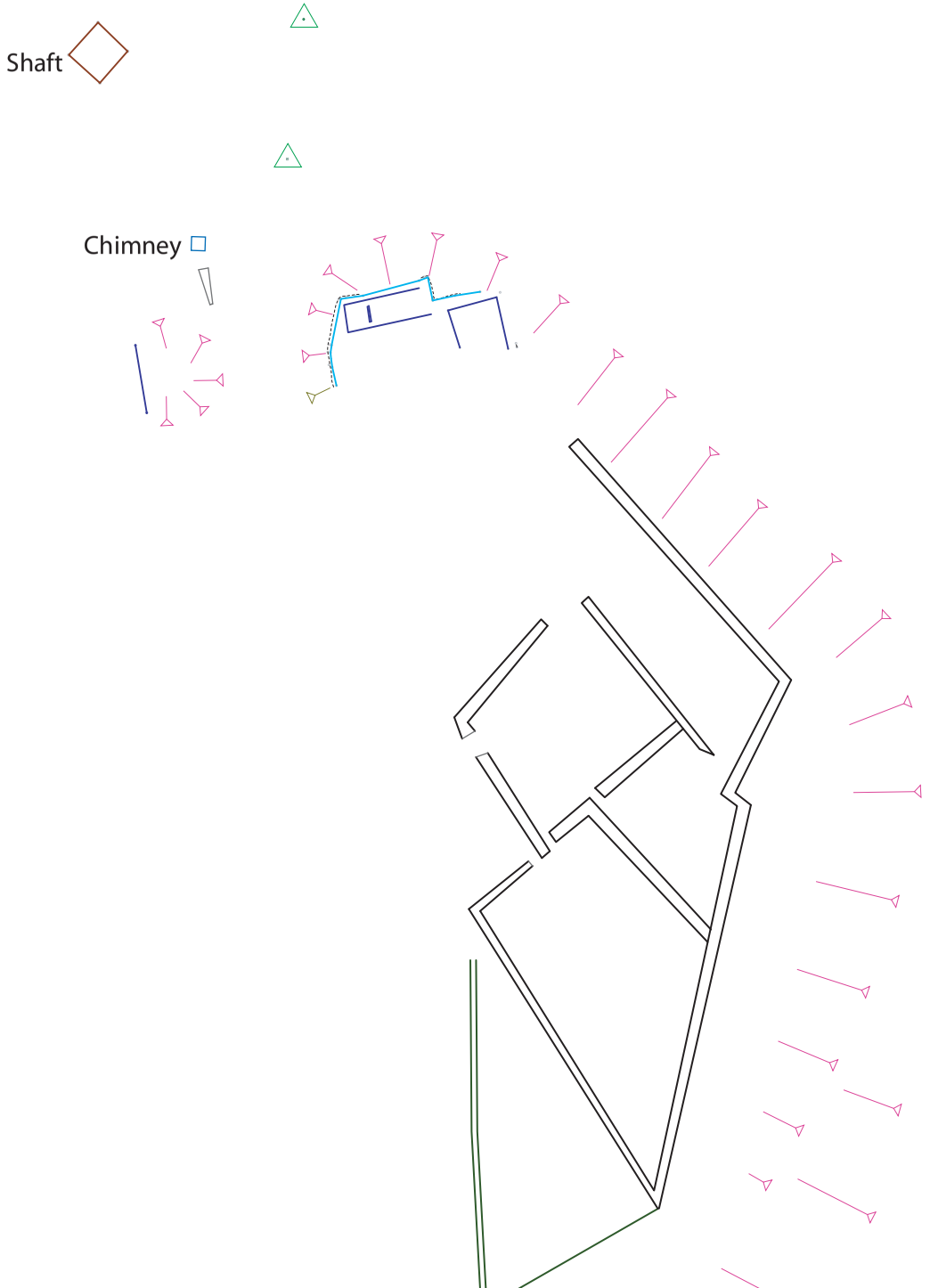

Fig. 23
Hill Pits Chimney

Scale = 2m

Looking NE

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Fig. 24
Hill Pits Chimney with the remains of the engine house behind

Scale = 2m

Looking SW

Fig. 25
View across Hill Pits workers cottages

Scale = 2m

Looking W

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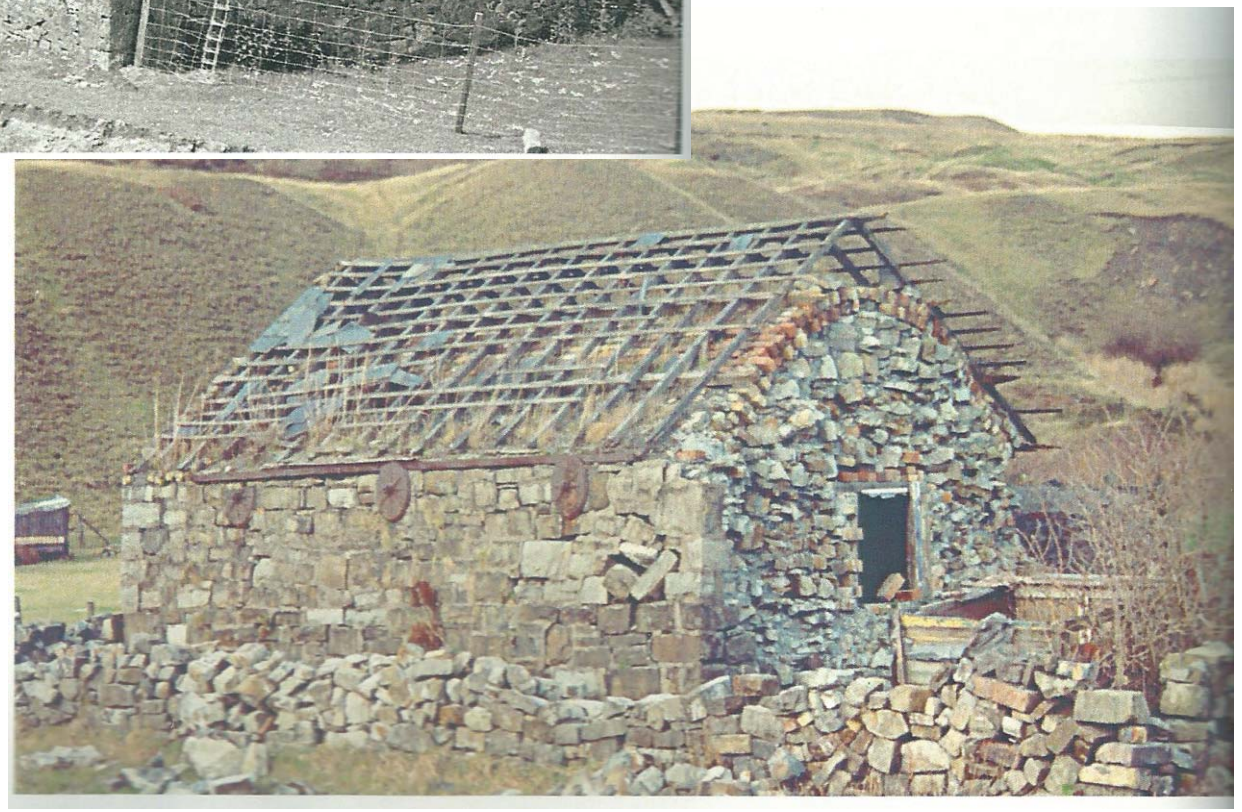
Revealing the past, informing the future

