Royd Hill Farm
Royd Lane
Higham
Barnsley

Design and Access Statement
& Annex Justification

August 2008

INDEX **PAGE**

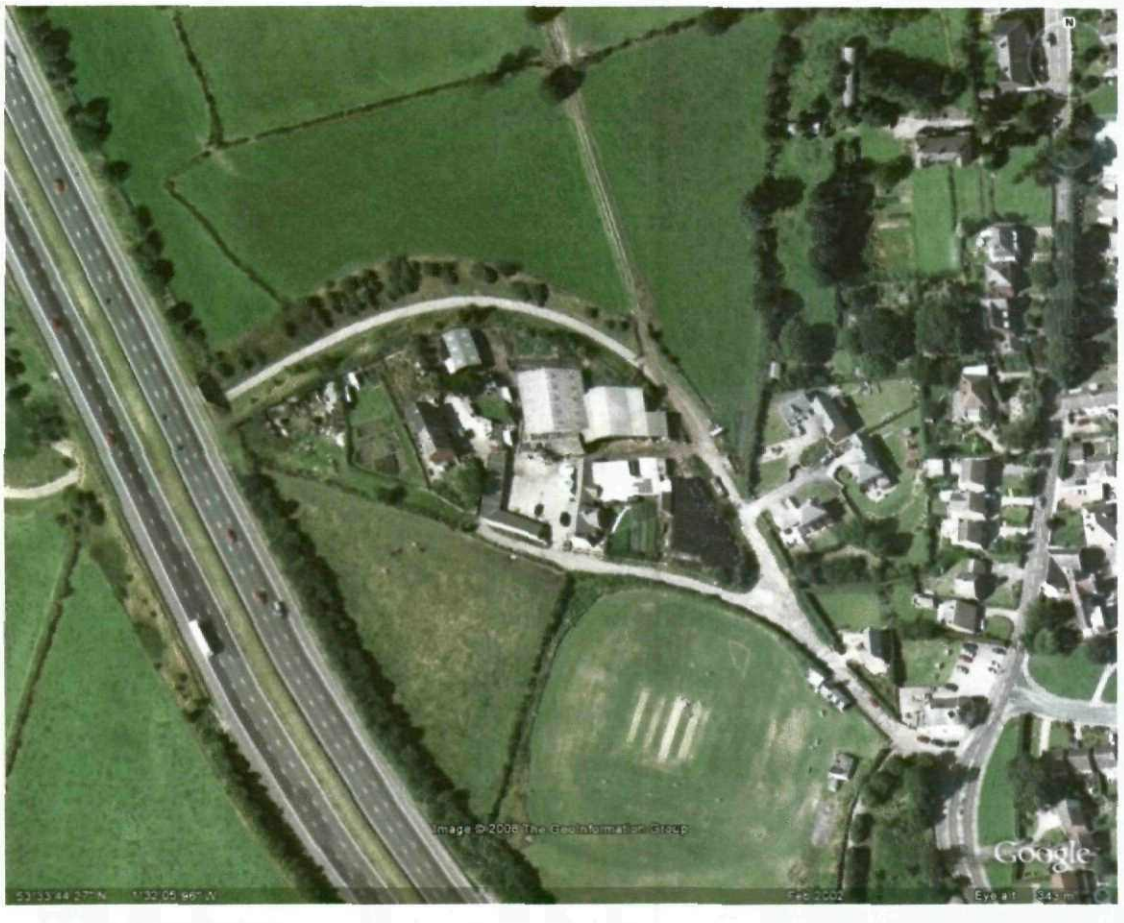
Appendices

DESIGN AND ACCESS STATEMENT

ROYD HILL FARM, ROYD LANE, HIGHAM, BARNSLEY

GENERAL

The Site



Royd Hill Farm is located in Higham, Barnsley. The Application site is approximately 5550m2 (1.37 Acres) and consists of a two storey farmhouse and various 1 & 2 storey farm buildings.
The surrounding area is set within the green belt. To the East of the site there are three existing two storey dwellings. To the West of the site there are three relatively recently constructed detached dwellings, one of which is currently being extended.

Fig 1 – Extension to Surrounding Buildings

Main access to the site is from the South East and the Village of Higham. The main access road then divides into two directions which lead to the main courtyard, and the two dwellings to the West, and also around the perimeter of the site. The road carries on around the perimeter of the site, under the M1 motorway until, shortly after, it becomes a dirt track suitable for agricultural vehicles.
The buildings form a flow of process traditional to farmsteads of its nature and era. One of the out buildings is Grade II Listed. The building of timber frame construction and it is the timber frame that is of particular interest.
The site is self contained and does not overshadow any neighbouring properties. The small annex buildings opposite the Farmhouse and Grade II listed barn offer a degree of natural acoustic protection from the nearby M1 motorway.
The development will look to comply with a range of policies including GS7 Green Belt, GS8 & 13 Development within the Green Belt, BE2 and 2A Development affecting Listed Buildings and T2A vehicular access.
Alongside the relevant policies the site will be developed using guidance from 'The Conversion of Traditional Farm Buildings : A Guide to Good Practice ' as published by English Heritage.

Neighbour Consultation(See Appendix A)

The following neighbours were consulted:

Name: Mr C Peake & Mrs P Trueman
Address: 22 Royd Lane, Higham, Barnsley
Comments: (See Appendix A)

Name: Miss K Wyke & Mr P Allen
Address: 24 Royd Lane, Higham, Barnsley
Comments: (See Appendix A)

Name: Mr D Lane & Mrs M Lane
Address: 26-28 Royd Lane, Higham, Barnsley
Comments: (See Appendix A)

The comments made by the neighbours demonstrate a clear understanding of the proposed works has been communicated. The residents are clearly in favour of the proposed scheme and believe that it will add value to the current site by creating a mini hamlet. The residents have also indicated that they would be happy to see the rear wall to the annex re-built in stone. The current proposals are to keep the existing walls as rebuilding would increase the percentage of walls being demolished within the site considerably. As the area is within greenbelt the amount of new build has been kept to the minimum.
Reference has also been made to the importance of bringing back into use a site which is now largely in disrepair.

Local Authority Consultation

Prior to the submission of this application 2 Pre Submission Assessment meetings have taken place between Matthew Burgin and Michael Barnett (BBAD Ltd) and Tony Wiles and Kieran Dunn (Barnsley MBC). The second meeting also included representatives from the Client. Both meetings resulted in significant changes to the proposed schemes in line with recommendations from both the Conservation and Planning Officer.

SITE PROPOSAL

Whilst the existing farmhouse is still in use the outbuildings have deteriorated into a poor state of repairs. Several of the buildings, or elements thereof, give the first impression that they are currently in danger of collapse. Should the buildings be left without remedial action it appears that this is probable outcome for the buildings in the short term.
As with many existing farmsteads dereliction is becoming an increasing problem, particularly as the site clearly no longer has a viable mainstream or low key agricultural use. It would appear that an inherently sustainable redevelopment would be of long term benefit to site. From the neighbour consultation, this sentiment is shared by the current occupiers of the immediate surrounding properties.
From English Heritage – ' If adaptive reuse is the most sustainable option it will help to determine which elements of the building are most worthy of retention, and which may be lost with little or no detriment – sometimes indeed with beneficial effect. Such understanding will also help to inform pre-application discussions for the various consents that may be required.'

Key Site Factors

Due to the existing nature of the site there are two key features which must be retained to achieve sympathetic and sustainable re-use.

- Existing Grade II listed timber framed barn.
- The flow of process of the existing farmstead and courtyard.

Existing Grade II listed timber framed barn.

The existing Grade II listed timber frame is in an advanced state of disrepair. A structural report on the Grade II listed Barn was carried out by EPOC (16.03.08) (See Appendix B) and concluded that there was major structural integrity problems with areas of the barn. It also identified areas of infestation within the timber frame. The many recommendations included underpinning foundations, reproofing and removing areas of walls and replacing with salvaged stone.
Due to the importance of this building to the site as a whole the barn needs to be appreciated and understood as a whole. As it is timber framed construction this frame will be load bearing and, as such, any work to either the timber frame or external envelope will have major implications. As the building is believed to date back to the 15th century any future re-use will have to consider loadings on the timber frame. See attached method statement supplied by the Structural Engineer. (See Appendix C)

The flow of process of the existing farmstead and courtyard.

Whilst the main barn is believed to date back to the 15th century the remaining buildings are more recent. It is possible that this barn is the only remaining original building and the other outbuildings have been added during the lifespan of the farmstead. As the roof is of a slate construction, it would appear that they would be dated around 1750-1880, during the boom period for agricultural activity. The use of blockwork and render, particularly on the annexe buildings would suggest that the outbuildings have been modified piecemeal throughout this period.
Whilst individual buildings appear to have been removed, adapted and fallen into disrepair, the farmstead character has remained.
It is easy to see how this farmstead functioned in providing shelter for the farm families and livestock and would suggest it took its current form around the 1840s to the 1870s.
Preserving the nature of this regular courtyard layout is essential and designed correctly would enhance the overall farmstead. Many of the alterations over the years have been carried out to poor design and construction standards and can be redesigned sympathetically.

