



## **Holmbush Mine, Kelly Bray, Cornwall**

### **Report on building conservation works**



**Historic Environment Projects**



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### **Report on building conservation works (2001, 2007)**

<b>Client</b>	<b>East Cornwall Regeneration Project</b>
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The 2001 measured building survey for the pumping engine house was undertaken by Nigel Thomas and Colin Buck, with the CAD 'as built' conservation works drawings produced in 2011 by Francis Shepherd. The 2007 measured building survey for the winding engine house was undertaken by Mike Venner and Paddy MaCready (CC Technical Services), with CAD editing by Mike Venner (2008). The 2008 'as built' conservation works drawings were produced by Andrew White of Knevitts (Cons. Eng).

Within HE Projects the Project Manager was Colin Buck, and Andy Young edited this report.

The views and recommendations expressed in this report are those of Historic Environment Projects and are presented in good faith on the basis of professional judgement and on information currently available.

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## **Cover illustrations**

Front cover images of Hitchen's pumping engine house, boiler house chimney, copper crusher, winding engine house and chimney before (2001) and after (2007) works. Rear cover image of Holmbush Mine after works taken from the south (both images © CC 2007).

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## Abbreviations

CCC	Cornwall County Council (CC- Cornwall Council)
DCMS	Department of Culture Media and Sport
ECRP	East Cornwall Regeneration Project
EH	English Heritage
HER	Cornwall and the Isles of Scilly Historic Environment Record
HE	Historic Environment, Cornwall Council
NGR	National Grid Reference
NHL	Natural Hydraulic Lime
PRN	Primary Record number (old PRN in HBSMR)
SWRDA	South West Regional Development Agency
SM	Scheduled Monument
WHS	World Heritage Site

## 1 Summary

This mine site conservation scheme was part of the East Cornwall Regeneration Project (ECRP); a second phase of conservation works (2006 – 2009) to Tamar Valley mine sites, including their access links and village improvement works, following the first phase of similar works in East Cornwall from 1999 to 2001. This report describes the building consolidation phase to Holmbush Mine, north of Kelly Bray, Callington.

Holmbush Mine (Stoke Road), includes a fully extant pumping (Site 1) and winding engine house (Site 8), two boiler houses (Sites 2 and 9), two fully extant chimneys (Sites 3 and 10), a partially extant copper crusher (Site 5), a water wheel pit (Site 6), a shaft balance bob masonry mountings (Site 4), and winder drum loadings (Site 11). In 2001, conservation works to the pumping engine house, the main boiler house, the boiler house chimney and temporary stabilisation works to the wheelpit and winder drum loadings were undertaken during the first phase of the East Cornwall Project. The second phase scheme conserved the remaining buildings (winding engine house, boiler house and chimney, winding drum slot/loadings, water wheel and flywheel pit).

In the first phase of works (Proj. No. 2001079), the site building conservation contractors were AD Williams, who started work on Hitchen's Pumping Engine House in late July 2001; followed by the boiler house, the boiler house chimney, the balance bob mountings and the copper crusher. Site safety fencing was erected after the building conservation works had finished (December 2001). Following these conservation works, the site was Scheduled as a monument of National importance (SM 15555).

In the second phase of works (Proj. No. 2007048), following Scheduled Monument Consent (dated 21/7/2004), contractors were tendered and Darrock & Brown were successful. Work started on the Winding Engine House in July 2007 followed by the boiler house, the winder drum slot and loadings, the wheelpit and copper crusher flywheel loadings. The works finished in September 2007. Project funding included the provision of two site information boards detailing the overall site archaeology, history, ecology and mineralogical assets. The site is owned by the Duchy of Cornwall.

Finalisation of this project enabled this former 19<sup>th</sup> century site of intensive mining to be safely used for public access dedicated to historical, leisure and educational activities as part of a wider scheme of similar co-ordinated land reclamation and regeneration works in east Cornwall.

## 2 Introduction

### 2.1 Project background

Holmbush Mine is one of a number of mine sites (Prince of Wales Mine, Drakewalls Mine, Silver Valley Mine and Wheal Brothers), forming part of the overall East Cornwall Regeneration Project (ECRP: 2006-2009). The ECRP is the second phase of mine building conservation works following the first phase from 1999-2001 (Gunnislake Clitters, Okel Tor, and Wheal Brothers). It had been formulated with the co-operation of local community groups and the site's landowner. The conservation and management of features relating to the site's mining heritage and enablement of safe public access forms the basis for the proposed site conservation scheme.

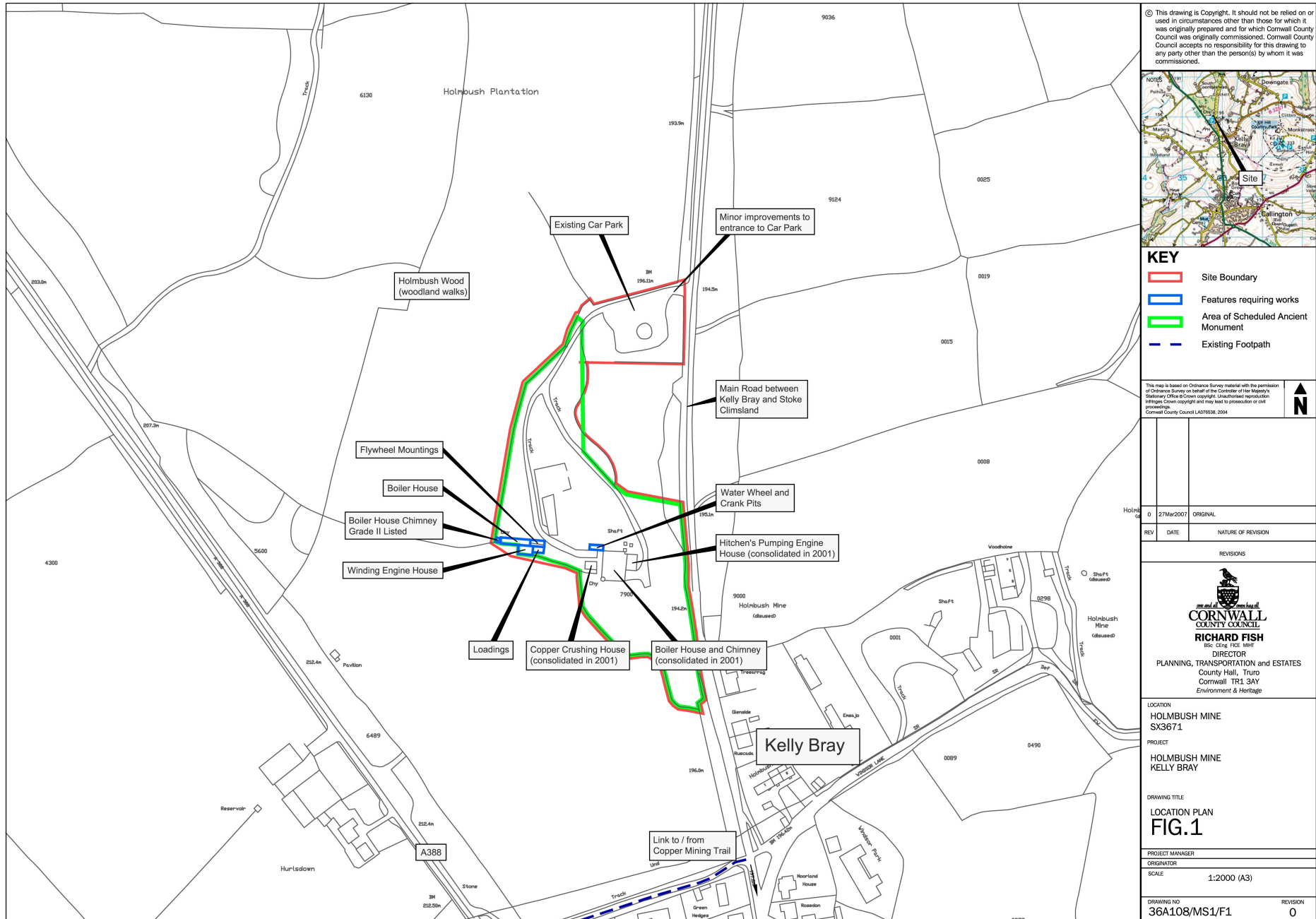
The site is at SX 3572 7210, (PRN 42290-see Figs 1 and 2 for site location and conservation works project area). The ECRP project aims comply with the overall strategy for the Tamar Valley (see CCC Strategy document 1998). Funding for the project had been secured from a variety of sources; primarily the South West Regional Development Agency (SWRDA), Objective One funds, Cornwall County Council (CCC), and the Tamar Valley Service.

Cornwall Archaeological Unit (CAU) produced an archaeological assessment of the Holmbush mine site in December 1998 (Buck 1998, Rep No. 1998R069), in which each site was identified and management recommendations produced. An Ecological assessment report was compiled in August 1998 (Howard and Eliades, CTNC Environmental Consultants). Camborne School of Mines produced a geotechnical mine assessment of the site (CSMA Minerals Rep. No. 61-0143 in Aug 1998), and a report of a Risk assessment in relation to public access within the site was also produced (Sherrell Report No. 2173 in Nov 2001, including the results of percussion drilling into Hitchen's Shaft). In August 2001, CCC Historic Environment Section carried out an EDM survey of Hitchen's Pumping Engine House (before works) with annotated notes detailing a summary of the necessary consolidation works (Project No. 2001057, N Thomas). AD Williams was the successful building conservation tenderer. A structural buildings assessment survey on the Rotary Engine House and site report with on-site supervision of the contractor was commissioned from BSW Engineering Cons. (Mervyn Stewart at Plymouth). The building conservation works occurred between July and December 2001, Colin Buck was employed as the archaeological consultant and recording archaeologist.

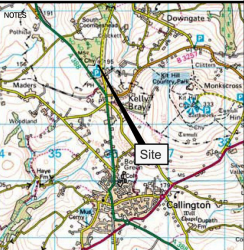
The Historic Environment Service (HES) was commissioned in early 2007 by Cornwall County Council Landscape and Urban Design Unit (Chris Hariades), to undertake an impact assessment survey of the site (Buck 2007, Rep No. 2007R039), with the aim of undertaking the completion of the remaining building conservation works at Holmbush Mine (Stoke Road), as the site had now been Scheduled (SM 15555). The report assessed the impact of the proposed works on the site's significant assets, giving mitigation recommendations for their impacts and described the proposed site management. Scheduled Monument Consent for the currently planned works was given by DCMS on 21/7/2004 (RTF: HSD 9/2/6403).

A structural buildings assessment survey of the Winding Engine House and site report with on-site supervision of the site contractor was commissioned from Knevitts Cons. Eng. of Wadebridge (Andrew White – B6148.3 January 2007). A subsequent detailed specifications report and tender document report was also produced by Knevitts Cons. Eng. (Andrew White – B6148.3 April 2007). CCC Technical Services carried out an external and internal EDM survey of the single extant engine house (before works) with annotated notes detailing a summary of the necessary consolidation works (Dwg. No. 36A108/HM/LP1). Darrock & Brown was the successful building conservation tenderer. The building conservation works occurred between July and September 2007, Colin Buck was employed as the archaeological consultant and recording archaeologist.

Holmbush mine building conservation works 2001, 2007 CB September 2011



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- KEY**
- Site Boundary
  - Features requiring works
  - Area of Scheduled Ancient Monument
  - Existing Footpath

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REV	DATE	NATURE OF REVISION
0	27Mar2007	ORIGINAL

REVISIONS		

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LOCATION  
 HOLMBUSH MINE  
 SX3671

PROJECT  
 HOLMBUSH MINE  
 KELLY BRAY

DRAWING TITLE  
 LOCATION PLAN  
**FIG.1**

PROJECT MANAGER  
 ORIGINATOR  
 SCALE  
 1:2000 (A3)

DRAWING NO  
 36A108/MS1/F1  
 REVISION  
 0

## 2.2 Aims

The main historic buildings consultancy and archaeological recording objectives of this project were to:

- Participate in the consultation process with the landowner, the ECRP Project Manager, structural engineers and contractors, and to set out the appropriate specification for the remediation works in terms of building consolidation works, shaft treatment and site fencing.
- Ensure that there was an adequate level of recording of upstanding masonry features affected by the conservation works (as identified and described in the archaeological assessment of the site), during the consolidation works.
- Include a photographic record of all building and landscape features affected by the scheme (before, during and after works).
- Carry out supervision of the contractors whilst the remediation works were being carried out, to ensure compliance with the detailed agreed work specification.
- Produce a descriptive survey record at appropriate detail of those structures, features, and sites etc that were affected by the land reclamation scheme.
- Produce a report outlining the findings of the archaeological consultancy and to provide the ECRP and landowners with copies of the same.
- Provide archaeological field and archive data for inclusion in Cornwall and the Isles of Scilly Historic Environment Record.

## 2.3 Project methodology

A building conservation scheme (especially within the World Heritage Site), necessitates the intervention of a field archaeologist/historic buildings consultant at two main stages; the archaeological assessment, and the resulting site works (results contained within this report). Historic buildings consultancy and archaeological recording during these projects ensure that there is a record of archaeological features that are affected, disturbed or destroyed by the conservation works. Furthermore, ongoing consultation with the site contractors and engineers is of paramount importance to ensure that appropriate building conservation techniques and standards are consistently applied, and to promote the survival and protection of important surface and sub-surface archaeological features, and to mitigate or limit damage wherever possible.

For the buildings consolidation part of the works, it was decided at an early stage to hold bi-weekly progress meetings on site with the CCC project funding manager (Chris Hariades), the site archaeologist (Colin Buck of CAU), the Structural Engineer (Andrew White of Knevitt Cons. Engineers) and the site manager for the contractors (Arthur Britton). These site meetings were also held throughout the scheme to view and comment on the works that had been carried out and to iron out any problems that occurred during the works.

The site gazetteer (Mitigation recording results - Section 4.0), contains a detailed description of how consolidation and preservation works affected each archaeological feature within the project area.

### 2.3.1 Site reports

The results of desk and field based surveys and reports (archaeological, ecological, geotechnical and structural), used and referred to during the course of the scheme are:

#### 2001

- Ecological Assessment of land at Holmbush Mine, Callington (Cornwall Trust for Nature Conservation, Howard & Eliades, August 1998)

- Geotechnical and Structural Engineering Consultancy Works at Holmbush and Winsor Lane, Callington. CSMA Minerals Redruth (Report No. 61-0143, Aug 1998)
- Holmbush Mine, Kelly Bray, Callington, Cornwall: Archaeological Assessment, (CAU Report No 1998R069, December 1998)
- Consolidation of Historic Mine Structures, Holmbush Mine, Kelly Bray, Callington (Sherrell and BSW)
- Stabilisation of Historic Mine Structures, Holmbush Mine, Tamar Valley, Contract 1` (Specifications/Tenders/Bills of Quantities/Contract Documents etc, Sherrell & BSW Consulting Engineers 2000)
- Holmbush Mine, Risk Assessment in relation to public access within the site, Report No. 2173, November 2001 (Frederick Sherrell Ltd, Report No. 2173, Nov 2001)

## 2007

- Structural Appraisal Report: East Cornwall Regeneration Project, Holmbush Mine, Kelly Bray, Callington, Knevitts Consulting Engineers, January 2007 B6148
- Structural Safety Works, Contract Documents, Form of Tender, Conditions of Contract, Schedule of Works, Specifications etc – Holmbush Mine, Kelly Bray, Callington,, Knevitts Consulting Engineers, April 2007 B6148
- Pre-Tender information Pack (CDM Regs. 2007) for Holmbush Mine, Kelly Bray, Callington, Knevitts Consulting Engineers, April 2007 B6148
- Holmbush Mine, Kelly Bray, Callington, Cornwall: Impact assessment report, (HES (Projects) Report No 2007R039, May 2007)
- Holmbush Mine, Kelly Bray, Cornwall – Ecological report of consolidation works, Andrew McCarthy Assoc. Report No 689, Sept 2007

### **2.3.2 Survey and recording techniques**

The measured building surveys that had been undertaken by the building survey teams (in 2001 by CAU [N Thomas and Colin Buck, CCC - Proj No. 2001057], in 2007 by CCC [M Venner – Proj No. 36A108/HM/LP1-2]), prior to any consolidation works being carried out (before scaffolding had been erected), were used throughout both schemes for a number of reasons:

- These provided essential dimensions and detail for rebuilding where removal of unsafe sections of masonry walls occurred.
- Provision of detailed structural engineering solutions to building instability problems and liaison with the Historic Buildings Consultant.
- Calculation of accurate Bills of Quantity for production of Contract documents.
- Accurate medium upon which the archaeological watching brief results can be measured and recorded on-site.
- These EDM surveys are reproduced in the archaeological watching brief report and are an effective and cost efficient method of graphically showing the extent and nature of the consolidation works.