In 1978



In 1995

Fig. 26
Image of the
Powder House

ARCHAEOLOGY WALES
Revealing the past, informing the future

APPENDICES

APPENDIX I – Conservation timetable

Powder House, Garn Road

Timescale	Tasks	Personnel
Immediate Tasks	Fence off the site to prevent access that could lead to further collapse.	Volunteers
	Consult a drainage contractor regarding the best means of preventing water impacting on the site.	Project Co-ordinator
	Consult an historic buildings architect and structural engineer regarding rebuilding the structure	Project Co-ordinator
	Apply for Listed Building Consent to carry out the rebuilding works.	Project Co-ordinator
Spring 2012	Carry out further ecological work on the sites, including a herpetological survey.	Specialist Ecologist
Summer 2012	Carry out drainage works.	Specialist drainage contractor.
General Tasks	Ensure a photographic record is kept of all the works carried out on the site.	Volunteers
	Produce an interpretation board to be located close to the buildings.	Volunteers
Bi-annual Tasks	Ensure the vegetation is kept under control on the site.	Volunteers
	Carry out inspection to assess the condition of the buildings. Report on any deterioration.	Volunteers

Tramway Incline Brake

Spring 2012	Apply for Scheduled Monument Consent to carry out the works on the structures.	Project Co-ordinator
	Carry out further ecological survey including a herpetological survey.	Specialist

Summer 2012	Remove encroaching vegetation from the structures. Remove rubble from within the brakeman's house. Re-point the top of the walls within the sunken structure. Carry out cleaning and re-coating of exposed brake mechanism metalwork, using a mineral oil.	Volunteers Volunteers Volunteers Volunteers under archaeological supervision
General Tasks	Ensure a photographic record is kept of all the works carried out on the site. Produce an interpretation board to be located close to the buildings.	Volunteers Volunteers
Bi-annual Tasks	Ensure the vegetation is kept under control on the site. Carry out inspection to assess the condition of the buildings. Report on any deterioration. Carry out an inspection of the condition of the paintwork covering the metal mechanism. Report any deterioration.	Volunteers Volunteers Volunteers

Hill Pits

General Tasks	Carry out further ecological survey work, including a herpetological survey prior to any work commencing on site. Ensure a photographic record is kept of all the works carried out on the site. Produce an interpretation board to be located close within the site.	Specialist Volunteers Volunteers

Hill Pits Engine House Chimney

Annual Tasks	Carry out inspection to assess the condition of the structure. Report any deterioration. Remove any woody vegetation	Volunteers

	that is found to be growing between the stones.	Volunteers

Hill Pit Engine House

Annual Tasks	Carry out inspection to assess the condition of the structures. Report any deterioration.	Volunteers

Workers Cottages

Spring/summer 2012	Remove rubble from within the footprint of the cottages and the alley surrounding them. Hack out and re-point the retaining wall around the cottages using lime mortar. Rebuild the rear retaining wall in the area of bank erosion using rubble from cottages. Fill space between retaining wall and bank with rubble removed from cottages. Clear drain in south-eastern corner of cottages and reinstate it to allow water to drain around and away from the cottages.	Volunteers Volunteers Volunteers Volunteers under specialist guidance
Annual Tasks	Carry out inspection to assess the condition of the structures. Report any deterioration.	Volunteers

Mine Shafts

Spring 2012	Fence off the southern mine shaft.	Coal Authority
Annual Tasks	Carry out inspection to ensure that no collapse has occurred.	Coal Authority

Enclosure fields associated with the cottages

Spring/summer 2012	Clear out the drainage ditch surrounding the field walls and reinstate it in conjunction with the drainage works at the cottages.	Volunteers under specialist guidance

	Removal all corroded metalwork from the fields.	Volunteers
Biannual Tasks	Carry out an inspection of the site to ensure that the drainage continues to function properly, flowing around rather than through the fields.	Volunteers

APPENDIX II – Volunteer Training and Specialist Consultants

The following are a selection of the volunteer training opportunities and specialist contractors available for consultation during the conservation works.

Volunteer Training

Task	Training Source	Potential Costs
Lime mortar work including repointing of walls. Stone wall consolidation and rebuilding.	Sam Hale Ty Mawr Lime Brecon Enterprise Park Brecon Powys LD3 8BT Tel: (01874) 658005 Web: www.lime.org.uk Email: sam.hale@lime.org.uk Training day tailored to the requirements of the project. The day would focus on training in lime in building and lime pointing. This will cover all aspects of building required to allow the volunteers to undertake repair and consolidation work on the sites. The training day could either be held at the Ty Mawr training centre near Brecon, or on site. On-site training would carry an additional charge of £100 for use, transport, set up and take down of equipment and materials.	£110 (ex VAT) per person – 10% discount for groups of 10 or more.

Specialist Consultants

Task	Consultant	Potential Costs
Advice and guidance on the repair of the Powder House	Historic buildings architects: David Harvey Architect Fold Farm Cottage Broad Street Presteigne Powys Tel: (01544) 260227 Email: david@harvey7711.fslife.co.uk Has worked on a similar structure near Caerphilly. Available to provide advice on the repair and consolidation of the structure until the middle of April – after that will be	No charge for a site visit and advice.

	retired but can suggest someone else.	
Drainage of Powder House environs and Hill Pits Cottages		
Metalwork conservation	Jon James National Museum of Wales Jon.James@museumwales.ac.uk	Available to provide advice on conservation of metalwork via email.

Appendix III – Issues and Constraints

World Heritage Site

The Blaenavon Industrial Landscape was designated as a UNESCO World Heritage Site (BILWHS) in 2000 in recognition of the outstanding value of the cultural resource. All three sites in this study lie within the designated World Heritage Site (WHS). The WHS status does not provide any statutory protection to the sites with all work carried out in the designated area subject to normal planning constraints.

Listed Buildings

Two of the structures on the site are listed as features having specific architectural or historic interest:

- Garn Road Powder House – Grade II
- Hill Pits Chimney – Grade II

Listed Buildings Consent will be required from Cadw prior to work being carried out on any of the above features.

Scheduled Ancient Monuments

The Tramway Incline Brake is scheduled as an ancient monument of national significance in Wales. As a result, Scheduled Monument Consent (SMC) will be required from Cadw prior to any works being carried out on the site. Works that will require SMC comprise:

- any works for the purpose of removing or repairing a scheduled monument or any part of it or of making any alterations or additions thereto.

Cadw recommends that discussions are held with the Regional Inspectorate regarding any planned works prior to submission of an SMC application.

Biodiversity, Habitat and Protected Species

UK Biodiversity Action Plan

The UK Biodiversity Action Plan (UK BAP) is the Government's response to the Convention on Biological Diversity (CBD) signed in 1992. It describes the biological resources of the UK and commits a detailed plan for their protection and lists Action Plans for habitats and species.

The UK Habitat Action Plans (HAPs) are divided into Broad Habitat Statements, which are further divided into Priority Habitats, and provide detailed actions and cost targets for conserving these habitats. There are now 45 HAPs.

A number of species are categorised by the UK BAP as being of conservation concern or priority status for national attention; they are included within 391 UK BAP Priority Species Action Plans (SAPs).

Torfaen Local Biodiversity Action Plan (LBAP)

The UK BAP is further developed into local and regional Biodiversity Action Plans through local partnerships, and describes the important biological resources of the region, and sets out a strategy for their conservation.

The Torfaen Biodiversity Partnership has selected 24 HAPs and 38 SAPs to be included within the Torfaen Local Biodiversity Action Plan (Torfaen LBAP). The

HAPs for ‘Boundary and Linear Features’, ‘Dwarf Shrub Heath (Upland and Lowland)’, ‘Purple Moor Grass and Rush Pasture’, ‘Open Standing Water and Canal’, and ‘Colliery Spoil’ are of direct relevance to this report. Unfortunately, a number of the above LBAP HAPs have not been completed, so can not be used to inform this report at the present time.

Wildlife Legislation

It summarizes the most important points for background information and interest purposes only. It does not comprehensively reflect the text of the legislation, nor can it substitute for legal advice; it should not be relied upon in place of these things where any critical purpose is concerned. Please note that the word ‘recklessly’ is used as an amendment to *The Wildlife and Countryside Act 1981,* by *The Countryside and Rights of Way Act 2000* and relates only to England and Wales.