EXISTING GRADE II LISTED BARN (PLOT 2)

Existing Overview

The barn adjacent to the farmyard is the oldest building on the site and is of timber frame construction. As with many barns the form and plan is simplistic with few openings. There are two substantial openings large enough to drive a loaded wagon with a smaller door situated in the corner. Careful inspections have indicated the appearance of many alterations over the years to the openings, some more obvious than others. It is possible that the openings removed were used at one point to pitch in the crop, suggesting it was once served as a threshing barn. The removal of openings would also suggest that, as was common in the 1880's, the barn was also used as a cow house.
The barn currently has a Planning Approval (Ref : B/05/0602/DT/LB) granted on 31st March 2005.

Proposed Scheme

Current Volume	= 665.86 m3
Proposed Volume	= 665.86 m3
Proposed Increased	= 0 %
Current Footprint	= 124.00 m2
Proposed Footprint	= 124.00m2
Proposed Footprint Increase	= 0 %

The proposed scheme utilises the existing form of the barn. As the barn is Grade II listed the design is sympathetic to the historical importance of the building and its current material state of disrepair. As the building dates back to the 15th century and is timber frame it is likely that the external cladding is not original. Whilst the cladding may have been added it is now of intrinsic importance and must be considered in the design and method statements.

Over the years, as the stone cladding has become part of the evolution and history of the barn, openings within the stone have been added and omitted. As with many barns of its type it does not currently have many openings. For the building to have a sustainable and adaptive re-use it will be necessary to have more openings within the envelope of the cladding than is currently there.

Careful inspections have been carried out to identify where openings have been blocked up over the years. Re using these openings will allow windows to be situated necessary for the daylighting required within the dwelling without compromising the historical integrity of the building. The Code for Sustainable Home (for New Build) and EcoHomes (for Conversions) developed by the Building Research Establishment (BRE) both identify the importance of dayighting within dwellings. Daylighting is encouraged and rewarded to exceed 2 % in kitchen areas and 1% in study areas, bedrooms and living areas. Whilst it is unlikely, due to the constraints placed upon the design by the buildings current form and listing, it is necessary to consider the importance of daylighting. Drawing 08-011-120 identifies areas within the cladding where clear evidence of previous opening exists.

On the front elevation there are currently 2 openings which are used as doors. The largest of the two openings (the cart door opening) shows clear evidence of having been reduced. There is also evidence of two other openings within the front elevation. The proposed elevations feature 8 openings, which exceeds the current number of both existing and removed by 4. There is also a rooflight in the roof, which will be the conservation type to reduce impact. On the approved application there are 4 windows and 2 rooflights. The glazing will be set back deep within the reveal to create shadow lines and minimise reflections and overall impact. The formation of these windows has been kept to a minimum along with the overall dimensions of the openings. Four of the openings (which are the ones additional to the approved design) are small apertures with chamfered internal reveals to maximise the amount of light received inside and give the appearance of glazed owl holes. In general the colour and construction of the windows will be to suit the surrounding and is to be approved by the Planning and Conservation Officer, prior to installation.

The rear elevation currently has 4 openings, with the largest showing evidence of having been reduced in size. The new elevation has just one more opening and one conservation rooflight than existing and just one more rooflight than the approved elevation.

The side elevation current has one opening, which is to remain, as it appears on the approved design.

The existing roof covering of stone slate is to be re-used if possible.

Internally the timber frame is to receive localised treatments, in accordance with specialist recommendations, where necessary. The roof trusses are to remain as

existing and alongside being a feature of the barn, will also form part of the structural roof.

EXISTING FARMHOUSE (PLOT 1) - UNLISTED

Existing Overview

The existing Farmhouse is a two storey stone constructed traditional farm property with a front porch and basement. The building is currently occupied by one of the Applicants. The existing roof is of stone slate but has been repaired with a bitumen waterproof membrane and appears to be in need of replacement. Attached to the side is a grade II listed single storey timber framed barn.

Proposed Building

Current Volume	= 577.25 m3
Proposed Volume	= 887.00 m3
Proposed Volume Increase	= 53.7 %
Current Footprint	= 103.90 m2
Proposed Footprint	= 143.50 m2
Proposed Footprint Increase	= 38.1 %

The proposed works involve extending the building to the rear, increasing the overall footprint by around 38.1 %. The increase in size has enabled the building to have 4

double bedrooms. The master bedroom has a dressing area, en-suite and a balcony which takes advantage of views over the cricket field.
The Farm House is not a listed building and the proposed works, whilst adding 38.1% to the existing footprint, are in keeping with the existing building. As is common with the Farmstead character the Farm House is the flagship of the Farmstead and is the first building to be seen when approaching the entrance.
All new external materials will match existing and be approved by the Local Authority prior to commencement.

BARN 2 – PLOT 3 (UNLISTED)

Existing Overview

Barn 2 is a large detached outbuilding with no listing. Internally there are timber roof trusses which are the only features of interest. The external structure is weathered sandstone, as the listed barn. It is likely that this barn was converted to cow houses in the 1880's.

Proposed Building

Current Volume	= 641.29 m3
Proposed Volume	= 848.23 m3
Proposed Volume Increase	= 32.3 %
Current Footprint	= 129.29 m2
Proposed Footprint	= 180.00 m2
Proposed Footprint Increase	= 28.2 %

The proposed building has an increased footprint whilst retaining the existing height at eaves. The building is slightly longer with two additional one storey habitable areas at the rear. The roofs to the one storey additions have been stepped from the main roof, and a different pitch used, in accordance with comments made by the

Planning Officer to give the buildings a 'articulated' look in keeping with the Farmstead. The front elevation has been design to compliment the listed barn with a floor to eaves height window, similar to the listed barn. Such size openings would be common as a typical cart door entrance in Farm Outbuildings of this age. To minimise the impact of the glazing on the front elevation timber double doors and panelling have been added, as suggested by the Planning Officer, to the extent of approximately 50% of the overall panel.
All new external materials will match existing and be approved by the Local Authority prior to commencement.

ANNEX BUILDINGS (UNLISTED)




Existing Overview

The Annex buildings are one storey outbuildings that appear to have been used to house livestock. The external construction is of stone and render and exposed blockwork with a steel sheet roofing. Internally and externally the outbuildings seem to have no features of architectural or historical importance.

Proposed Building

Current Volume	= 537.91 m3
Proposed Volume	= 995.98 m3
Proposed Increased	= 84.9 %
Current Footprint	= 189.29 m2
Proposed Footprint	= 189.29 m2
Proposed Footprint Increase	= 0 %

Design Evolution (See Appendix D)

The proposed Annex buildings have evolved during the design stage firstly through comments made by the Planning and Conservation Officers during pre application consultations and then by following English heritage guidelines for the Conversion of Traditional Farm Buildings.

Initially the Annex buildings were to be 1 ½ storey accommodation with the height of the existing rear wall to remain as existing. This design was discussed with the Planning and Conservation Officers but was seen as contrary to the traditional form of farm buildings. The 1 ½ storey with dormers was the main reason for this and is not seen as a suitable form of construction in keeping with the existing form of the farmstead.

The Planning and Conservation Officer commented that it would be preferable to have a traditional 2 storey construction which would compliment the existing farm buildings, even though this would require the exiting rear wall to be raised slightly. A second scheme was then designed with the annex buildings to have a similar design as the two barns. The main feature of the two barns is a wall to eaves glazed panel on the front and rear elevations. These panels would represent a typical cart door entrance, which were a common feature of barns used for threshing.

Although this design met the guidelines set by the Local Authority of massing and complimenting the new barn developments, after considering English Heritage literature, it was decided to add a third scheme. There is no evidence to suggest that the outbuilding had ever been used as threshing barns, and the one storey construction would preclude the option of large cart doors. The buildings are of much smaller scale than the two barns and farmhouse. The introduction of floor to eaves windows not only had no historical grounds but also had the appearance of being in competition aesthetically with its much larger neighbouring buildings. The neighbouring buildings could justify this appearance both through scale and historical usage. Consequently the final scheme toned down the aesthetical appearance of the outbuildings by removing the large glazed panels in favour of traditional style windows. As the building has historically appeared as a secondary building within the farmstead it now subtly blends in within the development. As the farmstead is to be subject to adaptive re-use, a natural progression is for the redundant buildings to be used as cottage style accommodation which suits the form and scale of the existing buildings.

JUSTIFICATION FOR ADAPTIVE RE-USE OF ANNEX BUILDINGS.

The Conversion of Traditional Farm Buildings by English Heritage states ' a small proportion of buildings – whether protected through listing, unlisted but set within designated landscapes or simply unlisted buildings – will not be capable of adaptive re-use, because their scale precludes this '

Although the annex buildings are set within greenbelt, they are not listed and do not appear to be of intrinsic importance.

The current form of the annex buildings is of benefit to the farmstead in a number of ways. Historically it demonstrates the flow of process, previously identified, within the courtyard plan. More recently it acts as an acoustic barrier from the nearby M1 Motorway. Standing in the courtyard the noise from the Motorway is substantially reduced compared to nearby areas outside the courtyard. As the proposed scheme slightly increases the height of the building this benefit is to be increased.

The overall scheme, and in particular the annex buildings, has the support of the nearby neighbours, as can be seen in the neighbour consultation letters. The neighbours would be in favour of rebuilding the external rear wall in stone, which would be in keeping with the rest of the homestead. This option has not been considered as removing such a large area of the original structure may be classed as new build, as opposed to conversion within the greenbelt. Although this is a missed opportunity the Structural Engineer has designed a lightweight steel frame to support the existing wall. The existing wall is rubble filled stone, with render and although it appears structurally sound, it has been decided to support the roof and additional walls on the steel frame. For extra stability the wall will also be tied into the steel frame. (See Appendix E -*Note Engineers design based on Annex Evolution Scheme 2)

Utilising the existing building as dwellings adds to the sustainability of the overall site and the effectiveness of its intended adaptive re-use. The Code for Sustainable Home (for New Build) and EcoHomes (for Conversions) developed by the Building Research Establishment (BRE) both identify and reward the use of multi-storey dwellings over single storey for the sustainable and efficient development of land.