Archaeological recording for all conservation works (incl. fencing), consisted of a mixture of photography and annotated notes detailing their location and specification. On-site preparatory works by HE Projects included a photographic survey of all visible buildings that were to be affected by the land reclamation scheme before tree/ivy and rubble clearance was carried out, during/after works (see relevant report figures).

The results of the watching brief are summarised below in the mitigation recording results inventory (Section 4.0). All plans, maps, photographs etc generated during the project have been appropriately archived in the Cornwall and Isles of Scilly Sites and

Monuments Record. Correspondence and other material related to the project has been archived into the project file (Section 6).

The recording and historic buildings consultancy was undertaken by a single member of staff (Colin Buck), who followed HE Projects Health and Safety guidelines outlined in the project specifications (which included the completion of a Health & Safety Risk Assessment Record). Safe working practices were observed at all times, especially where recording work was undertaken on features near or within shafts. The project archaeologist (who also managed some aspects of the project) liaised closely with both of the site contractors, and the relevant structural engineer. The 2001 site contractors were (AD Williams of Landulph), and the site works foreman (Darren Thompson), and the Structural Engineer Mervyn Stuart of BSW Ltd (Plymouth). The 2007 site contractors (Darrock and Brown of Bodmin); the site works manager (Arthur Britton), the site supervisor (Pete West), and the Structural Engineer was Andrew White of Knevitt's Structural Eng. Ltd.

### **2.3.3 Pre-works consultations**

Pre-works consultations (an important part of the historic buildings consultancy), with the relevant structural building engineers; the landowner (Duchy of Cornwall), and ECRP Project Officers (Pete Sainsbury for 2001, and Chris Hariades for 2007), were undertaken informally by HE Projects (Colin Buck) to ensure that the proposals did not undermine the historic character of the extant mine buildings and their setting within an industrial landscape in the World Heritage Site (WHS).

Regular on-site consultations between the structural engineer, the site contractors and site historic buildings consultant, ensured that the agreed specifications were adhered to and that the techniques and quality of work were consistent throughout the contract term of the site.

### **2.3.4 Building conservation works summary**

The archaeological assessment survey (Buck 1998) described in detail the remnants of buildings and related masonry features at Holmbush Mine. Those affected by the conservation works are described below. Figure 2, a conservation scheme site plan, shows each structure. Douglas Fir timber was used, the new specifications matching the original sizes.

#### **2001 Building consolidation works (July – December 2001) by AD Williams:**

- Hitchen's Pumping Engine House (Buck 1998, Site 1)
- Pumping Engine Boiler House – limited structural works (Buck 1998, Site 2)
- Boiler House chimney (Buck 1998, Site 3)
- Balance bob box masonry (Buck 1998, Site 5)
- Copper Crusher House (Buck 1998, Site 7)
- Temporary stabilisation works to Sites 6 (wheelpit), and 8 (crank pit loadings and winder drum loadings)

#### **2001 Fencing works:**

- Fencing around the Hitchens Pumping Engine Shaft (Buck 1998, Site 4), and within the balance bob slot (Site 5)
- Fencing around the probable site of Plat Shaft (Buck 1998, Site 13)
- Fencing around the Copper crusher flywheel/crank pit (Buck 1998, Site 7), and doorway (east side)
- Fencing around the north side of the boiler house (Buck 1998, Site 2)



- Temporary fencing across both ends of the waterwheel pit (Buck 1998, Site 6)
- Temporary fencing around the east and north sides of the Winding Engine House (Buck 1998, Site 8)
- Temporary fencing in front of the winding engine boiler house chimney (Buck 1998, Site 10)

**2007 Building consolidation works (July – September 2007) by Darrock & Brown:**

- Winding Engine House, bob and winding drum loadings (Buck 1998, Site 8)
- Winding Engine Boiler House – limited works (Buck 1998, Site 9)
- Winding engine boiler house chimney (Buck 1998, Site 10)
- Copper crusher flywheel/crank pit (Buck 1998, Site 7)
- Wheelpit (Buck 1998, Site 6) and removal of all temporary fencing erected in 2001

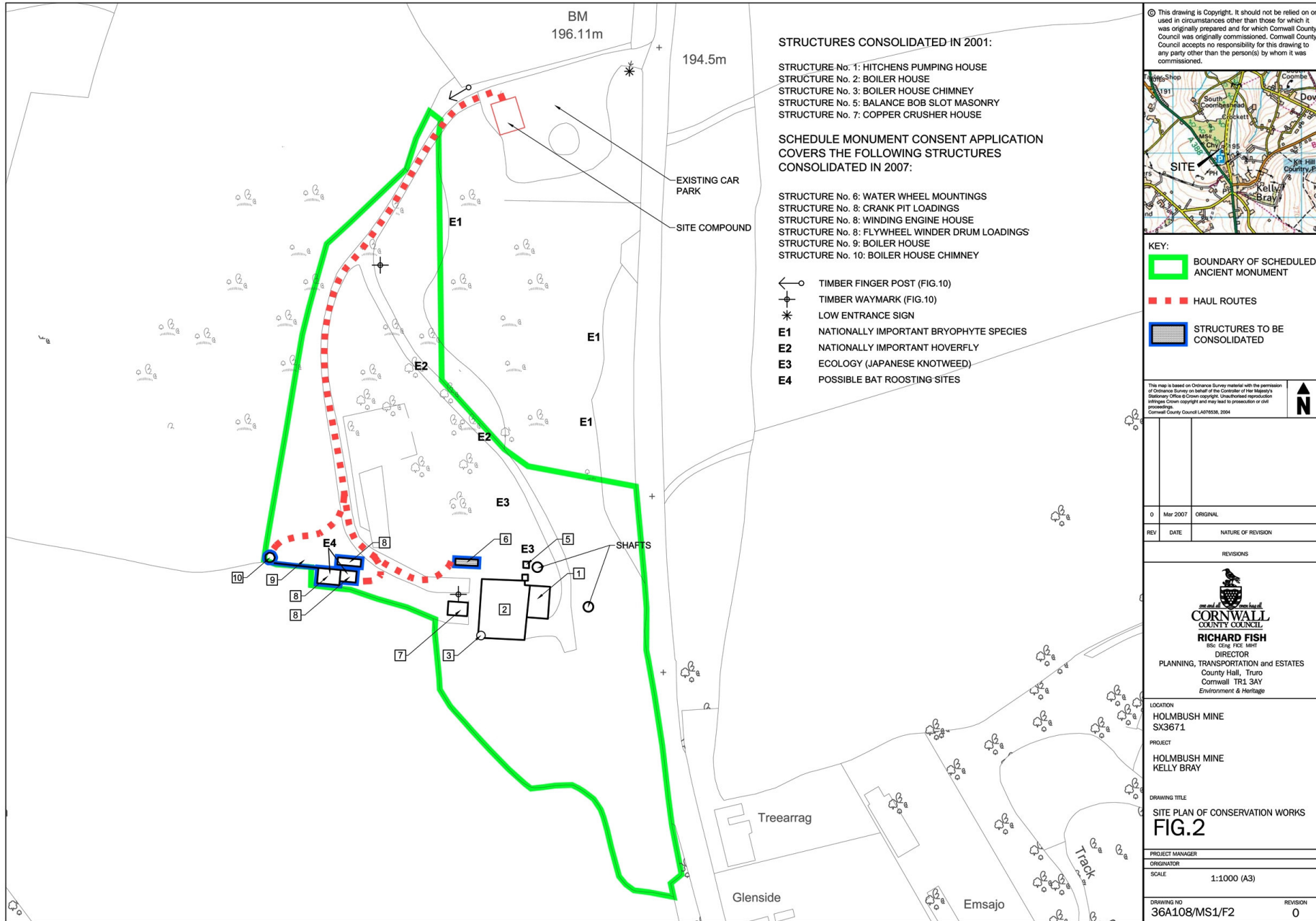
In the first phase of both building conservation schemes, the relevant structural engineers were instructed to carry out a preliminary structural survey of the main buildings included in their project. Few structural problems were identified in the 2007 project area (Winding Engine House etc), the most visible and obvious being the state of the internal masonry for Hitchens Pumping Engine House (Site 1), particularly where the timber window/door lintels had rotted, and the masonry above had collapsed over each opening (see Figs 3 to 7). In addition the upper stone/brick pier between two windows can be seen to have visibly moved outwards.

Following the production by both structural engineers of a single document which detailed Contract documents, Tender forms, works specifications (agreed after consultation), and Bills of Quantities (for the main building conservation contract referred above), the works were put to tender after consent was given by the Obj 1/5b and CC fund providers, and the landowner (Duchy of Cornwall).

AD Williams, a Landulph based company, often specializing in building conservation work (recently had an award from the Cornish Buildings Group for similar conservation work to an engine house at Gunnislake Clitters Mine), was successful in gaining the Holmbush Mine 2001 works contract. Darrock and Brown, a Bodmin based company (working with the Cornish Lime Company), with much experience of undertaking building consolidation works to historic buildings were successful in gaining the 2007 Holmbush Mine works contract. Following ongoing site discussions with respect to the building specifications with the structural engineer and site contractors during site works, the mine buildings were consolidated using sympathetic remediation and consolidation techniques.

An important aspect of the historic buildings consultancy and archaeological watching brief records were the weekly site consultations with the project structural engineer and contractors with regard to the extent of repointing and style of finish for all consolidation works (and where appropriate by phone/email). The 2001 specification for the lime mortar was Moorcroft aggregate mixed with Natural Hydraulic Lime (NHL), 5.0 strength for wall tops and 3.5 for the remainder.

For the 2007 project to the Winding Engine House, the Cornish Lime Company supplied pre-washed aggregate (CLS 26), which was mixed with NHL 5.0 strength for wall tops and 3.5 for the remainder. The aggregate was chosen (using the medium of agreed mortar panels), as being the most similar to that used during the original construction of all the mine buildings. For deeper pointing, CLS 17 was used in the heart of the wall. Following scaffold erection by both contractors (and removal of dangerous parts of the walls), the masonry was cleared of ivy and other vegetation growth, and where necessary wire brushed to remove mould in damp areas.



Both the depth of 'raking out' and style of re-pointing was agreed and a standard style adopted:

- The aggregate:lime mix (2.5:1) was applied to walls after joints were raked back to sound mortar and pointed with a rebate depth of 2mm.
- After the mortar had taken on an initial 'set', the joints were struck off with a wire brush to expose the aggregate texture.
- The finished surface was regularly dampened to stop the lime from drying out too quickly and subsequently cracking.
- Loose wall tops were reduced to sound jointing material after earth and roots etc, had been removed. The wall tops were rebbed and rebuilt with flush joints, but these were brushed off after the initial set. This applied mainly to the tops of the remnant boiler house walls.

Following the completion of the 2001 project, the site was fenced as described and shown in the Sherrell risk assessment report (2001). Some of the fencing was viewed as temporary (minimizing public access to sites which were viewed as being un-safe and unstable and which could not be made safe due to budgetary constraints) and was ultimately removed prior to commencement of the 2007 project. The remainder (timber post and rail), was permanent and is still extant.

**Table of sites and summary of conservation works undertaken (2001, 2007)**

Site No.	Feature	NGR (SX)	Conservation works summary
	<b>Holmbush Mine 2001</b>		<b>PRN 42290</b>
1	Hitchens Pumping Engine House	35786 72017	After ivy was removed – general building conservation works to the extant building. Removal and replacement of rotted lintel timbers on three sides of the building (with tanalised wood). Wall 'capping' and repointing with lime mortar was undertaken where appropriate to masonry. Small scale clearance of the cataract pit and ground around the cylinder bedstones.
2	Boiler house	35776 72015	After ivy/vegetation removal – focussed structural building conservation works (and wall capping) to sections of the boiler house walls.
3	Chimney	35768 72006	After ivy/vegetation removal, erection of scaffolding. Repointing of masonry with lime mortar where appropriate. Installation of a lightning conductor and earth rods/mats at base.
4	Hitchen's pumping engine shaft	35787 72025	Drilling of shaft before works to ascertain shaft closure spec (Sherrell (2001). Shaft fencing after conservation works finished)
5	Balance bob masonry/slot	35782 72026	After ivy/vegetation removal, structural repairs by lintel replacement and re-pointing, with tops of walls partially rebuilt and rebbed.
6	Water wheel pit	35764 72027	Due to lack of project funds, installation of temporary brickwork where structural

Site No.	Feature	NGR (SX)	Conservation works summary
			collapse was occurring in the wheelpit due to timber lintel collapse between main bearing tension bolt openings.
7	Copper crusher house	35766 72020	Removal of covering ivy (interior and exterior). Replacement of disintegrated timber lintels with new structural timbers and localised rebuilding of collapsed masonry above new lintels. Repointing and capping of walls with lime mortar.
8	Winding engine house (incl. crank pit loadings and winder drum loadings)	35716 72025	Due to lack of project funds, installation of temporary brickwork where structural collapse was occurring in the winder drum loadings due to timber lintel collapse between main bearing tension bolt openings. Also installation of temporary brickwork where structural collapse was occurring in the west end of the crank pit loadings due to structural collapse.
	Fencing/steps		Following the building conservation scheme, the hazardous areas (steep drops), were fenced (timber post and rail), as recommended by Sherrell (2001). In addition, steps were installed in the north side of the boiler house interior to provide safe access into its deeper interior.
<b>Holmbush Mine 2007</b>			<b>(SM 15555)</b>
6	Water wheel and crusher flywheel/crank pit	35764 72027	Removal of temporary brickwork (2001) and reinstatement of timber lintels above main bearing tension bolts. Repointing and capping of walls with lime mortar.
8	Winding engine house (incl. crank pit loadings and winder drum loadings)	35716 72025	Removal of covering ivy (interior and exterior). Replacement of disintegrated timber lintels with new structural timbers and localised rebuilding of collapsed masonry above new lintels. Repointing and capping of walls where necessary with lime mortar. Removal of temporary brickwork (2001) and reinstatement of timber lintels above the main bearing tension bolts at the winder drum loadings. Removal of temporary brickwork at the west end of the crank pit loadings and building conservation repair. Provision of access stairs to view the interior of the engine house.
9	Winding engine Boiler house	35711 72029	After ivy/vegetation removal –building conservation works (patch repointing and wall capping), to the remaining section of the boiler house wall.
10	Chimney	35704 72030	Repointing of masonry with lime mortar where appropriate. Collapse repaired at top of chimney by rebuilding. Installation of a lightning conductor and earth rods/mats at base.

