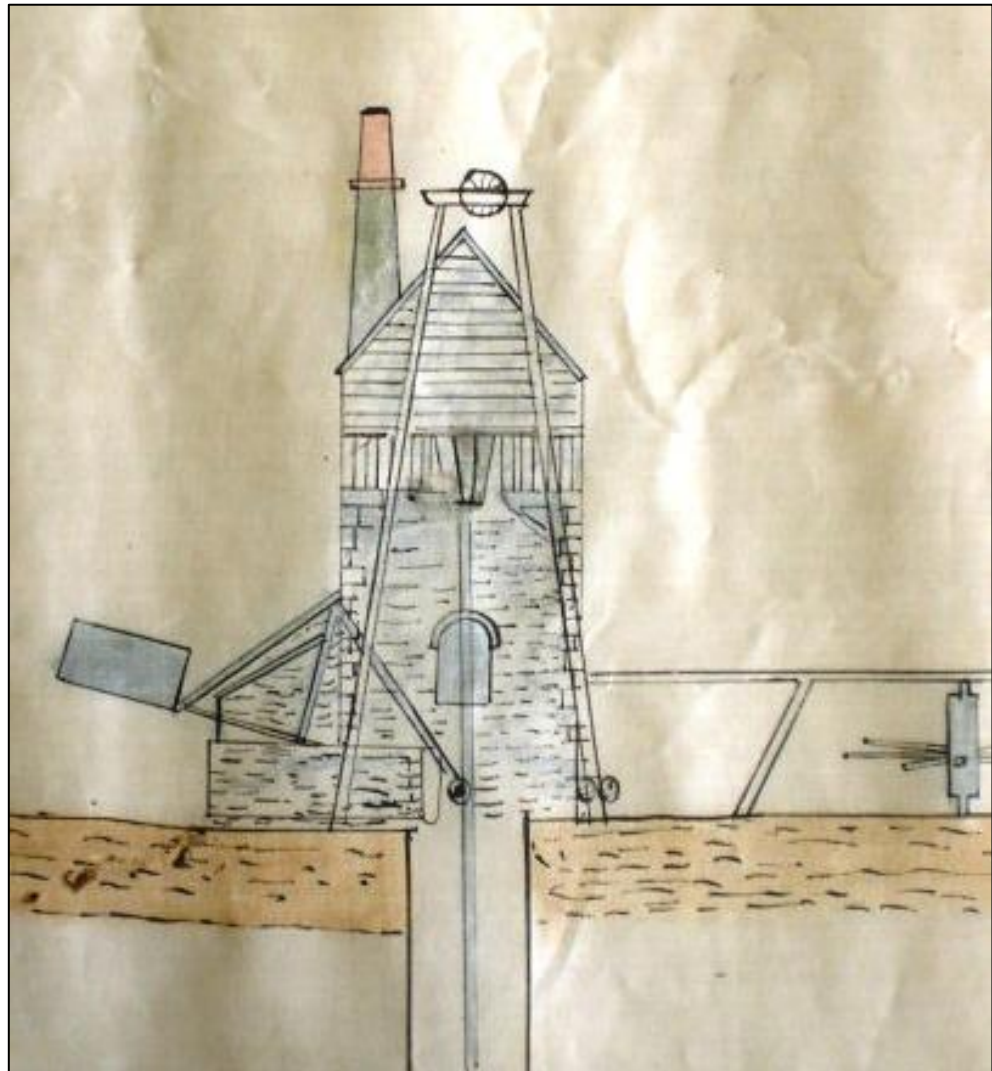


East Wheal Lovell Engine house, Wendron, Cornwall

Impact assessment



East Wheal Lovell Engine House, Laity, Wendron, Cornwall

Impact Assessment Report

Client	Christopher Foster
Report Number	2015R056
Date	October 2015
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The views and recommendations expressed in this report are those of Cornwall Archaeological Unit and those of the other authors and organisations whose reports are summarised here. They are presented in good faith on the basis of professional judgement and on currently available information.

I am grateful for the assistance given me in drawing up this report by both Chris Foster (landowner), Mathew Wills of 3HW Architecture & Design and Carolyn Royall for producing the site plans.

Freedom of Information Act

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Cover illustration

Reproduction of a sketch of the 50" engine house (East Wheal Lovell) on New Engine Shaft (MRO section CRO R144A)

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Contents

1	Summary	1
2	Introduction	3
2.1	Project background	3
2.2	Aims	3
3	Site background	4
3.1	Location, setting and characterisation	4
3.1.1	Location	4
3.1.2	Setting	4
3.1.3	Characterisation	4
3.2	Designations	6
3.2.1	Statutory	6
3.2.2	Non-Statutory and local designations	6
3.3	Statement of Significance for East Wheal Lovell Engine House Definition of Outstanding Universal Value and area significance	6 6
3.4	Planning Policies	7
3.4.1	Background	7
3.4.2	Saved Kerrier Local Plan Policies	8
3.4.3	Cornwall Council's (new) Local Plan	8
3.4.4	National Planning Policy Framework	9
3.4.5	Historic England policies	9
3.4.6	World Heritage Site Management Plan (2013 – 2018)	10
4	East Wheal Lovell Mine	11
4.1	Site history (summary)	11
5	Site gazetteer	15
5.1	General site description	15
5.2	Gazetteer Table	15
5.3	East Wheal Lovell engine house	18
6	Impact assessment	26
7	Impact mitigation recommendations	29
7.1	Impact mitigation strategy	30
8	References	31
8.1	Primary sources	31
8.2	Publications	31
8.3	Websites	31
9	Project archive	31
10	Appendix	32
10.1	Conservation philosophy text	32
10.2	Glossary of mining terms	33

List of Figures

Fig 1 Location map of East Wheal Lovell Mine

Fig 2 CC 2005 Aerial photograph

Fig 3 Brenton Symons 1870 Plan of the Lovell and Helston Mining Districts

Fig 4 1880 OS 1:2500 map

Fig 5 1908 OS 1:2500 map

Fig 6 Site gazetteer map

Fig 7 Engine house from North west

Fig 8 Engine house from South

Fig 9 Engine house from North east

Fig 10 Internal view of south east

Fig 11 Internal view of north east

Fig 12 New Engine Shaft and balance bob pit

Fig 13 Annotated plans, sections and elevations of the engine house showing significant features and structural problems

Fig 14 Existing survey plans and elevations of the engine house showing significant architectural features

Fig 15 Proposed elevations of the engine house

Fig 16 Proposed plans and sections of the engine house

Fig 17 Proposed site plan

Abbreviations

CAU	Cornwall Archaeological Unit
CC	Cornwall Council
CRO	Cornwall Record Office
EH	English Heritage
HE	Historic England
HER	Cornwall and the Isles of Scilly Historic Environment Record
LB	Listed Building
MCO	Monument Cornwall
NGR	National Grid Reference
OS	Ordnance Survey
OUV	Outstanding Universal Value
PRN	Primary Record Number in Cornwall HER
SDOHE	Senior Development Officer Historic Environment
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WHS	World Heritage Site

1 Summary

This report constitutes an archaeological impact assessment of a proposed change of use to the East Wheal Lovell Engine House, Wendron, a Grade II Listed Building. The desk based assessment is focussed on above and below-ground archaeological potential. Recommendations are made relating to the significance of the archaeological resource, in order to inform the project developers (Mr Chris Foster), and Cornwall Council (Planning/Advice) of the impact of the proposed scheme on the former site of the building and site.

The history of the site can be summarised as follows (after Bennett 2014):

East Wheal Lovell was one of the principal mines of the Wendron mining district. This district, which lies to the northeast of Helston, covers a relatively small area (c18 square miles) compared to some of the main mining districts of Cornwall. Mining in the Wendron area has taken place since the medieval period; many of the shallow valleys having been extensively streamered for tin. From the seventeenth century onwards the underground mining of the lodes was carried out with alluvial streaming within the shallow river valleys. However, during the first half of the nineteenth century Wendron was the second-most important tin streaming district in the county (second to the St Austell area), with most of the principal tin stream works being associated with the River Cober. The principal tin mines in the district were Trumpet Consols, Basset & Grylls, Wendron Consols, Trevenen & Tremenheere, Calvadnack, Polhigey, Wheal Lovell and East Wheal Lovell. Most of the mines in the Wendron district had closed by the mid-1870s, more often than not due to worked out and exhausted lodes. The last working beam pumping engine was at East Wheal Lovell where activity finally ceased in 1891.

The entire mine site within this application is outside (to the north and west) of the UNESCO inscribed Cornish Mining World Heritage Site (WHS) for the Wendron Mining District (Area 4). The Wendron Mining District has Outstanding Universal Value for its near surface alluvial tin production which later led to comparatively shallow shaft mining. It contains areas of former tin stream works together with extensive upland mineworkers' smallholdings.

Architects (Mathew Wills of 3HW Architecture & Design) were appointed in 2014 to produce low heritage impact proposals for adaptive reuse of the engine house to form a domestic residence and work unit. In addition, a structural building engineer's report (Knevit's 2014) was also commissioned to comment on the structural issues of the building and to advise appropriate mitigation. CAU was commissioned in 2014 to provide historic buildings advice to both the architects and engineers to minimise heritage impacts, following withdrawal of the original planning application in 2013.

This impact assessment report will accompany the Listed Building Consent application for adaptive reuse of the engine house and rebuild of the former boiler house. Archaeological impact mitigation recommendations include a programme of historic buildings consultancy before works start (to ensure the proposals have a minimal impact). It is anticipated that there will be a programme of archaeological recording to include photographic record prior to and after works to ensure that there is a detailed record of the works, a Level 3 annotated survey of the Listed Grade II engine house and boiler house, and production of a detailed archaeological recording after works finish.

However, it should be noted that although many of the major impacts to the site are known at the present time, there may be slight variations to the specifications presented in this report (and supplementary information from the project engineers). This report should therefore be viewed as a generic impact assessment for the project.

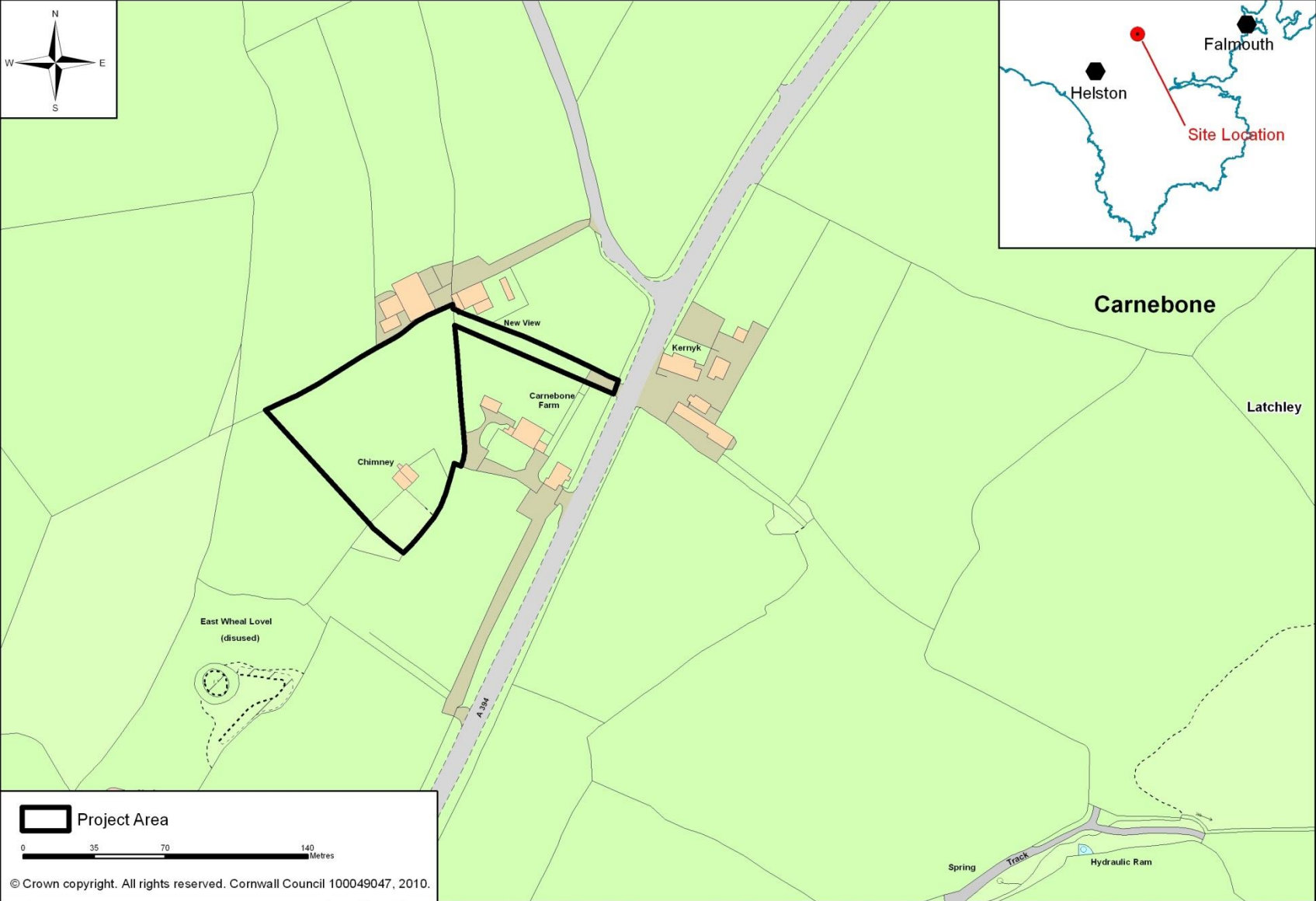


Figure 1 Location map of East Wheal Lovell Mine.

2 Introduction

2.1 Project background

East Wheal Lovell Mine is located outside the eastern edge of the Wendron Mining District WHS, but within the Wendron Mining area; an area which contains significant surviving elements of the late medieval and mid 19th century Cornish mining industry (Figs 1 and 2).

The applicant (Chris Foster) submitted a pre-application enquiry in September 2012 with a series of sketch ideas regarding the conversion of the engine and boiler house into a live/work unit. The pre-application feedback dated 14th January 2013 (PA12/09166/PREAPP) informed the preparation and submission of a Full Planning and Listed Building Consent application for a live/work unit under PA13/01566 and PA13/01567 respectively. Both of the applications were supported by Wendron Parish Council during the consultation period, however, the applications were subsequently withdrawn following a lack of support for the application and its supporting detail.

A post withdrawal pre-application enquiry was submitted under PA13/02599/PREAPP, which involved a meeting between applicant, agent, case officer and conservation officer, which was followed up by written feedback on 13th September 2013.