It is the intention of the Applicants for the Annex buildings to be occupied by relatives. The three applicants all have elderly relatives over retirement age with health issues. The houses have all been designed to Part M compliance and with the relevant WC amenities. It is proposed that the staircase will be design to facilitate the retrospective fitting of a stair lift.

Additional occupation of the buildings not only gives the farmstead a sense of place but will increase the overall security of the site. The courtyard will be the central feature of the site and will be enveloped by sustainable residential developments. To enable the courtyard to retain this feeling and remain uncluttered, private and visitor parking has been allocated outside this area. Each annex building also has its own external space and store.

As the courtyard is to become a focal point within the development it is important that it is complementary to the scheme as a whole. Currently the courtyard is of a concrete construction and has no aesthetic merits. It would appear that the surface is relatively new but is in a poor state with numerous cracks. To enhance the courtyard it is proposed to have a stone cobble effect finish, as indicated below.

Fig 2 – Courtyard Finish

The cobble effect finish, along with paved areas to the front of the barns / farmhouse and small grassed gardens to the annexes will enhance a sense of community to the development.

SITE SUSTAINABILITY

As the Applicants intend to occupy all of the dwellings they are committed to using renewable energy sources which will reduce carbon emissions way in excess of that recommended by SAP and Building Regulations.

Appendix F is an initial feasibility study carried out for Plot 2. The report identifies the possible use of both Ground Source Heat Pumps and Air to Water Heat Pumps. There is also an option to use Solar in conjunction with these heat sources. A further feasibility study is underway to introduce a carbon neutral boiler using wood pellets. The preferred method of supplying hot water and heating is likely to reduce SAP Level Carbon emissions by 25 – 50 %, possibly in line with a Code Level 4 house. This type of system will be used on Plots 1,2 &3.

For the Annex buildings it is anticipated that solar panels will be used to generate hot water. It is likely that such a system will reduce SAP Level Carbon emissions by 25%, possibly in line with a Code Level 3 house.

Plots 2 & 3 have an allocated external lockable boiler store, large enough to facilitate a bio mass boiler.

As sustainable development is becoming increasingly required by the Local Authorities, it is not unusual for a condition to be included within a Planning Approval. Such a condition may state that no works shall commence until a report has been submitted to and approved by the Authority identifying how the predicted CO_2 emissions from the development will be reduced by at least 10% through the use of on site renewable energy equipment.

The overall commitment to sustainable heating and hot water supply will reduce the carbon emission on the site to in excess of this requirement. Although the heating and hot water systems have yet to be finalised the applicants are committed to long term sustainability.

In conjunction with the renewable heat source all dwellings within the site offer the following:

- Provision of a Home Office
- Outdoor drying spaces
- Adequate space for internal and external recycling bins
- Adequate space for external storage, suitable for cycle storage
- All insulants used will have a Global Warming Potential of less than 5
- Provision will be made for cycle storage to all units
- A minimum of 75% of light fittings will be energy efficient
- All dwellings to have water butts.

Appendix A
Neighbour Consultation

Supporting Statement for Royd Hill Farm

In support of the application submitted for the development of Royd Hill Farm Higham, please see the following statement:

As the residents who are geographically most effected by the proposed development at Royd Hill Farm, we would like to convey our unequivocal support for the proposed development. The new owners have clearly communicated their plans for the site and as a collective we are pleased that the main objective of the development is to create a small family development that is integrated into our existing community.

In relation to the conversion of the outbuildings into two storey dwellings, we have seen the proposed plans and have no objections to the proposed scheme. The current buildings are not in use and it would be nice to see them returned to some form of use. Having said this, if possible we would like the rear wall of the outbuildings to be demolished and replaced with a new stone wall. We believe this would cause less disruption through the construction phase than piecemeal repair work and would be aesthetically superior to the existing rendered wall. Moreover, we support the proposed schemes for the farmhouse and two barns and believe that once completed, the development will add real value to the community, both aesthetically and through increased property values.

Furthermore, in relation to the protection of the openness of the greenbelt, the new owners have already removed a number of large, unsightly agricultural buildings to open up the rear of the farm, thus significantly improving the openness and appearance of the site. The land has been cleared of agricultural and industrial debris and sections returned to grass. We would argue that the site in relation to aesthetics has improved significantly and hope you would agree that by allowing the development of Royd Hill Farm to continue, you are not only protecting the greenbelt in an area of outstanding beauty, but you are ensuring that a site of historical and communal importance receives the investment it clearly deserves. We welcome any comments you may have to this statement.

Kindest Regards

Mr C Peake & Mrs P Trueman
22 Royd Lane
Higham
Barnsley

P. Trueman
C. Peake

Miss K Wyke & Mr P Allen
24 Royd Lane
Higham
Barnsley

K. Wyke
P. Allen

Mr D Lane & Mrs M Lane
26-28 Royd Lane
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Appendix B
EPOC Structural Report

THE **EPOC** GROUP

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STRUCTURAL INSPECTION

OF

BARN BUILDING

AT

ROYD HILL FARM

HIGHAM

BANSLEY

FOR

MR DARREN DICKINSON

Date of Inspection **16th March 2008**

Reference No. **08/101**

STRUCTURAL INSPECTION OF BARN BUILDING AT ROYDS HILL FARM

CONTENT

1.0 INTRODUCTION

1.1 The EPOC Group was appointed by Mr D. Dickinson to carry out a structural appraisal of a barn building at Royd Hill Farm.

1.2 The inspection was carried out on 16th March 2008. The property was not occupied when the inspection was carried out.

1.3 The following report shall be for the sole use of Mr D Dickinson this report should not be reproduced in whole or in part or relied upon by third parties for any use without the expressed written authority of The Epoc Group. This exclusion shall not apply to any party acting for Mr D. Dickinson having a strictly professional interest in the specific matters to which this report relates.

1.4 This report relates only to the barn building.

1.5 This report is based on an inspection of visible, exposed and accessible parts of the structural fabric of the barn building under consideration. No trial pits were excavated to expose the sub-structure

1.6 The objective of this report is to establish the structural condition of the barn building and recommend remedial action.

1.7 Mr Dickinson informed the Epoc Group that the barn was a listed structure and any proposals for the repair and alteration would have to gain local authority and English Heritage approval.

2.0 OBSERVATIONS

2.1 General Observations

2.1.1 The barn building comprises of a loadbearing timber frame with stone masonry walls under a stone slate roof. The Epoc Group was informed by the owner that the barn was of 15th Century construction.

2.1.2 The barn is joined to and shares the Southern gable with Royd Hill Farmhouse.

2.1.3 The barn forms a complex of buildings on Royd Hill Farm

2.2 West Elevation

2.2.1 The West elevation is constructed in rubble filled random coursed stone masonry. The walls are approximately 450mm thick. The stone is showing signs of extreme weathering caused by wind and rain. This weathering is evident over approximately 75% of this elevation. In places the weathering has extended beyond the outer leaf and the rubble fill is exposed. **(Photograph 1)**

2.2.2 At the Southern end there is a porch to the farmhouse constructed in similar materials. The construction is recent and in good condition.

2.2.3 There is a large opening and small doorway within this elevation

2.2.4 There are patches of repairs to this elevation predominantly at eaves level which appears to be of recent construction

2.2.5 A vertical joint was noted in the wall at the Northern end although the wall either side appear to be of a similar type and construction. **(Photograph 2)**

2.2.6 There was evidence of significant movement throughout the length and height of this elevation. The wall showed signs of roof spread at eaves level with an outward movement of approximately 250mm. There were numerous bulges throughout the length of the wall and it was difficult to observe any form of consistent straight line. Cracks were noted running up from the head of the small door up to eaves level. **(Photograph 3)**

2.3 North Elevation

2.3.1 The North elevation is the gable end. Its construction is similar to the West elevation. As on the West elevation the there is significant wind and rain weathering of the stonework face over approximately 70%.

2.0 OBSERVATIONS (Continued)

2.3 North Elevation (Continued)

2.3.2 At the junction with the West elevation there is a large crack running the full height of the wall. This crack is approximately 20mm wide. It is evident that this cracking is due to outward movement of the West elevation. **(Photograph 4 & 5)**

2.3.3 The gable is showing signs of outward movement. This movement starts at approximately 2.50m above ground level with an outward lean of approximately 200mm over 3.50m. **(Photograph 6)**

2.4 East Elevation

2.4.1 The East elevation is constructed in coursed stone masonry. This elevation has been protected from the affects of wind and rain weathering and generally remains in good condition. The wall in this elevation is constructed in stonework with rubble fill and is approximately 450mm thick. **(Photograph 7)**

2.4.2 There is a gable wall in this elevation with a large opening. The opening has been partially blocked up in brickwork.

