CPAT Report No. 1333

Glyn Neath Gunpowder Works

CULTURAL HERITAGE IMPACT ASSESSMENT

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Summary

The Glyn Neath Gunpowder works was assessed for the impact of any conservation or amenity enhancement works on the cultural heritage. In this context cultural heritage comprises the archaeological and built historic environment assets, their landscape setting and their importance to the community. Fieldwork was undertaken in March 2015.

The significance of these assets has been determined using Cadw guidance, with reference to wider UK and international parallels where necessary. The Glyn Neath Gunpowder Works are considered to be of high significance on the basis of their combined evidential, historical and aesthetic values. The works consists of 38 features, relating to power, communications and process; some are of greater significance than others, but the group value of the works makes it relatively rare in a UK context.

Recommendations are made for the mitigation of the impacts of conservation and enhancement works on extant or potential above-ground or below-ground archaeology.

1 Introduction

1.01 In February 2015 the Clwyd-Powys Archaeological Trust (CPAT) was commissioned by the Brecon Beacons National Park Authority (BBNPA) to provide a Cultural Heritage Impact Assessment of parts of the former Glyn Neath Gunpowder Works, near Pontneddfechan, Powys.

1.02 The former Gunpowder Works is located between Ordnance Survey NGRs SN 9143 0818 and SN 9202 0882, in the valley of the Afon Mellte. The complex as a whole is spread over a length of approximately 2km, and occupies an area of approximately 57ha. Parts of the complex are a Scheduled Ancient Monument (SAM BR205); the Scheduled monument consists of five small areas and one linear area following the axis of the upper part of the works.

1.03 That part of the site to the north of the Afon Mellte is owned by BBNPA, with the exception of the western end of the former Gunpowder Works (including the 'Sudan Mills' and associated transport and power infrastructure), which is in private ownership. The land south of the Afon Mellte is owned by Natural Resources Wales (NRW). In this report, historical references to the Gunpowder Works are to the complex as a whole. The assessment of current condition and future impact are however confined to those elements of the former Gunpowder Works which are in BBNPA ownership.

2 Aims

2.01 The BBNPA have identified the need for conservation and remediation works to many of the buildings and features associated with the Gunpowder Works. To this end a Conservation Action Plan (CAP) was prepared for BBNPA by the Pickard Finlason Partnership in 2013. The CAP identified 22 sites where such work was required.

2.02 However the archaeological and historical significance of the Glyn Neath site is not fully understood. Not all of the extant features relating to Gunpowder Production have been designated, and fewer still have been recorded on the Clwyd-Powys Historic Environment Record (HER).

2.03 This Cultural Heritage Impact Assessment has four principal aims:

- To identify sites, features and areas of archaeological and historical interest that were outside the designated or known heritage assets
- To assess the significance and heritage value of all the extant remains in BBNPA ownership
- To determine the potential for further archaeological research
- To identify the likely archaeological impact of possible future remediation and conservation works, and to make recommendations for appropriate mitigation

3 Methodology

3.01 The project comprised three stages of research and analysis, followed by reporting and recommendations. All work was undertaken in accordance with the Chartered Institute for Archaeologists' (CIfA) *Code of Conduct*, and with the CIfA's *Standards and guidance for historic environment desk-based assessment* (December 2014).

Desk-based research

3.02 This was undertaken to provide a coherent – but not exhaustive – overview of the historical background to the whole complex, and to set the Glyn Neath concern in the context of nineteenth- and twentieth-century gunpowder manufacture in Britain. This mainly used secondary sources, supplemented by primary documentation held by Cadw and the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW). A full list of sources is provided in section 10.

Fieldwork

3.03 A site visit was made on 18th March 2015. This visited all of the locations identified in the 2013 CAP, as well as all other designated assets in the ownership of BBNPA. Several other features were also noted that had not been recorded by Cadw, RCAHMW or the CPAT HER. Photographs were taken in RAW and JPEG format using a 10-megapixel Olympus E450 DSLR. Notes were taken using pro-forma recording forms (an example is provided in Appendix 2).

3.04 Fieldwork was undertaken to inform the assessment of heritage value. It was not intended to produce a comprehensive archaeological survey.

Assessment of heritage value

3.05 The assessment of heritage value identified areas of archaeological significance and priority, and assessed the likely archaeological impact of possible future conservation and remediation works. As well as the specific works suggested by the CAP, the assessment also considered the likely impact of similar work on other elements of the historic landscape.

Reporting and archiving

3.06 A draft report was prepared between 16th and 24th March 2015. A further draft was submitted in May 2015. The project archive is currently held at the CPAT office in Welshpool, and will be transferred to BBNPA once the report is finalised. Copies will also be sent to Cadw and RCAHMW.

4 Historical background

4.01 The sequence of ownership and development of the site can be summarised as follows:

- *c*.1820s-1850s? Silica mining and possibly (for a time) silica firebrick manufacture as Frederick and Jenner's 'Dinas Bridge Fire Brick Works'.
- 1857. Vale of Neath Powder Company established and the Glyn Neath works set up.
- 1862-1863. Curtis's and Harvey bought the site.
- 1918-1920. Curtis's and Harvey became part of Nobel Industries Limited.
- 1926. Nobel Industries Limited became part of Imperial Chemical Industries Limited.
- 1931-1932. Glyn Neath works closed and manufacturing facilities deliberately destroyed.
- 1932-*c*.1942. Glyn Neath site used for the storage of explosives.
- 1952. Site acquired by the Forestry Commission.
- 1957. Area to the west of the Afon Mellte passed to BBNPA.

Historiography

4.02 The history and archaeology of gunpowder manufacture has been overshadowed in the literature by other types of industry, and Glyn Neath is conspicuous by its absence from the admittedly limited range of site-specific studies of nineteenth century gunpowder manufacturing sites. D. Morgan Rees', in his *The Industrial Archaeology of Wales* (one of the pioneering and influential David and Charles series of regional studies) only gives Glyn Neath (Pontneathvaughan) three short sentences in the Gazetteer (Rees 1975, 256). The most comprehensive published history of the Glyn Neath Gunpowder Works is provided in a booklet produced by the Merthyr Tydfil and District Naturists Society (Pritchard *et al.* 1985).

4.03 The manufacture of gunpowder was a secretive process, and consequently little was known about it outside the industry until the 1990s. A report of a 1974 'public field meeting' to the Glyn Neath site noted that the 'exact process and its stages are not clear … ICI will not divulge details for industrial and security reasons …' (Stevens 1974, 1). The situation changed following the abandonment of gunpowder manufacturing in Britain in 1976 (see below), and a number of historical and archaeological studies have been made of individual sites and the industry as a whole. Many of these have been the work of amateur local historians (as at Glyn Neath) and so their coverage and quality is variable. However more rigorous site-specific and synthetic studies have been undertaken by English Heritage (Cocroft 2000; Cocroft and Tuck 2005; Jecock *et al.* 2005; Jecock *et al.* 2009; Pullen *et al.* 2013) and by Glynis Crocker (Crocker 1988; Crocker 1999).

4.04 Documentary evidence for the Glyn Neath works is extremely limited.

Gunpowder manufacture in Britain

4.05 Gunpowder was manufactured in Britain from around the mid-fourteenth century until 1976. Originally part of Royal artillery operations, the production of gunpowder became a specialised industry in its own right from the mid-sixteenth century onwards. During the early seventeenth century several gunpowder factories were constructed in the south-east of England – notably in Surrey, Kent and Essex (Cocroft 2000, 7-8). These works used water-power from the tributaries of the Thames, and were conveniently

close to London and the main centres of military administration and supply. The south-east of England became the main focus of the industry, although other factories were also in operation in Dorset, Somerset, Bristol and Cheshire (Cocroft 2000, 9-10). The English Civil War (1642–1645) led to an expansion of the gunpowder industry, with the repeal of the Royal Patent in August 1641.

4.06 The industry continued to expand through the seventeenth and eighteenth centuries. This expansion was still largely down to military use of gunpowder, and so the south-east of England remained the dominant location for production; however black powder was increasingly being used in mining and civil engineering applications. Consequently new centres of production were established in Scotland and the English Lake District during the eighteenth century (Cocroft 2000, 26-27). At the same time improvements to individual processes began to be made – such as the introduction of edge-runner mills for incorporating (Crocker and Fairclough 1998, 25-27). In 1772 the first Act regulating the manufacture of gunpowder came into force. This stipulated how much powder could be made and stored at any given time, what materials were to be used in constructing the buildings, and how far apart the different elements of the process needed to be (Cocroft 2000, 27).

4.07 From the 1780s the Royal Gunpowder Mills were re-organised, transforming the scale and efficiency of the process, and the quality and quantity of the product. During the American War of Independence, British powder had been 'notorious' for its lack of strength and durability; however by c.1800 'British powder … was regarded as a world standard' (Cocroft 2000, 32). The changes to the state factories strongly influenced the development of private-sector concerns during the nineteenth century.

4.08 The industry as a whole was generally slow to adopt new technologies. For example steam power was not considered until the later nineteenth century, and although the first concrete buildings were erected at the Waltham Abbey factory in the 1850s, that material was not widely adopted until the twentieth century (Cocroft 2000, 99-103). Most sites which had emerged by or during the 1850s were water-powered, and in some cases also used water for transport.