Badgers (Meles meles)

Under the *Protection of Badgers Act 1992 (c51)* it is illegal to:

- Wilfully kill, injures or take, or attempt to kill, injure or take, a badger.
- Cruelly ill-treat a badger, dig for badgers, using badger tongs, using a firearm other than the type specified under the exceptions within the Act.
- Interfere with a badger sett by damaging, destroying, obstructing, causing dog a dog to enter a sett, disturbing an occupied sett - either by intent or by negligence.
- Sell or offer for sale a live badger, having possession or control of a live badger.
- Mark a badger or attach any ring, tag, or other marking device to a badger.

The Badger is also protected under *Schedule 6* of *the Wildlife and Countryside Act 1981* (as amended) relating specifically to trapping and direct pursuit.

British bats (Vespertilionidae and Rhinolophidae)

All species of British bats are listed in *Schedule 5* of *The Wildlife and Countryside Act 1981* (as amended) and have full protection under Section 9. These species are also all listed as European Protected Species on *Schedule 2* of the *Conservation (Natural Habitats, &c.) Regulations 1994 & 2007* which gives them full protection under *Regulation 39*. All species of British bat are also protected under *Schedule 6* of the *Wildlife and Countryside Act 1981* (as amended) relating specifically to trapping and direct pursuit of these species. All species of British bat are included as priority species in the *UK Biodiversity Action Plan* and as species of principal importance for the conservation of biological diversity in England under *Section 74* of the *Countryside and Rights of Way (CRoW) Act 2000*. It is illegal in the UK to:

- Deliberately capture, injure or kill a bat.
- Deliberately or recklessly disturb bats.
- Damage or destroy a bat roost (this is an ‘absolute’ offence).
- Deliberately or recklessly disturb a bat at a roost or damage, destroy or obstruct access to a roost.
- Sell or attempt to sell a bat.

- Possess or transport a bat (or any part of it) without a licence.

Dormouse (Muscardinus avellanarius)

Dormice (Muscardinus avellanarius) are listed in *Schedule 5* of *The Wildlife and Countryside Act 1981* (as amended) and have full protection under *Section 9.* Dormice are also all listed as European Protected Species on *Schedule 2* of the *Conservation (Natural Habitats, &c.) Regulations 1994 & 2007* which gives them full protection under *Regulation 39.* Dormice are also protected under *Schedule 6* of *The Wildlife and Countryside Act 1981* (as amended) relating specifically to trapping and direct pursuit. Dormouse, are included as a priority species in the *UK Biodiversity Action Plan* and as a species of principal importance for the conservation of biological diversity in England under *Section 74* of the *Countryside and Rights of Way (CRoW) Act 2000.* It is illegal in the UK to:

- Deliberately capture, injure or kill dormice.
- Deliberately or recklessly disturb dormice.
- Deliberately or recklessly damage, destroy or obstruct any nesting place used by dormice for shelter, resting, breeding or protection.
- Sell or attempt to sell dormice.
- Possess or transport a dormouse (or any part of it) without a licence.

Otters (Lutra lutra)

Otters are listed in *Schedule 5* of *The Wildlife and Countryside Act 1981* (as amended) and have full protection under *Section 9.* Otters are also all listed as European Protected Species on *Schedule 2* of the *Conservation (Natural Habitats, &c.) Regulations 1994 & 2007* which gives them full protection under *Regulation 39*. Otters are also protected under *Schedule 6* of the *Wildlife and Countryside Act 1981* (as amended) relating specifically to trapping and direct pursuit of these species. Otters are included as a priority species in the *UK Biodiversity Action Plan* and as a species of principal importance for the conservation of biological diversity in England under *Section 74* of the *Countryside and Rights of Way (CRoW) Act 2000.* It is illegal in the UK to:

- Deliberately capture, injure or kill otters.
- Deliberately or recklessly disturb otters.
- Deliberately or recklessly damage, destroy or obstruct any nesting place used by otters for shelter, resting, breeding or protection.
- Sell or attempt to sell otters.
- Possess or transport an otter (or any part of it) without a licence.

Water Voles (Arvicola terrestris)

The places of shelter for Water voles are protected under *The Wildlife and Countryside Act 1981 (Amendment 1998).* It is illegal to:

- Deliberately or recklessly damage, destroy or disturb any place that water voles use for shelter or protection.
- Deliberately or recklessly disturb water voles while they are using such a place.

Birds

All wild birds (either native, non-native, visiting or resident) are protected under *Section 1* of *The Wildlife and Countryside Act 1981 (*as amended) and *The Countryside and Rights of Way (CRoW) Act 2000.* It is illegal to:

- Capture, injure or kill any wild bird.
- Take, damage or destroy the nest of any wild bird while it is being built or is being used.
- Take, damage or destroy any eggs of any wild birds.

Certain species of wild bird as shown in the table below have been given additional protection under *Schedule 1* of *The Wildlife and Countryside Act 1981 (*as amended). It is an offence to disturb these birds when they are nest building, or are either at or near a nest containing eggs or young. It is also an offence to disturb their dependant young birds.

Avocet	Bee-eater	Bittern	Bittern, little
Bluethroat	Brambling	Bunting, cirl	Bunting, Lapland
Bunting, snow	Buzzard, honey	Capercaillie (Scotland only)	Chough
Corncrake	Crake, spotted	Crossbills (all species)	Divers (all species)
Dotterel	Duck, long-tailed	Eagle, golden	Eagle, white-tailed
Falcon, gyr	Fieldfare	Firecrest	Garganey
Godwit, black-tailed	Goshawk	Grebe, black-necked	Grebe, Slavonian
Greenshank	Gull, little	Gull, Mediterranean	Harriers (all species)
Heron, purple	Hobby	Hoopoe	Kingfisher
Kite, red	Merlin	Oriole, golden	Osprey
Owl, barn	Owl, snowy	Peregrine	Petrel, Leach's
Phalarope, red-necked	Plover, Kentish	Plover, little ringed	Quail, common
Redstart, black	Redwing	Rosefinch, scarlet	Ruff
Sandpiper, green	Sandpiper, purple	Sandpiper, wood	Scaup
Scoter, common	Scoter, velvet	Serin	Shorelark

Shrike, red-backed	Spoonbill	Stilt, black-winged	Stint, Temminck's
Stone-curlew	Swan, Bewick's	Swan, whooper	Tern, black
Tern, little	Tern, roseate	Tit, bearded	Tit, crested
Treecreeper, short-toed	Warbler, Cetti's	Warbler, Dartford	Warbler, marsh
Warbler, Savi's	Whimbrel	Woodlark	Wryneck

Great Crested Newt (Triturus cristatus)

Great Crested Newts are listed in *Schedule 5* of *The Wildlife and Countryside Act 1981* (as amended) and have full protection under *Section 9.* Great Crested Newts are also all listed as European Protected Species on *Schedule 2* of the *Conservation (Natural Habitats, &c.) Regulations 1994 & 2007* which gives them full protection under *Regulation 39.*

It is illegal in the UK to:

- Deliberately or capture, injure or kill a Great Crested Newt.
- Deliberately or recklessly disturb Great Crested Newts when in a place of shelter.
- Deliberately or recklessly damage or destroy any place that Great Crested Newts use for shelter, protection or breeding.
- Sell or attempt to sell a Great Crested Newt or any part of one at any point of its life cycle (egg, larvae, juveniles and adults).

Common Amphibians

The following common amphibians are protected *The Wildlife and Countryside Act 1981* (as amended) against sale or trade: the Common frog, Common toad, Smooth newt and Palmate newt.