2.4.3 There are some areas of missing and damaged stonework within this elevation most notably around the gable extension within this wall. The damage around this gable is loss of masonry at eaves level, cracking to the right hand side and weathering of the stone face. **(Photograph 8)**

2.4.4 There is a large timber lintel forming the opening in the gable. The lintel is showing signs of deterioration. The wall above this lintel is also showing signs of outward movement **(Photograph 9)**

2.4.5 Vegetation in the form of ivy was noted growing on the wall to the left hand side of the gable

2.5 Roof

2.5.1 The roof is covered in large heavy stone slates. These slates are in good condition with only the odd lose or missing tile

2.5.2 There are signs of sagging of the roof and the ridge line is uneven. This sagging is evident from both the East and West elevations.

2.0 OBSERVATIONS (Continued)

2.6 South Elevation

2.6.1 No external observation could be made as this gable also formed the gable of the farmhouse.

2.7 Internal Observations

2.7.1 The inner leaves of the external walls were constructed in random stone masonry and were generally in good condition.

2.7.2 Internally the barn is a timber framed construction with large section timber kingpost trusses supported on large section timber posts with gracing timbers at eaves level. These frames were joined together with large section timbers at eaves level. This timber frame was built into the external walls. The kingpost trusses support timber purlins and timber rafters. **(Photograph 10 & 11)**

2.7.3 The purlins and rafters appeared to be a more recent construction than the remaining timber frame. The owner informed The Epoc Group that these indeed had been recently replaced in oak.

2.7.4 The original timber frame showed signs of insect infestation and some areas of rot caused by rain penetration through areas of missing roof tiles

2.7.5 There were the remains of timber beams within the walls indicating that a mezzanine floor once existed.

2.7.6 At the time of the survey the floor was bear earth and no floor construction was evident

2.7.7 Two trial holes were noted in the barn. Both extended approximately 750mm below internal ground level and exposed stiff yellow clay. In one of the trial holes water had seeped into the pit and this water had softened the clay indicating that the clay was susceptible to the affects of water ingress. The trial pits indicated that the walls extended approximately 500mm below internal ground level.

3.0 DISCUSSION

3.1 The barn has undergone some significant movement some of which may be attributable to mining subsidence.

3.2 The West and North elevations have undergone extensive weathering and this weathering has affected the structural integrity of the structure.

3.3 The West elevation has weathered so badly that the rubble fill has been exposed to the elements. This has allowed entry of water into the rubble fill between the two leaves of stonework. This can cause settlement of the fill inducing lateral forces on the wall causing bulging. This bulging is already evident in both the West and North elevations

3.4 The North elevation is in a very similar condition and is showing signs of lateral movement at high level.

3.5 The East elevation is generally in good condition. There are some areas where repairs are required to maintain the structural integrity.

3.6 The timber lintel to the gable in the East elevation is in poor condition and the wall above is showing signs of lateral movement.

3.7 The roof covering were in good condition however the roof showed signs of sagging and the ridge line was uneven.

3.8 The timber frame structure showed signs of extensive insect infestation and localised rot. A Specialist report should be obtained to determine extent the damage and remedial treatment. Load carrying capabilities of the existing timber frames need to be determined.

3.9 New timber purlins and rafters were noted. It may also be necessary to determine the load carrying capabilities of these elements.

3.10 The founding level of the walls was shallow. The bearing strata comprised of stiff clay which was susceptible to the affects of water ingress. The owner informed The Epoc Group that it was proposed to reduce the level within the barn by approximately 500mm.

4.0 CONCLUSIONS

4.1 The West elevation and the North Gable have been subjected to major movements and weathering and the structural integrity has been greatly impaired. This has rendered these walls beyond repair

4.2 The East elevation has been constructed in higher quality materials and due to the sheltered nature has not suffered the levels of face deterioration and movements. There are some areas that require repair specifically above the large opening in the gable extension.

4.3 The roof structure is showing signs of sagging although the rafters and purlins have recently been replaced. The stone slate roof covering is in good condition and can be reused in the proposed development.

4.4 The timber frame is generally intact although there are signs of insect infestation and rot caused by rain penetration. The extent of damage needs to be assessed by a timber specialist.

4.5 The founding level of the walls is only 500mm below existing internal ground level. The owner has informed The Epoc Group that the proposed development will reduce the floor level by 500mm exposing the base of the wall

It is recommended that the following work is carried out to permit redevelopment of the barn. It must be noted that the proposals will require consent from the local authority and English Heritage.

- **Demolish the West elevation and North Gable wall and rebuild using salvaged stone from the walls where possible. The proposed construction is to be built off new concrete foundations using a blockwork inner leaf and salvaged stone laid in lime mortar. The new wall thickness should reflect the thickness of the existing wall. During construction of the new walls the timber frame will require temporary support**

- **The East elevation is to be retained and repair works carried out in the form of replacement of missing stonework and reconstruction of the gable wall above the existing lintel. The whole wall should be repointed using lime based mortar to improve the integrity of the wall.**

- **All timber lintels and beams over openings in the external elevations should be replaced with new timber.**

- **Condition of the timber frame requires assessment by a timber specialist. All necessary repairs must be carried out in line with their recommendations.**

- **Remove the stone slate roof covering, carry out alterations to roof timbers to improve roof alignment, relay existing stone slates on new battens and felt and install new roof drainage.**

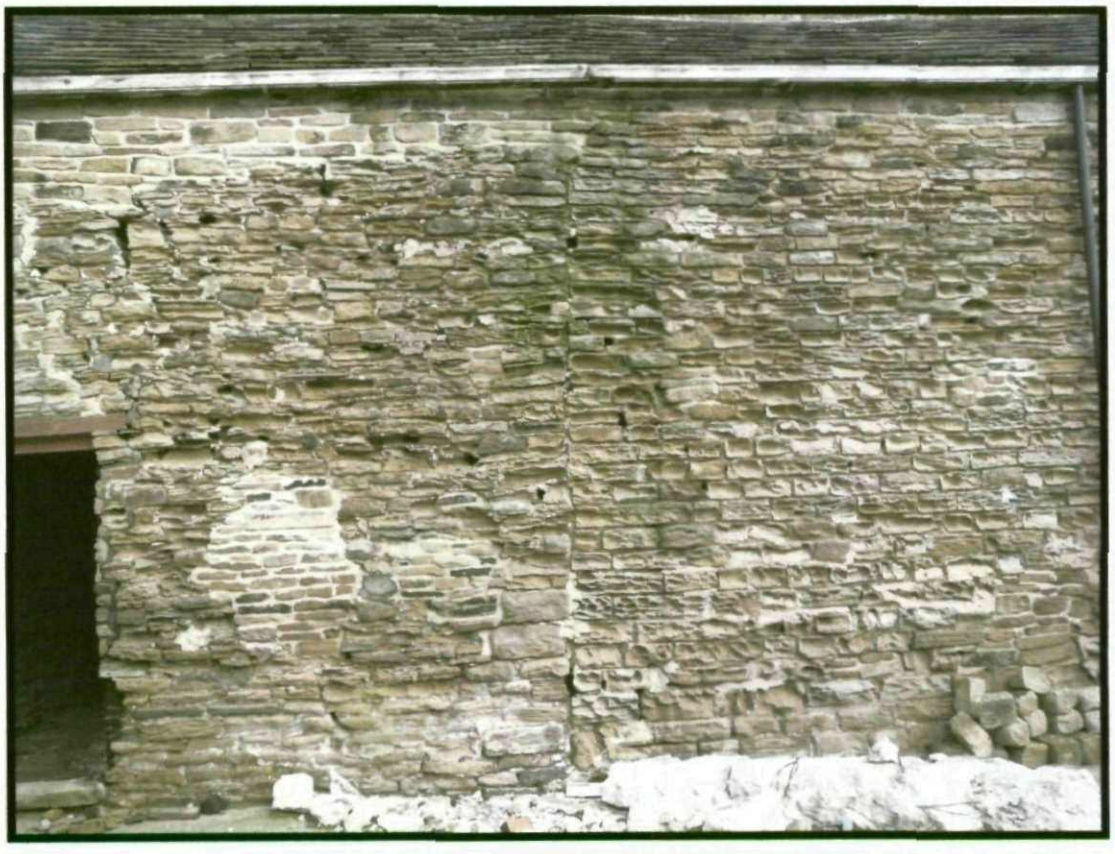
4.0 CONCLUSIONS (Continued)

- **Carry out underpinning works to South gable and East elevation to allow lowering of floor level within the barn. (Estimated costs £500-£1000/linear metre)**