The process

4.09 The manufacture of gunpowder involved three ingredients: Charcoal (15%), Sulphur (10%), and Potassium Nitrate (Saltpetre) (75%). These were washed, refined, crushed and mixed in a series of processes that together were known as 'incorporating' (Jecock *et al.* 2009, 22-23). At Glyn Neath the incorporating facilities were at the southern end of the site, outside the present study area. This is the location known as the 'Sudan Mills', which was powered by at least one water turbine fed from the Lower Weir and, by 1927, a steam engine. As well as storage, grinding and mixing facilities, this area also included barrel-making.

4.10 The next stage in the process was the pressing of the milled mix into a 'cake'. This was undertaken to reduce the potential for the ingredients to separate; it also increased the burning rate and potential power of the gunpowder (Jecock *et al.* 2009, 23). The cake presses were hydraulic machines (Fig. 2). At Glyn Neath two cake press houses were located within the study area (B19 and B20).

4.11 The press cakes were then granulated into 'corn powder', a two-stage process known as 'corning'. The first stage reduced the press cake to granules of approximately the right

size (using rollers); the second stage used a set of sieves to separate out grains of the required size from those too big (stops) or too small (dust). The stops were re-rolled (Jecock *et al.* 2009, 23). There were two 'Corning Houses' at Glyn Neath (B16 and B17).

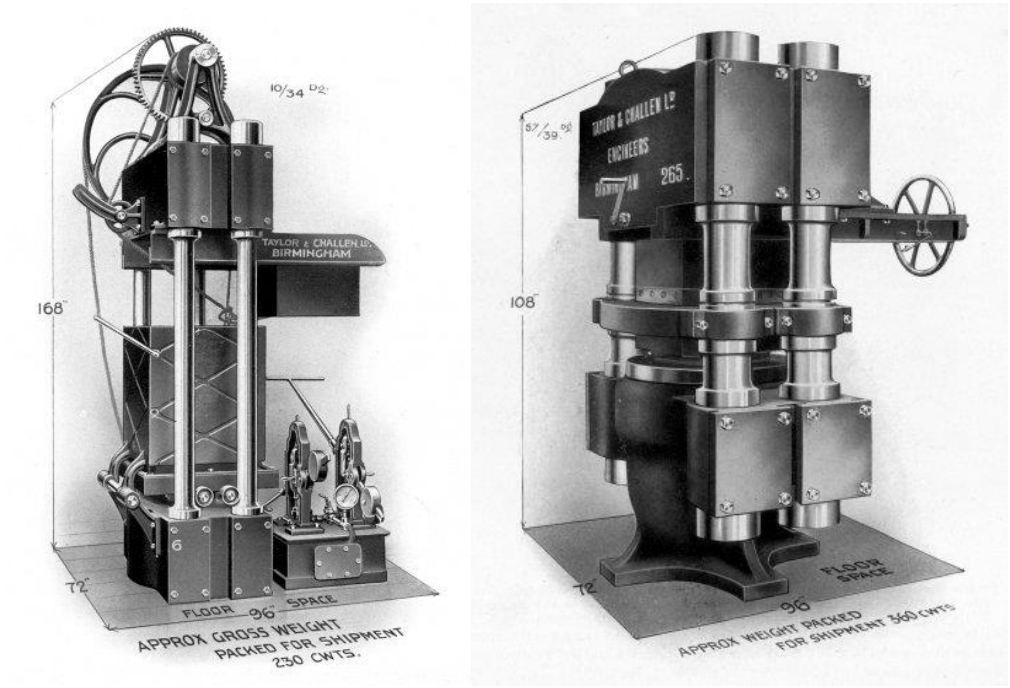

Fig. 2. Hydraulic cake presses. From a 1908 catalogue produced by Taylor and Challen Ltd, a specialist Birmingham manufacturer of gunpowder-making machinery.

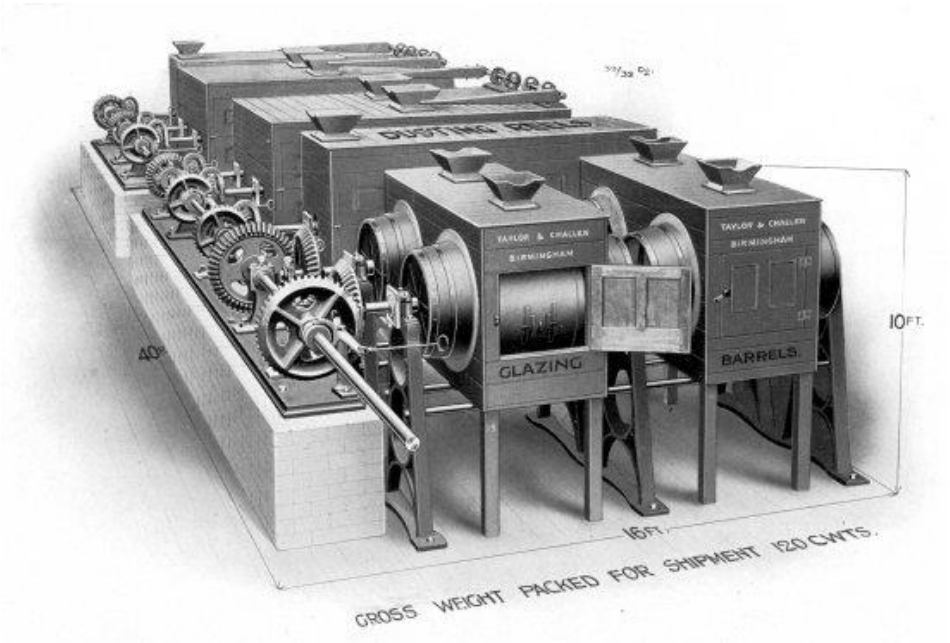

Fig. 3. Dusting reels and Glazing barrels from Taylor and Challen's 1908 catalogue.

4.12 Corning produced rough granules which needed to be 'glazed'. Glazing involved several hours of tumbling the grains in barrels, with the addition of graphite. This produced a smooth, free-flowing gunpowder with good moisture resistance (Jecock *et al.* 2009, 24). The resulting powder was then dried in the 'Stove House' (B6), and processed by another arrangement of sieves in the 'Dusting House' (B10) to further refine the grain size (Fig. 3).

4.13 The powder was then ready, and could be sold in barrels. However it could also be pressed into pellets to make cartridges approximately 35mm in diameter and 50mm long (Pritchard *et al.* 1985, 21). There were four 'Pellet Press Houses' shown on the 1927 plan of Glyn Neath, two of which (B2 and B18) are in the study area. One of these (B18) is shown as 'out of use' on the 1927 plan; its counterpart on the opposite side of the river (Nobel plan No.70) was also out of use as a result of being 'damaged by explosion' – presumably the incident of 11th January 1921 (see below). A 'Barrel House' (B5, Nobel plan No.62) is depicted just north of the 'Stove House'.

4.14 Various magazines provided temporary storage for the powder at different stages of manufacture, and before sale. Five are shown on the 1927 plan, of which three (B1, B3 and B14) are within the study area.

Fig. 4. The workforce, c.1890. Photograph from Pritchard et al. *1985, p.15.*

5 Cultural heritage assets

5.01 This section describes the various elements of the site within the ownership of the BBNPA, and includes a brief assessment of their historic function, the nature of their construction, and their current condition.

5.02 Previous descriptions of the Glyn Neath site have followed a progression upstream from Pontneddfechan, grouping clusters of buildings together based on their geographical proximity rather than their relationship to the manufacturing process. In this report, the site is considered differently: the features are grouped into four categories – water power, transport infrastructure, buildings and other features – and the complex is considered moving downstream towards Pontneddfechan. This makes more sense in terms of the original process flow, and makes it easier to understand the site.

5.03 The features described in this report have been numbered according to this schema. A concordance between this numbering system, the numbers shown on the 1927 Nobel plan, Cadw SAM numbers, RCAHMW National Primary Record Numbers (NPRN) and CPAT HER Primary Record Numbers (PRN) is provided in Appendix 1. The location of the features is shown in Fig. 5.

Water power

5.04 A complex series of weirs, aqueducts and leats provided power to various parts of the site. The origin and date of these is not known, but their maximum extent is shown on the 1927 Nobel plan. It is possible that some of these features may have been constructed as part of the pre-1857 brickworks; certainly they would have been the first installations created as part of the development of the gunpowder works from the 1850s and 1860s.

5.05 **Upper Weir (W1).** This is located at SN 92034 08822, and consists of a stone-built weir across the Afon Mellte, with a sluice structure on the east bank of the river. The sluice appears to have regulated the take-off to the leat on that side of the river.

5.06 **Upper Aqueduct (W2).** This is located at SN 92046 08708, and carried water across the Afon Mellte, running from the leat on the east side of the river which took water from the Upper Weir (W1). According to the Nobel plan it (or an adjacent structure) also carried the tramway to the eastern side of the river. Stone abutments on each bank, and a central stone pier, supported a cast-iron channel. At least some part of upper aqueduct was evidently still in situ in 1974, but damaged, as it was noted that water 'now spills down into the river below' (Stevens 1974, 2). A photograph published in 1985, but evidently taken much earlier, shows the wrought-iron structure in place but apparently disused (Pritchard *et al.* 1985, 31). The central pier is no longer extant, but parts of the wrought iron structure survive in the steam bed (Fig. 6).

5.07 **Upper Leat (W3).** This carried water from the Upper Aqueduct, to the west of the Magazines and associated structures (B1, B2, B3 and B4) and emerged at the western corner of the Boiler House/Stove House complex (B6 and B5). This appears to have been largely stone-lined, but with firebrick-lined sections at the north and south ends; these appear to have been rebuilt. The leat is generally c.1.2m wide. A series of iron bolts and fixtures at the north end indicate the presence of a former sluice here. Much of the lining has partly collapsed, and the channel is partly filled with its own rubble (Fig. 7). At its south end the leat emerges between two stone-built pillars with later concrete additions (Fig. 8). There is no evidence for any form of regulating mechanism here, but one must

have existed as the water needed to be directed both to the Boiler House (see below) and on to the Elevated Leat.