## **3 Site description**

### **3.1 Location and setting**

This mine is located on two sites. The main building complex (Stoke Road at SX 3572 7210) is 500m north of Kelly Bray (near Callington), immediately west of the road to Stoke Climsland and contains two engine houses, a large and a small boiler house, a copper crusher building with associated wheelpit/flywheel crank pit and reservoir ponds. The chimneys and engine houses of this group are now part of the Holmbush mine Scheduled Monument (SM 15555). The second and smaller site (located east in the adjacent valley next to Windsor Lane) contains an engine and boiler house (SX 3611 7193), with spoil heaps and five shaft sites. The engine house and attached chimney stack are also designated as part of the Holmbush Mine Scheduled Monument.

The building conservation scheme only included the upper section of the mine site (Hitchen's Shaft near Stoke Road), which is bounded by the A388 to the east, Holmbush Plantation to the north and west, and an agricultural field marking the southern boundary. This small complex of buildings contained the pumping, winding and crushing capabilities of the mine and its primary waste dump. Both of the engine houses are extant and were in a relatively average state of repair prior to the conservation scheme, although the south gable wall of the crusher building alone survives of the original structure. Hitchen's Shaft, the main pumping shaft of the mine, is not visible and is presumably choked. The southern part of this upper site is characterised by a large linear spoil dump running parallel to the A388 to Stoke Climsland. The northern section of the mine was previously occupied by a large spoil heap but this has been progressively removed, presumably for reprocessing (perhaps to Redmoor or New Consols in the 1950s).

The landscape setting is mainly characterised by a combination of enclosed downland (Hurldown), post-medieval woodland and arable fields (settlement of Coombeshead). The southern corner of the woodland is occupied by the 19<sup>th</sup> century Holmbush mine with a single main mine shaft (Hitchen's (Site 4), a linear remnant of a large spoil heap, sites of mine buildings, together with other earthworks associated with its past role as a copper mine (1844 – 1903). The Scheduled site (see Fig 1), covers all of the Stoke Road part of the mine (and the Rotary Engine House near Winsor Lane). The upper site has much character, perhaps mainly due to the fact that it contains the main upstanding Engine house buildings and two tall chimneys, with remnants of the two boiler houses and the aligned water wheel pit and winder flywheel pit.

### **3.2 Designations**

#### **3.2.1 International**

The Cornish Mining World Heritage Site (WHS) seeks to demonstrate the international importance of the developments within mining and allied technologies which took place within Cornwall and West Devon during the last half of the 18th century and into the 19th century, establishing beyond doubt the contribution of this region to the development of the modern, industrialised world.

The World Heritage Site Management Plan 2005-2010 (2005, 12), statement of Outstanding Universal Value states that: *'The Cornwall and West Devon Mining Landscape was transformed during the period 1700-1914 by early industrial development that made a key contribution to the evolution of an industrialised economy and society in the United Kingdom, and throughout the world. Its outstanding survival, in a coherent series of highly distinctive cultural landscapes, is testimony to this achievement'*.

The formal WHS bid to UNESCO for World Heritage Site status (non-statutory) was submitted to UNESCO in February 2005 by the Cornish Mining World Heritage Site Bid Partnership and has now been approved. This demonstrates the far reaching effects of

the technological changes on the society, economy and landscape of the area, and identified a number of areas within Cornwall and West Devon where the results of these processes are still well-preserved. The WHS areas, representative of the period of Cornish dominance of the mining world (c.1700-1860), include the project site within the Tamar Valley Area and Tavistock (Area 10). *'Area A10 is the the most easterly and the second largest of the WHS Areas, this mining district A10 (i) lies in the Tamar Valley Area of Outstanding Natural Beauty and comprises both valley and upland settings for tin, copper, silver-lead and arsenic mining, ore-processing and smelting'*.

### **3.2.2 National**

Holmbush Mine was recommended for 'New scheduling as proposed at Step 3' (English Heritage Step 4 Report 1998) by English Heritage's **Industrial Monuments Protection Programme** due to the quality of its mine building remains for a copper mine. The mine was duly Scheduled in late 2001 (the area covered by the scheduling is shown in outline on Fig. 1). The 2001 Scheduling (SM 15555) supersedes its previous Listing Building status. Scheduled Monument Consent from Department of Culture, Media and Sport (DCMS) was given in 2003 for a range of additional works following the first phase of works in 2001. The undertaking of site works within the SM site boundaries complied with the Scheduled Monument Consent conditions as stated by the Department of Culture, Media and Sport (DCMS Ref: HSD 9/2/6403 dated 21/7/2004).

### **3.2.3 Regional/county**

Cornwall County planning constraints for this site include its designation as a Special Area of Great Landscape Value.

## **3.3 Brief site history of Holmbush Mine**

(summarised excerpt reproduced from Buck, 1998, Section 2)

The Holmbush, Kelly Bray and Redmoor Mines all worked the lead, copper and tin lodes from at least the 1830s (although Holmbush may date from the early C17th). By 1837-8 the copper mine was operated by two pumping engines of 39" and 50" cylinder, together with an 18" winding and crushing engine. The main shaft at that time was Flop Jack's Shaft (at the Winsor Lane valley bottom site - worked via flat-rods). A 70" steam engine powered the Hitchen's Shaft engine house from 1868 (when it appears the Stoke Road site was first developed), but this was increased to an 80" by 1881/2. This main engine house complex west of the Stoke Climsland road contained also a rotative winding engine and midway between the two engine houses, a copper crushing house, powered by a nearby water wheel. The winding house appears to have been built in the late 1880's and is relatively well preserved. The main production period was 1845-1886. Copper, lead and silver was produced up to the late 1880's.

To summarise, the north-south trending lead lode produced over £135,000 worth (1,689 tons) of 64% ore, and from 1822-64 36,000 tons of 7.25% copper ore was sold for about £280,000 (Booker 1971, 201) and a further 7,000 tons produced between 1880-86. From 1853-63 20,093 oz. of silver and from 1877-86 20,326 tons of mispickel were produced. Additionally a total of 10,554 tons of arsenic, 3 tons of wolfram and 108 tons of fluorspar were produced (Dines 1956, 629). The settlement of Kelly Bray owes its existence to these mines, as does the existence of the terminus of the East Cornwall Mineral Railway (Buck 1998, 6).

## 4 Archaeological recording results

General recording methodology is detailed in Section 2.3.2 above and Fig 2 shows the sites on plan:

### 2001

- A pre-cursor to the 2001 building conservation works was the removal of trees and dense vegetation from the interior of the pumping engine and boiler houses (Sites 1 and 2 respectively), and copper crusher (Site 7). Although, over a decade later no excessive vegetation has restricted access to these sites, there has been no landscape management of brambles and vegetation growth (except for removal of some Japanese Knotweed by CCC), by the landowners – the Duchy of Cornwall.
- Prior to works commencing, EDM elevational surveys of the pumping engine house (Figs 6 and 7), and copper crusher (Figs 14 and 15), were produced by CAU in 2001 (Proj No. 2001057). In addition, a plan of the pumping engine house, copper crusher, boiler house, boiler house chimney, balance bob mountings and wheelpit was also produced (Fig 5). 'Before' and 'After' annotated surveys are reproduced as part of this report for each elevation (external and internal) of the main buildings within the project area and the 'After' site plan, based on the original CAD drawings. These detailed surveys are archived in the Sites and Monuments Record (see Section 7.0).
- A set of tender and then working survey drawings detailing the nature and extent of the works were produced in July 2001 by the structural engineer which accompanied the Contract documents, works specification and Bills of Quantity.
- For the buildings consolidation part of the works, it was decided at an early stage to hold weekly progress meetings on site with the CCC project funding manager (Peter Sainsbury), the site archaeologist (Colin Buck), the Structural Engineer, and the site foreman for the contractors (Darren Thompson). These site meetings were also held throughout the scheme to view and comment on the works that had been carried out and to iron out any problems that occurred during the works. The structural engineer produced six reports following these site meetings.
- Unfortunately, there were insufficient funds to undertake building conservation to all of the unstable mine buildings; the waterwheel pit, the copper crusher flywheel crank pit and the winding engine house drum slot loadings could not be conserved at the time (although temporary stabilisation measures were undertaken).
- The archaeological watching brief record and historic building consolidation consultancy for all of the safety works at Holmbush Mine took place from mid August 2001 to mid December 2001, although some time had been spent prior to groundworks in an advisory/consultancy role to ensure the detailed project specifications followed English Heritage guidance for the conservation of historic buildings.

### 2007

- EDM plan and elevational surveys of the engine house (with ivy covering), and plans of the loadings and boiler house were produced by the Technical Services Section of CCC in 2007. Revised detailed surveys of the Winding engine house (surveyed 2007 but re-drawn in 2008), are archived in the Sites and Monuments Record.
- A structural report (B6148) with building conservation recommendations (annotating the original 2007 EDM/CAD surveys), was produced by Knevitts in January 2007.
- The ecological consultancy and report of the consolidation works recording was undertaken by Andrew McCarthy Associates of Exeter (Eleanor Weir) in 2007.

- A set of tender and then working survey drawings detailing the nature and extent of the works were produced in April 2007 by the structural engineer (Andrew White) which accompanied the Contract documents, works specification and Bills of Quantity.
- Given the nationally important designation of Holmbush Mine as a Scheduled Monument, CCC Historic Environment Service was requested to produce an Impact Assessment Report (Buck 2007, Rep No. 2007R039), detailing the impacts and mitigation measures in advance of the building conservation scheme.
- Site clearance of dense vegetation and some trees were undertaken in the summer of 2007, prior to groundworks starting. Any small tree stumps that had been affecting the buildings were cut down and the stumps treated with 'Round-up'.
- The archaeological watching brief record and historic building consolidation consultancy for all of the safety works at Holmbush Mine took place from July 2007 to September 2007, although consultancy time had been spent prior to groundworks starting to ensure the detailed project specifications followed English Heritage guidance for the conservation of historic buildings. 'Before' and 'After' external and internal surveys (based on the original 2007 surveys) are reproduced as part of this report for each elevation of the winding engine house and water wheel pit etc (see Figs 16, 19, 20, 23, 27 and 28).

This section of the report details and selectively illustrates the archaeological information uncovered during the watching brief stage for building consolidation or other groundwork. See Figure 2 for the location plan of sites within the project area, and the summary table of remediation works (Section 2.3.4). Site investigation and watching brief details were sketch surveyed and photos taken at all sites before, during and after works had taken place.

## Inventory of archaeological mitigation recording

### Note:

- Cornwall Sites and Monuments information (SMR) is only given if different from the preceding site
- The Archaeological assessment report (Buck, December 1998), describes the historical and functional background for each of the sites and a descriptive survey. Site numbers given below refer to the assessment report.
- The mitigation recommendations given in the impact assessment report (for the 2007 works only), for each site are reproduced below and precede the mitigation results. The inventory list is given in order of completion.

## Building conservation works (2001)

### 4.1 Hitchen's Pumping Engine House

**District:** Caradon  
**Civil Parish:** Stoke Climsland  
**Site name:** Holmbush Mine  
**PRN:** 42290  
**NGR :** SX 35786 72017  
**Site No:** 1



Recommendations (Buck 1998, 16):

After ivy and rubble removal it is recommended that a structural survey of the engine house is carried out. Consolidation and repair works will be necessary. Rotting wooden lintels should be replaced with suitable equivalents and collapsed stonework above the replaced lintels (or at cill level) rebuilt, using if possible, fallen material. It does not appear necessary on preliminary inspection, to completely re-point the entire building, though the walls should be capped to weather proof them. Given the future scheduling of the mine, the nature, style and extent of consolidation works will require consultation with DCMS.

Conservation works (2001):

Prior to the building conservation contract, in early July 2001 (following Listed Building Consent), a route to the pumping engine house was cleared of vegetation and small trees to permit vehicular access, via the car park (see Figs 1 and 2). The Pre-Contract meeting was held on 27<sup>th</sup> July with the site works starting on 2nd July 2001. The main compound was set up in the car park, with a smaller mixing compound on the south side of the pumping engine house. Following completion of the EDM survey of the building before works started, scaffolding was erected and ivy cut down.

Three lime mortar aggregate test panels were used to demonstrate a variety of aggregates and sands. A site meeting attended by Mervyn Stewart and Colin Buck confirmed the combination described below. Natural Hydraulic Lime (NHL) 3.5 was used for repointing walls whilst the more exposed sections of the site used NHL 5. Both were mixed in the ratio of 1 : 2.5 (Lime : Aggregate). The aggregate consisted of 1.5 parts of 'sand' from Lean Quarry, Liskeard crushed down to 3mm to dust.

The CCC HES detailed building survey (elevations of the pumping engine house and copper crusher, with a plan of the boiler house and water wheelpit, see Figs 5 - 7, 14 and 15), was annotated to record the building conservation work as it progressed. As general guidance from the structural engineer, drawings of the engine house with annotated recommendations were followed by the site contractors. Following complete scaffolding (inside and out), the contractors were able to proceed by starting the works from the top wing walls downwards (wall capping etc). They removed numerous rotten timber lintels and other timber inserts, and replaced them with Douglas Fir softwood (C18 strength) sourced from the Glynn Valley. The timbers had been tanalised at Bake Sawmills to give a minimum 40 year life. It was neither financially possible nor practical (due to limited availability given the required sizes) to use hardwood. The site archaeologist (with the site foreman), provided accurate site measurements for the replacement timbers.

Figure 6 is an annotated reproduction (CCC HES survey) of the external faces of the detailed building survey of the Pumping Engine House building, showing each external building elevation both 'before' and 'after' consolidation works were undertaken. Figure 7 is an annotated reproduction of the internal faces of the detailed building survey of the Pumping Engine House building, showing the building elevations both 'before' and 'after' consolidation works were undertaken. Both figures are annotated to illustrate in more detail than described within this text, the nature and extent of the consolidation works that were carried out to each building. An internal photograph of the building before works were carried out is reproduced as Figure 3, which can be compared to that of Figure 4 (after works had finished). Additional stone was purchased from Lean Quarry, near Liskeard.

By mid October 2001 the engine house had been fully consolidated. The tops of the walls had been 'capped' (two layers of stones rebbed in NHL 5.0 and the surface repointed to allow run-off between the masonry). The walls were repointed where necessary and the south wall upper pier had been rebuilt (as it was rotating away from its constructed position). The floor area was cleared of debris and the granite cylinder bedstones revealed with their hold down bolt holes visible (see Fig 5).

Conservation works to this large iconic building was the main element of this project. The official practical and snagging completion of all the 2001 contract works were agreed in late December 2001, followed by a six month defects liability period (ending in late May 2002).