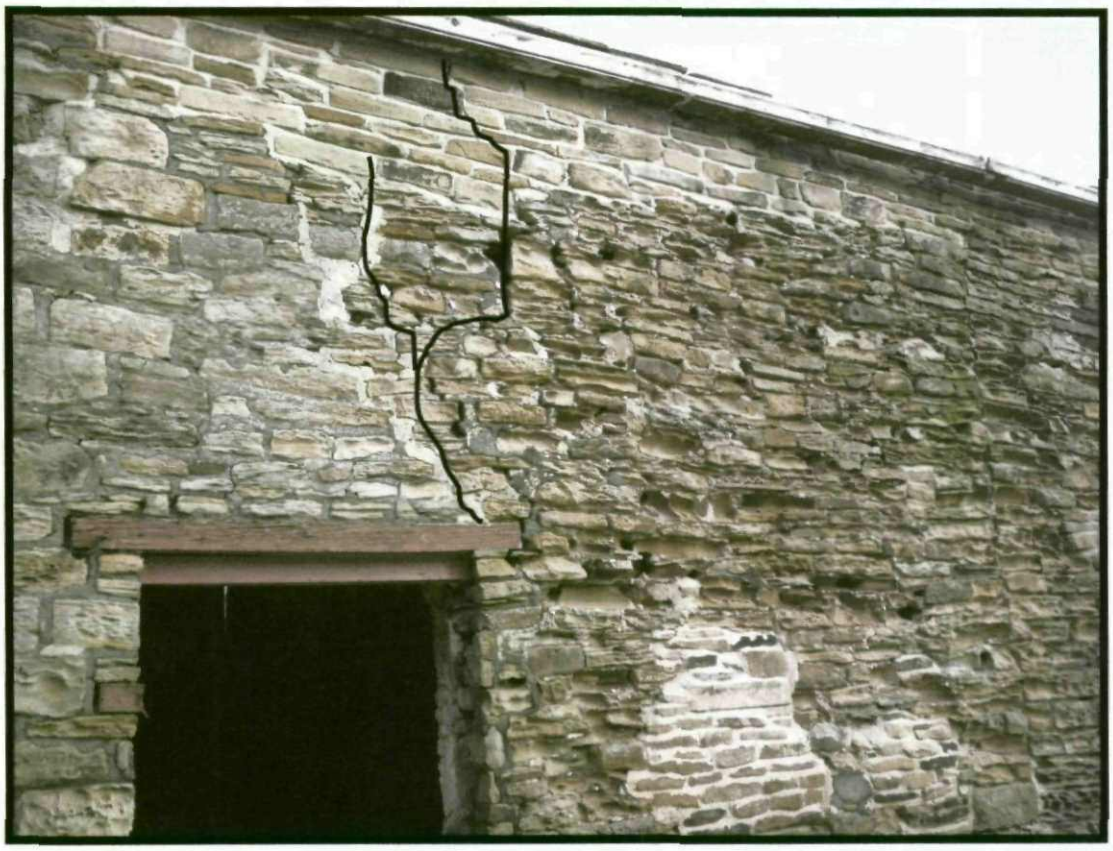
ANTONIO RUBINO BEng CEng MICE
CHARTERED ENGINEER