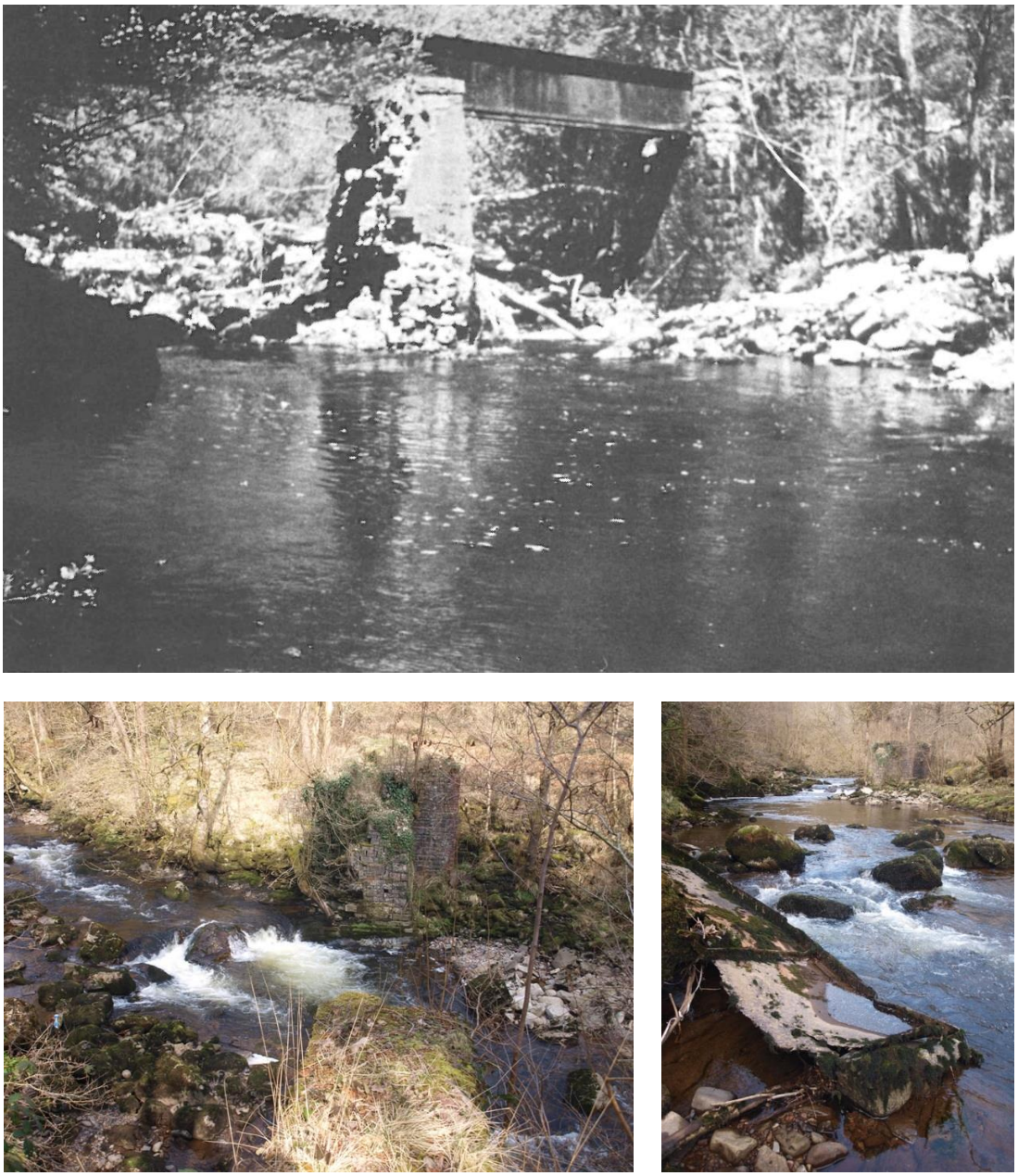

Fig. 6. Upper Aqueduct (W2). Top: historic photograph (from Pritchard et al. *1985) showing the aqueduct* in situ*. Bottom left: looking north across the Afon Mellte, showing the abutment on the other side of the river. Bottom right: looking north-west up the Afon Mellte, showing a fragment of the aqueduct in the river bed and the surviving abutments in the background.*

Fig. 7. Upper Leat (W3), north end. Looking south from the interface with the former aqueduct, showing showing the brick and concrete former sluice emplacement (foreground) and the stone-lined main channel running towards the Boiler House (B7).

Fig. 8. The Upper Leat (W3), south end. Looking north from the Boiler House (B7).

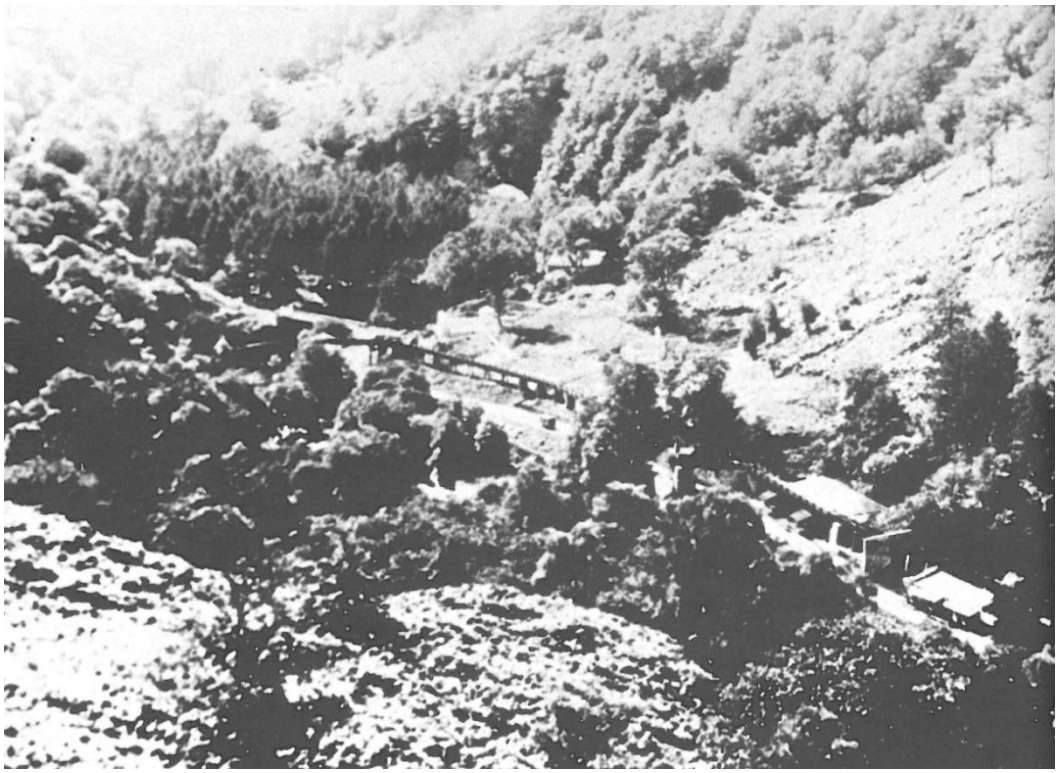

Fig. 9. Elevated Leat (W4). Historic photograph (from Pritchard et al. 1985, 30) showing the leat and the cluster of buildings around the Boiler House (B7).

Fig. 10. Elevated Leat (W4). Detail of one of the stone supporting pillars, adjacent to the Expense Magazine (B12)..

Fig. 11. Stone pillars of the Elevated Leat (W4) alongside the Main Tramway (T1).

5.08 **Elevated Leat (W4).** This was a continuation of the leat to the south of the Boiler House, running ultimately to the 12-15hp Turbine House at SN 91560 08194. It consisted of a launder (water channel) supported on a series of stone pillars. The launder itself could have been made of timber or iron, but given the date and the presumably similar construction of the Upper Aqueduct (W2), iron seems more likely. The Elevated Leat is shown on an undated (but presumably pre-1931) historic photograph (Fig. 9, on previous page). Ten of the free-standing pillars which formerly supported the leat survive in various stages of preservation (Figs. 10 and 11). The north wall of the Stable (T5) also incorporated a support for the Elevated Leat (see below).

5.09 **3½ hp Turbine House (W5).** According to the Nobel plan this was located between the Heading Up / Packing House (B10) and the Dusting House (B9); it would have provided power to the latter (see below). It is not clear on the ground where this would have been installed without encroaching on either building or the tramway. It is more likely to have been located to the north of the Dusting House, where a number of structures survive that would be more likely candidates for a Turbine House. However the Nobel plan provides no indication of their function, and they are not covered by the CAP. This needs further investigation.

5.10 **12-15hp Turbine House (W6).** This is located to the south of the Glazing House (B12), between the tramway and the Afon Mellte, at SN 91990 08505. The turbine would have provided power to the Glazing House (see below). The structure is built of brick and stone, and comprises a turbine housing that runs from the tramway level down to river level, and the remains of part of the superstructure (Fig. 12). It was extant before 1877.

Fig. 12. The 12-15hp Turbine House (W6). Left: View of the superstructure at the level of the Main Tramway, looking north. Right: view down into the turbine housing.