Following this feedback, the plans and information to hand have been extensively revisited. The proposed drawings have been substantially amended to take into account, as far as feasible, the recommendations of the aforementioned pre-application. In addition the applicant has commissioned an additional structural appraisal, together with commissioning a historical review by Tony (Bennett 2014), together with appropriate historic buildings consultancy and this full impact assessment produced by CAU, which will supplement the planning application and has informed conservation detailing to many of the prepared documents. The applicant has also made extensive enquiries and undertaken research to locate as much historical data on the building and surroundings as possible to inform the authenticity of the application.

This report (commissioned by Chris Foster in February 2015), assesses the impact of the proposed adaptive reuse conversion works on the significant assets of the Listed building engine and boiler house, together with mitigation of above and below ground impacts during works to the area around the engine house. 3HW Architecture & Design (Matthew Wills, 2015) has produced Level 3 Survey drawings of the existing building and produced detailed plans for its conversion. In addition, an outline Heritage Impact Statement and Design and Access statement has been produced.

This report identifies the archaeological impacts resulting from the proposed adaptive reuse building scheme, and describes the mitigation of the works on the site's significant assets. In addition, it refers in detail to conservation philosophies (Appendix 10.1) and describes how these are integrated into the architect's proposals.

2.2 Aims

The purpose of this impact assessment is to:

1. Assess the impact of the proposed repairs and adaptive reuse of the engine house on the significance and character of the building and site. This report will be considered as part of the Listed Building Consent application, which will be sent to both the area Conservation Officer and Historic England (formerly English Heritage)
2. Indicate the steps that have already been taken by the archaeological consultant to avoid or minimise adverse impacts upon the site, its features and archaeology.
3. Understand the development history and construction of the engine house.
4. Provide an assessment of the nature, extent and quality of survival of historic and archaeological features within the project area.

5. To assess the nature, significance and character of the archaeological resource (national, regional and local importance), and potential for buried archaeology.
6. To assess the impact of the development proposals on the importance, integrity and character of the engine house and former mine site of East Wheal Lovell.
7. To describe the capacity of the structure and site to be altered (whilst retaining its value to the nearby World Heritage Site).
8. Produce a report outlining the findings of the impact assessment survey.
9. To describe how impacts of the proposed development can be mitigated (to standing structures and buried archaeology).
10. Indicate that the proposed methods and techniques are appropriate to the history, character and outstanding universal value (OUV) of the site and accords with the Cornish Mining World Heritage Site revised management plan (2013 – 2018).
11. Ensure the detailed site information presented by 3HW Architecture & Design Ltd conforms to the overall mitigation strategy for the site.
12. Provide archaeological field and archive data for inclusion in Cornwall and the Isles of Scilly Historic Environment Record.

3 Site background

3.1 Location, setting and characterisation

3.1.1 Location

The site identified by the location plan (Fig 1) is situated to the North of the A394 linking Helston and Falmouth. The engine house (SW 69968 31481), is sited 65m to the West of Carnebone Farm, with access directly from the A394 via a private track to the North of the said property. East Wheal Lovell Engine House is located at the eastern edge of a field south west of the farm, which formerly sited East Wheal Lovell Mine. The engine house, shaft and chimney are the only original remnants of the mine that remain. Former mine buildings shown on Figure 2 have now gone, and the footprint of the boiler house has been rebuilt in concrete block.

Two sites within and close to the development have been identified from the Cornwall and Isles of Scilly Sites and Monuments Record (MCO Nos. 12409: East Wheal Lovell Mine and 52435: East Wheal Lovell Mine Engine House).

3.1.2 Setting

The project area is the now flat and featureless field which contains the engine house (centred SW 6992531489), formerly the core of East Wheal Lovell Mine. The tall engine house with intact integral chimney (see Fig 7), is set at the eastern edge of a wide field, close to a mound of waste ground on the south side of the engine house next to the former balance bob masonry. Old stone hedge boundaries from the boundaries of the field. The engine house is visible from the main Helston to Falmouth A394 (see front cover and Fig 2).

3.1.3 Characterisation

In 1994 the whole of Cornwall was subjected to Historic Landscape Characterisation (HLC) in which the landscape was assigned to one of a number of HLC Zones according to its predominant historic landscape character. The Historic landscape characterisation within the project area consists of a single zone type: the project area lies within 'Recently Enclosed Land' (HER GIS layer 'Cornwall HLC Zones 1994').



Figure 2 Aerial photograph of the project area (Copyright CC 2005).

This character type is given to land that has been enclosed since the 18th century era from former open downland. However, it is the engine house building itself which provides the main focus of historic mining heritage. The walled remains are one of only a relatively small number of former engine houses in the area (compared to their original number), that retain fully extant walls.

The landscape outside the project area is characterised north and south of the site as Predominantly Agricultural (large pasture fields), but with a small number of mining remnants, mainly small mine spoil heaps near former shafts. The key landscape characteristics of the area (Carnmenellis 'plateau' arising from the 2005-8 survey (Area CA10)):

- Gently undulating open and exposed elevated granite plateau, boggy in places, with radiating valleys at edge.
- Significant remains of mining and quarrying industry including mine engine house and related structures and settlements particular around Carn Brea to the north and around Porkellis.
- Permanent pasture and rough grazing, with some horticulture on south facing slopes.
- Cornish hedges and some hedgerows enclosing small to medium scale fields of Anciently Enclosed Land.
- Few hedgerow trees on plateau and narrow areas of woodland (mostly Wet Woodland) in valleys.

- Fragmented remnant Lowland Heathland in high parts of Landscape Character Area with associated species in Cornish hedges.
- Settlement pattern of mainly dispersed villages of medieval origin.
- Upland recently enclosed as small farms and 'miners' smallholdings.

3.2 Designations

3.2.1 Statutory

The former pumping engine house is Listed Grade II: No. 66363 (SW699314). The entire project area and area to the north and south of the site is within the Tamar Valley Area of Outstanding Natural Beauty (AONB). The Listing description is given as follows:

SW63SE WENDRON CARNEBONE 4/377 Engine House at SW699314, East Wheal Lovell
GV II List Entry No. 1142023 UID 66363 Listing NGR: SW6997031484

Beam engine house. Circa mid C19. Granite and elvan rubble with granite dressings. Round brick arches over most openings. Rubble chimney with bricks upper stage over moulded brick collar. Plan: Rectangular 1-room plan with thicker front (bob) wall and round chimney engaging rear wall at the left-hand side. Exterior: 2 storeys over basement plinth. Unaltered elevations. Front (bob) wall has central round-headed opening. Rear gable wall has central round-headed openings to ground floor and first floor. Lintel between basement opening and ground floor opening has fallen or removed. Interior: Machinery, and roof structure removed.

3.2.2 Non-Statutory and local designations

There are no non-statutory and local designations.

3.3 Statement of Significance for East Wheal Lovell Engine House

Definition of Outstanding Universal Value and area significance

Given the site's proximity to the World Heritage Site, the area statement of significance includes the Outstanding Universal Value (OUV) of the Cornwall and West Devon Mining Landscape. It has been described in the Nomination document for World Heritage Site Status; *'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 distinctive cultural landscapes, is testimony to this achievement'*. The *'coherent series of distinctive cultural landscapes'* comprises ten areas of Cornwall, one of which is the Wendron Mining District (Area A4). There are seven main components identified in the Nomination Document through which the OUV is physically expressed: mine sites, mine transport, ancillary industries, mining settlements and social infrastructure, miner's smallholdings, great houses and estates, and mineralogical and other sites of scientific importance. Individual aspects of the cultural heritage making up the site have differing levels of significance; some may be of an international importance, whilst others will be of national, regional or local significance.

The Outstanding Universal Value statement for WHS Area A4 is: *'A long history of importance for tin streaming and small scale mining was followed by a relatively brief period of deep mining, but neither spurred the development of substantial settlements or a developed infrastructure. Particularly distinctive of the Area are the huge areas of smallholders fields (part of a wider landscape surrounding the Area) which developed to meet the housing needs of a rapidly growing population in the mining landscape to the north and the land pressure which resulted. Over time, towns and villages began to develop, lifestyles changed, and eventually the mining economy collapsed,*

Carnmenellis becoming almost completely abandoned. This now approaches being a fossilised landscape - very rural and quite remote with a tiny population, a few still farming at the upland limits of agriculture. A landscape that most people left when it could no longer sustain them. Within the southern part of the Area most mine buildings have been demolished though important engine houses remain at Basset & Grylls, Wheal Enys and Trumpet Consols...' (OUV of the Cornwall and West Devon Mining Landscape 2007, 41).

Historic Building significance

East Wheal Lovell Engine House

The decision to List the engine house as being of national importance is of obvious significance, both to the site and its contextual relationship within the importance of the nearby Wendron mining district. Extant engine houses even in Cornwall, by their very nature are rare; the nature and extent of their physical survival during the past 150 years dependant on a variety of factors; including the quality of construction, and the desire of the landowner to keep it intact. The only other significant building within the project area is the attached chimney – although this too has now been slightly reduced in significance as the chimney cornice needs repairing (see Figs 7 - 12).

However, if funding opportunities do not present themselves for long-term conservation and preservation, sensitive adaptive reuse, is perhaps, the next best option to allow these single buildings to be preserved for future generations.

Archaeological significance:

Given the cartographic and documentary evidence presented in this report (and the detailed comments relating to the archaeological potential), this entire site has a high value in terms of the preservation of extant archaeological features relating to the engine house and chimney. In addition it should be recognised, however, that foundations for 19th century buildings are often not very deep, and so the archaeological resource of the site of the former Boiler House (Site 3), is likely to survive within approximately 1m of the current ground surface. However, given the present knowledge base, it is difficult to assess the significance of the below-ground remains, and therefore also the impact of any development until more information about the nature and extent of the archaeological below ground resource is known.

Visual significance:

This tall iconic engine house and chimney, standing relatively close to the main road from Helston to Falmouth has a great deal of visual significance providing a strong visual link to the history of mining in this area. It is visible from miles around, especially from a local vantage point of viewing this impressive engine house from a field gate next to the main road at SW 6999131369.

3.4 Planning Policies

3.4.1 Background

From 1 April 2009, the six District Councils and the County Council became a unitary authority - Cornwall Council. Many of the planning policies that were used by the former districts have been saved until such time that a countywide Local Plan is adopted. These policies will be used to determine planning applications that are submitted to Cornwall Council, albeit that the national guidance of the NPPF will be given greatest weight in decision making if the saved policies are considered out-of-date.

The Secretary of State formally 'saved' a range of policies from the existing adopted Local and Structure Plans. Information on planning policy that continues to have some weight is available from each of the following old District and County areas. Note that

the Cornwall Structure Plan was revoked with the revocation of the Regional Spatial Strategy.

The saved Kerrier Plans, the Nppf and the revised Cornwall and West Devon Mining Landscape World Heritage Site Management Plan, provide a range of relevant policies for the protection of the historic environment from the detailed level of an archaeological feature to county policies for the protection of the historic heritage of mine sites in Cornwall. The following abstracts (Section 3.4.2) are relevant policies from this range of documents:

3.4.2 Saved Kerrier Local Plan Policies

The Kerrier District Local Plan was adopted in 2002, and a number of policies from this document were "saved" by the Secretary of State in September 2007. The Local Plan includes a number of policies for the protection and enhancement of the historic and natural environment, and to encourage economic regeneration. It is not proposed to discuss these in detail here, and reference should be made to the Plan. In summary, the following policies apply:

Policy B.EN4: Historic Heritage - mining remains

Development likely to significantly harm industrial archaeology, mining heritage, historical, industrial and mining buildings and sites, including former mineral railways, tramways, engine houses and chimneys, will not be permitted unless the importance of the archaeology is outweighed by the benefit of the development to the community.

Policy B.EN5: Historic Heritage – conservation and enhancement of mining remains

Development for the conservation, interpretation and display of industrial archaeological sites and buildings will be permitted where:

- there is no significant harm to the character and appearance of the landscape, built environment or the quality of the natural environment;
- there is no significant harm to the character, appearance, historic, cultural and heritage value of the buildings and remains themselves, their setting or to other nearby heritage features;
- there is safe parking in accordance with the council's guidelines and the access and approach roads can provide safely for the level and type of traffic likely to be generated.

3.4.3 Cornwall Council's (new) Local Plan

In Cornwall the development plan comprises the 'saved' policies from the adopted Local Plan (in this case for Kerrier 2002). The policies in the emerging Cornwall Local Plan are not part of the development plan and have limited weight because of the draft stage that the Local Plan has reached in the adoption process (the first version submitted to the Secretary of State on Friday 6 February 2015), but the policy and explanatory text does give a clear indication of the Council's direction of travel. However, the 'saved policies' of the Kerrier 2002 Local Plan (Section 3.4.2) carry some weight, that weight depending upon the extent that these policies are consistent with the National Planning Policy Framework (Section 3.4.4).

'The emerging draft of the Local Plan for the submission to the Secretary of State seeks to address all aspects of land use planning including policies on minerals and waste developments. This draft contains a policy on the protection of the historic environment that applies to all development proposals:

Development proposals will need to retain Cornwall's local distinctiveness and character and protect and enhance Cornwall's historic environment and assets according to their international, national and local significance through the following measures;

- *Protect, conserve and enhance the historic environment of designated and undesignated heritage assets and their settings, including historic landscapes, settlements, Conservation Areas, marine environments, archaeological sites, parks and gardens and historic buildings*
- *Enhance and promote the outstanding universal value of the World Heritage Site and its setting; supporting the adopted management plan’.*

3.4.4 National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published on 27 March 2012, replacing all the previous Planning Policy Statements, including PPS 5, as well as other planning guidance. Its central theme is the '*presumption in favour of sustainable development*', set out in twelve core land-use planning principles which underpin both plan-making and decision-taking.

Although matters relevant to the historic environment are scattered throughout these principles, particularly design, urban and countryside policies, it is the section on Conserving and Enhancing the Historic Environment which supersedes PPS 5, whilst following that document's significance-led approach to decision-taking. NPPF 126 to 141 are core historic environment policies in Chapter 12 of the NPPF. These have not been reproduced in detail in this CMP.