Common Reptiles

All native British reptiles are protected against deliberate killing or injury under *The Wildlife and Countryside Act 1981* (as amended). Common Lizard (*Lacerta vivipara*), Slow-worm (*Anguis fragilis*) Grass snake (*Natrix natrix*) and Adder (*Vipera berus*) are also protected against sale or trade.

Invertebrates

Certain invertebrate species are fully protected under *The Wildlife and Countryside Act 1981 (*as amended) against killing, injury and damage or destruction of their place of shelter. Other species are only protected against sale or trade. A comprehensive list of the species protected and their level of protection is available from Buglife, the Invertebrate Conservation Trust:

http://www.buglife.org.uk/conservation/policy/tableofinvertebratespeciesonthewildlifeandcountrysidelaw.htm

Local Development Plan

Torfaen County Borough Council's Deposit Local Development Plan (2011-2021) sets out its policies regarding the preservation of the cultural and historic resource within the county. It recognises the significance of the Blaenavon Industrial Landscape World Heritage Site and puts in place a number of policies designed to protect and enhance the landscape. These are:

- The Forgotten Landscapes Partnership will help conserve and restore the built and natural heritage features that are integral to the historic character of the landscape and natural features around Blaenavon.
- Protecting Listed Buildings
- Protecting Scheduled Ancient Monuments
- Protecting Registered Historic Landscapes

Rights of Way and other access agreements

A Public Right of Way links Hill Pits with the B4248, while sections of the line of the tramway running from Hill Pits to the Ironworks in Blaenavon is designated as a Permissive Route by the landowners. The 'Iron Mountain Trail', an established heritage walk, takes in the site of Hill Pits.

Appendix IV – Botanical Target Notes

Target Note 01. Grassland. **NVC U1 *Festuca ovina – Agrostis capillaris – Rumex acetosella* grassland** is found in drier locations such as the sides and flatter crests of colliery spoil pit-banks (TN01), drier areas of pre-industrial substrates (TN01), the sides and tops of buried and partially buried structures (TN04) and boundary features (TN05). Diagnostic plant species, noted from field survey, include: *Festuca ovina, Agrostis capillaris, Rumex acetosella, Hieracium pilosella, Taraxacum officinale* agg. and *Cerastium fontanum*. At the Hill's Pit powder house site *Ulex europaeus* is also present. Mosses and lichens are an important element in this sward type; diagnostic species, noted from field survey include: (lichens) *Cladonia arbuscula, Cladonia impexa, Cladonia fimbriata, Cladonia uncialis, Cladonia gracilis, Cornicularia aculeata* and *Peltigera canina*; and (mosses) *Polytrichum piliferum, Brachythecium albicans, Hypnum cupressiforme s.l.* and *Rhytidiadelphus squarrosus*.

For the purposes of this survey, the grassland has been mapped according to the protocol set out in the section J1.2 of the 'Handbook for Phase 1 habitat survey' (JNCC 2003).

Target Note 02. Grassland. **NVC MG10 *Holcus lanatus – Juncus effusus* rush-pasture** (TN02) is found in locations at the bases of the colliery spoil pit-banks, such as ditches and other lower lying areas, and where these ditches have become impeded and defunct, causing inundation of surrounding areas. This grassland type is principally found in the series of small, embanked gardens, or paddocks, or enclosures, at the Hill's Pit (chimney, cottages and gardens) site and at the Hill's Pit powder house site. Diagnostic species, noted from field survey, include: *Juncus effusus, Juncus inflexus, Holcus lanatus, Ranunculus repens* and *Cardamine pratensis*.

For the purposes of this survey, the grassland has been mapped according to the protocol set out in the section J1.2 of the 'Handbook for Phase 1 habitat survey' (JNCC 2003).

Target Note 03. Woodland. **NVC H12 *Calluna vulgaris – Vaccinium myrtillus* heath** (TN03). This habitat type often occupies in close proximity to or intimately intermixed with the **NVC U1 *Festuca ovina – Agrostis capillaris – Rumex acetosella* grassland** described above; the local occurrence of either type being the result of localised variations in edaphic properties. Diagnostic species, noted from field survey, include: *Calluna vulgaris, Vaccinium myrtillus, Empetrum nigrum ssp. nigrum, Festuca ovina, Agrostis capillaris, Hypnum cupressiforme s. l., Cladonia arbuscula, Cladonia impexa, Cladonia fimbriata, Cladonia uncialis, Cladonia gracilis* and *Polytrichum piliferum*.

For the purposes of this survey, the heathland has been mapped according to the protocol set out in the section J1.2 of the 'Handbook for Phase 1 habitat survey' (JNCC 2003).

Target Note 04. Buildings and structures. There are a variety of buildings and structures present at all three of the assessed sites. These are described within there landscape and ecological context in part 1.6 above. A detailed description of the

buildings and structures is beyond the scope of this ecological report, and should be sought in the archaeological report/s.

From the ecological perspective, and with regard to protected species of vertebrates, all of the structures contain crevices and fissures suitable for a variety of species of fauna, as well as protected species of vertebrates.

All of the buildings are constructed using local dressed or undressed stone. Some are mere buried, or partially buried, foundations or lower courses. Some, such as the chimney at the Hill's Pit (chimney, cottages and gardens) site, and at the up-standing remains at the Hill's Pit powder house site, are substantial structures. Furthermore, heaps of stone rubble, resulting from the collapse of structures, are also valuable potential habitats.

In conjunction with the structures themselves, other habitats are also present. These include **NVC U1 *Festuca ovina – Agrostis capillaris – Rumex acetosella* grassland** found around and on some of the structures at the Hill's Pit (chimney, cottages and gardens) site and the Hill's pit brake wheel site; **NVC MG10 *Holcus lanatus – Juncus effusus* rush-pasture** found around the Hill's Pit (chimney, cottages and gardens) site and the Hill's powder house site; and scrub habitats, associated with disturbance, containing species such as: *Sambucus nigra*, *Salix* spp., and *Rubus fruticosus* agg., found at the Hill's Pit powder house site.

Target Note 05. Boundary features. Enclosing most of the small, embanked gardens, or paddocks, or enclosures, at the Hill's Pit (chimney, cottages and gardens) site are low boundary features; the construction of these is unknown to the assessor/author of this report Some of these are topped by a series of neglected and over-grown *Crataegus monogyna* hedgerow trees.

In conjunction with the boundary features themselves, other habitats are also present. These include **NVC U1 *Festuca ovina – Agrostis capillaris – Rumex acetosella* grassland** found on boundary features; and **NVC MG10 *Holcus lanatus – Juncus effusus* rush-pasture** found around the bases of the boundary features.

Target Note 06. Grassland. Alongside tracks and other disturbed, muddy areas, there are elements of **NVC U6 *Juncus squarrosus – Festina ovina* grassland**. Diagnostic species of this grassland type, noted from field survey include: *Juncus squarrosus, Festuca ovina, Agrostis canina, Carex* cf. *nigra* and *Deschampsia flexuosa*. Around pool to the northeast of the Hill's Pit (chimney, cottages and gardens) site wetter, marginal areas have abundant *Eriophorum* cf. *augustifolium*. While this is an important habitat in areas adjacent to the three assessment sites, it is not present in large areas in the actual sites themselves.

Appendix V – Animal Notes

Animal Note 01. Grassland. **NVC U1 *Festuca ovina – Agrostis capillaris – Rumex acetosella* grassland** is characteristic of base-poor, oligotrophic and summer parched soils in the warm, dry lowlands of southern Britain, although locally congenial conditions can extend its range into scattered localities within oceanic south-west Britain and around upland fringes. This grassland is species-poor, but could provide suitable foraging habitats and nesting habitats for a range of birds, bats, reptiles, amphibians and Otters.

Animal Note 02. Grassland. **NVC MG10 *Holcus lanatus – Juncus effusus* rush-pasture** is characteristic of strongly impeded drainage in a wide range of mineral soils, of varying pH, throughout the British lowlands and upland fringes. This grassland is species-poor and generally of low value for nature conservation, although at Hill's Pits it could provide suitable foraging habitats habitats for a range of birds, bats, reptiles, amphibians and Otters.