Fig. 13. Structure at the junction of the Elevated Leat (W4), the Lower Leat (W12) and the 'Clean Gangway' (W7). View looking south, with the Waterwheel (W8) in the background, beyond the line of the Main Tramway (T1).

Fig. 14. The 'Clean Gangway' (W7) surviving as an earthwork between the two corning houses. View looking east from above the (old) Corning House (B14) towards the New Corning House (B15).

5.11 **Clean Gangway (W7).** According to the Nobel plan, there was a junction in the leat at approximately SN 92030 08820. The main part of the leat went on to the Waterwheel and 18hp Turbine and Pump House (W8 and W9), and the remainder ran westwards (downstream) for another 100m or so to another Waterwheel (W10) located in the river bed. This westward extension was called the 'Clean Gangway' on the Nobel plan. It appears to have passed over the top of both the corning houses (B14 and B15). The watercourse junction is probably marked by the stone structure opposite the Waterwheel (W8) on the north side of the tramway (Fig. 13, on previous page). The first part of the 'Clean Gangway' was probably elevated as far as the New Corning House (B14); an earthwork (Fig. 14) survives to the west of the New Corning House which must have been the western continuation of the 'Clean Gangway'. This has been wrongly described by RCAHMW as 'Upper Leat'. It was not possible to trace the course of this feature west of the (old) Corning House (B15).

5.12 **Waterwheel (W8).** This substantial stone-built wheelpit is located at SN 91923 08382, and was supplied from the Elevated Leat (W4). It was built between 1877 and 1904, along with the adjacent Turbine and Pump House (W9). The waterwheel was built first, with the walls of the Pump House keyed into the south wall of the wheelpit (Fig. 15). The waterwheel is no longer extant, but would have been an overshot wheel.

5.13 **18hp Turbine and Pump House (W9).** A bearing box in the south wall of the wheelpit leads to the adjacent 18hp turbine house, also built between 1877 and 1904. As noted above the Pump House was built after the wheelpit and is keyed into it, this, together with differences in the style of construction and materials used, suggest that the turbine

was a later addition to augment the power supplied by the water wheel. Only the eastern gable wall, which is built on top of the earlier wheelpit structure, survives to its original extent; the remaining walls have been demolished or removed. Parts of the floor survive.

Fig. 15. Waterwheel (W8) and 18hp Turbine and Pump House (W9). Top left: the top of the Wheelpit with the gable wall of the Pump House. Top right: the interior of the Pump House. Bottom: Both structures viewed from the east side of the river, showing the relationship between them and the Main Weir (W11).

Fig. 16. The partially surviving emplacement for Waterwheel (W10) on the south side of the river, served by the Clean Gangway (W7).

Fig. 17. The Main Weir (W11) viewed from the top of the wheelpit for Waterwheel (W8). The smaller western weir is in the foreground, with the larger eastern weir behind.

Fig. 18. Detail of iron fixtures on the Main Weir (W11).

5.14 **Waterwheel (W10).** This was located in the riverbed at SN 9181 0483, was served by the Clean Gangway (W7), and presumably supplied power to the nearby Corning House (B15). The waterwheel emplacement survives as a square stone-built structure alongside the south bank of the Afon Mellte (Fig. 16, on previous page). It is incorrectly described by the RCAHMW as an 'abutment'.

5.15 **Main Weir** (W11). This substantial masonry structure is one of the earliest features on site, and despite degradation and erosion remains an impressive element of the complex. It is located at SN 9192 0839. It actually consists of two weirs, separated by the island in the middle of the river; the weirs are built into the rocky outcrop at the extreme south end of the island (Figs. 15 and 17). The eastern weir is longer and taller than the western weir. It served to channel the main flow of the river into the Lower Leat (W12). Iron fittings suggest that some sort of sluice mechanism was bolted to the top of the weir which would have enabled the water levels upstream to be controlled to some extent (Fig. 18). The northern end of the weir has been partly demolished since the closure of the works to enable the free flow of water.Historic photographs (Pritchard *et al.* 1985, cover, 11) suggest that the eastern weir originally extended all the way across the river. The western weir, which runs between the island and the upper Waterwheel (W8), effectively acted as an overflow channel. It is a deep V-shaped structure, with grooves cut into the tops of the wall for a sluice mechanism.

5.16 **Lower Leat (W12).** This ran down the eastern side of the Afon Mellte (outside the study area) before crossing at the Lower Aqueduct (W13), feeding the 6hp Turbine and Pump House (W14), and then running to the 'Sudan Mills' complex at the southern end of the site (also outside the study area).

5.17 **Lower Aqueduct (W13).** This originally carried the Lower Leat (W12) across the river, at SN 9182 0843, and was in existence by 1877. Only the abutments survive: the aqueduct structure has been replaced by a modern footbridge (Fig. 19).

5.18 **6hp Turbine and Pump House (W14).** This was constructed before 1877, but after the Lower Aqueduct (W13) as it partly abuts the aqueduct's western abutment. The walls are of stone, with a brick arched roof reinforced with iron tension rods. Machinery has been removed, but features survive indicating the original arrangement: there is a concrete machine base at the south-western end, an opening for a bearing box (now removed) in the north-east wall, and part of the concrete floor (Fig. 19). The internal wooden lintels are recent replacements; the originals are also likely to have been timber.

Fig. 19. 6hp Turbine and Pump House (W14). Top left: view from across the river, looking along the modern footbridge built on the abutments of the Lower Aqueduct (W13). Top right: interior view, showing the arched roof, concrete floor, machine base and aperture for a bearing block. Bottom: exterior view looking south-west, with the footbridge behind.

Transport infrastructure

5.19 The tramway was dismantled after the closure of the works, although the upper part of the tramway is still shown on the 1947 edition of the Ordnance Survey (Bowring 2009, 81). There were strict regulations to ensure the separation of wagons on the tramway and the safety of the horses. The horses were required to wear copper horseshoes to reduce the risk of sparks. (Pritchard *et al.* 1985, 17; Bowring 2009, 81). There were stables at the southern end of the complex (outside the study area) and in the upper part of the works (T5). A 'truck shop' (T4) was located near the magazines at the northern end of the site, which was presumably for the maintenance and storage of wagons.

5.20 **Main Tramway (T1).** This ran the full length of the site, from the high explosives magazine at the northern end to the incline plane outside the southern entrance which led to the mainline railway. The Main Tramway consisted of steel rails on wooden sleepers, but the branches to 'danger buildings' were entirely made of wood (Pritchard *et al.* 1985, 17). The line of the Main Tramway survives as the footpath through the site; the Scheduled portion extends from SN 9177 0831 to SN 9217 0912. It mainly runs alongside the river, apart from a section around the northern complex of buildings (B1, B2, B3, B4 and T4) where it is separated from the river by a substantial embankment (F1). This was a substantial piece of engineering, with stone revetment walls in places to support cuttings (Fig. 10), and stone embankments alongside the river. The tramway bed is largely intact, although has been partly eroded by the river near the Stove House (B5), revealing the use of old rails to create the formation; it is not clear to what extent this form of construction was used elsewhere along the route.

5.21 **Upper Tramway Bridge (T2).** This was located at SN 92046 08708, and was either adjacent to, or part of, the Upper Aqueduct (W2). An early photograph (see Fig. 6 above) shows that the abutments and central pier of that structure were wider than necessary to support the aqueduct, and it seems likely therefore that the tramway was carried on the same abutments rather than there being a separate structure *per se*.

5.22 **Upper Tramway Branch (T3).** This branched from the Main Tramway at a point just north of the Stove House (B5); a Barrel House (B4) was located in the apex of the junction of the two lines (Fig. 27, below). The branch then ran alongside the river to the Magazines (B1 and B3) and the Pellet House (B2) at the northern end of the study area. As noted above this branch line would have been entirely constructed of wood.

5.23 **Truck Shop (T4).** This was located at the northern end of the Upper Tramway Branch (T3) at SN 9206 0867. This was presumably a place for the storage and maintenance of tramway wagons. According to the Nobel Plan it abutted the eastern walls of the Magazine (B1) and Pellet House (B2). No trace of this building survives. It may have been a simple open lean-to cover building constructed of timber, but a more substantial free-standing structure cannot be ruled out – particularly as there is no evidence for roof joists or other elements having been attached to or bonded with the Magazine building. The location is partly buried by rubble from the collapse of the east wall of the Magazine, and further investigation here would be helpful.

5.24 **Stable (T5).** This stone-built structure is located to the north of the Glazing House (B9), at SN 9199 0850. The CAP notes a discrepancy between the Listing description for the stable and the location of this building (see also B9, below). Only the northern wall survives to any great extent; it incorporates a brick-lined opening at first floor level (Fig. 20). This appears to have been a support for the Elevated Leat (W4) rather than a

window (there would be no need for a first floor in a stable, and, as the CAP points out, the location of this wall is consistent with the location of other piers for the Elevated Leat. Further investigation of both this structure and the Glazing House would be useful in confirming its function as a stable.

Fig. 20. The Stable (T5). View looking north along the Main Tramway (T1), showing the northern wall of the stable with brick surround to the support for the Elevated Leat (W4).

5.25 **Lower Tramway Bridge (T6).** This is located downstream of the Main Weir (W11), at SN 9190 0838. It carried a branch of the tramway to a magazine and pellet press house on the south side of the Afon Mellte (outside the study area). The original superstructure has been replaced by a modern timber footbridge. However original masonry survives in the form of an abutment on either side of the river and a central pier; the masonry of the upstream edge of the lower part of the pier is angled to form a cutwater (Fig. 21).