3.4.5 Historic England policies

The document Conservation Principles, Policies and Guidance (English Heritage 2008) sets out fundamental propositions that serve as a foundation for the way Historic England engages with every aspect of the historic environment, and should be a tool to be used by all who are involved in managing change in the historic environment. If (sustainable) change to the historic building of East Wheal Lovell engine house occurs it will involve a Listed Building consent application. EH are likely to request conditions based on policies reproduced within this published document. Relevant policies relating to this site are given below:

In 'Managing change to Significant Places' (2008, 41): 'Conservation involves people managing change to a significant place in its setting, in ways that sustain, reveal or reinforce its cultural and natural heritage values (Policy 4.2). Conservation is not limited to physical intervention, for it includes such activities as the interpretation and sustainable use of places' (2008, 43). In 'Take account of sustainability' 'Significant places should be used and managed in ways that will, wherever possible, ensure that their significance can be appreciated by generations to come, an established aspect of stewardship. Sustaining the value of the historic environment as a whole depends also on creating in the present the heritage of the future, through changes that enhance and enrich the values of places' (2008, 46). The following policies are most appropriate for East Wheal Lovell:

1. The conservation of significant places is founded on appropriate routine management and maintenance
2. Repair necessary to sustain the heritage values of a significant place is normally desirable if:
 - There is sufficient information comprehensively to understand the impacts of the proposals on the significance of the place; and
 - The long-term consequences of the proposals can, from experience, be demonstrated to be benign, or the proposals are designed not to prejudice alternative solutions in the future.
3. Restoration to a significant place should normally be acceptable if:
 - The work proposed is justified by compelling evidence of the evolution of the place, and is executed in accordance with that evidence;

- The form in which the place currently exists is not the result of an historically-significant event;
 - The work proposed respects previous forms of the place;
 - The maintenance implications of the proposed restoration are considered to be sustainable.
4. New work or alteration to a significant place should normally be acceptable if:
- (see two bullet points under the Repair section 2)
 - The proposal would not materially harm the values of the place, which where appropriate, would be reinforced or further revealed;
 - The proposals aspire to a quality of design and execution which may be valued now and in the future.

3.4.6 World Heritage Site Management Plan (2013 – 2018)

The WHS policies given below are relevant excerpts relating to the proposed site development from the revised WHS Management Plan 2013-2018. These remain unchanged from the original management plan (2005 – 2010), but have been reordered to refer back to the four core areas of activity set out in the World Heritage Convention; these are *Protection, Conservation & Enhancement, Presentation and Transmit*. All four groups of policies generally relate to the East Wheal Lovell landholding and its relationship to the World Heritage Site. However, the Conservation and Enhancement group (namely: Issue 7 Sustainable development, and Issue 8 Conservation of key components, is specifically relevant to the site. The following policies relate to the revised 2013-18 WHS Management Plan:

Conservation and Enhancement

Sustainable development

Policy C5: Landscape, nature conservation and Countryside management regimes should have regard for the authenticity and values of the site.

Conservation and maintenance of key components

Policy C6: The conservation and continuing maintenance of the historic fabric of the site should be undertaken to the highest standards to ensure authenticity and integrity.

Policy C7: The historic character and distinctiveness of the Cornwall and West Devon mining landscape should be maintained.

Policy C8: Traditional materials and skills should be encouraged in the maintenance of the authentic historic fabric within the site.

Sustainable development

Policy C1: Sustainable heritage-led regeneration should be promoted.

Policy C2: New development should add to the quality and distinctiveness of the site by being of high quality design and respectful of setting.

Policy C3: There should be a presumption in favour of retaining and reusing historic buildings which are important components of the World Heritage Site

Policy C5: Landscape, nature conservation and Countryside management regimes should have regard for the authenticity and values of the site.

Conservation and maintenance of key components

Policy C6: The conservation and continuing maintenance of the historic fabric of the site should be undertaken to the highest standards to ensure authenticity and integrity.

Policy C7: The historic character and distinctiveness of the Cornwall and West Devon mining landscape should be maintained.

Policy C8: Traditional materials and skills should be encouraged in the maintenance of the authentic historic fabric within the site.

Policy C9: Where the historic fabric within the site has been lost or compromised through non-authentic materials, inappropriate details and poor workmanship, historic character and detail will be reintroduced wherever and whenever possible.

4 East Wheal Lovell Mine

4.1 Site history (summary)

A detailed historical review of the engine house has been produced by Tony Bennett (2014) as a separate document, which will accompany the planning application. However, a summary of the mine site is given in this report to place the remainder of the impact recommendations in an historical and archaeological context.

'The mine consists of three separate groups of workings, one at Tregonebris mine... the second at Fatwork mine... and the third at Colonel's Shaft, 500 yds. Of the Tregonebris section. Cunnack (1885-1908) states that the surface workings are probably 18th century, that the Tregonebris section had commenced before 1850, but about 1854 it became unprofitable and work was concentrated on the Fatwork section until 1875. Attention was then again turned to Tregonebris which was run at a loss but continued until 1881... workings at Colonel's Shaft started about 1880 and were re-opened from 1926-1929... Engine Lode was worked from New Engine Shaft ... on the underlie to the 34 fm. Level below adit (17 fms)' (Dines and Phemister 1956, 259). The Cornwall Sites and Monuments Record (PRN 40250) states: *'East Lovell Mine was an old mine working c.1800 which was re-opened in 1857 and included Tregonebris and Fatwork setts. It was worked on a small scale until c.1891, producing tin. The OS map of 1877 shows an engine house at SW 6989 3142 and a magazine at SW 6987 3139. Shafts, spoil and some buildings associated with this mine are visible on RAF aerial photographs of c.1946 and were plotted during the Cornwall NMP'*.

The 50" pumping engine was purchased from the nearby Great East Lovell Mine in 1870, in order to re-work and deepen the Tregonebris sett, after the previously successful Fatwork sett, failed to produce more tin. New Engine Shaft was pumped by the newly built engine house (see Fig 6, Site 12), which was working by the end of 1871. Underground development work continued until the mid 1870s, after which it seemingly was idle (see Fig 3, the 1870 Brenton Survey map).

It re-started in 1880 with work being carried out at the site's three main lodes: Roger's Lode, Engine Lode and South Lode. Confusingly, one of the mine plans (R144 – undated but c mid 1870s) shows the engine house (with its boiler house on its east side), and its pumping shaft at a location north of its present site. However, this appears to have been the case – the engine house and shaft moved a few yards to the south east by the early 1880s (see Fig 4, and Fig 6, Site 1 – compared to Site 12), to presumably access a more desirable outcome at lower levels. However, again, this re-working did not produce consistent returns and the mine folded again in 1883, when no further tin was produced.

Relevant abandoned mine plans are reproduced in the Bennett report, but an expanded view of the 1883 OS and 1908 OS maps are produced in Figs 4 and 5 respectively. Figure 6, the site plan shows the position of the pumping engine house, its boiler house on the west side and the shaft in front with the balance bob west of the shaft (as illustrated in the Bennett Report). A Carpenter's and Smithy buildings are shown to the south west of the engine house, with the mine's magazine further to the south west in Figs 3 and 4, all outside the study area. Another small feature resembling a building to the east is also shown, possibly a compound.

After a period of further idleness for the mine and its largest pumping engine, in January 1893 the agents of the Duchy of Cornwall seized the surface plant, including

the 50" pumping engine, the 30" pumping engine, the 18" winding engine and other equipment, which was sold for scrap for a total value of £200. Figure 4, the 1908 OS map shows the mine with the mine buildings and boiler house gone, except for the engine house and chimney, the shafts apparently mostly infilled. The third edition OS map (1972 - not reproduced in this report), shows an extension to the west side of the engine house on part of the boiler house footprint, presumably the concrete block structure that still exists.

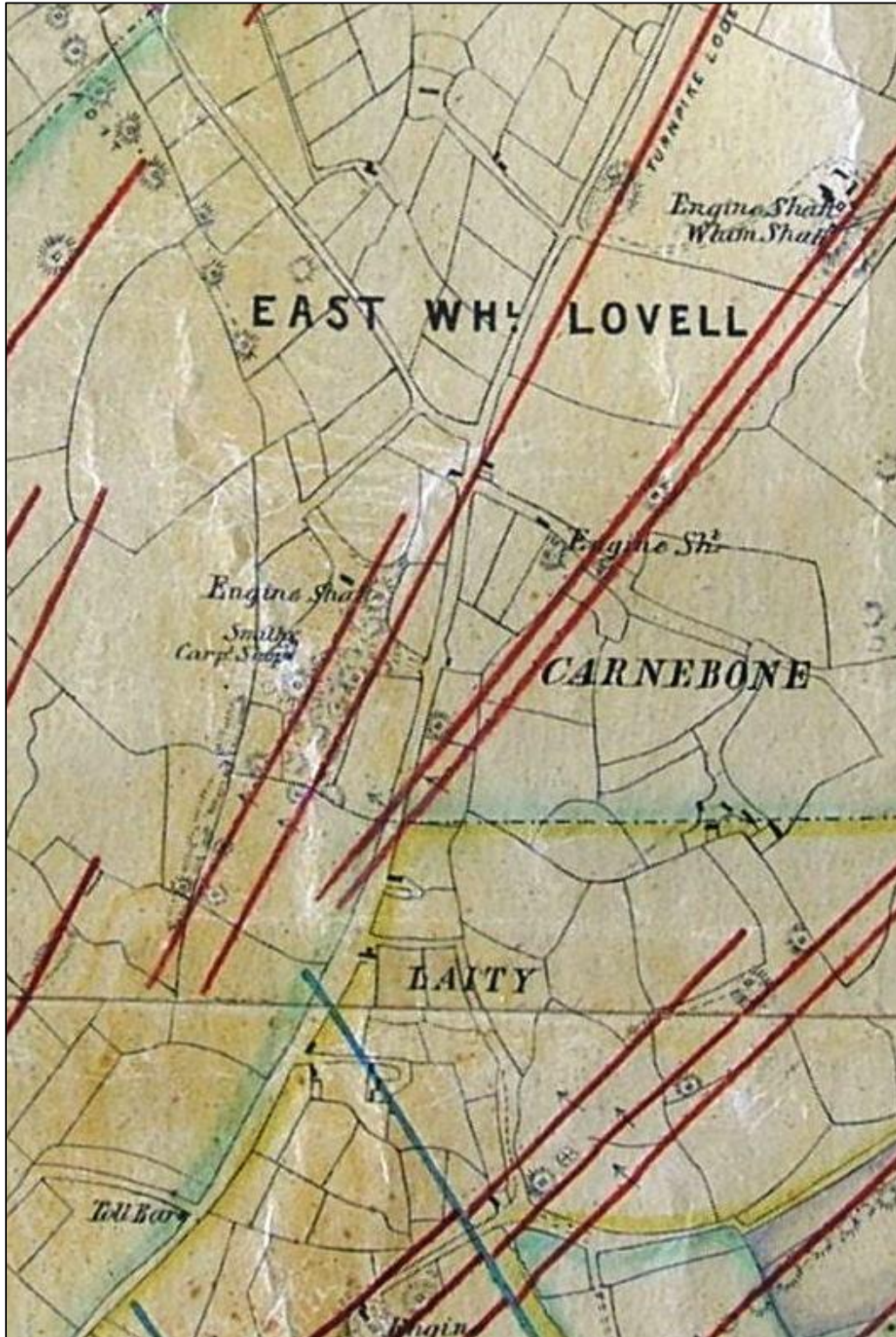


Figure 3 Brenton Symons Plan of the Lovell and Helston Mining Districts (1870).

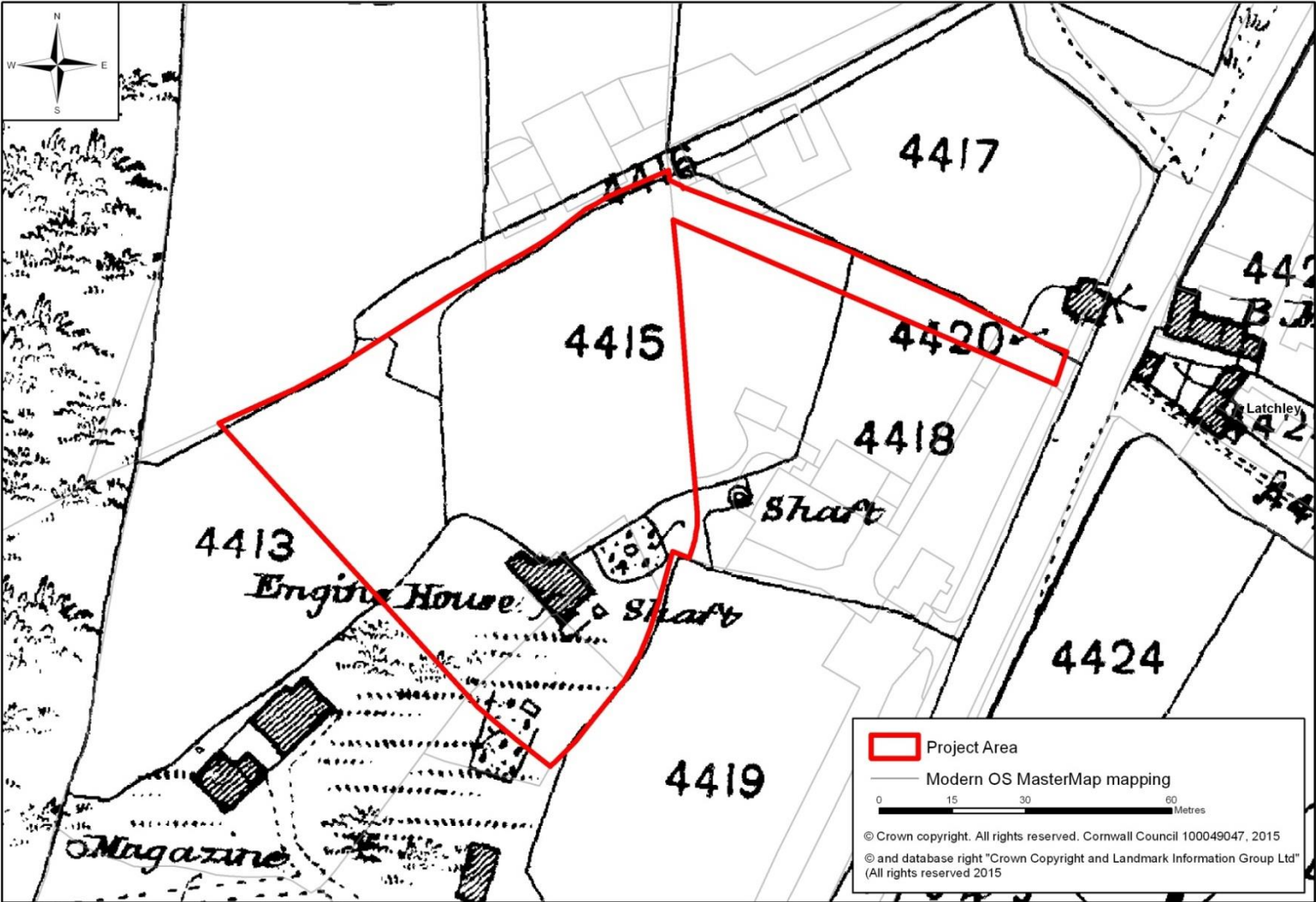


Figure 4 1880 OS 1:2500 map.