*Fig 3 Internal view of Hitchen's engine house (before works)  
C Buck 2001 © CC CAU*



*Fig 4 Internal view of Hitchen's engine house (after works) C Buck 2001 © CC CAU*

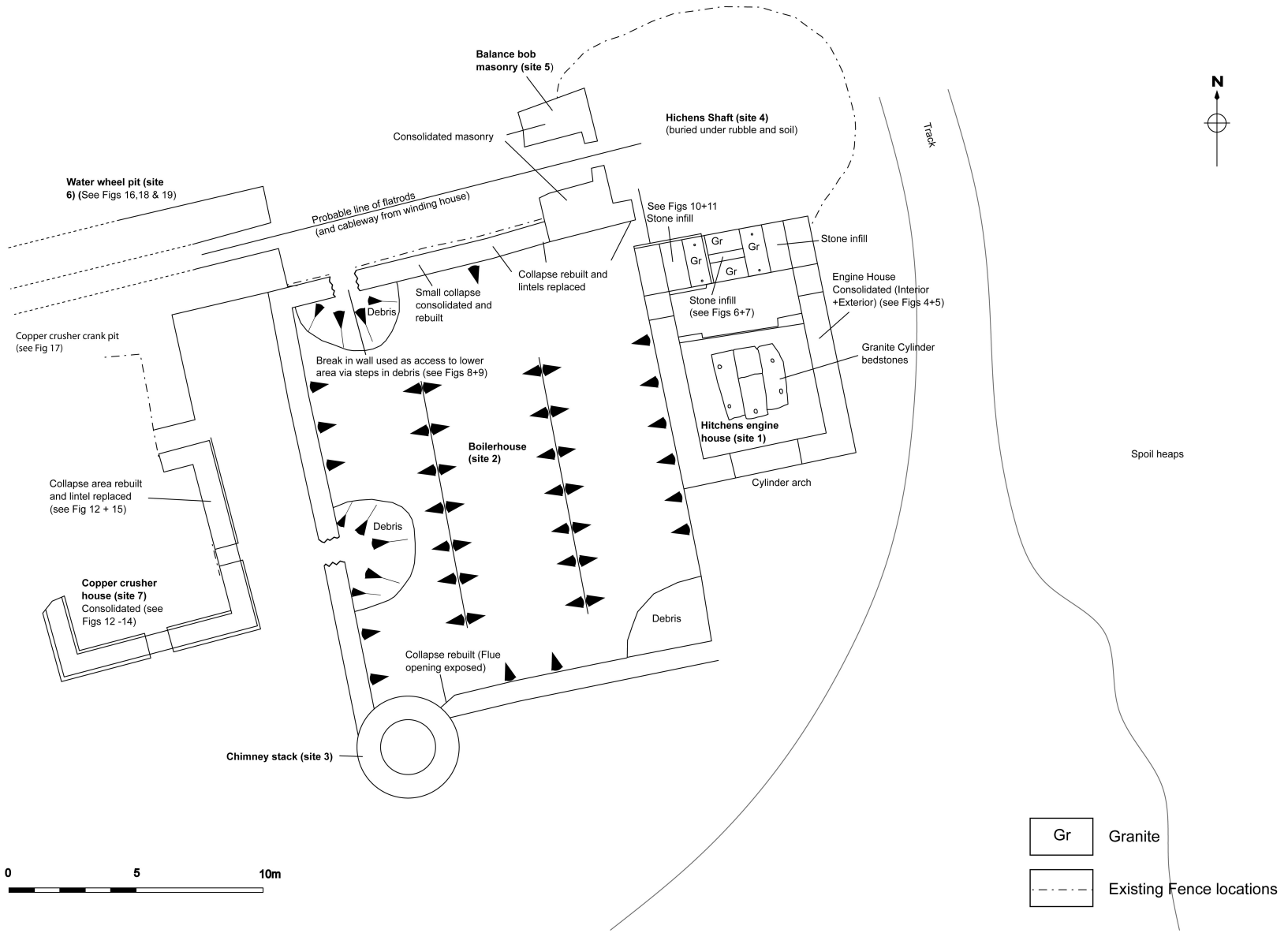


Figure 5 Survey plan of the engine house, boiler house and copper crusher after works

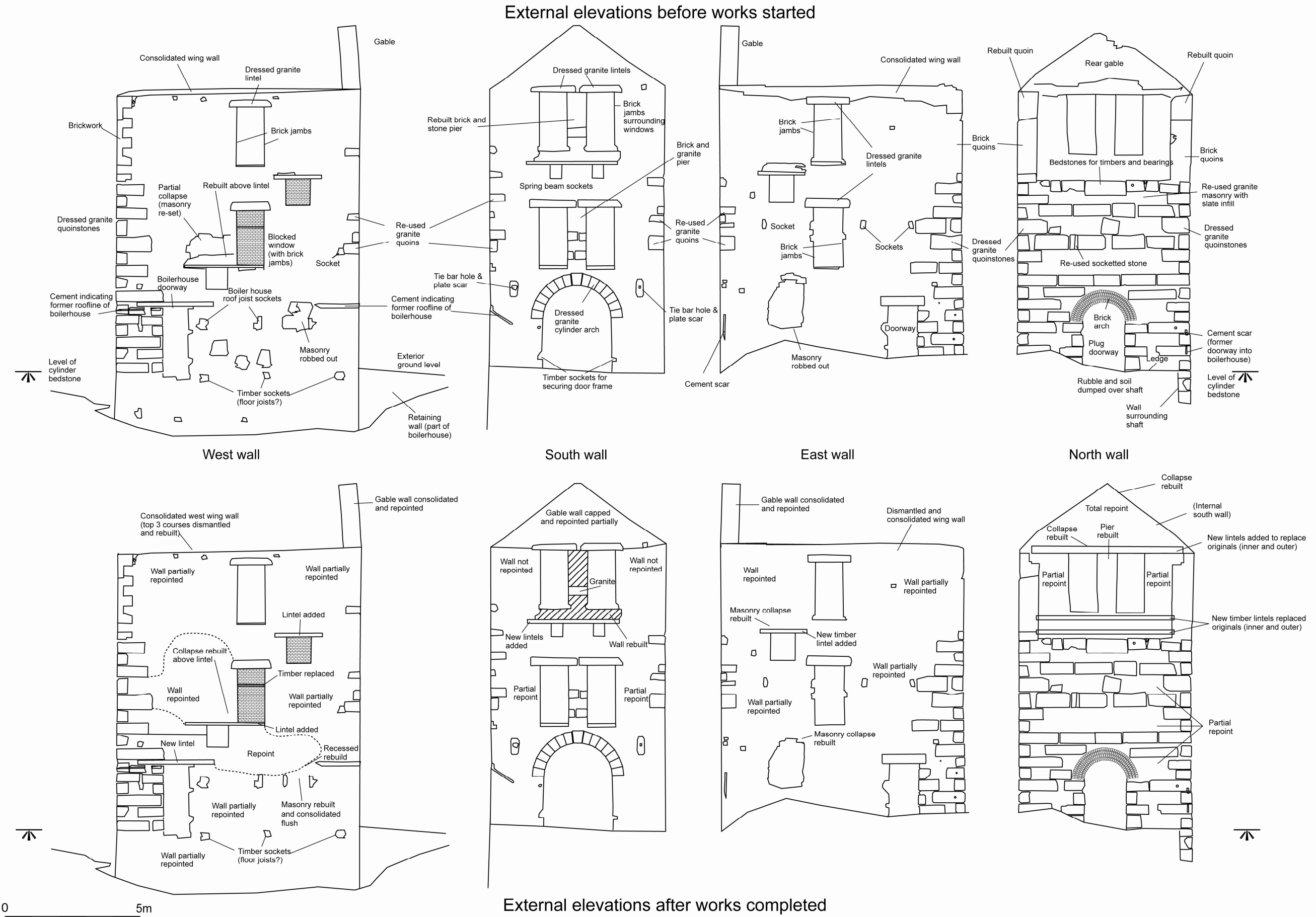


Figure 6 EDM external survey of Hitchen's Pumping Engine House before/after conservation works





## 4.2 Boiler House

**NGR :** SX 35776 72015

**Site No:** 2

### Recommendations (Buck 1998, 18):

Vegetation, limited tree and rubble clearance (after consultation with the Duchy forester) may be required within the boiler house floor. The boiler house walls will also need to be cleared of vegetation and then checked for stability. It is likely that sections will need to be repaired, particularly the existing overhang on the eastern end of the north wall (the balance bob feature). The depth of the boiler house floor raises an issue of public safety and a safe means of entry to this area may need to be considered.

### Conservation works (2001)

Following sycamore and ash clearance from this site (prior to conservation works starting), the cut down trees were cut into lengths and laid in the boiler house floor (see Fig 10). There were four main structural areas of concern around two of the three sides of the boiler house (the fourth side is the engine house west wall). Figure 5 (the site plan), is indicative of all 2001 works undertaken to the boiler house, the engine house, the copper crusher and the balance bob masonry plinths.

Works to the boiler house focussed on the remediation of structural problems in the boiler house walls, which are 1.25 to 1.8m deep below surrounding ground level. On the south side of the boiler house, there had been a collapse of masonry abutting the east side of the chimney, which (at its base at ground level) was approximately 1.0m wide, at a height of 2.0m above ground level. The collapsed masonry was rebuilt to its original specification, using lime mortar to the same specification as the engine house. Adjacent to the base of the rounded wall abutment was the inlet flue from the boiler house to the base of the chimney. This was also consolidated, although the brick arched opening was missing.

The north wall of the boiler house sited three places where structural remediation works were undertaken in October 2001. Fig 8 shows the north wall before three tanalised Douglas Fir timber lintels were added (to replace missing/rotted equivalents), masonry rebuilt above, and to the sides. The collapse of the original outer lintels had caused localised masonry collapse. Fig 9 shows the same wall after conservation works had been undertaken (and the extent of repointing and masonry replacement). Additional stone was brought in from Lean Quarry, near Liskeard. An important structural remediation was the replacement of a missing section of timber which formerly supported a corner of the south wall of the balance bob masonry to span into the engine house north west corner (see Fig 9). Due to funding constraints all of this work focussed on high priority structural works, so general repointing and wall capping was not undertaken.

Safe public access into the boiler house was provided by forming steps into the rubble and earth debris on the west end of the north side of the boiler house wall, adjacent to a collapsed opening (probably the lower section of a doorway that formerly provided access to a gallery around the three boilers sited in the boiler house). Figure 5 shows the conservation repair sites and links to other figures showing images or survey elevations of the buildings before and after works.





Fig 8 View of the boiler house north wall (before works) C Buck 2001 © CC CAU



Fig 9 View of the boiler house north wall (after works) C Buck 2001 © CC CAU



### **4.3 Boiler House Chimney**

**NGR :** SX 35768 72006

**Site No:** 3

Recommendations (Buck 1998, 18):

As with a large proportion of chimneys exposed to the elements during the past century, the mortar binding the brick courses has been eroded, allowing water penetration and leading to potential collapse. Re-pointing is necessary to the brick section of the chimney, together with strengthening of the brick coping. This should also be an opportunity to install a lightning conductor in the chimney. A grille should be considered for insertion into the flue opening at the base of the chimney to restrict access. After ivy removal it is recommended that a structural survey of the chimney is carried out to determine the specification of works.

Conservation works (2001)

Ivy and vegetation covered and obscured this chimney. Once scaffolding was erected this was removed (and the thick ivy stems at ground level treated with a root killer). The tops of the walls were rebbed with mortar, and the sides of the chimney repointed and rebuilt where necessary, although some small openings were left for bat roosting and bird nests. This chimney did not have an elevation survey, although the front cover image includes a photograph of the chimney in 2007.

### **4.4 Balance bob slot**

**NGR :** SX 35782 72026

**Site No:** 5

Recommendations (Buck 1998, 20):

This is an unusual feature and consolidation and repair works are necessary to the remains (see the general comments made in the recommendation section of Site No.1). To retain the structural integrity of the south wall it appears to be necessary to rebuild the collapsed section of wall under the existing overhang on a firm foundation.

Conservation works (2001)

Ivy and vegetation covered and obscured this mass of masonry. Once scaffolding was erected this was removed (and the thick ivy stems at ground level treated with a root killer). The tops of the walls were rebbed with mortar, and the sides of the feature repointed and rebuilt where necessary. An elevation survey of this masonry structure was not undertaken, however site photographs before works were taken (see Fig 10) show that the south east corner was very unstable as a supporting timber had rotted, and the masonry collapsed above in a localised manner. Figures 9 and 11 show the extent of repointing as well as the number and extent of new reinstated timber lintels.





Fig 10 View of the balance bob east wall (before works) C Buck 2001 © CC CAU



Fig 11 View of the balance bob east wall (after works) C Buck 2001 © CC CAU



## 4.5 Water wheel and crankpit

**NGR :** SX 35764 72027

**Site No:** 6

### Recommendations (Buck 1998, 21):

Rubbish and debris should be removed from the pits, whilst consolidation and repair works are necessary to the remains of the feature (see the general comments made in the recommendation section of Site No.1), which should be carried out under archaeological supervision.

### Conservation works (2001)

A structural inspection of this feature revealed that it contained rotted long timber lintels running throughout the length of the masonry, which provided access openings to tighten long bolts set from the top of the wheel shaft bearing mountings down through both the side walls. Unfortunately there was insufficient project funding to undertake conservation of this feature. However, a decision was taken to undertake temporary stabilisation works to some of the unstable tensioner bolt openings where the timber was in a poor condition. For these openings, bricks/blocks were placed under the lintels to provide temporary structural support, until such time as the feature could be properly conserved. This work was undertaken in 2007 (see Section 4.9).

## 4.6 Copper Crusher House

**NGR :** SX 35766 72020

**Site No:** 7

### Recommendations (Buck 1998, 21):

Vegetation, limited sapling clearance (following discussions with the Duchy forester), and rubble will need to be cleared from the crusher house floor. The crusher house walls will also need to be cleared of vegetation and then inspected for stability. It is likely that sections will need to be repaired, lintels replaced and the existing overhanging sections rebuilt. It is suggested that a possible route for public access into the boiler house may be through the existing (collapsed) western wall of the crusher house and through the western doorway of the boiler house into its interior. Refer to consolidation recommendations given above (Site No.1).

### Conservation works (2001)

The detailed building survey elevations and plan of the copper crusher house (see Figs 5, 14 and 15), were annotated to record the building conservation work as it progressed. Following complete scaffolding (inside and out), the contractors were able to proceed by starting the works from the top south wall downwards (wall capping etc) and removing all the rotten timber lintels and other timber inserts, and replacing with tanalised Douglas Fir timber.

Figure 14 is an annotated reproduction (CCC HES external survey) of the external faces of the Copper crusher building showing each external building elevation both 'before' and 'after' consolidation works were undertaken. Figure 15 is an annotated reproduction of the internal faces of the detailed building survey of the same building, showing the building elevations both 'before' and 'after' consolidation work. Both figures are annotated to illustrate in more detail than described within this text, the nature and extent of the consolidation works that were carried out to each building. A photograph of the building before works were carried out is reproduced in Figure 12, which can be compared to that of Figure 13 (after works had finished).

By mid November 2001 the crusher house had been fully consolidated. The tops of the walls had been 'capped' (two layers of stones rebedded in NHL 5.0 and the surface repointed to allow run-off between the masonry). The walls were repointed where necessary and the east wall lintel replaced and masonry re-built above (see Fig 13).