5 PHOTOGRAPHS

Photograph 1 – West Elevation

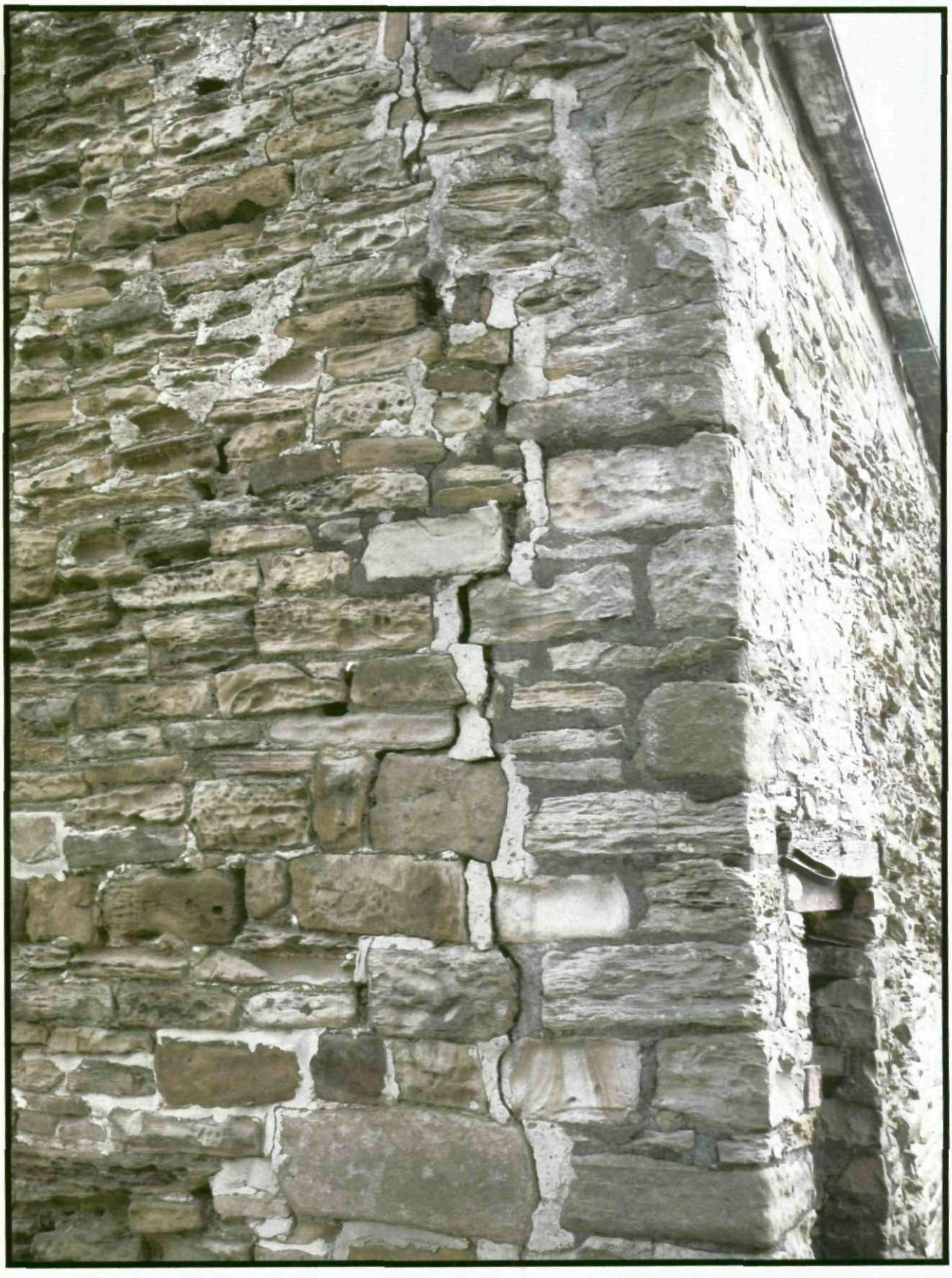


Photograph 2 – West Elevation show vertical joint

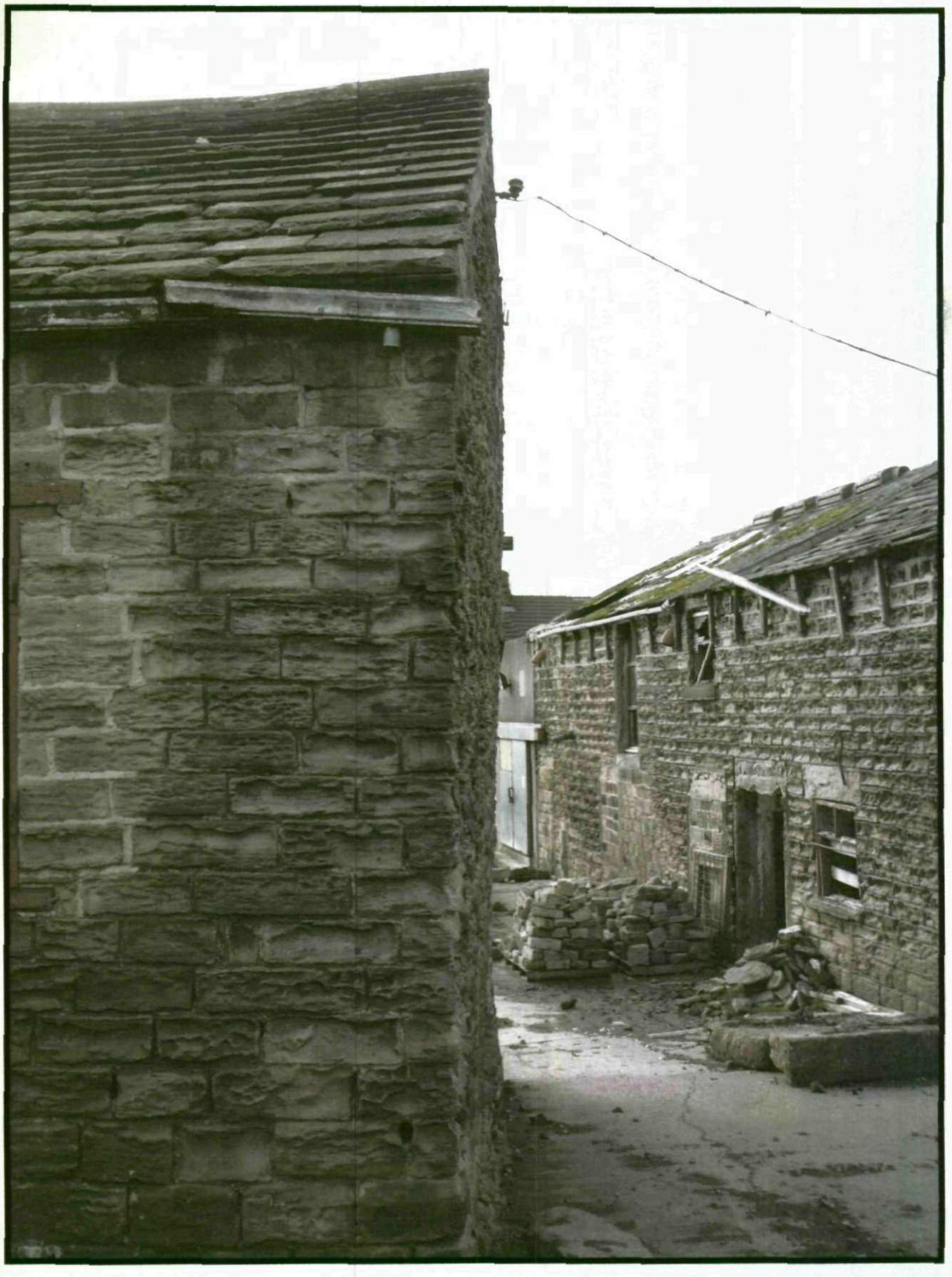


Photograph 3 – West Elevation cracking shown highlighted above doorway

Photograph 4 – North Elevation (Gable) Crack highlighted



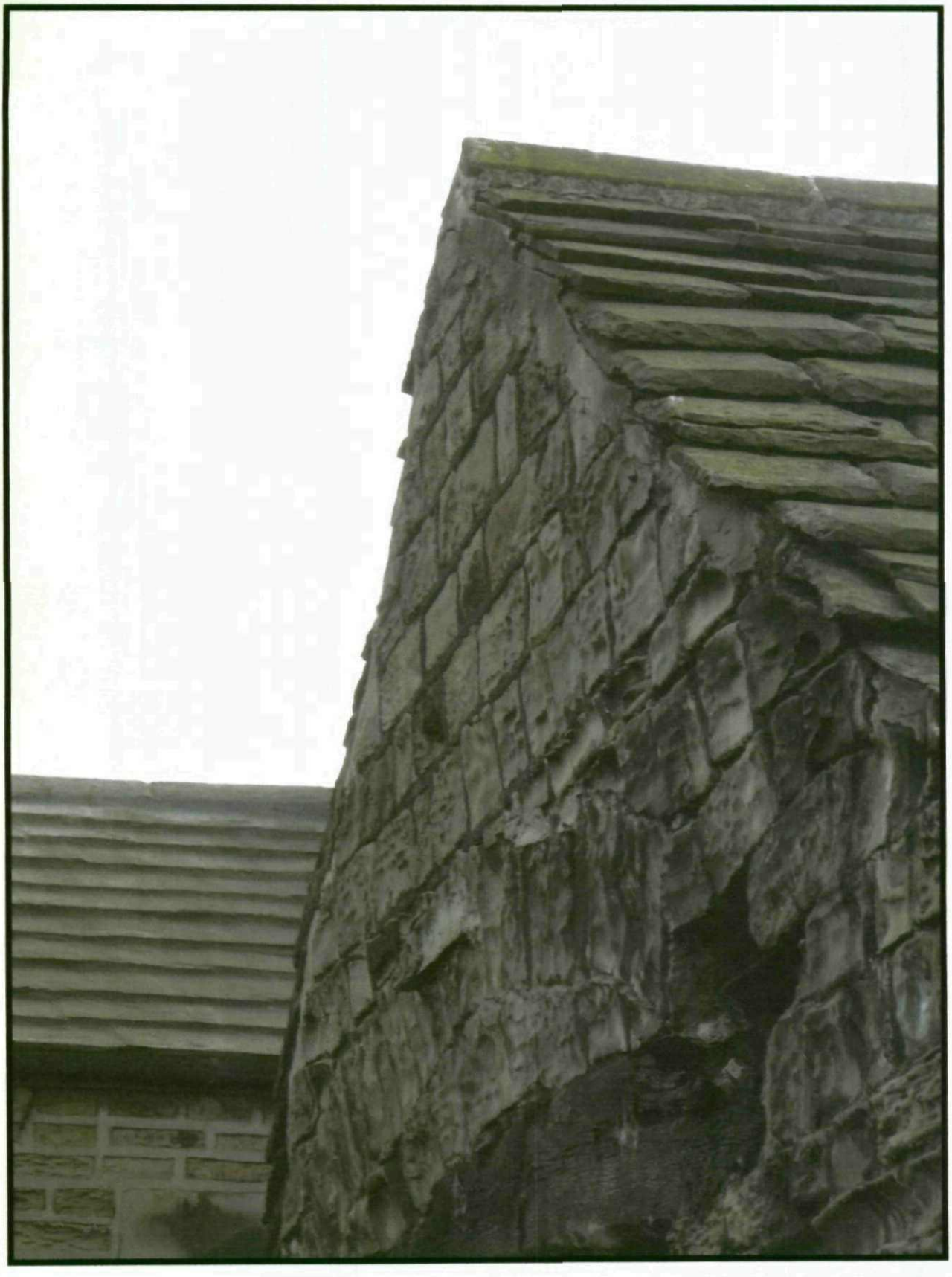
Photograph 5 – Close up of cracking in North Elevation (Gable)



Photograph 6 – Showing outward lean of North Elevation (Gable)

Photograph 7 – East Elevation

Photograph 8 – East Elevation showing damage to gable at eaves



Photograph 9 – Gable on East Elevation showing outward lean of wall above lintel

Photograph 10 – Internal view looking at North Elevation

Photograph 11 – Internal view of roof structure

Photograph 12 – Internal view looking at South Elevation

Photograph 13 – Wet rot to timber leg

Appendix C
Plot 2 Method Statement
& Drawings

THE *EPOC* GROUP

Consulting Civil & Structural Engineers

Method Statement for works to Listed Barn

1. Reduce internal and external levels down locally to walls to be demolished and level out remaining ground internally to allow installation of propping system to be carried out safely (as indicated on section on drawing 08/101/02).

2. Erect scaffolding externally to allow removal of roof covering and propping system to support existing roof structure and corner of barn. This is to include all high level stability bracing. The support system and bracing is to be designed by a specialist temporary works contractor. It may be necessary to fix some of the bracing to the timber roof structure to provide this stability.

3. Remove existing stone slate roof covering to reduce loading on support system.

4. Make adjustments to the propping system to transfer load.

5. Demolish the walls to be rebuilt and remove any existing foundations

6. Assess condition of roof timbers and vertical posts and consider how loading from main trusses will be resisted by new wall construction.

7. Construct new foundations as indicated on drawing 08/101/02 with starter bars installed for connection to floor slab.

8. Reconstruct new external wall using existing stone for the outer leaf and concrete blockwork for inner leaf. Dimensions are to be confirmed with a minimum overall dimension of 415mm (100mm outer leaf, 100mm cavity and 215mm inner leaf). Inner leaf is to be built around vertical posts which are to be retained. Bottom of posts are to be trimmed to allow level seating on the new blockwork wall. The posts are to be tied to the blockwork wall to minimise any differential movement or shrinkage movement.

9. Install new bearings and brackets to transfer loading onto new wall

10. Carry out treatment of the timber roof structure to improve is structural integrity. Carry out any necessary strengthening, bracing, and tying of existing roof to new and existing walls. (It is expected that only minor strengthening to the existing trusses are required. However more major strengthening may be requires to the roof around the gable area to the rear elevation.)

11. Once sufficient time has passed to allow the new wall and foundations to achieve full strength the temporary propping can be removed.

12. Carry out repairs to remaining existing walls to improve structural capacity and integrity.

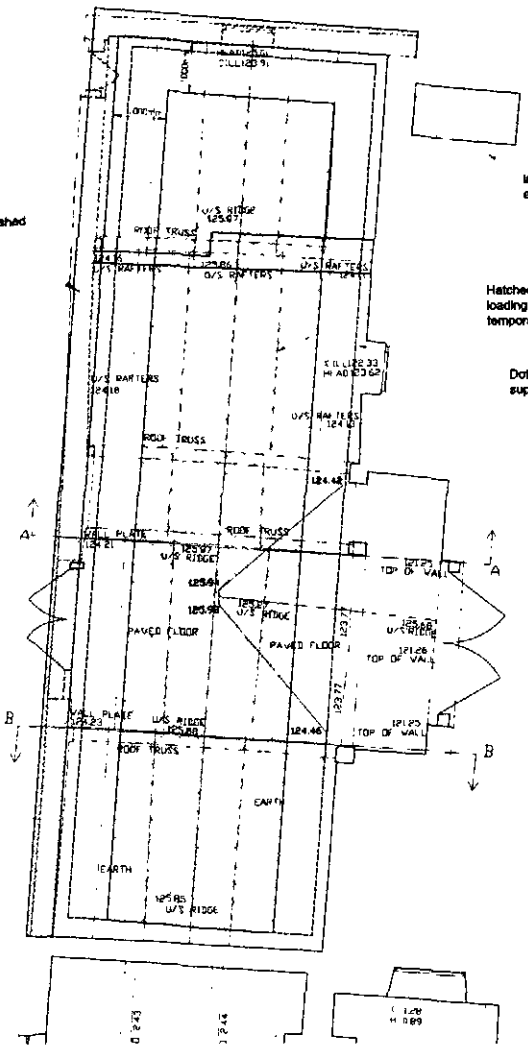
13. Install underpinning system to remaining walls to improve load carrying capacity as detailed on drawing 08/101/02. Note because of the poor condition of the wall below ground level it may be necessary to extend the concrete underpinning to sound wall construction.