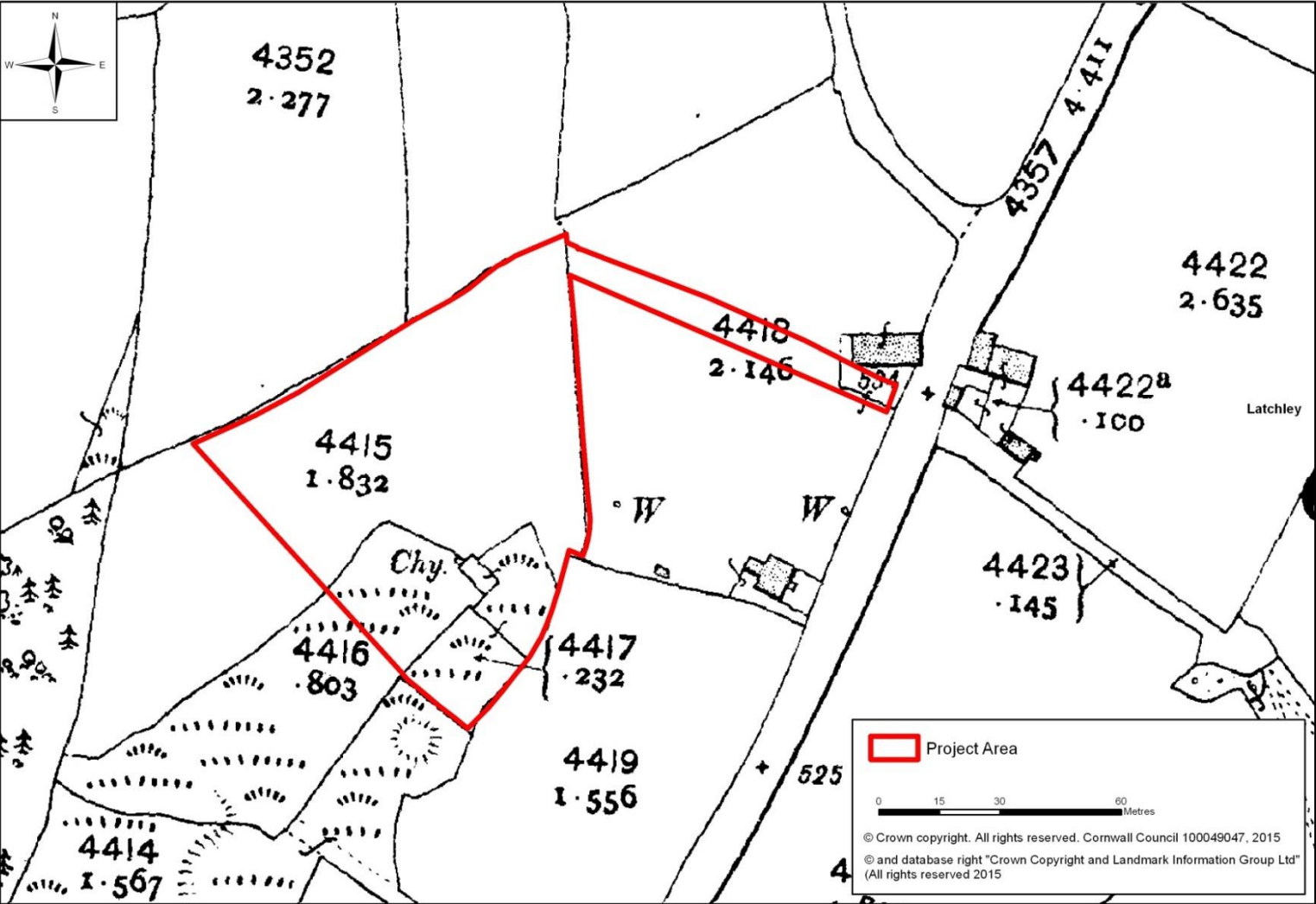


Figure 5 1908 OS 1:2500 map.

5 Site gazetteer

5.1 General site description

The landowner holds the northern part of the former East Wheal Lovell Mine; which includes the engine house and some mine shafts (see Fig 6). The remainder of the mine included the Carpenter's Shop, Smithy, another mine building/possible small engine house (over Roger's Shaft), and mine shafts (see Figs 3 to 6 – some out of the study area). The 1908 OS Map (Fig 5) shows rough ground, and later maps are indicative of general ground levelling – but leaving some mounds either around shafts or former remnants of mine waste tips (east and south of the engine house (Figs 4-5 and Site 1) and outside the study area to the south west of the site (see Fig 6). With the exception of the engine house and two mine shaft spoil bunds, this site is devoid of significant surface features (see Fig 2, an aerial photograph of the site).

The only extant masonry structures are the engine house, the annex building and the balance bob masonry (Site 5) all of which are described in detail in Section 5.3. Known visible significant sites are described in the Gazetteer table (Section 5.2), cross referring to figure illustrations and shown in the site plan (Fig 6). A number of sites included in the gazetteer are outside the study area but are noted for historical context reasons. The locations of the some shaft sites have been interpolated from mine plans and OS survey maps.

5.2 Gazetteer Table

Notes:

- 1) The District is Kerrier, the Parish is Wendron and the PRN No. is 40250 (mine) and 40250.1 (engine house).
- 2) All identified structures and sites are located by a 10 figure grid reference. In most instances these relate to a point at the centre of the feature/structure. Linear features (walls, etc), are given an NGR at both ends.
- 3) Cornwall County Council Sites and Monuments Record Primary Record Numbers (PRN) relevant to all of the sites within the project area are shown within the table.
- 4) The extent of survival of each feature is noted. Each site is graded to denote its level of importance:
A: Site of national importance, B: Site of county or regional importance, C: Site of local importance.
- 5) The final section summarises each site's recommended mitigation for site development.
- 6) Refer to Figure 6 – the Site Inventory Map.
- 7) * Location interpolated from mining plans.

Site No.	Name/description	NGR (SW)	Survival	Grade	Recommended mitigation
1	East Wheal Lovell Engine House (Existing) (Figs 7-11)	69970 31483	Extant	A	Detailed survey of building undertaken prior to works. Impact assessment and LBC conditions.
2	East Wheal Lovell Engine House Chimney	69966 31487	Mostly Extant	A	Detailed survey of building undertaken prior to works. Impact assessment and LBC

Site No.	Name/description	NGR (SW)	Survival	Grade	Recommended mitigation
	(Figs 7-9)				conditions.
3	Site of Boiler House (Fig 7)	69965 31482	Built upon at later date	C	An archaeological watching brief if site foundations are to be disturbed.
4	New Engine Shaft (Fig 12)	69977 31477	Infilled	C	Significant part of site. If H & S problem, advice from specialist mining engineers for capping.
5	Balance bob box and mountings (Fig 12)	69973 31473	Partially extant south wall (rear box not visible)	B	An archaeological watching brief if site foundations are to be disturbed as part of mine shaft capping process. Site not to be impacted by site works.
6	Engine Shaft (Original site) *	69958 31481	Unknown	C	If H & S problem, advice from specialist mining engineers for capping.
8	Site of Coal Shed	69976 31486	Not visible	C	An archaeological watching brief if site foundations are to be disturbed.
9	Adit Shaft	69983 31489	Infilled, mine waste mound	C	If H & S problem, advice from specialist mining engineers for capping.
11	Lanyon's/Old English Shaft *	69963 31456	Unknown	C	If H & S problem, advice from specialist mining engineers
12	East Wheal Lovell Engine House (Original site) * (Figs 7-11)	69965 31490	Unknown	C	Foundations of this building may remain.
Sites below are out of the study area (separate site ownership)					
7	Roger's Shaft *	69907 31412	Unknown	C	If H & S problem, advice from specialist mining engineers
10	Unnamed Shaft	70006 31500	Unknown	C	If H & S problem, advice from specialist mining engineers

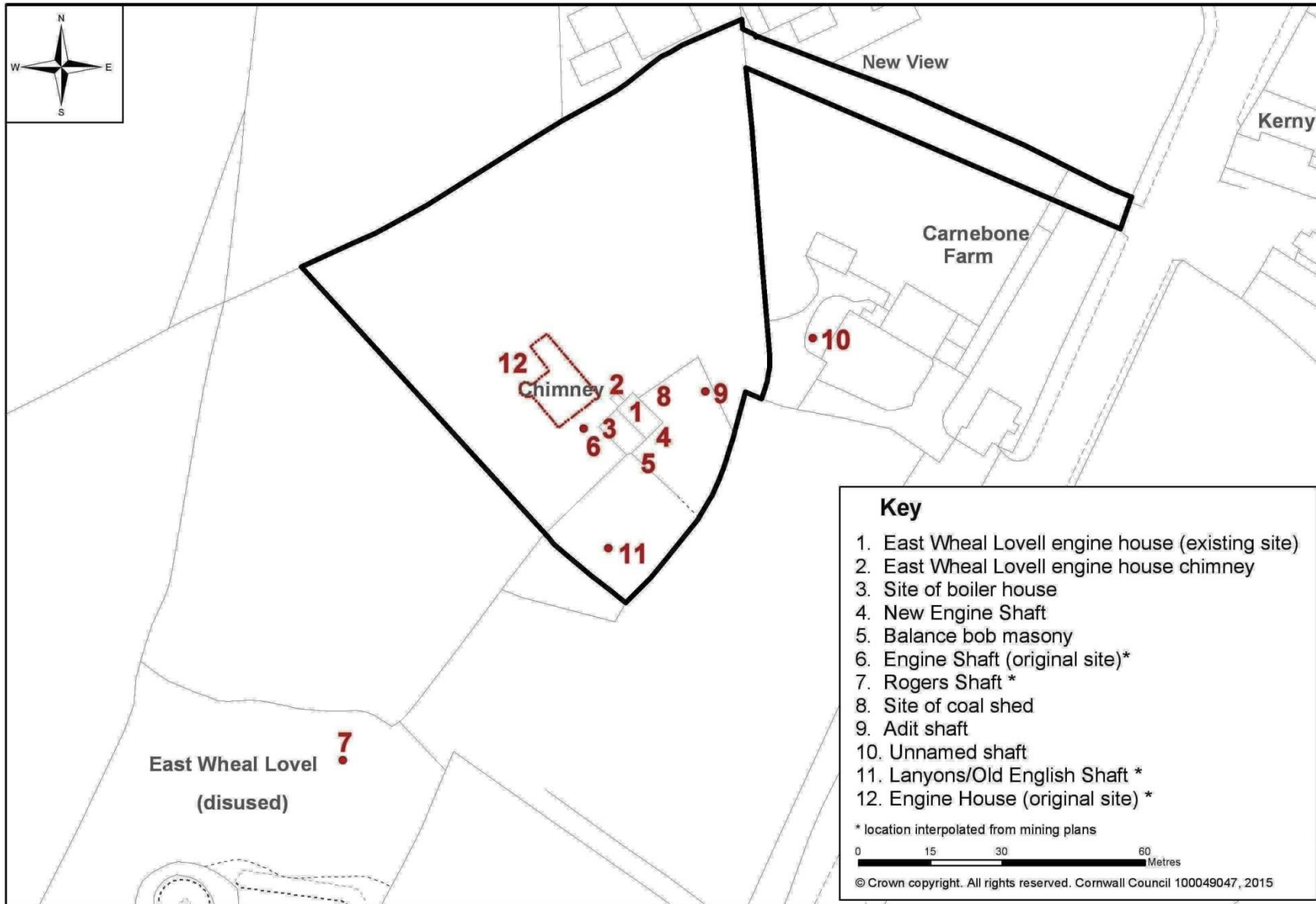


Figure 6 Site gazetteer map.

5.3 East Wheal Lovell engine house

The fully extant East Wheal Lovell engine house (Site 1, Figs 7-9 externally, Figs 10-11 internally), dates to approximately 1880 and a new pumping shaft (Site 4, New Engine Shaft) was probably sunk at the same time; south east of the building on Main Lode. The boiler house chimney (Site 2), is built into the north west corner of the engine house, and the boiler house (no longer visible by 1908 (Fig 5), but its footprint later built upon by a concrete block structure by 1972 (3rd edition OS), is located on its west side (Site 3). Externally the building is 6.8m wide and 9.3m long. The tall chimney is virtually intact (18.5m high), but unfortunately some of the upper brick cornice has fallen away (Fig 7).

Following a detailed survey of the building by 3HW Architects & Design, Figure 13 is an annotated drawing showing sections, elevations and a plan view of all significant structural aspects of the building, internally and externally. Missing timber lintels and cills are shown shaded on this drawing, for the main part, rotted timber structural components have caused limited and localised masonry collapse above, which fortunately has been limited by the structural strength of the outer brick window arches, except on the east elevation (Fig 9), where a vertical structural crack has extended from the upper window to the top of the wing wall. The strength of the granite quoins and granite rubble stone walls have essentially kept the building together for the past century. Refer to Figures 7-9 for external elevations and Figures 10-11 for internal elevations.

The engine house (as shown on the front cover), is in a relatively stable condition. This is mainly due to the fact that the window openings were built with round brick arches. The north eastern external elevation wall (Fig 9), still retains its window with brick arched headers, and an earlier steam pipe opening (when the boiler house was sited on the east side of the building in the 1870s). A vertical extends from this arch both up to the wing wall and downwards. A structural report by Knevitts (Cons. Eng.) dated November 2013 (No. B7974) describes the structural aspects of each elevation and provides structural mitigation measures, based on a conservation philosophy. The opposite south west wall (Fig 7), retains no windows, simply the main girder opening and an upper doorway from the engine house to the top section of the boiler house gallery (above the boiler). The later concrete block lean-to with a corrugated sheet roof has been built over part of the footprint of the second phase boiler house (the walls 8.9m long, 4.4m wide and 2.77m high where it adjoins the engine house). The south east bob-wall elevation wall (Fig 8), has a small plug door and steam condenser pipe opening, both quite stable and intact. The north west (gable) wall contains the cylinder brick arched header doorway with its bottom section gone – probably dismantled to remove the steam cylinder for subsequent sale in 1893, by the Duchy of Cornwall agents. The attached chimney has a collapse above ground level and its upper brick cornice detail has been lost through weathering of the lime mortar.

Internally, the loss of timber structural components (lintels and cills) have resulted in localised loss of supporting granite walling to most openings on all four elevations (see Fig 13). This can be easily rectified with replacement of the timber components on a 'like for like' basis, and rebuilding of the masonry above/below. The previously earth/rubble covered granite cylinder bedstones have been revealed and drawn into the floor plan surveys with their five cylinder hold-down bolt holes evident. In addition, the cataract pit has been cleared of earth/rock debris. Photographs of this have been reproduced in other reports (3HW's Design & Access Statement 2015).