*Fig 12 View of the copper crusher (before works) C Buck 2001 © CC CAU*



*Fig 13 View of the copper crusher (after works) C Buck 2001 © CC CAU*

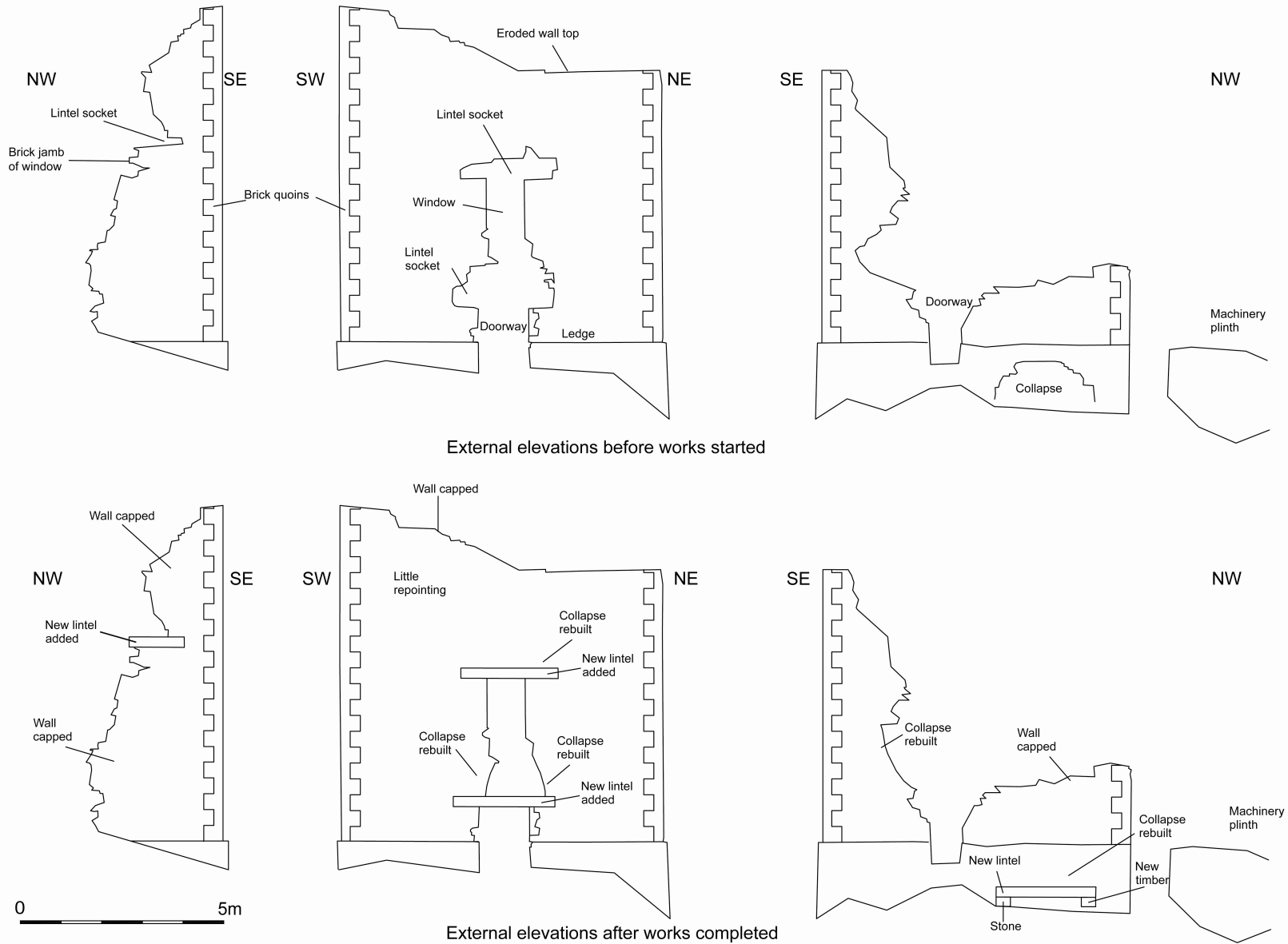
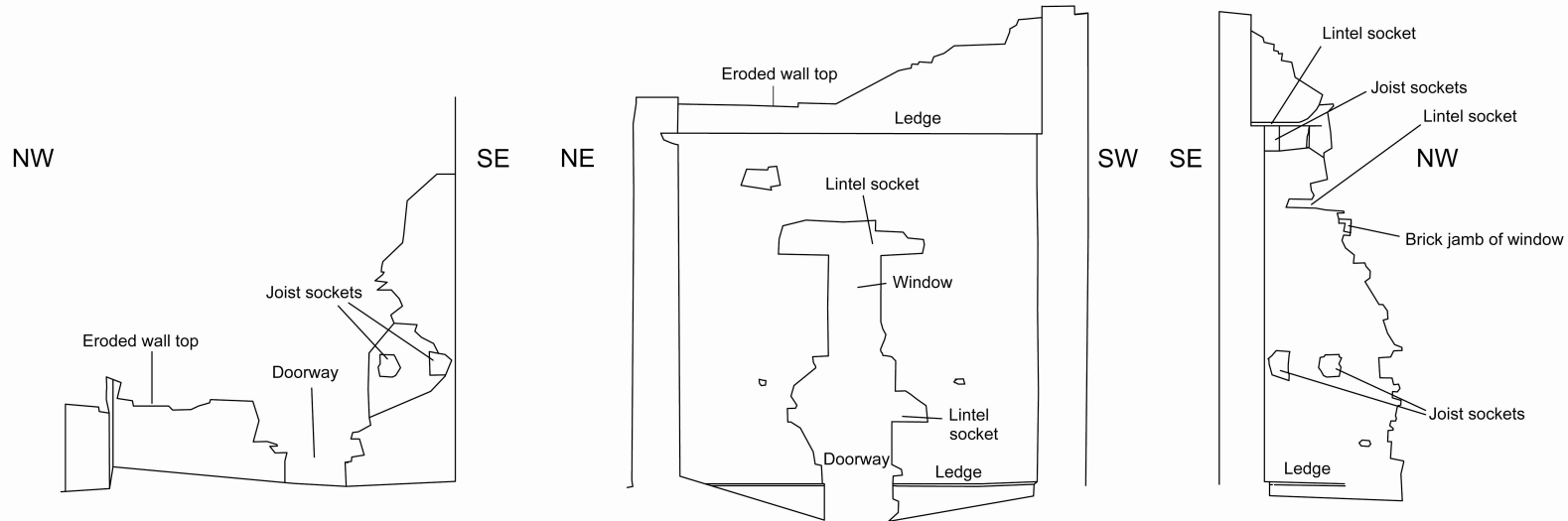
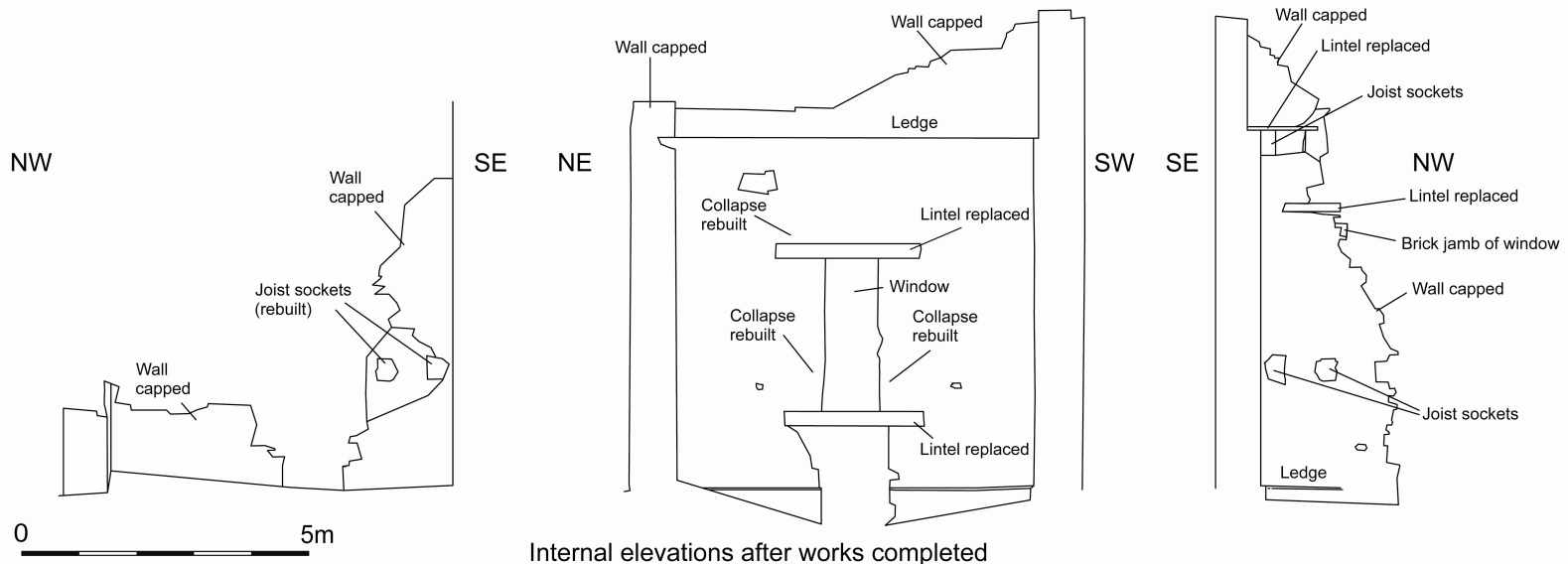


Figure 14 EDM external survey of the Copper crusher before/after conservation works



Internal elevations before works started



Internal elevations after works completed

Figure 15 EDM internal survey of the Copper crusher before/after conservation works

## **4.7 Winding engine house (crank pit and whim loadings only)**

**NGR :** SX 35716 72025

**Site No:** 8

### Recommendations (Buck 1998, 23):

Damaging vegetation should be removed and the masonry consolidated. Refer to recommendations given above (Site No.1).

### Conservation works (2001)

A structural inspection of the whim masonry loadings and slot feature revealed that it contained rotted long timber lintels running throughout the length of the masonry, which provided access openings to tighten long bolts set from the top of the winding drum bearing mountings down through the side walls. Unfortunately there was insufficient project funding to undertake conservation of this feature. However, a decision was taken to undertake temporary stabilisation works to some of the unstable tensioner bolt openings where the timber was in a poor condition. For these openings, bricks/blocks were placed under the lintels to provide temporary structural support, until such time as the feature could be properly conserved. This work was undertaken in 2007 (see Section 4.10).

In addition, the crank pit loadings in front of the bob wall had suffered a partial collapse to its west side as it appears a timber lintel had collapsed (to form an opening for condensate water to run through the base of the loadings). The masonry was temporarily supported by brick to permit stability until such time as it could be properly conserved (it was subsequently conserved in 2007).

## **4.8 Site safety fencing**

### Conservation works (2001)

In 2001 Frederick Sherrell Ltd (Geotechnical mining engineers) were commissioned to undertake a programme of drilling to ascertain if Hitchen's Shaft had a secure cap or plug, and to provide a Health & Safety assessment to include recommendations for site fencing. The resulting report (No. 2173, dated November 2001), found that the shaft had no definite cap at rock head level, but the possibility that there was a timber cap (possibly across timber staging still located in the shaft) at a depth of 10 – 12m below ground level. As a consequence, it was decided to fence the shaft area in front of Hitchen's pumping engine house. This and other fencing sites are shown in Fig 5, due to steep drops close to public access routes. The sites which had temporary stabilisation works were also fenced, although these were removed when the 2007 works had been finished.

## **Building conservation works (2007)**

Note: In late 2001 (after conservation works had ceased), Holmbush Mine was Scheduled as a monument of National importance. Thus, the later 2007 conservation works needed an Impact Assessment Report in order to gain Scheduled Monument Consent. The latter was produced by CC HES (Projects - Buck, 2007, Report No. 2007R039). Site impact descriptions for the 2007 works are given below.



## 4.9 Water wheel and crankpit

**NGR :** SX 35764 72027

**Site No:** 6

Recommendations (Buck 1998, 21):

See Section 4.5.

Expected site impacts (during 2007 work):

Both of the north and south walls of the wheelpit acted as loadings to support the main axle. A long timber lintel was set inside the base of each wall to permit access to holding down bolt tensioner access openings. The timber has rotted in the past century, allowing a small amount of masonry movement. These timbers will be replaced as part of the structural stability scheme. In addition, the side walls will be repointed where necessary and vegetation growing on top of the walls removed. It is not envisaged that all of the earth and grass covering the top of the walls will be removed – it is considered by the structural engineer that there is sufficient material to restrict the ingress of large amounts of water. Any structurally important missing quoin stones will be replaced from existing material found on site.

The overall impact of the proposed works on this feature can be defined as '*Minor positive*'. The works will provide more structural stability and a higher degree of Health and Safety for at least another generation. In addition the existing fencing that blocks off access into the wheelpit will be removed. The impact of not doing the works would mean further structural deterioration of the low timber lintels which could culminate in collapse of the inner wall faces of the structure, which at present are fenced to restrict public access.

Conservation works (2007)

Clearance of vegetation from the walls and base of the copper crusher crank pit masonry started on 23/7/07, followed in due course by repointing the sides and wall tops (see Figs 16 and 17 – photo of the site after works). The 2001 temporary brick/blockwork put under the long (rotting) timber lintels running at the base and along the lower sides of the wheelpit was removed in September. New timber lintels were inserted to replace the rotten equivalents. Shorter sections were used inside the centre of the wall whilst the longest available lengths were used on the inner (visible) face of the wall (see Figs 16 and 18 – photo of the site after works). Figure 16 is a survey plan and elevations of these features, with annotated comments describing in detail the nature and extent of the conservation works. The short section of fence at the western end of the wheelpit was left *in situ* due to the drop in height from ground level to the base of the wheelpit. Additional funds that were left over in the project following conservation works to the winding engine house (Site 8), were used to deep point with lime mortar the remainder of the wheelpit masonry mass on its north side, as funds had not originally been allocated for this. These works were finished by the end of September 2007.

## 4.10 Winding engine house, crank pit and winder loadings

**NGR :** SX 35716 72025

**Site No:** 8

Recommendations (Buck 1998, 23):

Damaging vegetation should be removed and the masonry consolidated.