Animal Note 03. Heathland. **NVC H12 *Calluna vulgaris – Vaccinium myrtillus* heath** is a typical sub-shrub community of acidic to circumneutral, free-draining mineral soils, throughout the cold and wet sub-montane zone, generally between 200m and 600m. While this habitat is species-poor it could provide suitable foraging, nesting and basking habitats for a range of birds, bats, reptiles, amphibians and Otters.

Animal Note 04. Buildings and structures. There are a variety of structures (TN04) present at all three of the assessed sites. From the ecological perspective, and with regard to protected species of vertebrates, all of the structures contain crevices and fissures suitable for a variety of species of fauna, as well as protected species of vertebrates. All of the buildings are constructed using local dressed or undressed stone. Some are mere buried, or partially buried, foundations or lower courses. Some, such as the chimney at the Hill's Pit (chimney, cottages and gardens) site (see AN06), and at the up-standing remains at the Hill's Pit powder house site (see AN07), are substantial structures. Furthermore, heaps of stone rubble, resulting from the collapse of structures, are also valuable potential habitats. These features could provide suitable refugia and nesting habitats for a range of birds, bats, reptiles and amphibians.

Animal Note 05. Boundary features. Enclosing most of the small, embanked gardens, or paddocks, or enclosures, at the Hill's Pit (chimney, cottages and gardens) site are low boundary features, the construction of these is unknown to the assessor/author of this report (TN05). Some of these are topped by a series of neglected and over-grown *Crataegus monogyna* hedgerow trees. The remnant *Crataegus monogyna* hedgerows, on the boundary features at the Hill's Pit (chimney, cottages and gardens) site, could provide nesting and foraging habitat for some species of birds, although this would be largely sub-optimal because the bushes tend to be rather sparse and open in their crowns. In addition, the boundary features could be used as basking habitat by reptiles.

Animal Note 06. Chimney at the Hill's Pit (chimney, cottages and gardens) site. This feature is a potential bat roost habitat, as well a potential bird nesting habitat, and a potential refugia for reptiles and amphibians.

Animal Note 07. Up-standing remains at the Hill's Pit powder house site. This feature is a potential bat roost habitat (though sub-optimal as it is damp and cold), as well a potential bird nesting habitat, and a potential refugia for reptiles and amphibians.

Appendix VI – Tables of Data

Species lists

Species	
Agrostis capillaris (Common bent)	o-la
Brachythecium albicans	o
Calluna vulgaris (Heather or Ling)	la
Cerastium fontanum (Common mouse-ear)	o-lf
Cirsium vulgare (Spear thistle)	r
Cladonia arbuscula	f-la
Cladonia fimbriata	o
Cladonia gracilis	o
Cladonia impexa	o
Cladonia uncialis	o
Cornicularia aculeata	r
Cynosurus cristatus (Crested dogstail)	o-lf
Empetrum nigrum ssp. nigrum (Crowberry)	o-lf
Festuca ovina (Sheep's fescue)	o-la
Hieracium pilosella (Hawkweed)	r
Hypnum cupressiforme s.l.	f
Peltigera canina	r
Polytrichum piliferum	f-la
Rhytidiadelphus squarrosus	lf
Rumex acetosella (Common sorrel)	o
Taraxacum officinale agg. (Dandelion)	r-lo
Ulex europaeus (Gorse)	r-la
Vaccinium myrtillus (Bilberry or Whortleberry)	lf

Species recorded from grassland, Target Notes 01 and 03.

Species	
Cardamine pratensis (Cuckooflower)	o
Holcus lanatus (Yorkshire-fog)	o
Juncus articulatus (Jointed rush)	o-lf
Juncus effusus (Soft rush)	o-lf
Juncus inflexus (Hard rush)	a
Juncus squarrosus (Heath rush)	r-lo
Ranunculus omiophyllus (Round-leaved crowfoot)	r-lo
Ranunculus repens (Creeping buttercup)	f-la
Veronica beccabunga (Brooklime)	lf

Species recorded from grassland, Target Note 02.

Animal Note 07. Up-standing remains at the Hill's Pit powder house site. This feature is a potential bat roost habitat (though sub-optimal as it is damp and cold), as well a potential bird nesting habitat, and a potential refugia for reptiles and amphibians.

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Calluna vulgaris (Heather or Ling)	la
Cerastium fontanum (Common mouse-ear)	o-lf
Cirsium vulgare (Spear thistle)	r
Cladonia arbuscula	f-la
Cladonia fimbriata	o
Cladonia gracilis	o
Cladonia impexa	o
Cladonia uncialis	o
Cornicularia aculeata	r
Cynosurus cristatus (Crested dogstail)	o-lf
Empetrum nigrum ssp. nigrum (Crowberry)	o-lf
Festuca ovina (Sheep's fescue)	o-la
Hieracium pilosella (Hawkweed)	r
Hypnum cupressiforme s.l.	f
Peltigera canina	r
Polytrichum piliferum	f-la
Rhytidiadelphus squarrosus	lf
Rumex acetosella (Common sorrel)	o
Taraxacum officinale agg. (Dandelion)	r-lo
Ulex europaeus (Gorse)	r-la
Vaccinium myrtillus (Bilberry or Whortleberry)	lf

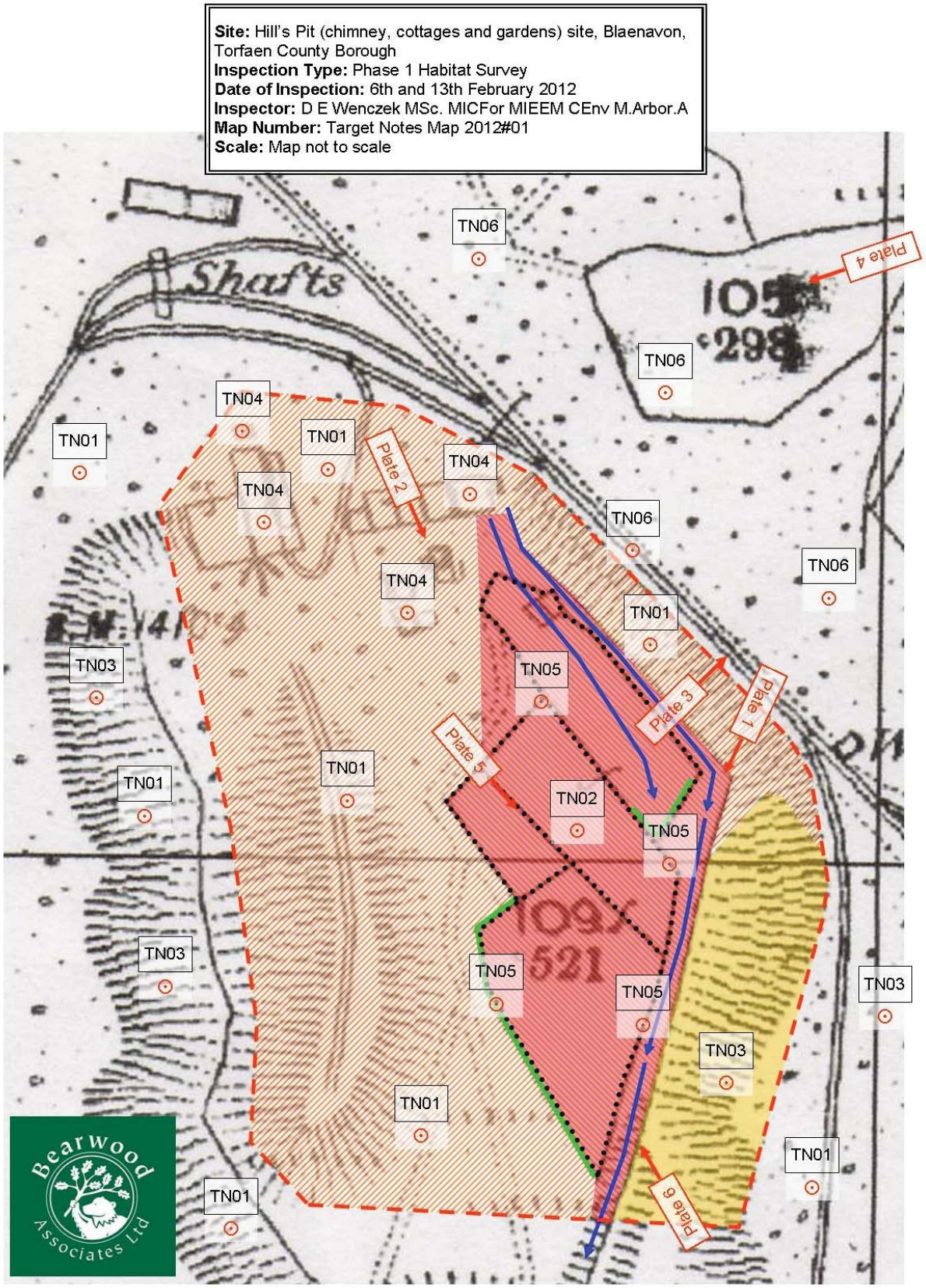
Species recorded from grassland, Target Notes 01 and 03.