5.26 **Lower Tramway Branch (T7).** This ran to a magazine and pellet press house on the south side of the Afon Mellte, via the bridge noted above (T7). Whilst most of this feature lies outside the study area, the Nobel Plan shows that the junction was on the northern side of the river, between the New Corning House (B14) and the 18hp Turbine and Pump House (W9). It is possible that evidence of the transformation between the steel rails of the main line and the wooden rails of the branches survives below ground here, although modern repair and resurfacing means that this is unlikely.

Fig. 21. Lower Tramway Bridge (T6). View from the east showing the upstream side of the bridge.

Fig. 22. Tramway Tunnel (T8). View from the line of the Main Tramway (T1), looking west showing the relationship of the tunnel entrance to the main line. The tunnel entrance is fenced off; there is a Holloway evident between the tunnel and the main line.

5.27 **Tramway Tunnel (T8).** This curious feature is located at SN 9172 0838. It is noted on the Nobel Plan, and is described by in the Scheduling description as having 'bi-passed [*sic*] a formerly difficult section of the river bank before the construction of the existing tramroad beneath the cliff'. It was not possible to inspect the interior, although again the Scheduling notes state that there is 'some masonry walling inside'. The southern entrance to the tunnel is visible (Fig. 22) but the northern entrance appears to have been blocked by partial collapse of the cliff. Further investigation here could determine the nature of the tunnel's construction, and whether the route of the tunnel is indeed the very pronounced loop shown on the Nobel Plan. There is also a possibility that tramway sleepers and rails may survive.

Buildings

5.28 There was one large cluster of buildings in the study area, together with two smaller groups, and a scattering of more isolated structures along the length of the valley. The large cluster consists of a series of processes around the Heading Packing House (B10), including the 12-15hp Turbine House (W6, described above), the Glazing House (B11), Stable (T5, described above), Dusting House (B9), Chimney (B8) and associated flue (B7), Boiler House (B6) and Stove House (B5). There is a smaller group of buildings at the northern end of the Upper Tramway Branch (T2), consisting of two Magazines (B1 and B3), a Pellet House (B2) and the Truck Shop (T4, described above) (Fig. 23). The other group of buildings is located between the Main Weir (W11) and the Water Wheel (W8), and includes the two Corning Houses (B14 and B15) as well as associated transport and water-power features noted above.

Fig. 23. The group of buildings at the northern end of the Upper Tramway Branch. View looking north from the tramway, showing the north-east corner of Magazine (B3) on the left, with Magazine (B1) on the right. The rubble foundations of Pellet House (B2) can be discerned between the two. The Truck Shop (T4) was located in front of Magazine (B1).

5.29 **Magazine (B1).** This is part of the northern cluster of buildings, located at SN 9206 0867. It is a stone-built structure, square in plan; the south, west and north walls survive to a height of between 2 and 2.5 metres. The west wall partly acts as a revetment for the Upper Leat (W3). The eastern wall has a large collapsed section in the centre, rubble from which overlies the site of the former Truck Shop (T4) as noted above. Internally there are sleeper walls which would have supported the former floor (Fig. 24).

5.29 **Pellet House (B2).** This is part of the northern cluster of buildings, located at SN 9206 0867; the Pellet House was situated between the two Magazines (B1 and B3), although it appears to have been built originally as a free-standing structure as it did not abut the Magazine (B1) to the north. The superstructure has been completely removed, although foundations and internal sleeper walls survive; rubble from the collapse has filled in the gaps between the sleeper walls (Fig. 25).

5.30 **Magazine (B3).** This is part of the northern cluster of buildings, located at SN 9206 0867. This stone-built structure is square in plan, and all walls survive to a height of between 1.5 and 2.5 metres; however the north wall is partly collapsed both into and outside the building. Again, despite being shown on the Nobel Plan as being connected to the adjacent Pellet House (B2) this was in fact constructed as a free-standing structure. As with the other buildings in this complex, sleeper walls survive internally below ground level (Fig. 26).

Fig. 24. Magazine (B1). Interior view looking north-east, showing the internal sleeper walls and collapse of the eastern wall.

Fig. 25. Pellet House (B3). View from the embankment to the west, showing the sleeper walls and foundations. Magazine (B1) is to the left, Magazine (B3) is to the right.

Fig. 26. Magazine (M3). Interior view showing sleeper walls and rubble.

5.31 **Barrel House (B4).** According to the Nobel Plan this isolated building, located between the Magazine/Pellet House complex noted above, and the Boiler House/Stove House complex described below, was situated in the apex of the junction between the Main Tramway (T1) and the Upper Tramway Branch (T3) (Fig. 27). No above-ground evidence was extant at the time of survey, and it is not noted by the RCAHMW or the Cadw Schedule. Further investigation here may enable better understanding of its form and role within the gunpowder works.

Fig. 27. The junction between the Main Tramway (T1), running to the left, and the Upper Tramway Branch (T3), to the right. The Barrel House (B4) was located in the apex of this junction.

5.32 **Stove House (B5)**. The Stove House is located at SN 9206 0855, and marks the northern end of the large cluster of buildings in the centre of the study area. It was in existence before 1877. It is a stone- and brick-built two cell building, formerly with a pitched roof, and is located adjacent to the Boiler House (B5) and was constructed at the same time. This is a relatively elaborate building, with brick detailing at eaves height on the gables, and brick surrounds to window and door openings. The south gable is largely intact, and the remaining walls are extant to eaves height, although the north wall has been partly demolished (presumably in order to extract machinery). An area to the north of this building – although not noted in previous surveys – appears to have been the site of an additional structure: there is a platform approximately 3.5m square which stands slightly above the surrounding ground surface (Fig. 28). Some investigation of this platform, and its relationship with the Stove House, would better inform understanding of the use and development of the site.

Fig. 28. Stove House (B5). View looking south, with the tramway and river to the left of the photograph. The building platform to the north – not marked on the Nobel Plan – is evident in the foreground.

5.33 **Boiler House (B6).** This is adjacent to the Stove House (B4), and although separate from it the details of its construction suggest that it was built at the same time. It is connected to the Chimney (B8) by a flue (B7) which runs from the west side. Built of stone, the walls are severely truncated, surviving to a maximum height of c.1.5m but generally much lower; the interior is partly filled by rubble, particularly at the western end (Fig. 29). This demolition presumably occurred in order to remove the boiler for scrap.

5.34 **Flue (B7).** A flue connecting the Boiler House (B6) with the Chimney (B8) is shown on the Nobel Plan, and the entrance to it is clearly visible in the west wall of the Boiler House (Fig. 29). The Nobel Plan suggests that the flue is straight, however the angle at which the flue leaves the Boiler House is not directly aligned with the Chimney, and it so it is possible that a more convoluted route may have been taken to enable a longer flue and therefore stronger draft.

5.35 **Chimney (B8).** This is located to the north-west of the Boiler House/Stove House, at SN 9206 0855. It is square in plan, built of firebrick on a stone base (Fig. 29). It has been significantly truncated since the closure of the works, including serious loss of fabric in the last twenty years. A photograph taken in October 1996 shows that it was then almost twice as high as it is now, with an extra tier rising above the present top of the chimney.

Fig. 29. Boiler House (B6), Flue (B7) and Chimney (B8). Top: the interior of the Boiler House looking west. Bottom left: detail of the entrance to the flue in the western wall of the Boiler House. Bottom right: the Chimney.

5.36 **Dusting House (B9).** This substantial masonry structure is located at SN 9203 0852, and its rear (western) wall forms a retaining wall built into the bank to the north-west, standing approximately 9.5m high (Fig. 30). This was in existence before 1877, and is adjacent to the 3½hp Turbine House (W5) and the Heading Packing House (B10). The side walls survive to a height of approximately 3.5m and are over 2m thick; the returns with the rear walls are curved slightly. There is no evidence for a front wall, which was presumably a relatively flimsy structure that would have enabled any blast to escape in the event of an accident. Internal sleeper walls (of brick) survive, together with a variety of holding-down bolts. The Elevated Leat (W4) crossed the front of this building.

Fig. 30. Dusting House (B9). View looking west from the line of the Main Tramway.

5.37 **Heading Packing House (B10).** This is adjacent to the Dusting House (B9) and of similar construction, although less substantial; it was also built before 1877. The rear of the building is simply the rough-hewn face of the cliff into which it has been built; the north wall is the south wall of the Dusting House, and the south wall is a more conventionally-sized masonry wall (Fig. 31). Again there are brick sleeper walls internally, and no evidence for a front wall – suggesting another 'blast wall'. The Elevated Leat (W4) crossed the centre of this building.

5.38 **Glazing House (B11).** The Glazing House is located at SN 9199 0850, and is a rectangular building built into the cliff, so that the west wall forms a retaining wall; this is continued to the south at an angle to retain the natural projection of the cliff face there (Fig. 32). It is approximately 25m south of the Heading Packing House (B10), with the Stable (T5) located halfway between the two. Power was provided by the 12-15hp Turbine House

(W6), to the south. It was in existence before 1877. As with the nearby buildings there are internal sleeper walls of brick, containing iron bolts and other fixtures for machinery; there no evidence of a substantial front wall so again this was probably a 'blast wall'. The side walls survive to a height of up to 3m, but the rear wall has collapsed and the resulting rubble has partly infilled the gaps between the sleeper walls.

Fig. 31. Heading Packing House (B10). Top: view looking south-west from the line of the tramway. The wall in the foreground is also the south wall of the Dusting House (B9). Piers for the Elevated Leat (W4), and the north wall of the Stable (T5) are visible in the background. Bottom: detail of internal sleeper walls, looking south from the north end of the building.