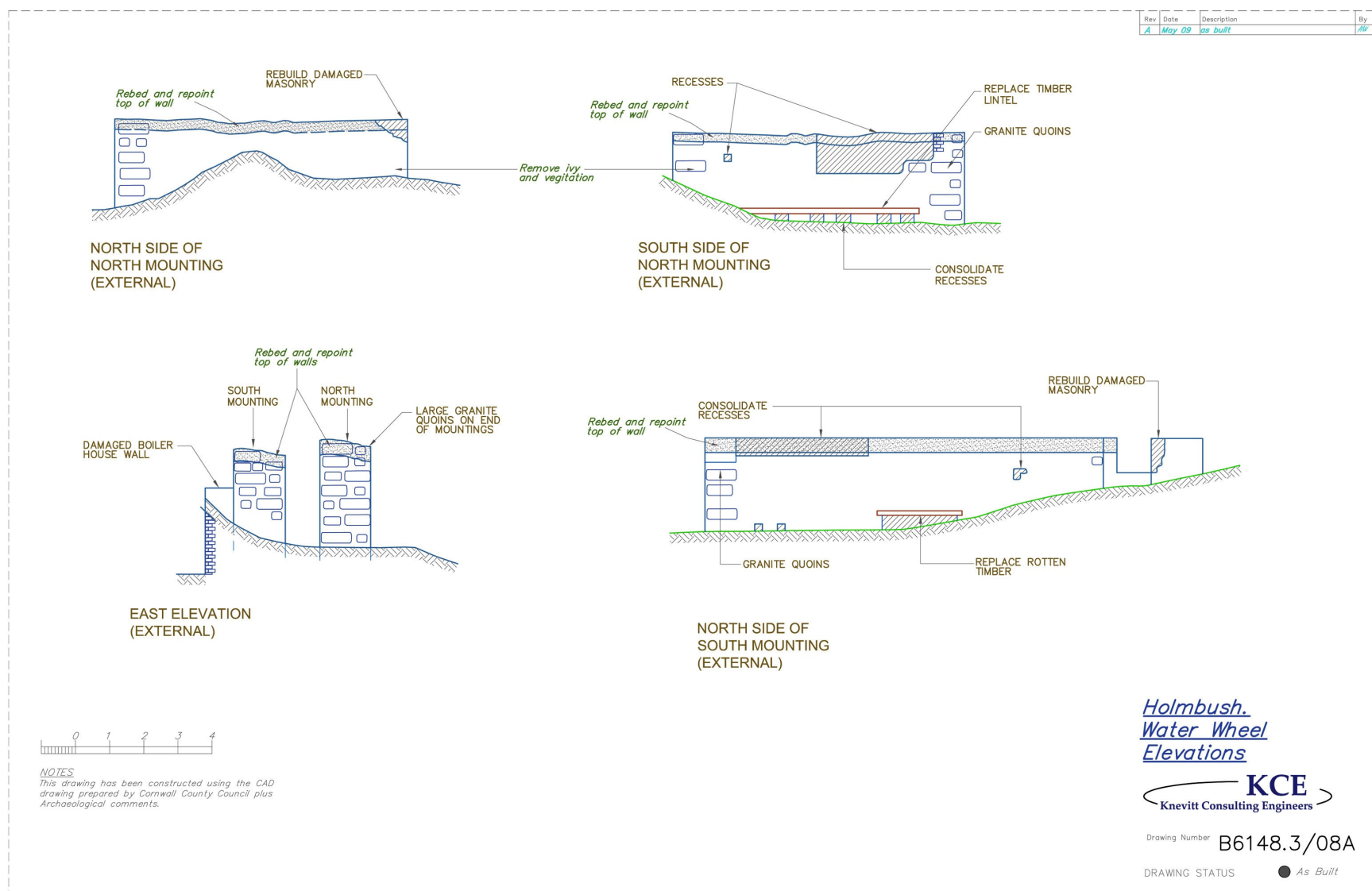
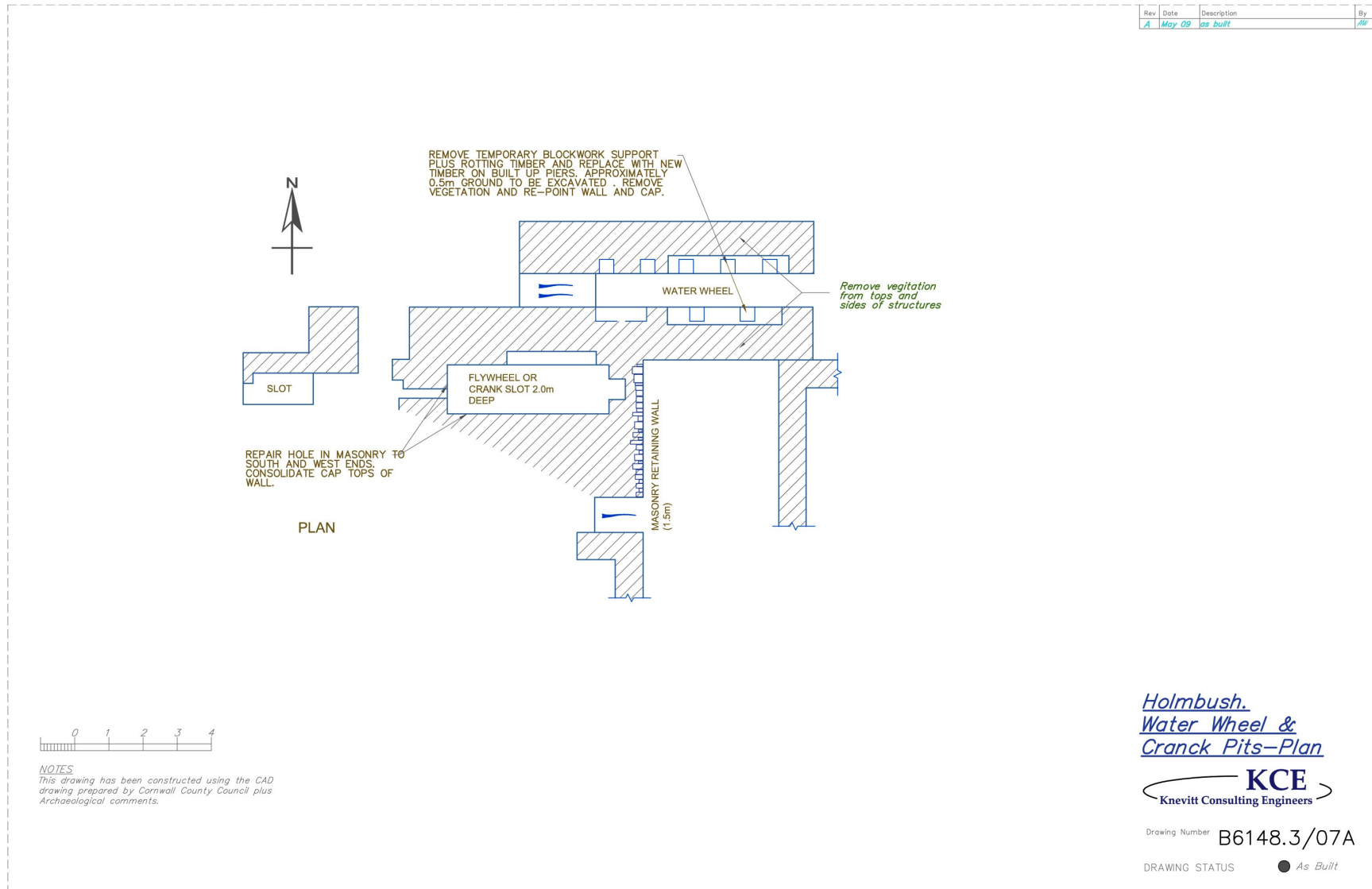


Figure 16 'As built' annotated plan/survey of the wheelpit/copper crusher crank pit after works (Kneivt Cons. Eng)





Fig 17 View of the copper crusher flywheel loadings (after works)

C Buck 2007 © CC HE Projects



Fig 18 Photograph of the wheelpit (after works)

C Buck 2007 © CC HE Projects

Expected site impacts (during 2007 work):

Photographs of the winding engine house show its physical size and relatively good structural condition. The impact of the proposed scheme on the building is simply to replace the rotting timber lintels, to rebuild small scale localised masonry collapse (above the lintel collapses), and to repoint the walls where necessary. Figs 19, 20, 23, 27 and 28 show detailed internal and external elevations of the building with annotated notes summarising the conservation works. A method statement will be produced by the site contractors to detail the procedures (and extent) of repointing the walls, capping the tops of walls with a lime based mortar, adding new timber lintels and ensuring the building remains in a sound structural condition. The east (bob) wall elevation shows that the lower part of the engine house is suffering structurally as a result of its missing large timber lintels.

The site structural engineer has made the following comments; *'Generally the walls to the winding engine house remain intact with only minor areas of collapsed or missing masonry. Where collapsed or missing masonry does not affect the stability of the structure this masonry can be rebedded and re-pointed. Otherwise, the stone masonry should be reconstructed... It is anticipated that many of the timber lintels and plates will need to be replaced with home grown Douglas Fir, although this will need to be reviewed when scaffolding is in place ...The exposed tops of walls will probably need to be re-bedded and re-pointed and should incorporate a suitable weathering construction...There is no visual evidence that the North and South wing walls nor the West gable wall have suffered from lateral movement following the collapse of the roof structure at some time in the past'* (Knevitt, B6148.3, 4.1 to 4.5 Holmbush Structural Appraisal).

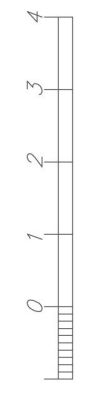
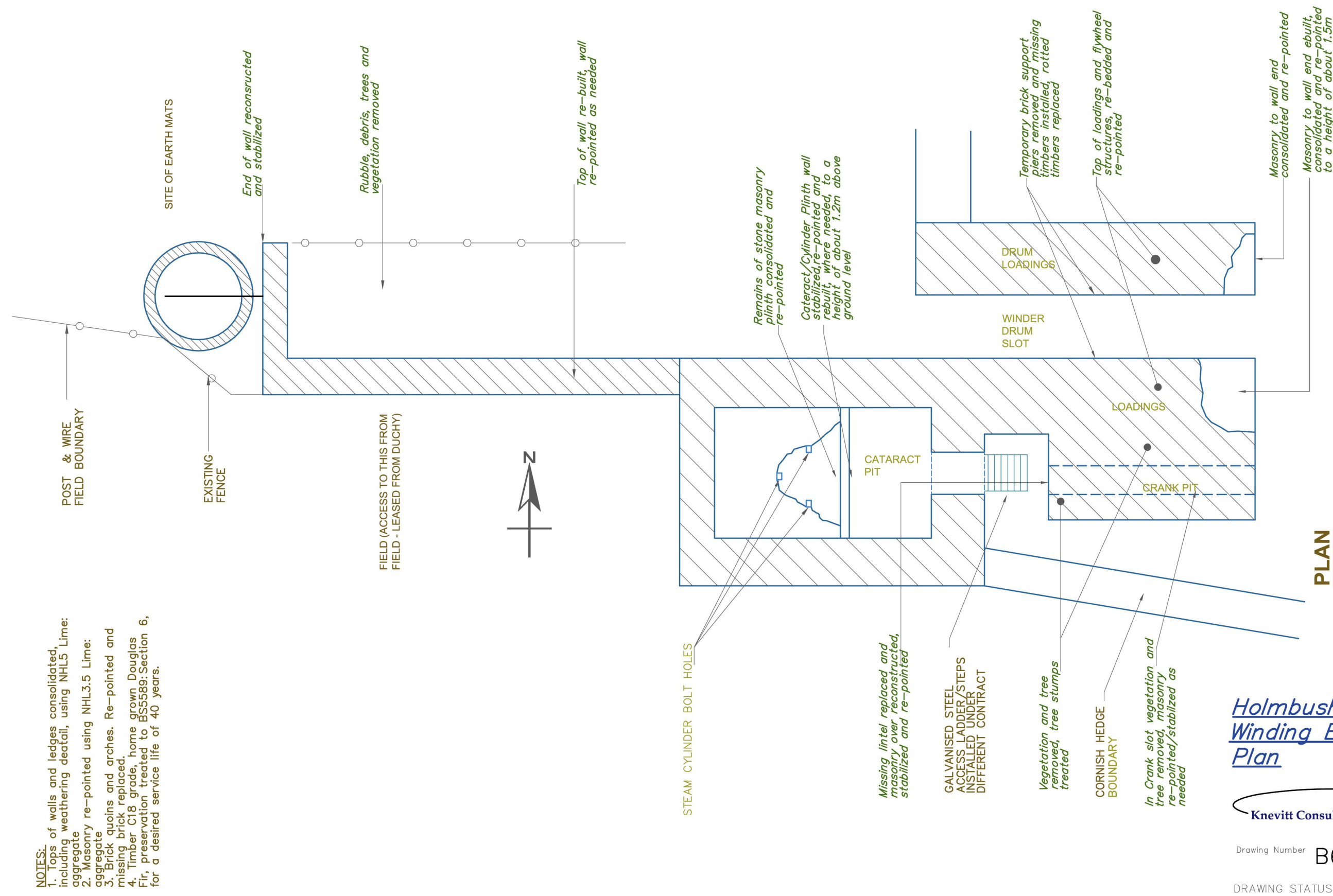
With respect to the adjacent flywheel winder drum and loadings the consulting structural engineers stated; *'The Loadings to the east of the engine house and the flywheel mountings are heavily vegetated on the top surface. Following removal of vegetation it is anticipated that the masonry will need to be re-bedded and re-pointed... Generally the Loadings and mountings are structurally sound with some localised rebuilding, consolidation and re-pointing being necessary... The lintel at the western end of the Loading, adjacent to the bob wall, has collapsed and should be replaced. This will then allow the tensioning slot to be cleared of debris... Within the Winder drum slot, between the Flywheel Mountings, temporary consolidation using brick masonry has been undertaken in the past. This is to be replaced with timbers in accordance with the original design for this type of structure'* (Knevitt, B6148.3, 4.9 to 4.12).

The impact of the conservation scheme on the fabric of the building will be to remove old and crumbling mortar and replace with new lime mortar. This may well entail repointing parts of the outside and a high percentage of the upper inside and surface of the four walls to retain structural strength to the building which lost its roof many years ago. It is the intention of the project to make the building structurally safe by consolidating the four main walls. In order to access the outside walls, scaffolding will be erected. Access for both scaffolders and site contractors is likely to be from the north side of the building. It should be noted that there will be a physical survey of the existing ivy growing on the walls (using a Hi-lift machine) of the building to assess whether there are any roosting bats, prior to removal of the ivy.

Both of the north and south walls of the flywheel drum 'pit' acted as loadings to support the main axle. A long timber lintel was set inside the base of each wall to permit access to holding down bolt tensioners access openings. The timber has rotted in the past century, allowing a small amount of masonry movement. During the 2001 conservation scheme to the pumping engine house a decision was taken to temporarily support (with brick) the collapsed sections of masonry which had dropped following the disintegration of the timber lintels. The collapsed timbers will be replaced as part of the structural stability scheme. In addition, the side walls will be repointed where necessary and vegetation growing on top of the walls removed. It is not envisaged that all of the earth



Rev	Date	Description	By
A	June 07	Steps revised	AW
B	May 09	As Built	AW



NOTES  
This drawing has been constructed using the CAD drawing prepared by Cornwall County Council plus Archaeological comments.

- NOTES:
1. Tops of walls and ledges consolidated, including weathering detail, using NHL5 Lime: aggregate
  2. Masonry re-pointed using NHL3.5 Lime: aggregate
  3. Brick quoins and arches. Re-pointed and missing brick replaced.
  4. Timber C18 grade, home grown Douglas Fir, preservation treated to BS5589:Section 6, for a desired service life of 40 years.