Species	
Cardamine pratensis (Cuckooflower)	o
Holcus lanatus (Yorkshire-fog)	o
Juncus articulatus (Jointed rush)	o-lf
Juncus effusus (Soft rush)	o-lf
Juncus inflexus (Hard rush)	a
Juncus squarrosus (Heath rush)	r-lo
Ranunculus omiophyllus (Round-leaved crowfoot)	r-lo
Ranunculus repens (Creeping buttercup)	f-la
Veronica beccabunga (Brooklime)	lf

Species recorded from grassland, Target Note 02.

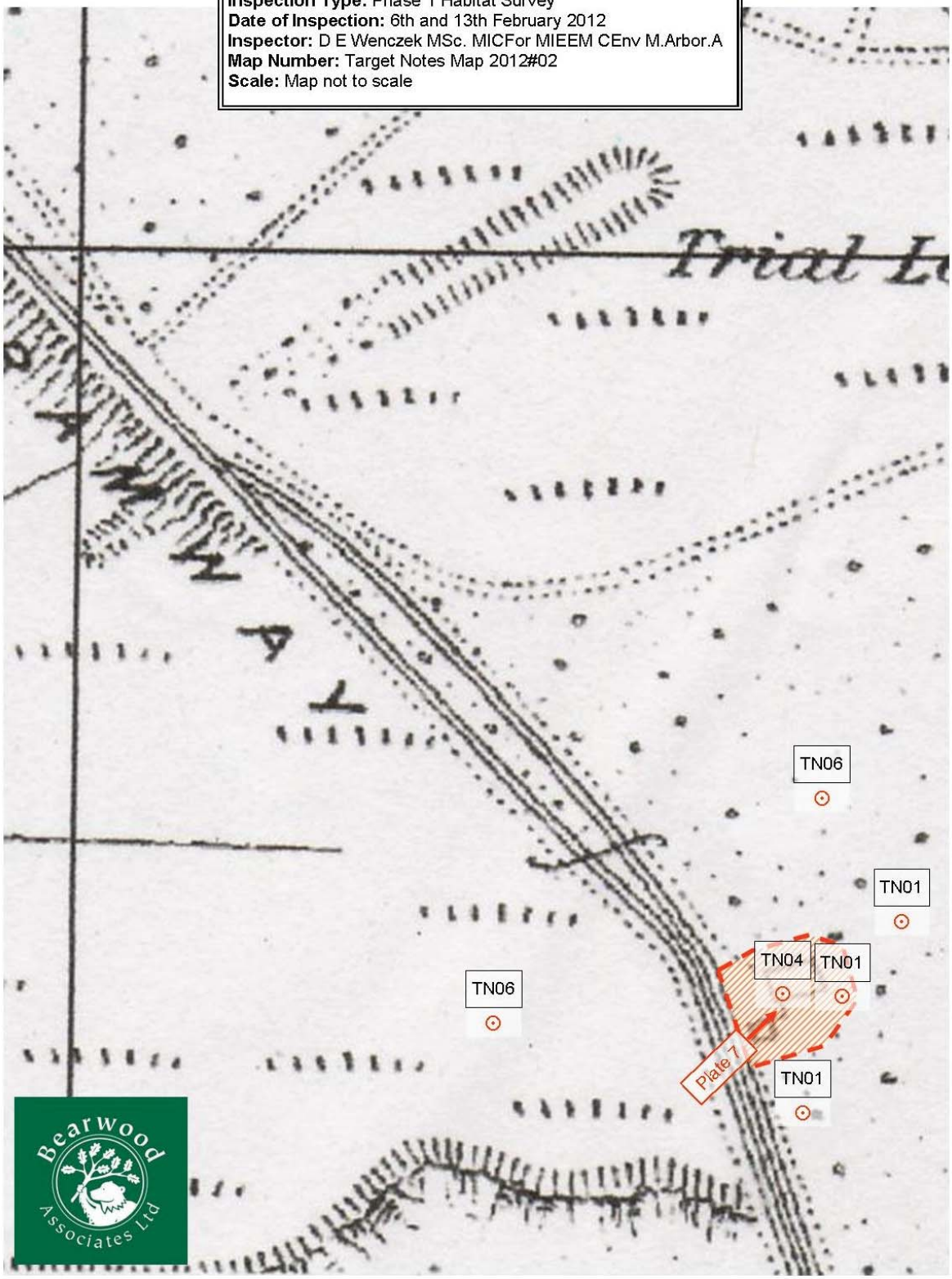
Appendix VI
Ecological Maps and Site Images