Fig. 32. Glazing House (B11). Top: general view, looking north from the tramway; the wall in the foreground is the continuation of the revetment wall, with the building itself located beyond the interpretation feature. Bottom left: view across the Glazing House looking south with the revetment wall and the 12-15hp Turbine House (W6) in the background. Bottom right: detail of bolts in the sleeper wall.

5.39 **Expense Magazine (B12).** This isolated structure is located at SN 9195 0846. It is a substantial stone-built structure with a brick-arched roof incorporating wrought iron tension rods (Fig. 33). Recent restoration has supplemented these with additional mild steel rods. There are supporting buttresses at the front, flanking to the north-east and south-west sides; the Elevated Leat (W4) passed across the front of this building (Fig. 10, above).

Fig. 33. Expense Magazine (B1).

5.40 **Watch House and Mess Room (B13).** This isolated structure is located up the hill to the west of the Expense Magazine (B12), at SN 9192 0846. It comprises a stone-built structure of two cells, with an open sided extension at the south corner; it was constructed before 1877. Little previous conservation work appears to have been undertaken. The walls survive to a height of up to 2m, but generally less, although the interior is filled with a significant amount of rubble. This is one of the few surviving buildings of the former Gunpowder Works which was not associated with industrial processes – there is therefore potential for the recovery of material culture associated with the people who worked on the site.

5.41 **New Corning House (B14).** This impressive isolated structure is quite unlike any of the other buildings on the site, being constructed of reinforced concrete (Fig. 34). It is located at SN 9183 0843; it is situated to the south of the Main Weir (W11) and was set back from the Main Tramway (T1), allowing the Clean Gangway (W7) to pass in front of and above it. Although a building is shown in this location on the 1877 plan, the present structure was probably built after the Nobel concern took over the site, as it is similar to

structures on their other sites – notably at Gatebeck (1923) and Lowwood (1928-29), both in Cumbria (Jecock *et al.* 2005, 107-112; Jecock *et al.* 2009, 75-77). The east and south walls survive to eaves level (approximately 6.5m), and the surrounding retaining walls survive to a height of around 3m. A small gable is extant at the top of the east wall, suggesting that the roof incorporated a clerestory. There are a variety of large holes to the internal faces of the walls, suggesting at least two floor levels and perhaps a staircase (in the eastern wall). Regularly-spaced smaller round holes are probably associated with the construction of the building.

5.42 **Corning House (B15).** This isolated building is located at SN 9183 0843, to the south-west of the New Corning House (B14) and adjacent to the Main Tramway (T1). It was powered by the Waterwheel (W10) on the opposite site of the river, and was in existence before 1877. The building is located in a hollow, which has a retaining wall to the east side but not to the rear (north) or west; the front (south) side of the building fronts on to the tramway (Fig 35). The building is constructed of roughly-coursed stone, with well-finished detailing to the south ends of the walls; the south wall was probably a 'blast wall'. The walls stand to a maximum height of c.4m, although partly collapsed in places. There are a number of beam-slots and other apertures built into the internal faces of the walls, suggesting at least two and possibly three levels of sieving and crushing machinery. In the centre of the building is a pit containing a number of iron bolts; this was probably the location of machinery transferring power from the waterwheel to the building (Fig. 36). The interior of the building, and the gap between it and the retaining wall on the east side, is partly filled with rubble from its collapse, but there is considerable archaeological potential here.

Fig. 34. New Corning House (B14). View looking north from the former junction of the Main Tramway (T1) with the Lower Tramway Branch (T7).

Fig. 35. Corning House (B15). Top: general view looking east from the line of the 'Clean Gangway' (W7), with the tramway and river to the left. Bottom: detail of the south-eastern corner of the building, showing the well-finished end to the east wall on the left, and the retaining wall on the right.

Fig. 36. Corning House (B15). The possible power transmission pit in the centre of the building; view looking south from the northern end of the building.

5.43 **Pellet Press House (B16).** This isolated structure is located at SN9172 0838, perched on the side of the river to the east of the tramway (Fig. 37). Its location is somewhat anomalous in terms of process flow, as it would have been better located to the north of the Corning Houses. It was constructed after 1877, and appears to have gone out of use in the 1920s. The lower part of the building is constructed of stone, and forms part of the retaining wall for the tramway; the upper parts are brick, but little survives. Iron brackets bolted to the retaining wall suggest that there was a walkway for access over the river.

5.44 **Cake Press House (B17).** This isolated structure is located at SN 9168 0827, and according to the Nobel Plan was served by a loop in the tramway that ran behind the building. A building was in existence here by 1877. Although only a single building is shown on the Nobel Plan, the field evidence suggests that there were two or possibly three separate structures (Fig. 38). The central part of the area is occupied by a rubble mound which appears to represent a collapsed structure; to the west, separated by a narrow pit, are the foundations and sleeper walls of another structure. There may be an additional structure to the east. Further investigation would be helpful here in elucidating the layout of buildings and the sequence of construction, as well as the relationship to the main line of the tramway and the tramway loop.

5.45 **Cake Press House (B18).** This is located at SN 9155 0822, to the north of the 6hp Turbine and Pump House (W14) which presumably provided a source of power. The rear wall of the building formed the retaining wall for the bank behind. Foundation walls and sleeper walls survive, but the side walls and front wall (presumably a 'blast wall') are not evident above ground; it is also possible that part of the building lies under the present footpath (Fig. 39). Further investigation would enable the original form of the building to be determined.

Fig. 37. Pellet Press House (B16).

Fig. 38. Cake Press House (B17). View looking east from the western end of the complex, with the Main Tramway (T1) to the right. The footings of the western structure are evident in the foreground, with the rubble mound (another building) behind.

Fig. 39. Cake Press House (B18). View looking west from the line of the tramway. The scale rod marks the rear (revetment wall).

6 Heritage significance and value

6.01 This assessment of significance has been made following Cadw's *Conservation Principles for the sustainable management of the historic environment in Wales* (2011), which have in turn been derived from English Heritage's *Conservation Principles, Policies and Guidance* (2008). Both documents identify six 'conservation principles', although with different emphasis; the six Cadw conservation principles are:

- historic assets will be managed to sustain their values
- understanding the significance of historic assets is vital
- the historic environment is a shared resource
- everyone will be able to participate in sustaining the historic environment
- decisions about change must be reasonable, transparent and consistent
- documenting and learning from decisions is essential

6.02 The Cadw guidance identifies four 'heritage values' which can be applied to assess heritage significance. These are:

- evidential value
- historical value
- aesthetic value
- communal value

6.03 These heritage values have been applied to the various components of the site, and to the site as a whole. In the following text, and in the summary table on pages 40 and 41, they have been scored 'high', 'medium', 'low' and 'none'.

Evidential value

6.03 Evidential value 'derives from those elements of an historic asset that can provide evidence about past human activity, including its physical remains or historic fabric. These may be visible and relatively easy to assess, or they may be buried below ground, under water or be hidden by later fabric. These remains provide the primary evidence for when and how an historic asset was made or built, what it was used for and how it has changed over time. The unrecorded loss of historic fabric represents the destruction of the primary evidence. Additional evidential values can be gained from documentary sources, pictorial records and archaeological archives or museum collections' (Cadw 2011, 16).

6.04 Of the water-power features, those with high evidential values include the Upper Leat (W3), the water wheel (W8), the 18hp turbine and pump house (W9) and the Main Weir (W11). Whilst all have suffered some loss of historic fabric, they survive in a sufficiently complete form to enable the water-power arrangements on the site to be easily understood. The 12-15hp turbine house (W6) and the clean gangway (W7) are less well-preserved; the turbine house in particular has suffered from its riverside location, and the earthwork remains of the clean gangway provide limited evidence for the original form of this feature. The upper aqueduct (W2) has low evidential value due to the loss of the structure which carried water across the river, although this is to some extent compensated for by the survival of fragments of it downstream, and the existence of archive photographs. Similarly very little survives of the elevated leat except some of the stone pillars which once supported it – meaning that the evidence for its original form

and function is not apparent at all – although again the survival of historic photographs enables greater understanding.

6.05 None of the features associated with the former tramway have a high evidential value. The removal of the tramway rails and the resurfacing of the path has removed much of the evidence, and the potential for below-ground archaeological evidence is also low. The tunnel (T6) has medium value, assuming that it survives to some extent internally; should elements of the rails and sleepers survive then the evidential value of this feature would be high. Similarly the only extant building is the former stable (T5); all other features have a low value due to their absence, or, in the case of the lower tramway bridge (T4) its replacement with a modern superstructure.

6.06 The gunpowder works buildings together have a much higher score for evidential value, largely because of their relatively good above-ground survival. Particularly good evidence for the former use and form of these buildings survives at the stove house (B5), boiler house (B6) and the old and new corning houses (B14 and B15); the remaining buildings are less well-preserved but below-ground evidence does survive that shows the likely locations and arrangement of machinery and internal fixtures. There is no evidence at all for the barrel house (B4), and this location should be a priority for archaeological investigation. Other sites – notably the two southern press houses (B17 and B18), and the watch house and mess room (B13) – have good potential but much of the evidential value lies below ground and in their landscape setting.

6.07 As a whole, evidential value of the Glyn Neath Gunpowder Works site can be said to be medium. Whilst many of the standing buildings have a high evidential value, the values of those elements which connected them – and therefore the evidence for the operation of the site as a whole – are more varied. Key elements, including parts of the water-power system and transport network, are absent entirely. The value of other elements may be improved with archaeological investigation, if the survival of below-ground remains can be confirmed.