**Holmbush.  
Winding Engine House  
Plan**

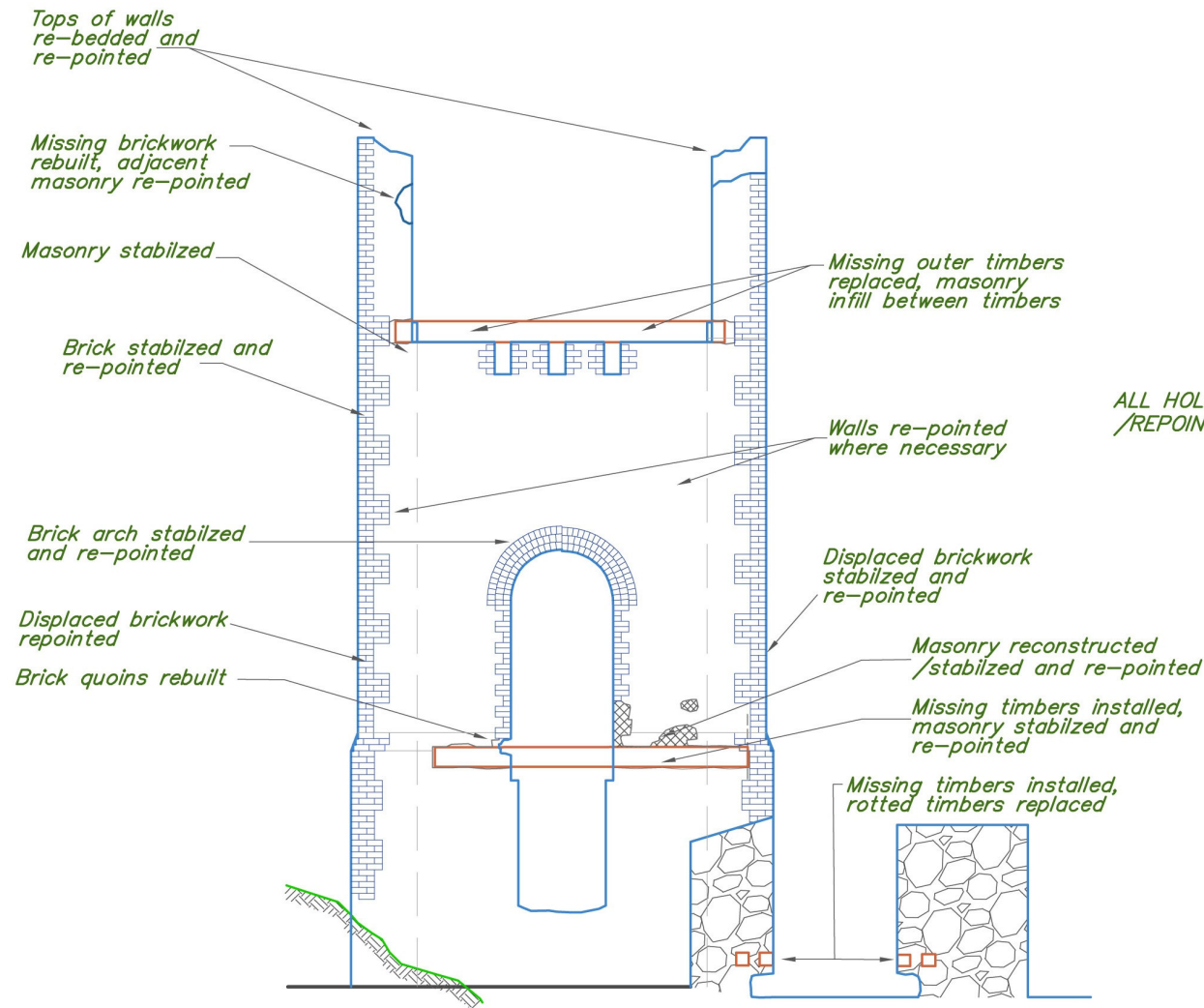


Drawing Number **B6148.3/01B**

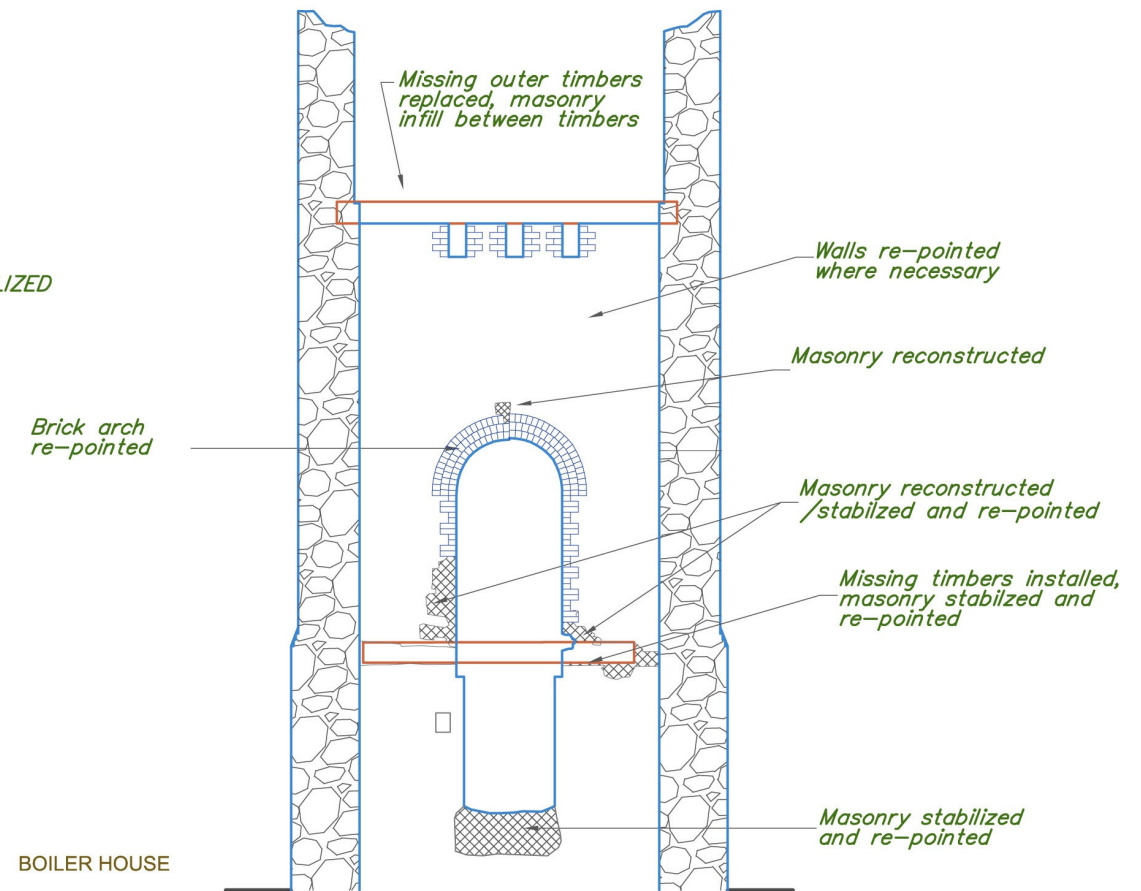
DRAWING STATUS ● As Built

Figure 19 'As built' annotated survey plan of the winding engine house/drum loadings and crank pit after works (Knevvit Cons. Eng. 2008)

Rev	Date	Description	By
A	May 09	as built	AW



**EAST ELEVATION - BOB WALL (EXTERNAL)**  
APPROXIMATELY 35% OF ELEVATION REPOINTED



**EAST ELEVATION - BOB WALL (INTERNAL)**  
APPROXIMATELY 40% OF ELEVATION REPOINTED



**NOTES**  
This drawing has been constructed using the CAD drawing prepared by Cornwall County Council plus Archaeological comments.

*Holmbush.  
Winding Engine House  
East Elevation*



Drawing Number **B6148.3/02A**

DRAWING STATUS **As Built**

Figure 20 'As built' annotated East (Bob wall) elevation surveys of the winding engine house after works (Kneivt Cons. Eng. 2008 )

and grass covering the top of the walls will be removed – it is considered by the structural engineer that there is sufficient material to restrict the ingress of large amounts of water. Any structurally important missing quoin stones will be replaced from existing material found on site.

The overall impact of the proposed works on the engine house, the crank pit loadings and the adjacent flywheel winder drum pit loadings can be defined as '*Minor positive*'. All of the building conservation works will provide more structural stability and a higher degree of Health and Safety for at least another generation, for what is an iconic site in the Kelly Bray (Callington) area.

The impact of not doing the works would mean further structural deterioration to all buildings due to progressive decay of a variety of timber lintels in the engine house and flywheel winder drum pit loadings which could culminate in further collapse of both of the structures, both of which at present are fenced to restrict public access due to their structural instability.

#### Conservation works (2007)

Clearance of vegetation from the walls and top of the winding engine house followed after scaffold erection (inside and out) by 20/7/07. The original lime mortar was compared to an aggregate test panel, resulting at a site meeting on 25th July 2007 in an agreement to use CLS 17 aggregate for deep pointing, with CLS 26 for repointing to walls etc. A Natural Hydraulic Lime (NHL) strength of 5.0 was used for both the upper wall capping, repointing and the upper chimney brick rebuild, whilst NHL 3.5 was used for the remainder of the walls. Both were mixed in the ratio of 1 : 2.5 (Lime : Aggregate).

To summarise, the masonry over the top of the rotted timber lintels was carefully replaced with fallen stone from the building after the new sections of tanalised Douglas Fir timber had been inserted to mimic the original timber specification. The top of the wing walls and bob wall were 'capped' and repointed. The walls were only repointed where there was a structural need to do so (mainly in the upper parts of all walls), in fact, the dense ivy had mainly grown against the walls, protecting the masonry and lime mortar pointing. It was evident that there were areas of original internal plastering still visible on the western internal wall – a rarity amongst buildings of this age.

Figs 19, 20, 23, 27 and 28 'as-built' internal and external measured survey elevations of the engine house. Each drawing has detailed annotations relating to the works that have been undertaken on each wall. Relevant photographs of each elevation are also reproduced in the text (Figs 21, 22, 24 to 26).

From an ecological perspective, the bat survey had not confirmed the presence of bats originating from the engine house (rather adjacent trees etc). In addition, an endoscope survey of the exterior of the building had also failed to identify any bat roosts. Small openings were left in the masonry for bat/bird nests etc. Internally, a build up of earth above the original floor level was removed to leave the ground at approximately its original height. Unfortunately, the granite cylinder bedstone had been removed long ago (probably when the engine was removed for re-sale), as well as part of the front of the bedstone cataract wall. The ground level to this feature had not been reduced – which would allow easy access through the building via the bob wall plug opening and new access steps. The low visible cataract wall was partially rebuilt and the remainder of the floor masonry repointed. By late August 2007 all the major conservation works to the engine house had been completed.

The crank pit loadings (see Fig 19 for survey plan with annotations) were repointed on all sides, and the structural collapse to the west end wall of the condensate tunnel was partially reconstructed in stone to restrict further collapse. Trees sited on top of the loadings had already been cut down and the stumps treated. However, earth and soil was left on top of the feature. In addition, the east side of the walls had been slightly





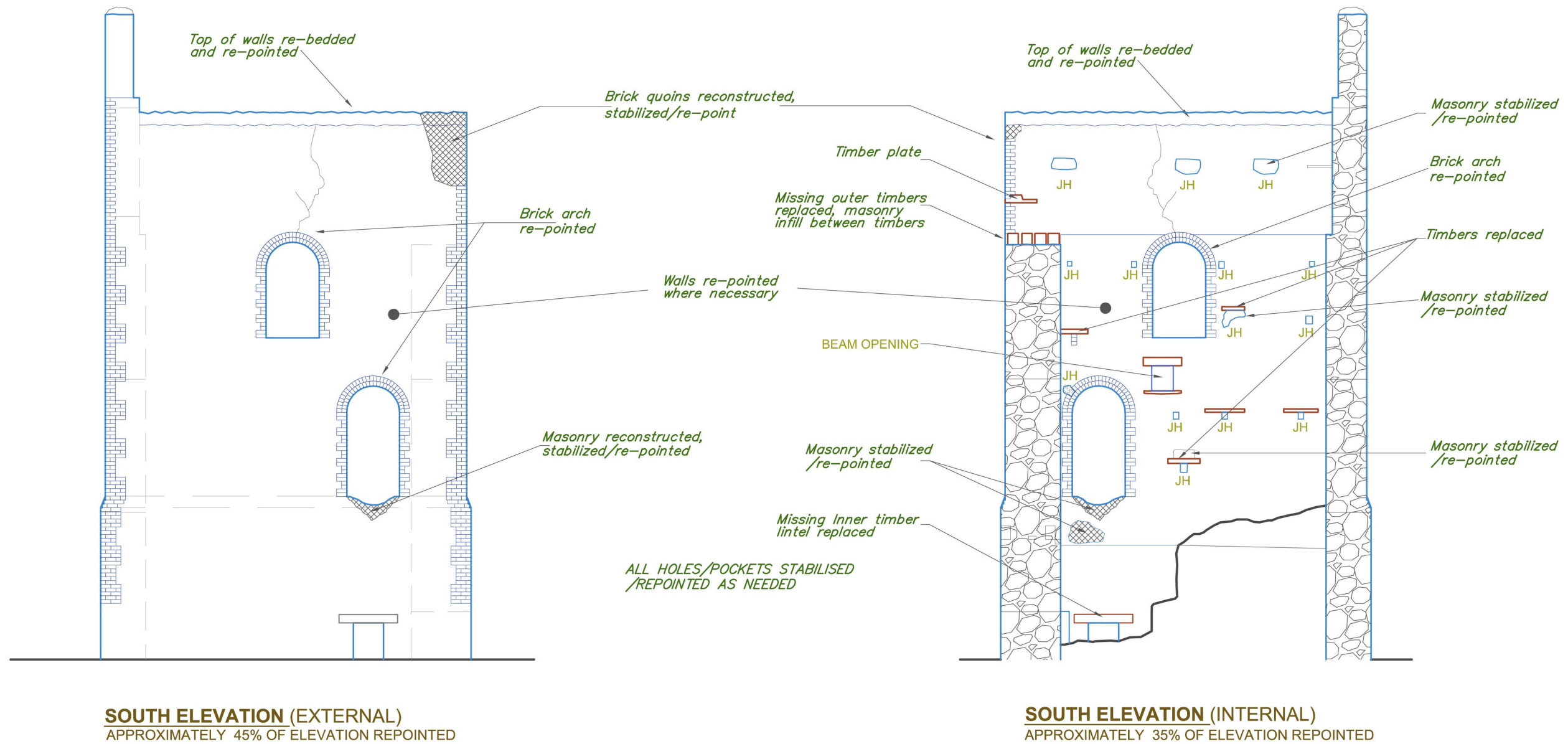
Fig 21 Internal view of the winding engine house east (bob) wall before works C Buck 2007 © CC HE Projects



Fig 22 Internal view of the winding engine house east (bob) wall after works C Buck 2007 © CC HE Projects



Rev	Date	Description	By
A	May 09	as built	AW



**NOTES**  
This drawing has been constructed using the CAD drawing prepared by Cornwall County Council plus Archaeological comments.

*Holmbush.  
Winding Engine House  
South Elevation*



Drawing Number B6148.3/05A

DRAWING STATUS ● As Built

Figure 23 'As built' annotated South elevation surveys of the winding engine house after works (Knevitt Cons. Eng. 2008 )





Fig 24 View of the south side of the winding engine house (before works)  
C Buck 2007 © CC HE Projects



Fig 25 View of the south side of the winding engine house (after works)  
C Buck 2008 © CC HE Projects



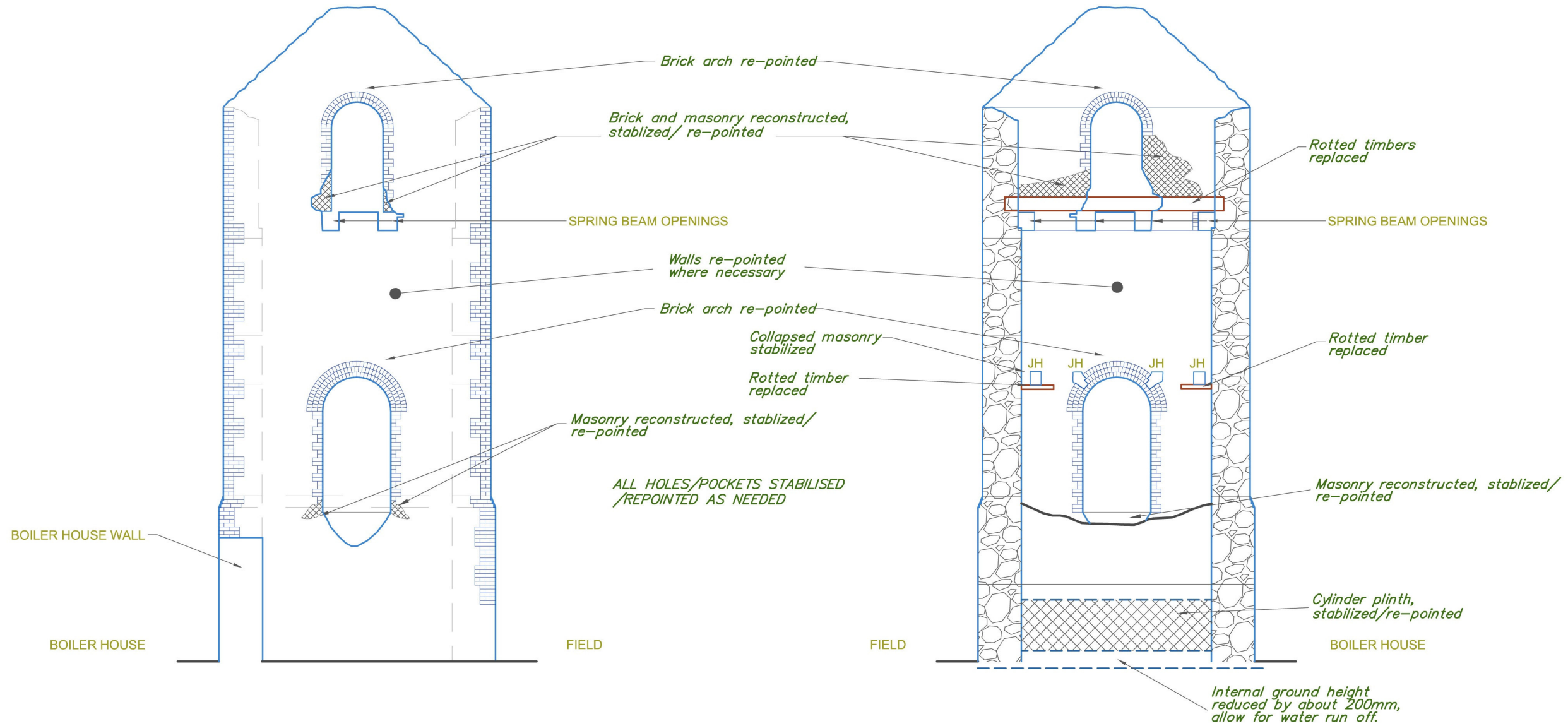
built up with brick quoins to deter access to the top (as it could be a health & safety hazard).