The shaft (Site 4) is infilled and choked at a depth of approximately 2m below ground level. There are no other visible archaeological features (headgear supports, etc), apart from an overgrown mound of earth/rock waste on the south side of the shaft, and the upstanding balance bob masonry (Site 5). There are upstanding remnants (1.5m high) of the balance bob mounting wall (south side), but no visual evidence of the box at its end (although this may be intact, and just below ground level. The internal 'slot' is infilled with earth and stone.



Figure 7 Engine house from North-west (© CAU 2014)



Figure 8 Engine house from South (© CAU 2014).



Figure 9 Engine house from North-east (© CAU 2014.)

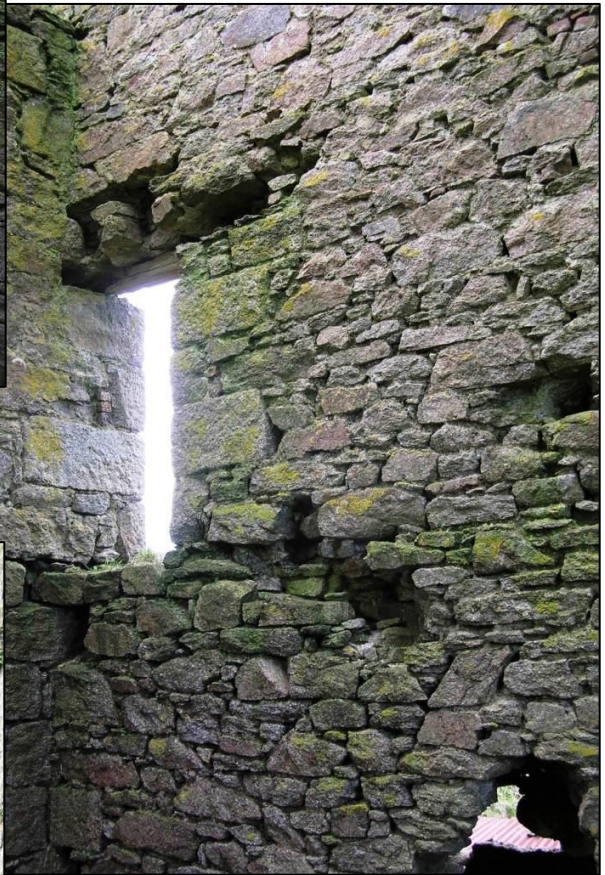


Figure 10 Internal view of south east corner (© CAU 2014).

Figure11 Internal view of north east corner (© CAU 2014).



Figure 12 View of New Engine Shaft and balance bob pit (© CAU 2014).



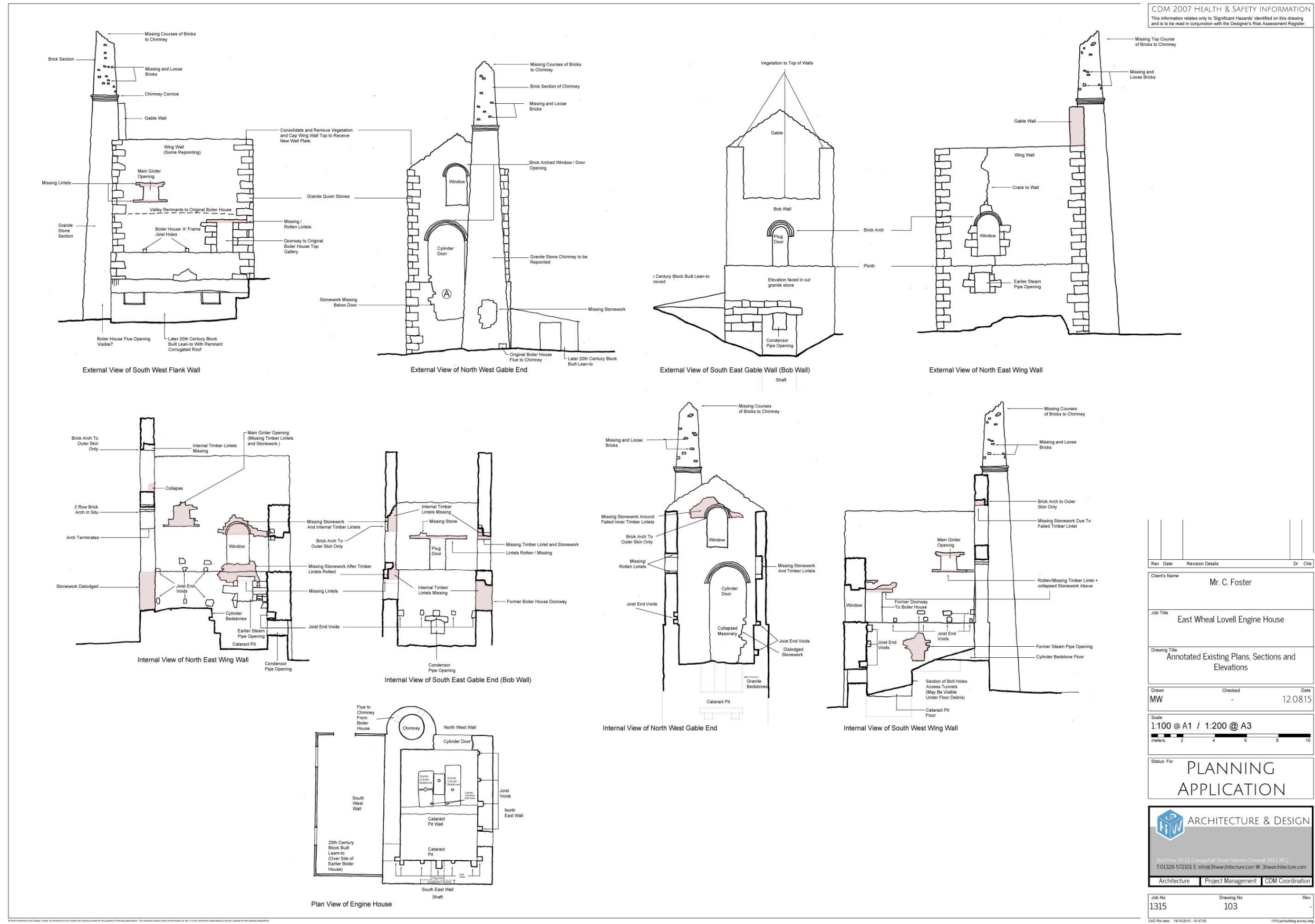


Figure 13 Annotated plans, sections and elevations of the engine house showing significant features and structural problems (© 3HW Architecture & Design).

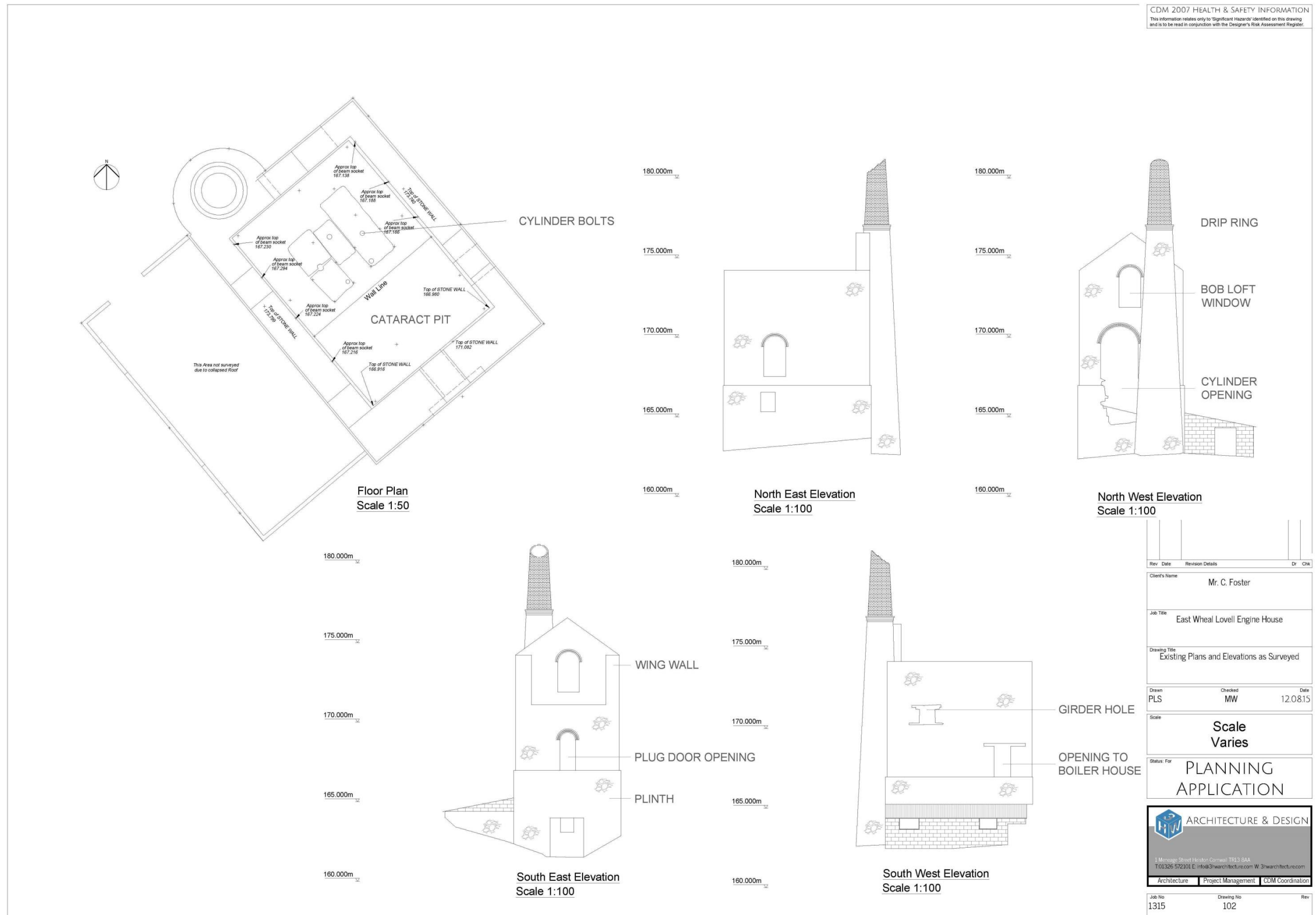
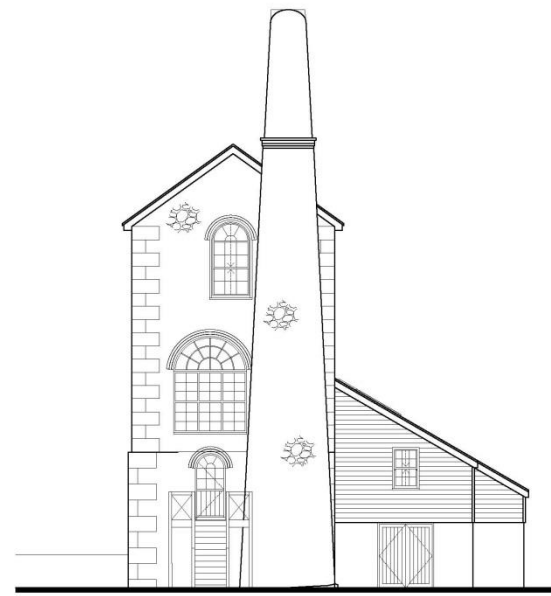


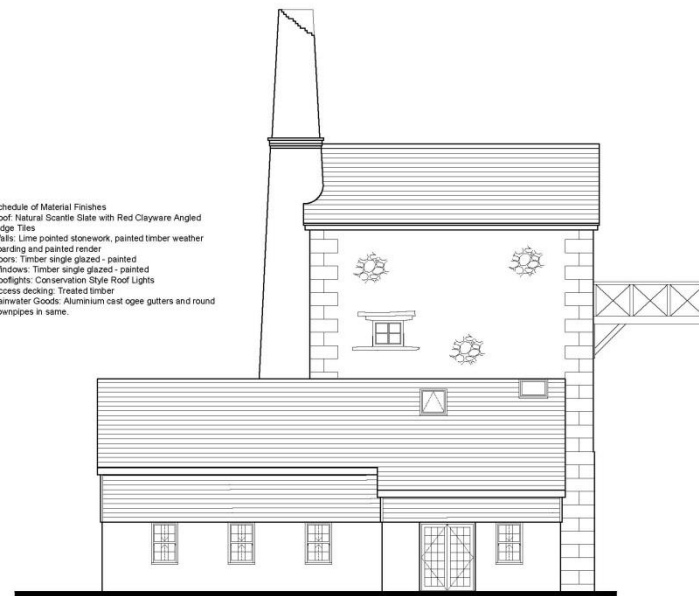
Figure 14 Existing survey plans and elevations of the engine house showing significant architectural features (© 3HW Architecture & Design).

CDM 2007 HEALTH & SAFETY INFORMATION
 This information relates only to 'significant Hazards' identified on this drawing and is to be read in conjunction with the Designer's Risk Assessment Register.

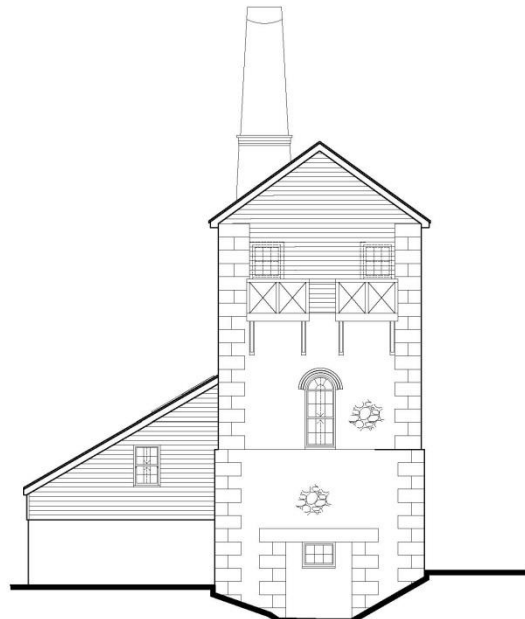


Proposed North West Elevation

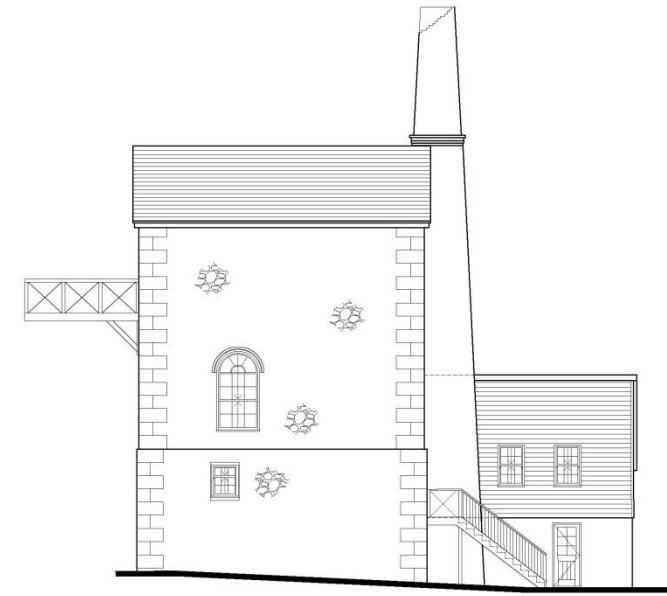
Schedule of Material Finishes
 Roof: Natural Scallie Slate with Red Clayware Angled Ridge Tiles
 Walls: Lime pointed stonework, painted timber weather boarding and painted render
 Doors: Timber single glazed - painted
 Windows: Timber single glazed - painted
 Rooflights: Conservation Style Roof Lights
 Access decking: Treated timber
 Rainwater Goods: Aluminium cast ogee gutters and round downpipes in same.