Historical value

6.08 Cadw guidance provides the following definition of historical value: 'An historic asset might illustrate a particular aspect of past life or it might be associated with a notable family, person, event or movement. These illustrative or associative values of an historic asset may be less tangible than its evidential value but will often connect past people, events and aspects of life with the present. Of course the functions of an historic asset are likely to change over time and so the full range of changing historical values might not become clear until all the evidential values have been gathered together. Historical values are not so easily diminished by change as evidential values and are harmed only to the extent that adaptation has obliterated them or concealed them' (Cadw 2011, 16-17).

6.09 Although the individual features have been scored (see table on pages 40 and 41) for their historical value, the application of this scoring has been strongly connected to the assessment of the evidential value. In other words the extent to which elements of the site survive has affected their individual historical value.

6.10 The site as a whole has a high historical value. This is because the ensemble of all features taken together – regardless of their physical survival – provides a near-complete picture of the process of nineteenth century gunpowder manufacture. Although historical

documentary evidence for the Glyn Neath site specifically is limited, there is enough to enable the details of that picture to be completed. Moreover there are a number of comparative sites which provide good context for Glyn Neath. These include the nineteenth-century Chilworth works (Surrey), and the slightly later Curtis's and Harvey explosives factory on the Medway (Kent); the latter being in the same ownership as Glyn Neath and therefore adding depth to the story. Perhaps the closest parallels – in terms of remoteness of location, gorge-side situation, and survival of buildings and features – are the Lowwood and Gatebeck works (Cumbria), both with associated settlements (Cocroft, and Tuck 2005; Jecock, M. *et al.* 2005; Jecock *et al.* 2009; Pullen *et al.* 2013).

Aesthetic value

6.11 Aesthetic value 'derives from the way in which people draw sensory and intellectual stimulation from an historic asset. This might include the form of an historic asset, its external appearance and how it lies within its setting. It can be the result of conscious design or it might be a seemingly fortuitous outcome of the way in which an historic asset has evolved and been used over time, or it may be a combination of both … [i]nevitably understanding the aesthetic value of an historic asset will be more subjective than the study of its evidential and historical values' (Cadw 2011, 17).

6.12 The aesthetic value of the Glyn Neath Gunpowder Works can be considered as resulting both from its intended design and its situation. The latter of course was informed by functional considerations that were inherent in the former; but for the twenty-first century visitor the aesthetic value of the setting is the most significant aspect of the complex as a whole. The steeply-sloping banks of the gorge and the fast-flowing river are elements which provide an intangible but important addition to a collective aesthetic value.

6.13 Individual buildings and structures do have an inherent aesthetic value which is unrelated, or at least only partly related, to the situation. Of the water-power features, the main weir (W11) is an impressive structure which embodies a conspicuous engineering design quality. The same philosophy of hydrological efficiency underpins the design of the two turbine houses (W6) and (W9), together with the water-wheel (W8); all three features, perched above the river which was their *raison d'etre*, have a high aesthetic value. Of the tramway features, only the stable (T5) scores a high aesthetic value, with the brick surround to the support for the former raised leat.

6.14 The stable sits within a complex of buildings that runs along the former tramway, separated by it from the river. Individually these buildings express a range of aesthetic values. At one end of the complex – and of the scale of aesthetic value – is the stove house complex (B5/B6), together with its associated chimney (B8); these display a level of architectural design which is exceptional in the context of the site as a whole. At the other end – again both literally and figuratively – are the two cake press houses (B17 and B18), which survive as below-ground remains and fragments of wall, and therefore score a low aesthetic value. The buildings in the middle – particularly the relatively densely-packed part of the complex immediately to the south of the stove house (B5) are another important aesthetic element. Individually some are extremely impressive, such as the very substantially-engineered retaining walls and side walls of the dusting house (B9); the new corning house (B14) with its minimalist reinforced concrete construction; and the old corning house (B15) with its well-finished front walls.

6.15 The individual aesthetic value of these buildings is however enhanced by their collective group value. They are linked visually, and also by the path of the former tramway (T1); the former elevated leat (W4) also links the complex together. With the exception of the new corning house (B14) and the stove house (B5), the buildings all share the same basic design feature – a lightweight wall that would minimise the disruption to the works in the event of an explosion.

6.16 The complex as a whole has been assessed as having a medium aesthetic value. Conservation of individual elements would improve this, as would management of aspects of the surrounding natural environment (more active management of the woodland, for example). However care should be taken to avoid excessive restoration or landscaping works which would detract from the high aesthetic value of the redundant buildings in the setting of the gorge.

Communal value

6.17 Communal value 'derives from the meanings that an historic asset has for the people who relate to it, or for whom it figures in their collective experience or memory. It is closely linked to historical and aesthetic values but tends to have additional or specific aspects. Communal value might be commemorative or symbolic. For example, people might draw part of their identity or collective memory from an historic asset, or have emotional links to it. Such values often change over time and they may be important for remembering both positive and uncomfortable events, attitudes or periods in Wales's history. Historic assets can also have social value, acting as a source of social interaction, distinctiveness or coherence; economic value, providing a valuable source of income or employment; or they may have spiritual value, emanating from religious beliefs or modern perceptions of the spirit of a place' (Cadw 2011, 17).

6.18 The communal value of the Glyn Neath Gunpowder Works is almost entirely that of its value in the present; there are no known surviving direct links with the place and its former workforce. Arguably the single historic asset with the greatest communal value is the former smithy and millwrights shops, now a community centre – although this lies outside the present study area (Fig. 40).

Fig. 40. Community centre.

6.19 The scope of this study has precluded any community consultation, which would normally inform an assessment of communal value. However it is clear that many elements of the site do have a high communal value – notably the paths and bridges which enable access for a wide variety of leisure uses. The main weir (W11) is used for wild swimming and associated activities. Many of the buildings will also have a communal value – this has been scored higher for those in good condition and closest to the various routes through the complex.

Discussion

6.20 The table below summarises the evidential, historical, aesthetic and communal values for the individual elements of the Glyn Neath Gunpowder Works complex. 'High' scores are shown as red blocks, 'medium' as yellow, 'low' as green, and 'none' as white.

Feature		Evidential	Historical	Aesthetic	Communal
W1	Upper weir				
W2	Upper aqueduct				
W3	Upper leat				
W4	Elevated leat				
W5	3½ hp turbine house				
W6	12-15 hp turbine house				
W7	Clean gangway				
W8	Water wheel				
W9	18 hp turbine & pump house				
W10	Water wheel				
W11	Main weir				
W13	Lower aqueduct				
W14	6hp turbine & pump house				
T1	Main tramway				
T2	Upper tramway bridge				
T3	Upper tramway branch				
T4	Truck Shop				
T5	Stable				
T6	Lower tramway bridge				
T7	Lower tramway branch				
T8	Tramway tunnel				

Feature		Evidential	Historical	Aesthetic	Communal
B1	Magazine				
B2	Pellet House				
B3	Magazine				
B4	Barrel House				
B5	Stove House				
B6	Boiler House				
B7	Flue connecting B6 and B8				
B8	Chimney				
B9	Dusting House				
B10	Heading Packing House				
B11	Glazing House				
B12	Expense Magazine				
B13	Watch House and Mess Room				
B14	New Corning House				
B15	Corning House				
B16	Pellet Press House				
B17	Cake Press House				
B18	Cake Press House				

6.21 Of the 38 features assessed, two stand out as scoring 'high' in all categories. These are the main weir (W11) and the stove house (B5). Both survive in a good state of preservation, and their original function is evident; both also have a high aesthetic value by virtue of the design and construction, and, in the case of the weir, as a result of its location.

6.22 Six features score 'high' in three of the four categories of significance, and medium in the fourth. The water wheel (W8) and the adjacent 18hp turbine and pump house (W9) are at a prominent location and sufficiently well-preserved to enable them to articulate the story of water power on the site. In addition they have a group value with the weir (W11). The smaller 6hp turbine and pump house (W14) has similar potential, although somewhat isolated from extant water-power features. The remaining three features are buildings, with high evidential, historical and aesthetic value, and in prominent positions which suggest a medium communal value.