14. Install new ground slab and tie into new wall foundations and underpinning.

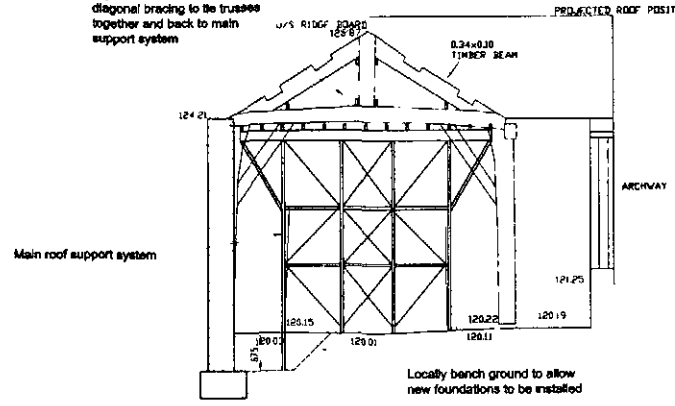
15. Once the underpinning and slab have achieved full strength the roof covering can be installed.

16. Complete all internal works.

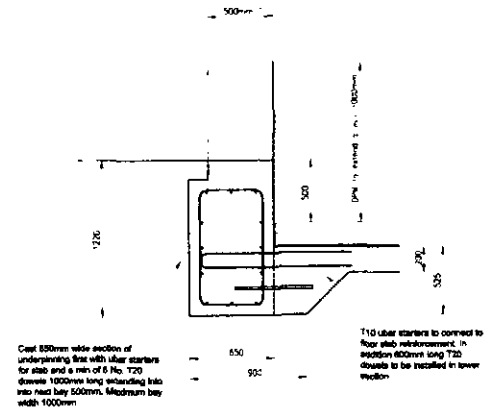
NOTES



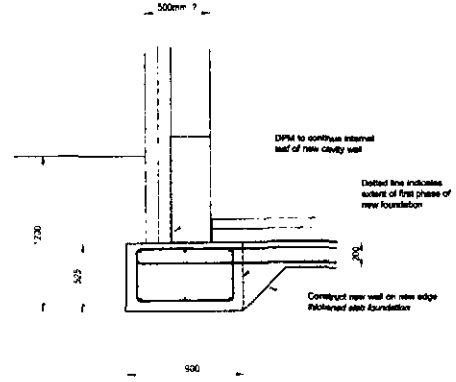
ROOF SUPPORT PROPOSAL
(PLAN)



ROOF SUPPORT PROPOSAL
(SECTION)



UNDERPINNING DETAIL)



FOUNDATION TO NEW WALL

DATE	REVISIONS

Project
STRUCTURAL WORKS LISTED BARN
ROYD HILL FARM - HIGHAM - BARNSLEY

Client
Mr DARREN DICKINSON

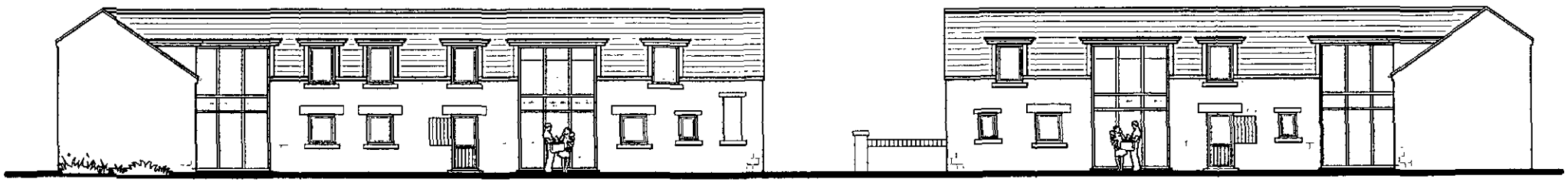
EPOC GROUP

Drawn by A Rubino
Date Aug 2008
Scale 1:50 1:20
Drg. No

Appendix D
Annex Evolution

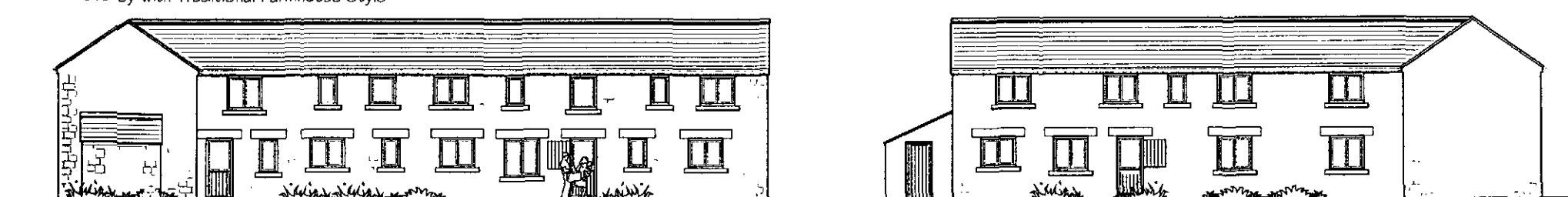
DESIGN EVOLUTION
ANNEXE BUILDINGS
ELEVATIONS FACING COURTYARD

Stage 1
Pre Application Assessment drawing 1½ storey



Stage 2
2 Storey with Floor to Eaves windows to match Barns

Stage 3
2 Storey with Traditional Farmhouse Style



Appendix E
Annex Method Statement
& Drawings

Method Statement for Annex Buildings

1. Install temporary lateral support to free ends of remaining rear wall at each gable to provide stability when the gable walls are demolished.

2. Demolish existing gable walls.

3. Install new foundations/slab to new front elevation, gables, cross walls and steel columns. These foundations are to be either a raft with or without pile foundations adjacent to the remaining rear wall.

4. Carry out any local underpinning at crack locations in remaining rear wall and install Helifix bars to stitch cracks.

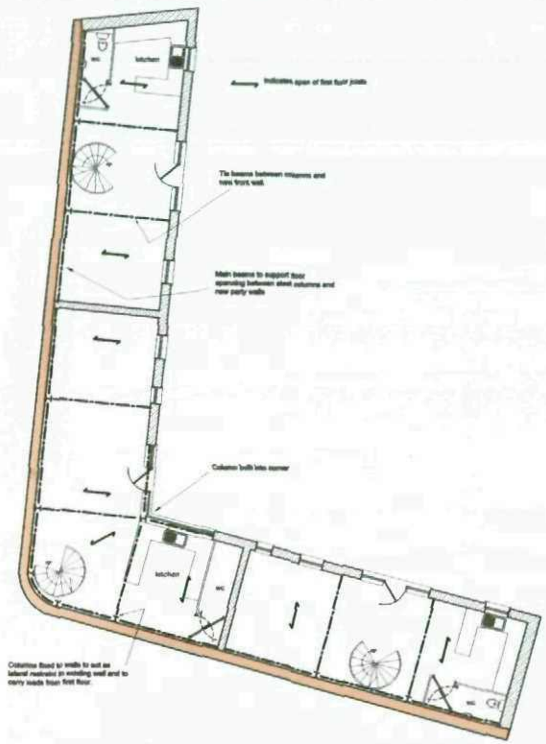
5. Construct new cavity walls and install steelwork support structure. (Steel columns are to be fixed to rear wall to provide lateral stability).

6. Remove temporary lateral support to rear wall once new gables have been constructed and have achieved full strength.

7. Install new roof and first floor which are to be supported on the new steel structure and new cavity walls.

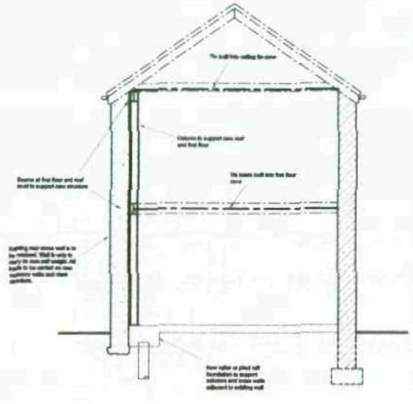
8. Install roof covering and complete internal works

NOTES



GROUND FLOOR PLAN
(SHOWING FIRST FLOOR STEELWORK ABOVE)

FIRST FLOOR PLAN
(SHOWING ROOF STEELWORK ABOVE)



TYPICAL SECTION

DATE	REVISIONS

Project STRUCTURAL WORKS - ANNEX BUILDINGS ROYD HILL FARM - HIGHAM - BARNSLEY	
Client Mr DARREN DICKINSON	
EPOC GROUP	Drawn by A. Rubino
	Date Aug 2008
	Scale 1:50 1:100
	Drg. No. [redacted]

Appendix F
Eco Hometec Renewables Report

Our Ref: DIC271/SJ - PLOT 1

14th July 2008

eco hometec

eco hometec (uk) ltd
Unit 11e
Carcroft Enterprise Park
Carcroft
Doncaster
DN6 8DD
Tel: (01302) 722266
Fax: (01302) 728634
E mail: sales@eco-hometec.co.uk
http://www.eco-hometec.co.uk

Mr M. Burgin
Barnett & Burgin Architectural Design Ltd
Unit 44
Century Business Centre
Manvers Way
Rotherham
S63 5DA

Dear Matthew

PLOT 1 - Budget Prices for UFH, Heat Pumps, Solar Cylinder & Solar Panels:

Further to receipt of plans and my telephone conversation with Mr Dickinson, we have pleasure in offering you our budget estimates. If you have any questions please do not hesitate to call or email.

Total Floor Area – 218m² - *Ground Floor* - 118m² - Solid Floor Construction
- First Floor - 100m² - Suspended Timber Construction
– See below for installation methods

OPTION 1 – UFH in conjunction with a Boiler

Equipment Specification. (Supply Only)

UFH – Design

We allow for the use of our PE-Xb SDR9 DIN 16892/93 DIN 4729 EVOH OXYBARRIER 16 x 1.8mm pipe work system. The pipe complies with DIN 4726/27, which specifies that oxygen diffusion through a non-permeable pipe may not exceed 0.1g/m3d.