Proposed South West Elevation



Proposed South East Elevation

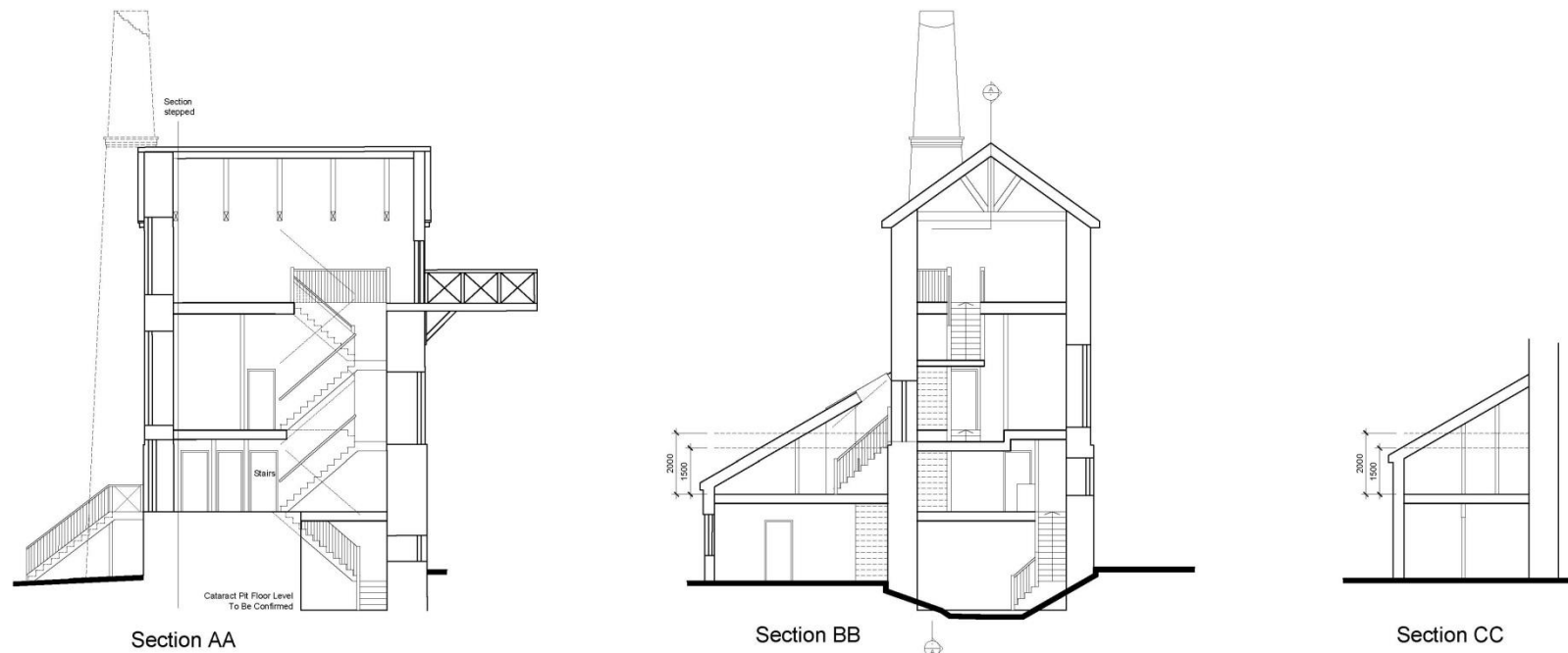
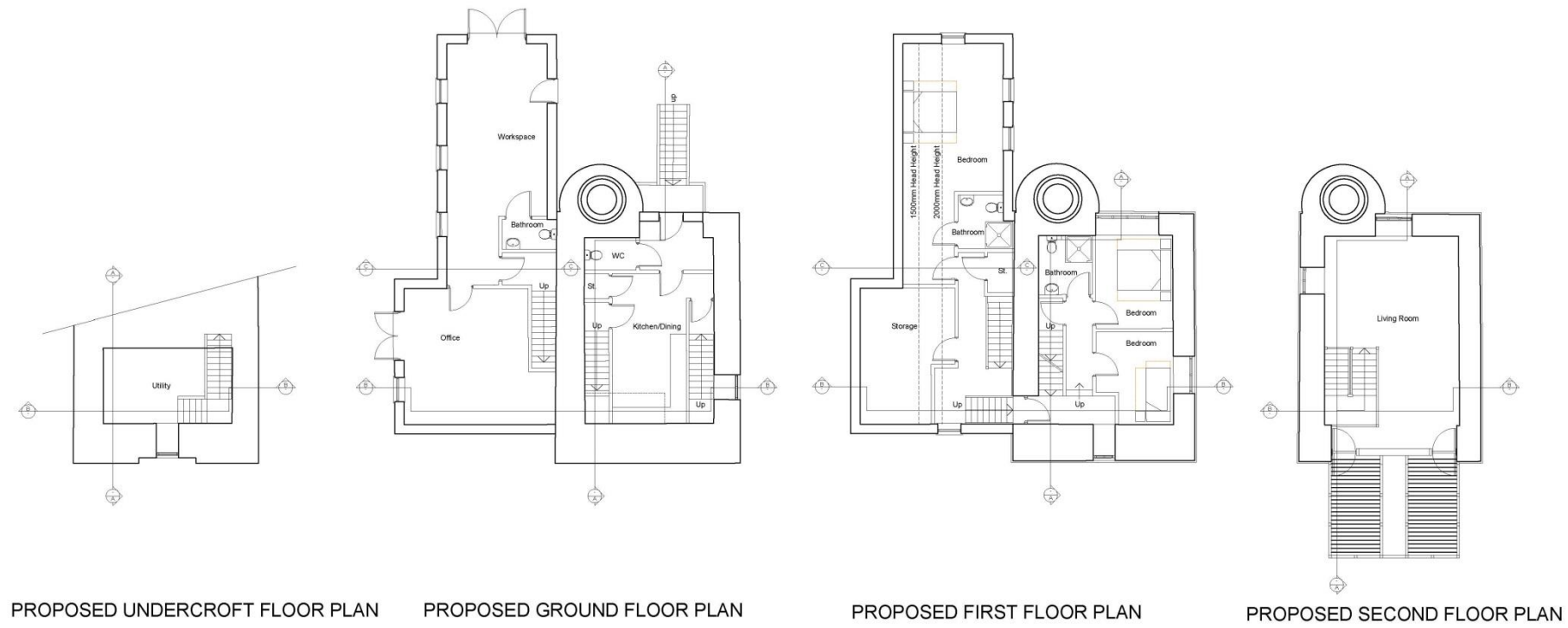


Proposed North East Elevation

Rev	Date	Revision Details	CHK
Client's Name Mr Chris Foster			
Job Title East Wheel Lovell Engine House			
Drawing Title Revised Proposed Elevations			
Drawn MW	Date 13.10.2014	MW	
Scale 1:100 @ A1 / 1:200 @ A3			
Status: For PLANNING APPLICATION			
1 Messing Street Heston Cornwall TR13 8AA T:01326 572101 E: info@3hwarchitecture.com W: 3hwarchitecture.com			
Architecture		Project Management CDM Coordination	
Job No 1315	Drawing No 112	Rev	

Figure 15 Proposed elevations of the engine house (© 3HW Architecture & Design).

CDM 2007 HEALTH & SAFETY INFORMATION
 This information relates only to 'significant hazards' identified on this drawing and is to be read in conjunction with the Designer's Risk Assessment Register.



Rev	Date	Revision Details	CHK
Client's Name: Mr Chris Foster			
Job Title: East Wheal Lovell Engine House			
Drawing Title: Revised Proposed Plans and Sections			
Drawn: MW	Date: 17/03/15		
Scale: 1:100 @ A1 / 1:200 @ A3			
Status: For PLANNING APPLICATION			
1 Meneage Street Heston, Cornwall TR13 5AA T 01326 572101 E info@3hware.com W 3hware.com			
Architecture		CDM Coordination	
Job No: 1315	Drawing No: 111	Rev	
CAD File name: 131502015_11_25.dwg		115.pdw	

Figure 16 Proposed plans and sections of the engine house (© 3HW Architecture & Design).



Figure 17 Proposed site plan (© 3HW Architecture & Design).

6 Impact assessment

The proposed change of use from a redundant steam engine house to a domestic dwelling and new workshop will have an impact on East Wheal Lovell engine house, its setting and character close to the World Heritage Site. However, as far as possible the impacts of these changes have been carefully mitigated throughout the design process. The proposed 3HW architect drawings have been reproduced in this report (Figs 14 to 17), and should be considered when viewing this report. In addition the separate reports '*Design and Access Statement*' and '*Heritage Impact Statement*' by 3HW architects - 2015), should also be consulted. These show externally that the proposed works do not include the necessity of forming any new openings – or the provision of new openings being made for services, etc. New double sliding sash windows (traditional design), will be used for all large windows and construction of a new bob wall timber infill (with two access doors – again to the original specification). A new site access will be created by importing gravel and laying onto the existing ground surface. A temporary caravan will be sited as shown on Figure 17. Internally, new floors are to be added to enable habitation, the joists secured using a combination of existing joist holes and joist hangars.

However, provision for demolition of the existing concrete block lean-to structure and its replacement for a new workshop are being proposed as part of the Listed Building Consent application. This will be sited on the original footprint of the boiler house (Figures 15 and 16). This building includes new roof-light windows, and a slight increase of roof height to adjoin the engine house close to the original position of the boiler house roof lead flashing, rebuilding of a section of collapsed east wing wall (and window).

The impacts for these proposed works are described below, and the mitigation recommendations in Section 8:

East Wheal Lovell Engine House:

- The landowner is applying for Listed Building Consent to change the use of the building from a redundant engine house to a domestic dwelling. Strenuous attempts have been made to minimise the impact of the change of use on the character and integrity of the building.
- 3HW Architects & Design undertook a detailed survey of the building, internally and externally. The existing survey plan and elevations (internal and external - Fig 14) reflect the main significant architectural features of the engine house (which are separately annotated in Fig 13), as advised by the author as part of an historic buildings consultancy project to advise both the client and the architect.
- The proposed change of use and conversion of this building to a domestic property will have an impact upon the engine house that appears to be 'Moderate', if the proposals are undertaken as shown and specified on Figures 15 and 16. However, following a period of amendments and discussion between the archaeological consultant and the architect and owners, they have proposed that there are very few alterations to the visual perspective of the engine house from the nearby main road from Helston to Falmouth – an observation point for many locals (see front cover image).
- The proposed visual impact should be minimal: Double sliding sash window openings shown on the architects plans have been shown to replicate the style used at other existing (and previous) engine houses. Doorway openings will be of pine timber (tongue and grooved), and of a style reminiscent of the late 19th century. The impact of the new roof should be minimal as the roof is virtually at its original height; second hand Cornish slate (dry laid with diminishing courses) is likely to be used. However, the provision of conservation style roof-lights on the new west elevation roof workshop building may well detract from its original design, although this is not likely to be seen except from fields to the west of the building. It has been recommended in the architect's specifications that the external walls are repointed where necessary with a lime mortar and aggregate that matches (in style

and content), the existing external walls. It is recommended that specialist contractors are employed to do this work. In addition, it has been proposed that the internal walls be treated to a lime plaster finish, as shown in the specifications and drawings.

- The structural movement crack in the north east elevation will be either stone stitched, or reviewed on site when scaffolding is erected as to other options, for example rebuilding a small section of wall – but Conservation Officer will be sought at this time.
- The standard bob platform (over the shaft) on the south east elevation, is to be rebuilt as part of this conversion – matching as close as possible to known timber specifications and design. The external boarding within the wing walls (south east elevation) is to be built to a specification which reflects the style used at the time – based on evidence of other adjacent engine houses. Where there would have been a slot for the beam to go up and down, there is now an imprint showing where it would have been (Fig 15).
- The impact of the change of use internally to the building is likely to be of more significance. The conversion of the building to contain a number of floors has attempted to conform to the original floor levels of the engine house (Fig 16). Although where possible, original joist holes have been used, it has been necessary to recommend the use of joist hangers to support new floor joist levels. The joist hanger pins are inserted (where possible into masonry joints), with resin anchored bolts. It is further recommended that the detail and position of the granite cylinder bed stones and holding down bolt holes are retained within the proposed living room floor, as a special architectural feature.

Services

The site location of related services for mains water, gas, electricity, sewage (pipes from the proposed septic tank location), and water drainage for this new development is not known nor are details of the proposed final site levels. It is recommended where possible that these are brought into the building along its northern side (to minimise any impact upon the former site of the original or later boiler houses (west/east sides). The impact of the new site services on the archaeological resource cannot therefore be determined. Internally, it is not certain where services are to be brought into the building but the design and access statement (3HW 2015,) states that '*All services would be surface mounted with no chases taken out of the stonework*'.

Chimney

There are no plans to reuse the chimney, although Listed Building Consent would be necessary for a new fireplace to be built into the north west corner of the engine house. The architects plans (Fig 16) show that the chimney is proposed to be repointed where necessary (especially the top section) to create a consistent style with the engine house walls, and to find similar brick to rebuild the missing section of the upper brick cornice. In addition, it is recommended that a lightning conductor be installed around the top of the chimney with an attached copper strip down the inside of the chimney flue which connects to an earth plate sited to its north (buried at a shallow depth). The location of the steel earth plates is not likely to affect any known archaeological features.