11.2 Target Notes Map 2012#01 Blaenavon, Torfaen CB



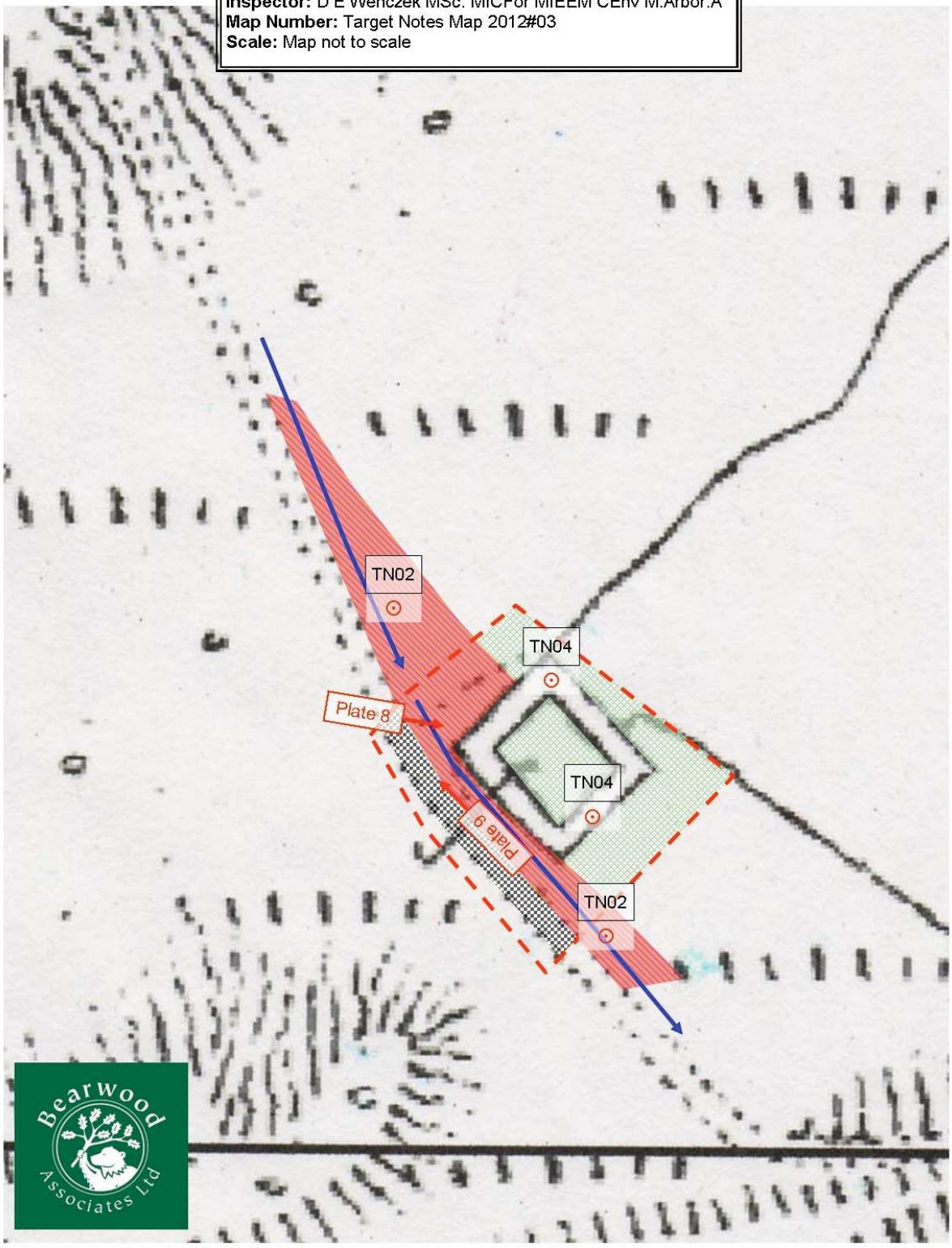
11.3 Target Notes Map 2012#02 Blaenavon, Torfaen CB

Site: Hill's Pit brake wheel site, Blaenavon,
Torfaen County Borough
Inspection Type: Phase 1 Habitat Survey
Date of Inspection: 6th and 13th February 2012
Inspector: D E Wenczek MSc. MICFor MIEEM CEnv M.Arbor.A
Map Number: Target Notes Map 2012#02
Scale: Map not to scale



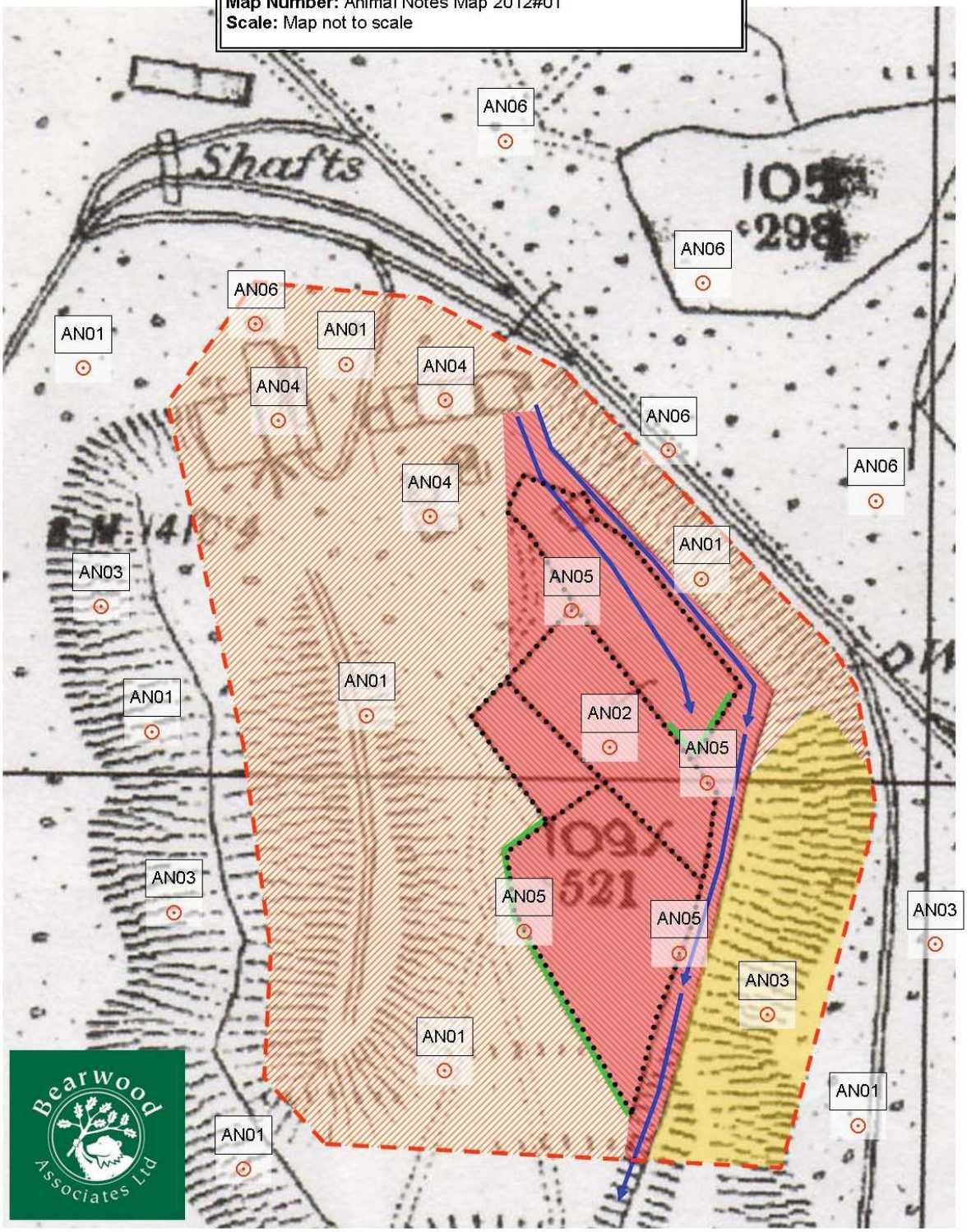
11.4 Target Notes Map 2012#03 Blaenavon, Torfaen CB

Site: Hill's Pit powder house site, Blaenavon, Torfaen County Borough
Inspection Type: Phase 1 Habitat Survey
Date of Inspection: 6th and 13th February 2012
Inspector: D E Wenczek MSc. MICFor MIEEM CEnv M.Arbor.A
Map Number: Target Notes Map 2012#03
Scale: Map not to scale