The 2001 temporary brick/blockwork put under the long (rotting) timber lintels running at the base and along the lower sides of the winder drum loadings were removed in September. New timber lintels were inserted to replace the rotten equivalents. Shorter sections were used inside the centre of the wall whilst the longest available lengths were used on the inner (visible) face of the wall (see Fig 26 – photo of the site after works). Figure 19 is a survey plan and elevations of these features, with annotated comments describing in detail the nature and extent of the conservation works.



*Fig 26 View of the winding engine house winder drum loadings (after works)  
C Buck 2008 © CC HE Projects*

Rev	Date	Description	By
A	May 09	as built	AW



**NOTES**  
 This drawing has been constructed using the CAD drawing prepared by Cornwall County Council plus Archaeological comments.

*Holmbush.  
 Winding Engine House  
 West Elevation*



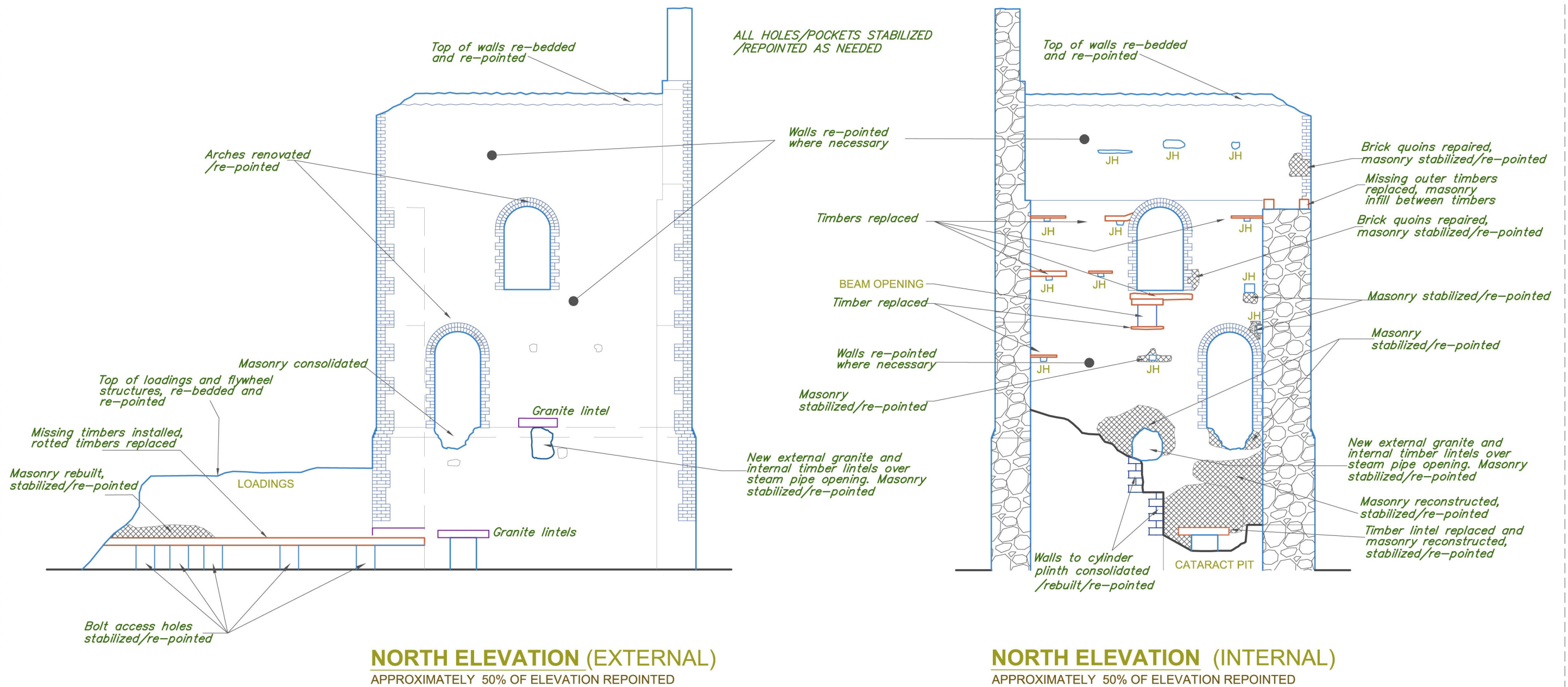
Drawing Number B6148.3/04A

DRAWING STATUS ● As Built

Figure 27 'As built' annotated West elevation surveys of the winding engine house after works (Knevvitt Cons. Engs. 2008 )



Rev	Date	Description	By
A	May 09	as built	AW



**NOTES**  
 This drawing has been constructed using the CAD drawing prepared by Cornwall County Council plus Archaeological comments.

*Holmbush.*  
**Winding Engine House**  
**North Elevation**



Drawing Number **B6148.3/03A**

DRAWING STATUS ● *As Built*

Figure 28 'As built' annotated North elevation surveys of the winding engine house after works (Kneivt Cons. Engs. 2008 )

## 4.11 Winding engine boiler house

**NGR :** SX 35711 72029

**Site No:** 9

### Recommendations (Buck 1998, 23):

Damaging vegetation should be removed and the masonry consolidated. Consolidation and repair works are necessary to the remains of the feature (see the general comments made in the recommendation section of Site No.1), which should be carried out under archaeological supervision.

### Expected site impacts (during 2007 work):

Knevitt Consulting (Structural building engineers) undertook a structural condition survey of the boiler house wall in November 2006 and stated '*The remaining southern Boiler House wall appears to be generally vertical and requires some re-pointing and the top re-bedded and re-pointed following vegetation removal*' (Knevitt, B6148.3, 4.14 Holmbush Structural Appraisal).

The main impact on the fabric of the building is likely to focus at the top of the wall where weather erosion is more likely to have affected the stability of the masonry, but more particularly the lime mortar. Soft and crumbling mortar will be removed (to a maximum depth of 40mm), from the masonry walls following a detailed site assessment of the feature by the site contractors. Following approval of an appropriate mix of lime mortar and an aggregate to match the existing, the site contractors will repair any defective stone or mortar. The style and extent of re-pointing (slightly recessed from the masonry face), will mimic that of the original (this will be decided when the test mortar panel is agreed with EH (if appropriate), the site engineer and site archaeologist. Any loose crumbly mortar (old and new) that has accumulated on the ground as a result of the works will be carefully cleared from the site.

The overall impact of the proposed works on this feature can be defined as '*Minor positive*'. The works will provide more structural stability and enhance the site's visual authenticity for at least another generation. The impact of not doing the works would mean further structural deterioration of the only remaining south boiler house wall as water has entered between the former inner and outer faces of the wall. If conservation works are not carried out (wall capping and repointing), the wall will structurally deteriorate leading to likely collapse.

### Conservation works (2007):

Figure 24 shows the degree of ivy and vegetation covering the remains of the boiler house south wall. Once this was removed (and the thick ivy stems treated with a root killer), the tops of the walls were rebedded with mortar, and the sides of the walls repointed where necessary. Figure 19 is a plan survey with annotations describing the extent of the conservation works and Fig 25 is a photograph of the boiler house wall after works had finished.

## 4.12 Boiler house chimney

**NGR :** SX 35704 72030

**Site No:** 10

### Recommendations (Buck 1998, 23):

As with a large proportion of chimneys exposed to the elements during the past century, the mortar binding the brick courses has been eroded, allowing water penetration and leading to potential collapse. Re-pointing is necessary to the brick

section of the chimney, together with strengthening of the brick coping. This should also be an opportunity to install a lightning conductor in the chimney. A grille should be considered for insertion into the flue opening at the base of the chimney to restrict access. After ivy removal it is recommended that a structural survey of the chimney is carried out to determine the specification of works.

Expected site impacts (during 2007 work):

Knevitt Consulting (Structural building engineers) undertook a structural condition survey of the chimney in November 2006 and stated '*The chimney is at its full height and is typical of chimneys. The lower section is of stone masonry and the upper of brick. The chimney is heavily vegetated and this will need to be cleared and masonry re-pointed and any defects in the masonry consolidated/repared. Brickwork at the top of the chimney has suffered from partial collapse and erosion of the mortar joints and the top sixteen courses should be taken down and then reconstructed incorporating bed-joint reinforcement for stability*' (Knevitt, B6148.3, 4.14 Holmbush Structural Appraisal). The report also recommended that after the chimney is repointed, a lightning conductor should be installed. The chimney will either be scaffolded or (more likely) be repaired and consolidated by steeplejacks – specialist chimney contractors.

The main impact on the fabric of the building is likely to focus at the top of the chimney where weather erosion is more likely to have affected the stability of the masonry, but more particularly the lime mortar. Soft and crumbling mortar will be removed (to a maximum depth of 40mm), from the masonry walls following a detailed site assessment of the feature by the site contractors. Following approval of an appropriate mix of lime mortar and an aggregate to match the existing, the site contractors will repair any defective stone or mortar. This may entail renewing the top 'capping' of the chimney (approximately 15m high) – which has not been closely surveyed due to the dense ivy. The style and extent of re-pointing (slightly recessed from the masonry face), will mimic that of the original (this will be decided when the test mortar panel is agreed with EH (if appropriate), the site engineer and site archaeologist.

If steeplejacks are to be employed, it is likely that a ladder access up the side of the chimney will be constructed by fixing it to the chimney by using small screws fixed into the mortar joints. When consolidation work has finished the screws will be removed and the small holes repointed with mortar. It may be preferable for photographs of the condition of the top of the chimney to be taken by the site contractors for discussion with the site archaeologist and EH (if appropriate) concerning the nature and extent of the conservation works. In addition the site contractors will install copper lightning conductors. The main copper conductor will be attached down the inside of the chimney (in masonry joints) to exit through a small hole drilled at the base of the north side and then be attached to either earthing rods or an earthing mat (depending on the localised earth impedance level), sited nearby. An earthing mat will require excavation of the ground to a depth of approximately 0.3 – 0.4m depth, for an area of approximately 1.0m x 4.0m. If this form of earthing needs to be undertaken, then an archaeologist will be present to record any visible or disturbed archaeological features.

Given the narrow limits of the Scheduled Monument boundary around the chimney there are not likely to be any other impacts. Any loose crumbly mortar (old and new) that has accumulated on the ground as a result of the works will be carefully cleared from the site.

The overall impact of the proposed works on this feature can be defined as '*Minor positive*'. The works will provide more structural stability and enhance the site's visual authenticity for at least another generation. A photograph of the chimney is reproduced in Fig 4. The impact of not doing the works would mean further structural deterioration of the top south side of the chimney which appears to have been hit by lightning in the past. Rebuilding of the missing bricks and the installation of a lightning conductor is seen as imperative in order to retain the structural competence of this iconic feature.





Fig 29 View of the top of the chimney (before works) C Buck 2008 © CC HE Projects



Fig 30 View of the top of the chimney (after works) C Buck 2008 © CC HE Projects



Conservation works (2007):

Ivy and vegetation covered and obscured most of this chimney (see Fig 24). Once scaffolding was erected only the top part of this was removed. The sides of the chimney were repointed with mortar, and rebuilt where necessary, although some small openings left for bat roosting and bird nests. Figs 29 and 30 show the top of the brick cornice before and after works. Given the state of the brickwork, and the hole in its south side, the top ten brick courses needed to be entirely rebuilt, with three layers of stainless steel reinforcement added for additional strength (each 2.5m x 6mm). In addition a wrought iron band around the chimney was replaced in its original position after repointing. This chimney did not have an elevation survey, although it can be seen on plan in Fig 19. The conservation work was finished by the end of September 2007.

Before the scaffolding was removed (by 12/10/07), a copper lightning conductor was fixed around the top brick course, and connected to a copper tape that was fixed vertically into the internal side of the chimney, exiting through a small hole that had to be cut/drilled through the west side of the chimney. Excavation for the lightning conductor earth plates took place on 1/11/07, after the scaffolding had been removed. A small digger excavated a trench 0.9m deep, 0.8m wide and 6.0m long, around the west side of the chimney (see Fig 31). Three galvanised steel plates, each 0.6m wide and 1.2m long, each interconnected with copper tape (1.0m long), were placed in the bottom of the trench. The excavated soil profile was approximately 0.2m of topsoil/grass/earth, 0.3m of roots and buried stone/brick/mortar, and 0.4m of light tan coloured clay/shillet with earth/stone inclusions. There were no substantive archaeological finds apart from a section of old winding wire (which was placed back in the backfilled trench).



*Fig 31 View of the lightning conductor earth plates (during works) C Buck 2008 © CC HE Projects*

## 5 References

### 5.1 Primary sources

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- Sharpe, A., Johnson, N., and Lewis, R., 1996, *A Guide to Conserving Historic Mine Buildings in Cornwall*



## 6 Project archive

The HE project numbers were **2001079** and **2007048**. These are now amalgamated into a single project **2007048**.

The project's documentary and photographic archive is housed at the offices of Historic Environment, Cornwall Council, Kennall Building, Old County Hall, Station Road, Truro, TR1 3AY. The contents of this archive are as listed below:

1. A project file (2007048) containing site records and notes, project correspondence and administration (incl for the 2001079 project).
2. Photographs (Black/White: **GBP**, Colour slides: **GCS**) and Digital are archived under the following index numbers:
3. **Site recording (2001079):**

**GBP** 1360/10-35; 1361/1-16; 1362/1-2, 9-12,21-34; 1363/24-37; 1389/35-37; 1390/6-11, 15-20, 26; 1406/2-17; 1407/7-28; 1408/6-30; 1409/1-2, 20-26;

**GCS** 31493-31507

Digital images (R:/Images/HE Images/Sites E-H/Holmbush Mine/Holmbush Mine WB 2001079)

CAD surveys: EDM 2001 Survey plan: CAU Proj No. 2001057. R:\Historic Environment (CAD)\CAD Archive\Sites H\Holmbush Mine\_2001057

4. **Site recording (2007048):**

**GBP** 1899/0-36 (site before consolidation works); 1900/1-5, 8-36; 1901/14, 16-18, 22-25 (site during consolidation works); 1901/1-13, 15, 19-21; 1906/10-13, 16; 1925/8-33 (site after consolidation works)

Digital images (R:/Images/HE Images/Sites E-H/Holmbush Mine/Holmbush Mine WB 2007048)

5. CAD surveys: .pdf copies of the original (2008) CCC CAD survey and 'as built' survey files (created by Knevitts Cons. Eng.) are in the project file.
6. EH OASIS No. cornwall2-109726

This report text is held in digital form as: G:\Historic Environment (Documents)\HE Projects\Sites H\Holmbush Mine\HBC\_WB 2007048