Site access

The proposed site access to the engine house will result in an additional visual impact through the field and close to the site. The archaeological impact is likely to be minimal, but it has been proposed that within the study area the track and turning area is raised above ground level to minimise any impact upon unknown buried archaeological features.

Mine shaft treatment

The architect does not specify an engineering approach to any safety works to the mine shaft. However, it is likely that only a minimal interventionist approach will not have

any detrimental site impact. Recommendations given in Section 10 relate to the provision of an impact assessment (to be agreed by the Senior Development Officer (Historic Environment - SDOHE, CC) if new specifications for these works are proposed. In addition, guidance on shaft treatment approaches has been published by the Cornwall Underground Access Group. It should be noted that shaft excavation as part of a concrete plug/slab treatment may well impact archaeological features – in particular the upstanding remains of the balance bob masonry walling, unless archaeological site mitigation and specifications can reduce this damage. It is likely that an archaeological watching brief will be necessary for this given the archaeological constraints.

In detail, the overall proposed development may have the following impact upon the known archaeological resource (shown as site numbers followed in brackets by site type).

High:

- **Site 3** (Boiler House foundations)
- **Site 4** (New Engine Shaft)
- **Site 5** (Balance bob box/mountings)

MODERATE:

- **Site 1** (Engine House)
- **Site 2** (Chimney)

NONE:

- **Site 6** (Old Engine Shaft safety works – if site fenced)
- **Site 8** (Site of coal shed)
- **Site 9** (Adit Shaft safety works – if site fenced)

Setting and character:

Any proposed new site development will have an impact upon the setting, character and outstanding universal value of other buildings within the adjacent WHS area. However, following guidance from the CAU Project Officer, these have been minimised as far as possible. However it will be necessary to liaise with the SDOHE (Planning Section), it is recommended that the site works reflect the inherent character, setting and architectural style of adjacent 19th century properties.

Summary:

The process of mitigating the effect of the proposed change of use of the Listed Building engine house has already been ongoing by the CAU Project Officer, and two pre-app consultations. The drawings presented by the site architect reflect numerous amendments and design changes to minimise the impact of internal and external changes of use. Thus many of the initial proposed site impacts have already been mitigated and drastically minimised. However, there are some site impacts (visual, character and structural), which are not possible to fully mitigate and it is these that need to be weighed up with the positive aspects of the scheme. It has been the intention to ensure that all practical and structural changes to the building are reversible.

As the nature, extent and quality of the below-ground archaeological resource is not yet known (except from cartographic analysis), it is not possible to fully assess the nature and significance of both the impact of the mine shaft safety works (Site 4 and 5), and foundation excavations for the new workshop (Site 3). However, the information from the desk-based study has been utilised to minimise the impact of new developments within the study area.

7 Impact mitigation recommendations

The recommendations that follow comprise an overall archaeological mitigation strategy for the assessment study area. These have been formulated by considering a combination of documentary, cartographic, and field evidence within the study area as well as following the appropriate WHS and District Planning Conservation Policies. Recommendations for individual structures and features are contained in the Site Gazetteer (Section 5.2); this section provides the context within which those specific recommendations should be read.

The impact of the proposed works for the conversion of East Wheal Lovell Engine House (Listed Building II), to a domestic dwelling, have been mitigated as far as possible through discussion with the CAU project officer, on the basis of the plans that have been viewed. It is recommended that as far as possible, all fabric and structural changes are reversible.

Ground surface impact mitigation recommendations

- Although attempts have been made to minimise the impact of ground disturbance and the effect on known below-ground archaeology, mine shaft excavation, workshop foundation excavation, service installation, access routes and lightning conductor earth plates will involve ground excavation. Given the lack of sufficiently detailed mine map evidence of any other adjacent features it is recommended that an archaeological consultant is employed to record any exposed or unearthed features.
- There have been no detailed proposals in terms of the specification for shaft capping. These are likely to have an impact upon the adjacent engine house bob wall, and other related features close to the shaft. It is recommended that an impact assessment of any shaft closure works is prepared as well as any mitigation recommendations, if a scheme is proposed.

Building impact mitigation recommendations

- It is recommended that the collapsed section of upper chimney brick cornice and lower section hole is rebuilt to the same specification as the remaining structure (with similar masonry stone and a lime mortar (NHL 3.5) with similar aggregate as existing), and it is appropriate (and advisable), that a lightning conductor be fitted to the chimney.
- If possible, the proposed second hand Cornish slate roof should be dry laid slate with diminishing courses to mimic its possible scantle slate original form.
- All new timbers will need to be inserted in place of existing. Timber remnants should be identified and replicated (either Oak or Douglas Fir), to have the same size specifications as existing.
- The exterior faces of the engine house should be repointed where necessary with an agreed lime mortar and aggregate mix (a test panel to be confirmed by the Conservation Officer/archaeological consultant). It is recommended that the building contractors are suitably experienced in working with lime based products and conserving historic buildings.
- It is recommended that the interior faces of the engine house should be replastered where necessary with lime with an agreed lime mortar and aggregate mix (a test panel to be confirmed by the Conservation Officer/archaeological consultant), to match (or if necessary replace), the existing remnants.
- It is recommended that there are no additional intrusive works undertaken on the building which are not reversible in terms of effect, than already specified in the 3HW drawings (Figs 15-17).
- It is recommended that an experienced archaeological consultant undertakes an element of site supervision (in terms of building conservation works), and site recording of works (where below ground impacts may reveal archaeological features), undertaken to this Listed Building.

Visual impact mitigation recommendations

Given the historic importance of this building and its proximity to a main road, the visual impact of the conversion works both to the building and the site (including access), should be minimised as far as possible. If the 3HW report statements and associated plans are followed, then the visual and architectural/archaeological mitigation concerns will be addressed.

Building Regulation recommendations

It is recommended that subsequent Building Regulation recommendations do not subsequently negatively alter the interior or exterior specifications and character as shown on the architect's drawings. It may well be necessary to ensure that a dialogue with CC Building Control Section ensures that the subsequent application does not result in structural/visual or character alterations to the agreed plans and design specifications that have been commented upon in this impact assessment report.

7.1 Impact mitigation strategy

The impact mitigation strategy methodology is described below in three main stages: The pre-works consultancy, site supervision during works and the archaeological recording record (during and after works). This mechanism demonstrates the steps that have been taken to avoid or minimise adverse impacts, and confirms that the proposed works have been designed in close liaison with the relevant statutory (and non-statutory) historic environment and conservation officers. This is based on a clear understanding of the significance of the site using appropriate methods and techniques for site monitoring and recording.

Pre-works consultancy

Chris Foster, the landowner, commissioned architects to facilitate production of plans and specifications for the adaptive reuse of the site and engine house. Pre-works consultancy throughout this formative design period has occurred with the report author, leading to general compromise and agreement, following accepted historic buildings conservation advice and philosophy (see Appendix 10.1).

Detailed liaison with the project's conservation architect (3HW) and through the mechanism of pre-app advice - appropriate statutory officers (Conservation Officers and County Planners), and non-statutory advisers (Cornwall Archaeological Unit), have ensured that the impacts have been reduced as much as possible. However, it should be noted that although many of the impacts have been foreseen through the design and consultation process, it may be the case that others will occur during site works, and cannot therefore be commented upon in detail nor mitigation discussed. This report should therefore be viewed as a generic impact assessment for the project at this stage.

Programmes of archaeological recording

Listed Building Consent from Cornwall Council will be necessary for these works. This report is a prerequisite for planning consent. This report makes the following archaeological impact mitigation recommendations:

- An archive (Black and White) photographic survey of the site and engine house should be undertaken (internally and externally), before any works are started.
- Archaeological recording during works (particularly excavation impact sites for example mine shaft excavation, workshop foundation excavation, and below-ground services/drain routes).
- Production of an archaeological report detailing the results of the above archaeological recording interventions. The archaeological recording report will include detailed 'before and after' site photographs as well as a descriptive text of

the general works. It is likely that a detailed brief will be supplied for the nature and extent of any archaeological recording.

8 References

8.1 Primary sources

Cornwall Council:

Aerial photograph (oblique) of East Wheal Lovell

Ordnance Survey, 1880 and 1908 *Mapping*

Ordnance Survey, 2007. *Mastermap Digital Mapping*

Survey drawings:

3HW Architects & Design Engine House annotations, existing and proposed plans and elevations (3HW Architect drawings 2014/5)

8.2 Publications

Bennett, T, 2014. *East Wheal Lovell Engine House – Historical Review*

Dines, H.G. and Phemister, J., 1956 (reprinted, Beer, K.E., 1988). *The Metalliferous Mining Region of South-West England*, HMSO

English Heritage, 2008. *Conservation Principles Policies and Guidance*, London

World Heritage Site Bid Partnership, 2013. *Cornwall and West Devon Mining Landscape- World Heritage Site Management Plan 2013-2018*

WHS, 2007. *The Outstanding Universal Value of the Cornwall and West Devon Mining Landscape*

8.3 Websites

<http://lbonline.english-heritage.org.uk> The Listed building database of Historic England and the Department of Culture, Media and Sport

<http://www.cornish-mining.org.uk> The Cornwall and West Devon Mining Landscape World Heritage Site website

<http://www.stastier.co.uk> A particularly useful website by the manufacturers of St.Astier brand lime products detailing methodologies for their application.

<http://www.cornishlime.com> The website of the Cornish Lime Company

9 Project archive

The CAU project numbers are **146481** (East Wheal Lovell Mine: Heritage Impact Assessment Report)

The project's documentary, digital, photographic and drawn archive is maintained by Cornwall Archaeological Unit, Cornwall Council, Fal Building, County Hall, Treyew Road, Truro, TR1 3AY.A project file containing site records and notes, project correspondence and administration

1. This report is held in digital form at HE CC as: G:\Historic Environment (Documents)\HE Projects\Sites\Sites E\East Wheal Lovell Mine\ East Wheal Lovell Mine Report 2015R0??
2. Historic England/ADS OASIS online reference: cornwall2-223729

10 Appendix

10.1 Conservation philosophy text

General conservation philosophy

A site's importance may relate to its historic heritage, its ecological or mineralogical heritage, or more usually, to a combination of two or more of these factors. Statutory designations (Listed Buildings, etc) and non-statutory designations (World Heritage Site), may well affect or constrain the scope of a proposed project and detailed consultation with relevant statutory agencies will need to take place both prior to and during a project, with a marked emphasis on a continual dialogue with consultants, focussing on the preservation of the historic character of the mining landscape and buildings.

Conservation work usually involves more than just the consolidation of a building or structure. The work carried out must respect its character and should take into account future access and interpretation, as well as the integrity of its surroundings. It is particularly important that all of these aspects are considered from the outset to avoid situations where consolidation or safety works compromise future plans for the site. Thus the process of professional dialogue and assessments needs to be co-ordinated, often by a conservation accredited architect, and broadly follow the pattern of assessment (or conservation management plan), evaluation (excavation or in this case Impact Assessment), and Mitigation (the results of an agreed mitigation strategy). If the project manager is not a conservation accredited architect then the assistance and close liaison of a archaeological consultant is very important before, during and after works have finished to ensure communication protocol with the respective statutory agencies and to ensure that the works are undertaken to the required standard.

Therefore disturbance to a site should be kept to the minimum required to achieve the aims of the schedule of works and impact assessment mitigation strategy (all of which should have been designed in close consultation with appropriate statutory agencies that is to say, EH, CC (HE Advice), etc. Thus the site should be (as far as possible) left in an enhanced or similar condition as when work started.

Building conservation/adaptive re-use

The conservation of a structure is likely to include a combination of one or more of the following approaches: stabilisation, partial or full repair, selective or full demolition and adaptive Re-use. schedules of work should incorporate some flexibility of approach and be tailored to specific site conditions and problems. The particular options selected are likely to be influenced as much by immediate objectives (for example, stopgap measures to prevent further deterioration), as long-term aims intended to serve for many decades, but should always take into consideration the intended longstanding use of both the structures and the sites within which they stand.

Wherever possible, conservation approaches should be based on carrying out repairs rather than rebuilding, other options being resorted to only where absolutely necessary. Other structural remediation works are likely to necessitate operations such as masonry removal and re-setting, masonry replacement, re-installation of lintels and other structural timber or stonework, pointing and weatherproofing of areas of exposed walls and perhaps reinstatement or replacement of roof structures and coverings.

The conservation philosophy should be based on principles of replication of existing specifications, perhaps adopting an appropriate period style (if large scale refurbishment is necessary), and following a basic principle of impact reversibility. For example, when considering replacement window styles, appropriate archive evidence should be provided if possible to substantiate a general principle of replacement.

Specifications

- Traditional building materials (for example, brick, stone, or appropriate timber) can be used when consolidating/adapting historic buildings.
- Traditional lime mortar mixes should generally be used, using locally sourced aggregates to match the original mortar composition or locally sourced rab for the engine house. Mortar test panels should be made to permit the selection of appropriate aggregate mixes/colour and finish before the pointing work is undertaken.
- Cement and modern materials should be used very rarely and only when the need for their use can be demonstrated.
- Where possible the original form and specification of windows, gutters, downpipes, timber weatherboarding, etc should be researched by viewing archive information and reference on site.

Whatever approach is taken, the need for flexibility, sensitivity, authenticity and above all, reversibility must be recognised from the outset, and, where possible incorporated into the design brief.

10.2 Glossary of mining terms

ADIT A level tunnel (usually driven into a hillside) in order to give access to a mine, and used for drainage or the hauling of broken ore. Deeper adits did not necessarily connect to surface, and were used to carry water back from distant workings to a pumping shaft.

ANGLE BOB A simple lever-based device using which the direction of a reciprocal motion (of pump rods, flat rods) could be changed (for example from horizontal to vertical).

ASSAY HOUSE The mine laboratory, where samples of ore were analysed for their mineral content.

BAL or BALL From Cornish "*Pal*" a shovel, and hence "a digging" = a mine. Generally applied to earlier mines. See also **WHEAL**.

BALANCE BOB A large counterweighted lever attached to the shaft pump rods and used to offset their weight and thus reduce the work of a pumping engine to lifting water alone. A surface balance bob would be mounted adjacent to the shaft on a pair of plinths or on a masonry support at ground level (balance bob mounting), the attached counterweight - a large box filled with scrap iron or rocks - working in an adjacent stone-lined pit. Other balance bobs would be installed in chambers cut into the rock adjacent to the shaft wall as needed to counterbalance the weight of the pump rods, especially on a deep shaft..

BAL-MAID A woman or girl employed at surface on a mine, generally in the dressing of ore.