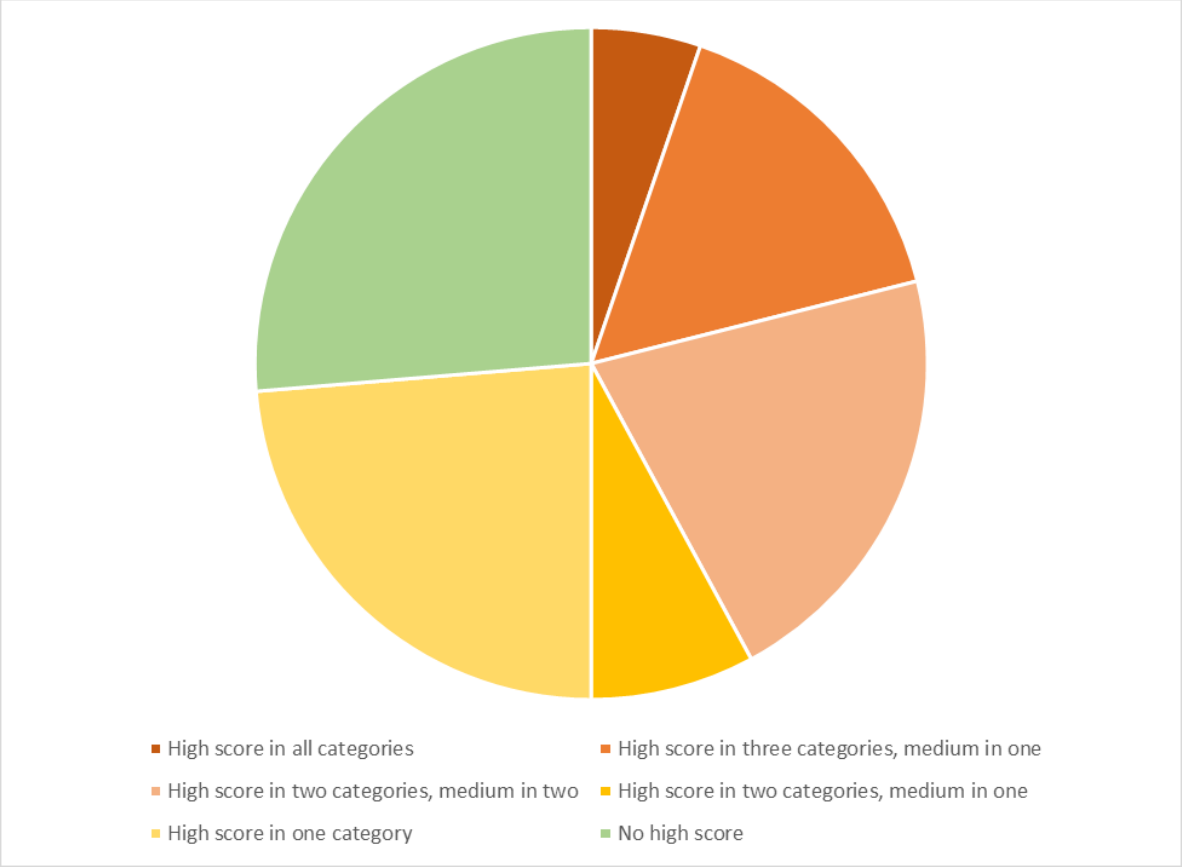

Fig. 41. The significance of heritage values.

6.23 Eleven features score 'high' in two categories, and a further eleven score only in one.

6.24 Therefore, of the 38 features assessed, 28 (74%) have a high score in at least one of the four heritage values. These are represented by the red and yellow areas in the chart shown above.

6.25 It is therefore concluded that the site as a whole is of high significance.

7 Potential impacts

7.01 Potential impacts may occur in several ways, either individually or as a combination of:

- Vegetation removal: this may compromise structural integrity and require further removal of masonry from upstanding structures; removal of trees may impact directly on below-ground archaeology; there may also be indirect impacts – for example increased erosion caused by the removal of tree cover on slopes above the site.
- Temporary works: the creation and maintenance of access routes for repairs or vegetation removal may impact on above- and below-ground archaeology, either known or unknown; propping, shoring and interim conservation may also have localised impacts.
- Remediation solutions: larger-scale conservation, reconstruction, repointing and stabilisation works will have an impact on standing structures and below-ground archaeology.
- Ignorance: large parts of the site, and relationships between different parts of the site, are not well understood; moreover their significance in an archaeological or historical sense has not hitherto been assessed.

7.02 Archaeological monitoring should accompany all phases of conservation work. Where large-scale interventions are planned, a comprehensive programme of archaeological investigation and recording should be undertaken before and during conservation work.

7.03 Areas of particular sensitivity and interest – where archaeological recording will inform the conservation programme, and/or potentially provide additional information which will assist interpretation – have been identified in section 4. They include:

- W5 – 3½ hp turbine house. The location and form of this turbine house, together with its relationship with adjacent and related structures, needs to be identified.
- T4 – Truck shop. Archaeological investigation here could determine the nature and extent of the former truck shop, which may have been a lean-to structure. There is the potential for the recovery of remains of elements of the former tramway system here.
- T7 – Lower tramway branch. The junction, between the new corning house (B14) and the main weir (W11) has the potential to inform understanding of the relationship between the main (timber) tramway and the branch tramways.
- T8 – Tramway tunnel. There is considerable potential here for the survival of archaeological remains relating to the tramway.
- Understanding of the operation of all of the buildings could be better informed by a targeted programme of archaeological work.

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Appendix 1 – Site numbering concordance

This report	Feature	Nobel plan	Cadw SAM	NPRN	CPAT PRN
Water-power					
W1	Upper weir	-	-	-	39164
W2	Upper aqueduct	-	BR230B2	405083	-
W3	Upper leat	-	BR230B2	405081	-
W4	Elevated leat	-	BR230B2	405081	-
W5	3½ hp turbine house	-	-	-	-
W6	12-15 hp turbine house	38	-	-	
W7	Clean gangway	-	-	-	-
W8	Water wheel	35	-	405091	-
W9	18 hp turbine & pump house	35a	-	405091	-
W10	Water wheel	60	-	405157	-
W11	Main weir	-	BR230F1	405090	39177
W12	Lower leat	-	BR230B2	405092	50031
W13	Lower aqueduct	-	BR230B2	405097	37084
W14	6hp turbine & pump house	28	BR230B1	405085	-
Transport infrastructure					
T1	Main tramway	-	BR230F2	405055	50038
T2	Upper tramway bridge	-	BR230B2	405083	-
T3	Upper tramway branch	-	BR230F2	405055	50038
T4	Truck Shop	45	BR230F8	-	-
T5	Stable	61	BR230F8	405100	50063
T6	Lower tramway bridge	-	BR230F2	405093	-
T7	Lower tramway branch	-	BR230F2	405055	50038
T8	Tramway tunnel	-	BR230C	-	37085
Buildings					
B1	Magazine	48	BR230F8	405104	50407
B2	Pellet House	47	BR230F8	405104	-
B3	Magazine	46	BR230F8	405104	-
B4	Barrel House	62	-	-	-
B5	Stove House	44	BR230F8	405102	-

This report	Feature	Nobel plan	Cadw SAM	NPRN	CPAT PRN
B6	Boiler House	43	BR230F8	405102	-
B7	Flue connecting B6 and B8	-	-	-	-
B8	Chimney	-	BR230F8	405102	-
B9	Dusting House	41	BR230F8	405101	50063
B10	Heading Packing House	40	BR230F8	405101	50063
B11	Glazing House	39	BR230F8	405100	50063
B12	Expense Magazine	37	BR230F8	405099	125356
B13	Watch House and Mess Room	36	BR230F8	405098	125355
B14	New Corning House	34	BR230F3	405089	50059
B15	Corning House	33	BR230E	405088	-
B16	Pellet Press House	68	BR230D	405087	-
B17	Cake Press House	30	-	405086	-
B18	Cake Press House	29	-	405084	-
Other features					
F1	Embankment				
F2	Mound				

Appendix 2 – Condition Survey Definitions

Condition

The surviving condition will depend on the nature and structure of the site, subsequent land-use and development, and erosion. Sites which are predominantly of stone construction will be more likely to survive substantially intact than purely earthwork sites. Erosion may be due to natural forces, animals, or man eg visitor. Although there is obviously some overlap with survival, this is intended to be qualitative rather than quantitative assessment.

Optimal	The site is in optimal condition, the best we can realistically hope to achieve. Very little or no intrusive vegetation, erosion or other damage
Good	Generally good but with minor localised problems. The form and structure of the monument survives well and damage is not significant. May be some intrusive vegetation or erosion scars, but these affects no more than c.15% of the site. The damage is an acceptable feature of the monument and at its present level does not require any management or conservation actions.
Moderate	Generally good but with significant localised problems. Significant damage has occurred (e.g. animal burrowing; stock, vehicle or visitor erosion). Damage is localised and affects no more than 25% of the site, and does not affect the integrity of the site as a whole.
Poor	The site is in a generally unsatisfactory condition and has major localised problems that affects the form and structural integrity of between 25% and 50% of the site (e.g. areas of animal burrowing; areas of collapse etc.).
Very Poor	The site has extensive significant problems with damage affecting 50% or more of the site and severely affecting the form and structure of the monument (e.g. extensive animal burrowing, sites under plough, dense vegetation cover). Damage could be caused by one or more factors.

Fragility

This relates to the structural nature of the site, rather than the level of any threat, which is vulnerability. Most sites are likely to have reached a fairly stable state in terms of natural weathering and low intensity interference. However, some sites may have reached a state where particular components may now be deemed fragile.

High	low earthwork sites and cropmarks, exposed and unstable internal features
Medium	more robust earthwork sites, predominantly stone structures partially turf covered
Low	predominantly stone structures mostly turf covered

Vulnerability

The level of vulnerability of a site is related to the nature of the immediate environment and current/proposed landuse. Sites in areas of predominantly arable farming will be more vulnerable than those in pastoral locations. Stone structures may be subject to robbing. Sites

adjacent to developed or industrial areas may be at risk from development. The attitude of the owner/tenant may also be relevant.

High A threat exists, which is not being managed and is likely to cause significant deterioration in condition over the short term.

Medium A threat exists or is likely to develop in the near future, minimal management is taking place, and the monument's condition is likely to deteriorate over the long term.

Low No identifiable threat, or a threat exists but it being adequately managed to prevent deterioration in condition.

Archaeological impact

An assessment of the archaeological impact will depend on the area affected, the depth of disturbance and the vulnerability and fragility of the monument.

High significant impact on the monument, buried stratigraphy exposed

Medium moderate impact on the monument as a whole, or very localised damage

Low minor disturbance with no obvious archaeological impact

None no impact apparent