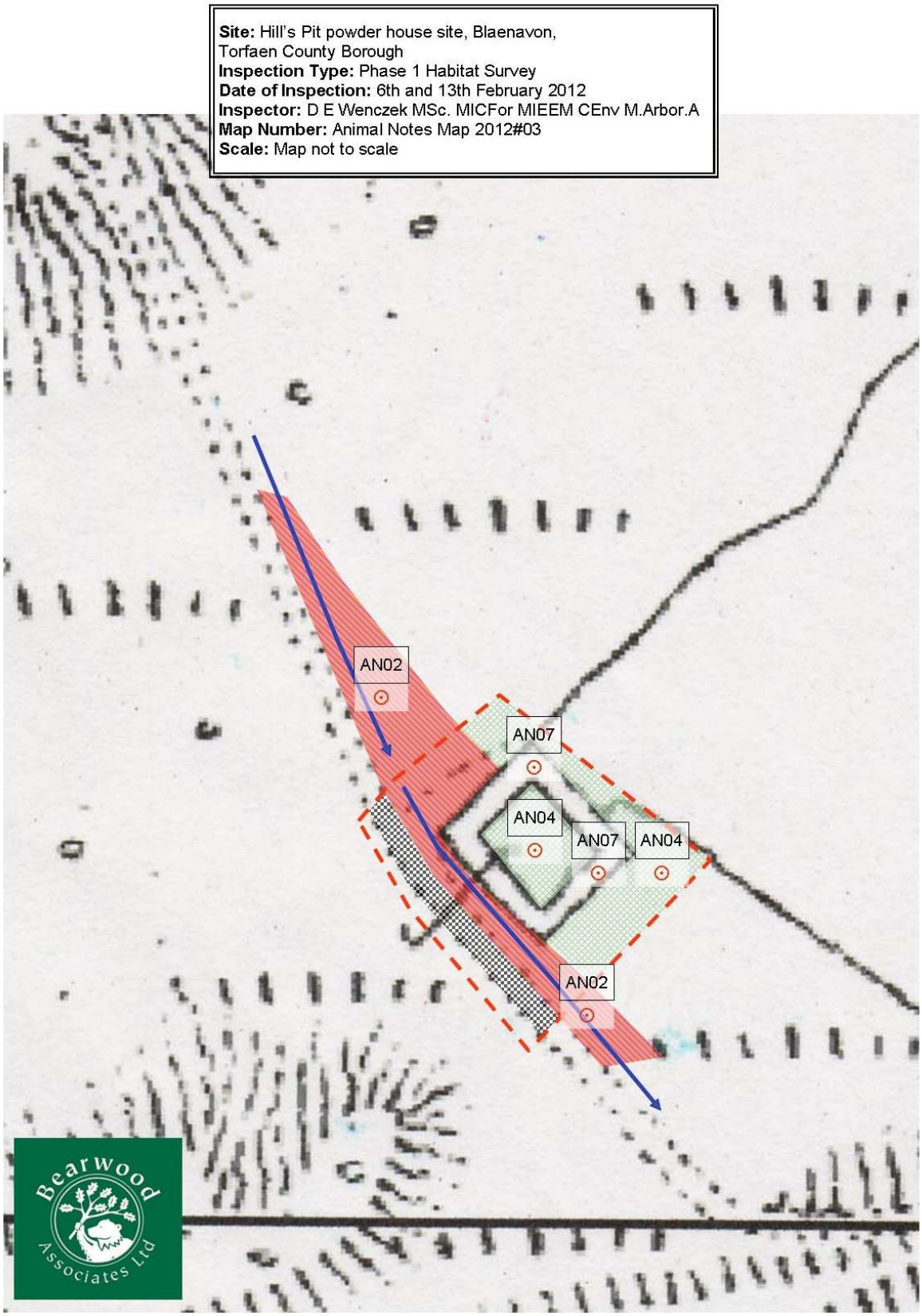
11.5 Animal Notes Map 2012#01 Blaenavon, Torfaen CB

Site: Hill's Pit (chimney, cottages and gardens) site, Blaenavon, Torfaen County Borough
Inspection Type: Phase 1 Habitat Survey
Date of Inspection: 6th and 13th February 2012
Inspector: D E Wenczek MSc. MICFor MIEEM CEnv M.Arbor.A
Map Number: Animal Notes Map 2012#01
Scale: Map not to scale



11.6 Animal Notes Map 2012#02 Blaenavon, Torfaen CB

11.7 Animal Notes Map 2012#03 Blaenavon, Torfaen CB



11.8 Site Photographs 2012#01 Blaenavon, Torfaen CB

Hill's Pit, Blaenavon, Torfaen County Borough

Plates 1-2 (dated 06.02.12)
D E Wenczek MSc. MICFor MIEEM CEnv M.Arbor.A
Bearwood Associates Limited

Plate 1: Hill's Pit (chimney, cottages and gardens) site. General view from the top of the pit-bank over the 'gardens'. Note the pit-banks on the left, with the NVC U1 grassland, in the foreground, merging with the darker NVC H12 heathland in the background. The 'gardens' and peripheral ditch are visible in the centre and right of the picture, with their characteristic NVC MG10 grassland.

Plate 2: Hill's Pit (chimney, cottages and gardens) site. General view from the cottages (note the partially buried masonry in the foreground) over the 'gardens'. Note the pit-banks in the background, with the NVC U1 grassland (background left), merging with the darker NVC H12 heathland (background centre and right). The 'gardens' and peripheral ditch are visible in the centre of the picture, with their characteristic NVC MG10 grassland, which flows from the area in front of the cottages downhill towards the pit-banks.

11.9 Site Photographs 2012#02 Blaenavon, Torfaen CB

Hill's Pit, Blaenavon, Torfaen County Borough

Plates 3-4 (dated 06.02.12)
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Bearwood Associates Limited

Plate 3: Hill's Pit (chimney, cottages and gardens) site. Portrait view of the NVC U1 grassland habitat, on the pit-bank to the east of the 'gardens'. The grassland tends to be species-poor, with in places, less than 30% grass cover; many areas are dominated by mosses and lichens.

Plate 4: Off-site pool to the northeast of the **Hill's Pit (chimney, cottages and gardens) site**. This picture shows the pool close to the above site; the chimney is visible in the background centre.
This pool is situated within NVC U6 grassland, with abundant marginal *Eriophorum* cf. *angustifolium* around the edges of the pool; one of the diagnostic species of this grassland type. Habitats such as this would be suitable for foraging and breeding amphibians, and foraging grass-snakes.

11.10 Site Photographs 2012#03 Blaenavon, Torfaen CB

Hill's Pit, Blaenavon, Torfaen County Borough

Plates 5-6 (dated 06.02.12)
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Plate 5: Hill's Pit (chimney, cottages and gardens) site. General view over the 'gardens' towards the pit-banks in the background. Note the stone-walled boundary feature in the foreground. The 'gardens', with their characteristic NVC MG10 grassland, are visible in the middle ground, while the darker NVC H12 heathland is visible rising in the background.

Plate 6: Hill's Pit (chimney, cottages and gardens) site. General view from the pit-bank at the south of the site, over the 'garden (centre), towards the cottages and chimney (background). Note the darker NVC H12 heathland in the foreground and right , and the remnant hedgerows in the centre and centre right, which top the boundary features that enclose the 'gardens'.

11.11 Site Photographs 2012#04 Blaenavon, Torfaen CB

Hill's Pit, Blaenavon, Torfaen County Borough

Plate 7 (dated 06.02.12)
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Plate 7: Hill's Pit brake wheel site. General view over the remains of the metal, brake wheel and its partially buried, enclosing buildings. The habitats here are dominated by NVC U1 grassland, with *Ulex europaeus* scrub (background right). Off-site, but still visible in this view, is the browner NVC U6 grassland of the surrounding moorland.

11.12 Site Photographs 2012#05 Blaenavon, Torfaen CB

Hill's Pit, Blaenavon, Torfaen County Borough

Plates 8-9 (dated 06.02.12)
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Plate 8: Hill's Pit powder house site. General view of the up-standing remains of the powder house. Note the inundated areas around the base of the building, with its characteristic NVC MG10 marshy grassland habitats. The drier areas, inside and elsewhere, around the powder house are choked with scrub of *Rubus fruticosus* agg., *Sambucus nigra* and *Salix* spp.

Plate 9: Hill's Pit powder house site. General view of the up-standing remains of the powder house. Note the inundated areas around the base of the building, with its characteristic NVC MG10 marshy grassland; Wet-flush habitats that in this view continue towards the pit-banks in the Background, from whence they arise. On the pit-banks can be seen the green-brown NVC U1 grassland, and the darker NVC H12 heathland habitats found at the other two assessed sites.

Archaeology Wales Limited
Rhos Helyg, Cwm Belan,
Llanidloes, Powys SY18 6QF
Telephone: 01686 440371
E-mail: admi@arch-wales.co.uk