BEAM-ENGINE A type of steam-engine much favoured in Cornwall for use in pumping, winding, and providing the power to crush ores preparatory to dressing on Cornish mines. The power from a large cylinder set vertically in an engine-house was transferred via a massive rocking beam or bob to the pumps in the shaft outside. For winding and crushing, the bob was instead attached to a flywheel and crank on a **LOADING** next to the **BOB-WALL** (or in the case of all indoor engines, the side wall). In most cases, the engine house formed an integral part of the framing of the engine.

BEDSTONE The granite slab which formed the foundation for the cylinder of a Cornish Engine.

BLOWING-HOUSE An early form of tin smelting furnace, small in scale and using charcoal as a fuel.

BOILER HOUSE A generally lightly-built structure attached to an engine house, and designed to contain the horizontal boilers for a steam engine; the associated chimney stack may be attached to this structure, or built into one corner of the engine house.

BRATTICING Timber partition work in a mine, for instance the **LAGGING BOARDS** which lined the upper section of a shaft where it ran through soft ground.

BUCKING The breaking down of copper ore on an anvil to about 10mm in diameter by bal-maids using small hammers, after which the ore was separated from the waste by hand. This process followed cobbing, in which it had been broken down to about 25mm in diameter, the waste again being hand removed. These processes, through which the majority of the highest quality copper ore was recovered, took place within roofed structures called bucking houses.

BUDDLE A device for concentrating tin ore. In the mid-19th century these most usually took the form of a circular pit with rotating brushes; the tin from the stamps was fed into the centre or side of the pit and was graded by gravity, concentrating the heavy ore near the inlet point. These were often mechanically worked. Earlier buddles were trapezoidal in shape, and manually operated. A variation used in tailings works to treat sands and slimes was the **ROUND FRAME**: a free-standing, all wooden, mechanically-actuated buddle, whilst a further variation was the dumb buddle or dumb pit, which was not mechanically operated.

CALCINER A furnace and heating chamber in which ores were roasted to drive off impurities such as sulphur and arsenic. These were also known as Burning Houses, later patterns being of **REVERBERATORY** design. The Brunton pattern calciner, introduced in the mid-19th century, was mechanically powered, and operated on a continuous basis, unlike earlier designs. Other patterns of calciner were also devised, the majority named after their designers (e.g. Oxland, Hocking and Loam).

CAPSTAN A manually or steam-operated winding drum, usually installed on a mine to raise pitwork from the shaft for maintenance or repair.

CATARACT PIT (or cock pit) A sub-floor area within the foundation levels of an Engine house between the Cylinder Plat and the Bob Wall, containing the regulating apparatus, and giving access to cylinder hold-down bolts.

CILL The base of a window or other wall opening.

COFFIN or **GOFFEN** The narrow excavation resulting from stoping on a lode being carried to or from surface on part or all of a lode. See also **GUNNIS**, **STOPE**, **OPENWORK**.

CONDENSER The cast-iron cylinder set in a tank of cold water immediately in front of the bob wall of an engine house in which the exhaust steam was condensed, creating a vacuum which greatly increased the efficiency of a steam engine. For a pumping engine this equipment was often contained within a pair of masonry walls projecting from the bob wall towards the shaft.

COST BOOK COMPANY A company of unlimited liability into which shareholders either paid 'calls' for further finance or shared any profits. Mines kept a 'cost book' to record expenses/costs/dues/earnings. This system was replaced by the end of the 19th century by limited liability companies.

COUNT HOUSE Properly **ACCOUNT HOUSE**, but generally shortened. The mine office, sometimes incorporating accommodation.

CULVERT A small tunnel constructed to carry a channel of water.

CYLINDER OPENING The often large, arched opening in the rear wall of an engine through which the steam cylinder was brought into an engine house during the erection of the engine. This opening was generally subsequently closed off with a timber partition and usually incorporated the principal doorway into the engine house.

CYLINDER PLAT The massive masonry base on which the cylinder of a Cornish Engine was bolted down (see also **BEDSTONE**).

DRESSING The concentration of the tin (copper or other ores) contained in the rock excavated from the stopes of a mine. Carried out on **DRESSING FLOORS**.

DRESSING FLOORS An (often extensive) area at surface on a mine where the various processes of concentration of ore took place - these consisted of crushing or stamping to attain a uniform size range, sizing (particularly on later mines), separation of waste rock, concentration (generally mechanically and hydraulically on tin mines, manually on copper mines), the removal of contaminant minerals (by calcination, flotation, magnetic separation), and finally drying and bagging for transportation to the smelter. Tin floors in particular were generally laid out down a slope to reduce mechanical or manual handling between stages in the process.

DRIVE (alternatively lode drive or heading). A tunnel excavated on the line of a lode as the first stage of the development of a STOPE.

DRY or **CHANGE HOUSE** (earlier **MOOR HOUSE**) The building within which miners changed their clothes before and after going underground. Some were heated by steam pipes connected to the engine boilers. Where there were large numbers of women or children employed on a mine, there might be two dries - one for men, the other for women and children. The pithead baths or showers found in collieries were rarely found in Cornwall.

DUMP or **BURROW** (alternatively spoil dump, spoil tip). A pile of waste material, usually from a mine or quarry. May contain primary waste (where this could not be disposed of underground) or waste from various stages in the dressing process. **TAILINGS LAGOONS** stored the extensive slimes from the final stages in the process; in earlier mines these were flushed over cliffs or allowed to wash away in streams or rivers.

EDUCTION PIPE The large diameter pipe through which exhaust steam was drawn into the condenser set outside the bob wall.

ENGINE HOUSE A building designed to contain steam, gas, oil or electric engines on a mine or other works. When forming part of the framework of a beam engine, these were particularly strongly constructed.

FATHOMS Measurement of horizontal or vertical distance at surface or underground (1 fathom: 6 feet)

FINGER DUMP A linear dump of waste material from a mine or quarry, flat-topped to allow material to be barrowed or trammed along it, and often equipped with a temporary tramway track.

FLAT RODS Reciprocating (or very occasionally rotative) iron rods used to transfer power from a steam-engine or water-wheel to a remote location.

FLUE A masonry-constructed tunnel or conduit connecting a furnace to a chimney stack

FRUE VANNER A mechanically-driven, laterally vibrated, inclined rotating belt on which fine tin-containing material in suspension in water was treated by relative density.

GIRDER The massive timber beam set across an engine house just below top floor level to which the parallel motion was attached and on which the spring beams sat.

GOSSAN The upper part of a mineral vein as it breaks surface. The natural weathering of the rock will decompose the metallic sulphides, characteristically leaving a porous rusty Quartz.

GUNNIS A narrow linear excavation left where a lode has been worked, most commonly used when open to surface. See **COFFEN**

HANG A TACKLE A temporary headframe construction with a winding mechanism to aid in the sinking of a shaft on a lode or to access a lode

HEAD or **CROP** The richest part of material in a buddle - nearest its feed point.

HEADFRAME The tall construction set over a winding shaft which carried the sheave wheels over which the winding ropes ran. Headframes usually contained ore bins or ore chutes to allow the broken rock in the skips or kibbles to be tipped into trams at surface.

HORIZONTAL ENGINE A steam engine where the cylinder(s) are set on a horizontal bed and the piston rods are attached via a cross-head to a crank and flywheel.

HORSE WHIM Similar to a capstan, but in this case power supplied by a horse walking around a circular platform (**PLAT**) was applied to an overhead winding drum; frequently used for winding from small shafts on Cornish mines, especially during exploratory work and shaft sinking. The smaller under-gear whims found in some 19th century farms were little used on mines.

JIG A large mechanically or hand-operated sieve set in a tank of water using which ore could be separated by waste. Sometimes constructed in groups within jiggling houses.

KIBBLE A large, strongly-constructed, egg-shaped, iron container used for ore and rock haulage in earlier shafts. Superseded by **SKIPS**.

LAGGING BOARDS The timber planks lining the upper part of a shaft, or where it ran through soft ground.

LAUNDRER A wooden or steel trough used to carry water or other liquids; often used to feed water or finely-divided material in suspension around a dressing floor.

LABYRINTH (colloquially "lambreth") A series of interconnected masonry-constructed chambers set adjacent to one another on whose walls the arsenic vapourised in a calciner or arsenic furnace was condensed out. The gas followed a zig-zag path through such groups of chambers, and one end of each chamber would be closed off with a door using which the condensed arsenic could be collected.

LEAT An artificial water-course, built to carry a supply of water to a mine.

LINTEL The horizontal timber or stone support above an opening in a wall or structure.

LOADING The masonry platform in front of an engine-house (or elsewhere on a mine) on which machinery such as cranks, flywheels or winding drums were mounted and on which the reciprocal motion of the sweep rod attached to the beam was turned into a rotative motion.

LOBBY The excavated cutting running up to an adit portal.

LODE A linear area of mineralization underground. In other parts of Britain a **VEIN**, or **SEAM**. Generally vertical or near-vertical, and often extending for considerable distances along its strike.

LODE-BACK PIT A shallow shaft dug from surface into shoad or the upper part (backs) of a lode, from which ore could be extracted from shallow stopes to the depth of the water table or just below. Waste material was generally dumped adjacent to the shaft mouth.

MAGAZINE Small strongly built store containing explosives (gunpowder or dynamite); often circular, sometimes with additional enclosing walls to contain the blast of an accidental explosion.

MELLIOR STONE The granite bearing stone in which the upright shaft of a **HORSE WHIM** ran.

MIDDLES The material in a buddle found between the crop and the tailings, this generally containing enough ore to warrant its re-treatment.

OPENWORK or **BEAM**. A mineral extraction site open to the surface, and similar to a quarry but usually distinguished by its elongated shape, and steep sides. Generally applied to features broader in extent than a **GUNNIS OR COFFIN**. A variety is a **STOCKWORKS**, where an area of ground containing a large number of small parallel lodes was removed wholesale.

OVERBURDEN The topsoil and subsoil removed in the process of opening or extending a quarry, or streamworks.

PELTON WHEEL A small enclosed water turbine, working at high pressure and rotational speeds. In use from the later 19th century.

PITWORK The term used to describe the pump rods, rising main, shaft guides (buntons) etc. within a shaft.

PORTAL The entrance to an adit beyond its **LOBBY**. Often timbered or stone vaulted.

PROSPECTING PIT/FOSSICKING PIT OR COSTEANING PIT A small pit dug in search of minerals, and almost always found in linear groups, often arranged cross-contour, or at right angles to the projected strike of known lodes or deposits of shoad. A **COSTEANING TRENCH** is a linear excavation cut for prospecting purposes.

RAG FRAME or **RACK FRAME** An inclined table-like surface on which very fine slimes in slurry form were treated to recover their tin. Large mines would have hundreds of such frames arranged in groups.

REVERBERATORY KILN A design of furnace in which there was indirect contact between the heat from a hearth and ore to be roasted, usually by incorporating a baffle flue.

ROTATIVE ENGINE A beam engine in which the reciprocating motion of the beam was converted to rotary motion via a sweep rod, crank, and flywheel.

SETT The legal boundary within which a mine could extract minerals.

SETT One of a series of stone supports for a tramway, performing the same function as sleepers.

SETT One of the components of timber framing of an adit where it ran through loose ground; also the timber framing of a shaft to which the shaft guides and **LAGGING BOARDS** were attached.

SHAFT A vertical or near-vertical tunnel sunk to give access to the extractive areas of a mine.

SHAKING TABLE A slightly inclined, mechanically vibrated table on which fine tin (as sands or slimes) in suspension in water was concentrated by relative density.

SHEARS or shear legs. A tall timber frame carrying a pulley or sheave wheel erected in front of an engine house over a shaft and used for the installation and maintenance of PITWORK.

SHOAD or **SHODE** Ore weathered from the load and moved (in geological time) downslope under the force of gravity. Material reaching a river valley would be to some degree concentrated before re-deposition in horizontal beds. These beds of detrital material (placer deposits) were exploited in streamworks.

SKIP A (generally elongated) iron or steel container equipped with small wheels or brackets running on the shaft guides (buntons) and used for rock and ore haulage in later mines.

SOLLAR A timber platform in a shaft, stope or underground working (often between a series of ladders).

SPRING BEAMS The pair of longitudinal timbers extending from the rear of an engine house parallel to and on either side of the BEAM at top floor level. These served to arrest any unwanted excess indoor motion of the beam via catches set onto its rear and were extended out from the front of the house to form the foundation for the bob-plat (the timber platform from which the bearings on the outdoor section of the beam could be serviced).

STACK A chimney on an industrial site, used to carry away smoke or fumes from boilers, furnaces and calciners. Often situated at the end of a Flue.

STAMPS A mechanical device for crushing ore-bearing rock to a fine sand. Heavy vertically-mounted beams (or later iron rods) carrying cast or forged iron heads were sequentially lifted and dropped onto the prepared ore beneath them by a series of cams mounted on a rotating drum; this usually being driven by a water-wheel or rotative engine.

STOPE Excavated area produced during the extraction of ore-bearing rock. Often narrow, deep and elongated, reflecting the former position of the lode. Where open to the surface, these form GUNNISES or COFFENS.

STREAMWORKS An area worked for detrital (redeposited) tin deposits by shallow excavation. Often characterised by linear dumps, river diversion, and evidence for leats. Some streamworks (dryworks) exploited deposits of shoad in now dry valleys and on hillsides, where concentrations of this material were economically workable. Leats and reservoirs were necessary to work these sites, and are characteristic of them.

STRIPS (settling strips) Elongated shallow tanks in which the primary settlement and subsequent separation of tin ore from waste took place after it had been stamped.

SWEEP ROD The elongated iron rod which connected the beam of a Cornish engine to a crank and fly wheel.

TAILINGS The waste sand and slime from a mine dressing floor, not containing workable quantities of mineral.

TAILRACE The channel along which water flows after having passed over or under a water-wheel and is then generally returned to the water course.

TRIBUTE A system of payment (by percentage of value of ore broken) whereby groups of miners contracted to work at previously-agreed rates.

TUTWORK A system of payment ("by results") in which groups of miners bid against one another for contracts to work sections of the mine for a percentage of the value of the ore raised from that area.

VANNER A person employed on the surface of a mine to check or assess the tin content at each stage of the refining process. The VANNING SHOVEL was used to test the relative concentration of ore in a sample of finely crushed ore or partially dressed ore.

WATER-WHEEL Wheel fitted with buckets or paddles around its periphery, and driven by the weight or force of a stream of water directed onto them.

WHEAL also **WHELE**, **WHILE**, **HUEL**. A mine.

WHEELPIT A structure built to house a water-wheel, often excavated and stone-lined, but sometimes free-standing.

WHIM PLAT The level and usually circular platform on which a horse-whim was sited.

WHIM The winding gear used for hauling from a shaft; consists of a power source and a winding drum. See Horse-Whim.

WIND BORE The cast-iron strainer attached to the bottom lift of pumps