The pipe is manufactured to ISO9000 standards and accordingly is covered by a manufacturers **50 year guarantee.**

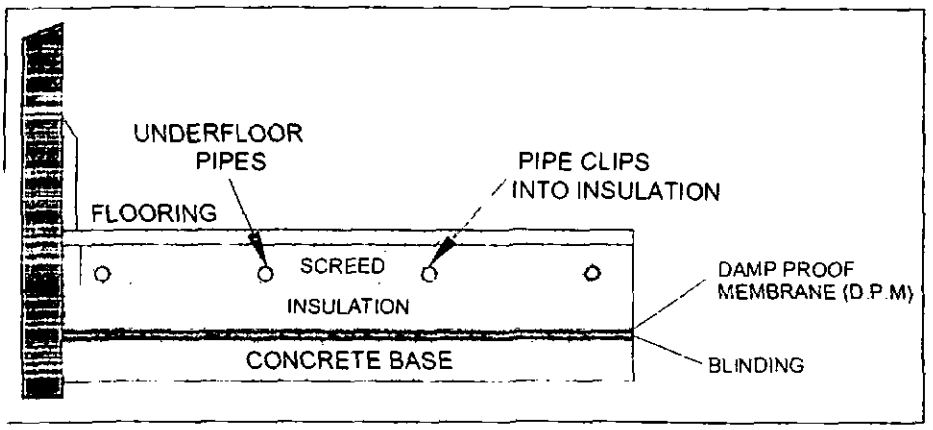
ecotherm UFH Design Parameters

We allow for under floor heating to all bathrooms and en-suites, but due to the relatively small usable floor area, we would recommend the installation of electric towel rail/radiator heaters. These offer the user the option of heated towels in the summer, when the main heating system is off, as well as the option of supplementary heat as and when required.

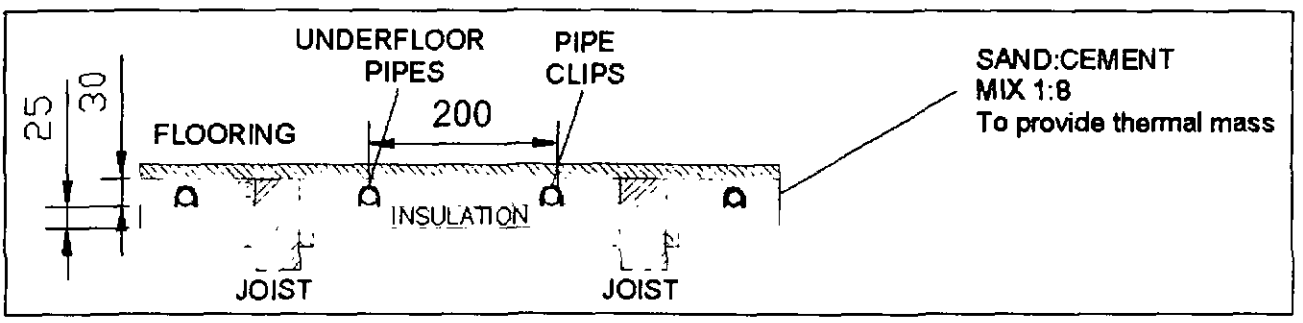
NOTE :
In an area with a large expanse of glass, heatloss & heat gain is inevitable, we recommend you have sufficient ventilation due to the heat gain in the summer and in the winter, heatloss or cold drop from the glazing is possible, even shortages - unless Low E or "K" glazing were to be used.

Installation Method:

Ground Floor Construction



First Floor Construction



Under floor heating pipework on timber floors, to be fixed to insulation and over joists in suitable spacing or channels, provided by others and in line with the supplied CAD before, any wiring, hot or cold pipework, or other heating pipework. Timber floors to be laid after installation of under floor pipework. Failure to comply will incur additional installation costs. A wooden floor should not exceed 22mm in total thickness.

We recommend laying a weak biscuit mix of sand and cement (8:1) around the pipes and between the joists level to underside of floor finish. The biscuit mix gives the floor extra thermal mass; reduces expansion and contraction noises that can be experienced as the floor cools and warms during the heating cycles and improves the overall output and performance of your floor heating system.

NB. Use of screed adds an additional 20Kg/m².

Other systems may suggest the use metal spreader plates to improve response time and output. Our experience is, these systems are generally more expensive, they do not offer the same levels of thermal mass and as the plates expand and contract unwanted expansion noises are often experienced.

Please note that we do not include for the installation of any wiring, heating controls, hot water or heating apparatus or associated pipe work for connection to the heat pump within this quotation.

We do not include for the supply or installation of any under floor insulation/construction/biscuit fill materials within this quotation.

We only allow for one visit to site to complete installation. All floor areas should be prepared and ready, prior to the installation. To complete filling and pressure testing of completed installation, a mains water and electricity supply will also be required.

Equipment Specification for UFH. (Supply Only)

Kit includes 16mm PexB pipe, manifolds, pump, pipe clips, some controls, expansion vessel & CAD layout

Optional price for UFH Installation

Optional price for floor templates system for ground floor

OPTION 2 – UFH in conjunction with a Heat Pump

Equipment Specification. (Supply Only)

UFH – Design

We allow for the use of our PE-Xb SDR9 DIN 16892/93 DIN 4729 EVOH OXYBARRIER 16 x 1.8mm pipe work system. The pipe complies with DIN 4726/27, which specifies that oxygen diffusion through a non-permeable pipe may not exceed 0.1g/m3d.

The pipe is manufactured to ISO9000 standards and accordingly is covered by a manufacturers **50 year guarantee.**

ecotherm UFH Design Parameters

We allow for pipework at 100mm centres to all areas with double circuits between floor joists.

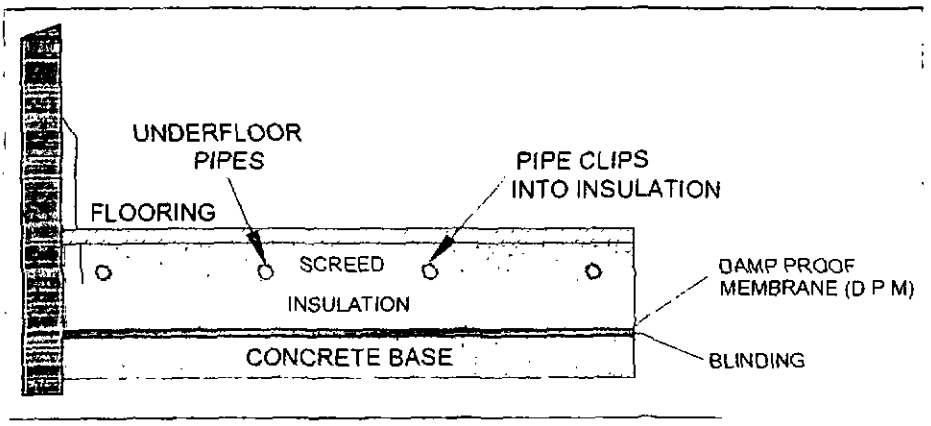
When installing any type of heat pump greater efficiencies are obtained when the output flow temperature is at its lowest. By installing more pipe, at closer centres, the heated area is increased, which in turn makes it possible to achieve the required comfort levels with a considerably lower flow temperature. This design means individual room thermostats, manifold actuators, wiring and installation are not required.

We allow for under floor heating to all bathrooms and en-suites, but due to the relatively small usable floor area, we would recommend the installation of electric towel rail/radiator heaters. These offer the user the option of heated towels in the summer, when the main heating system is off, as well as the option of supplementary heat as and when required.

NOTE : In an area with a large expanse of glass, heatloss & heat gain is inevitable, we recommend you have sufficient ventilation due to the heat gain in the summer and in the winter, heatloss or cold drop from the glazing is possible, even shortages - unless Low E or "K" glazing were to be used.

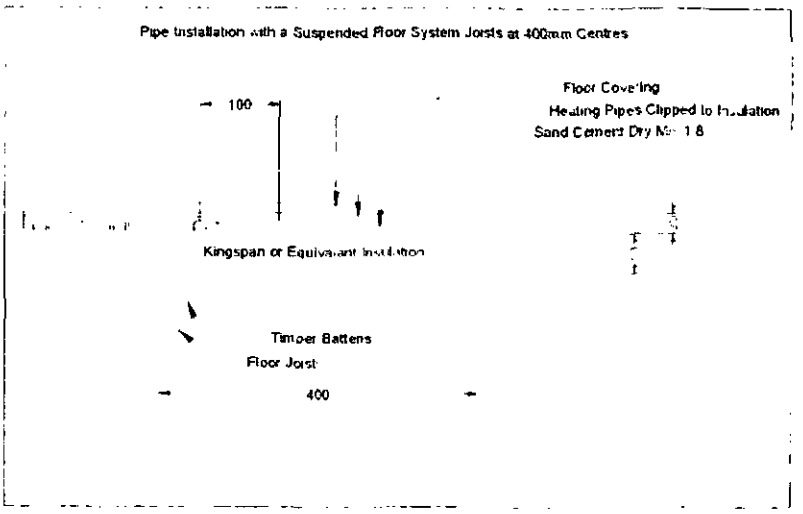
Installation Method:

Ground Floor Construction



First Floor Construction

Under floor heating pipework on timber floors, to be fixed to insulation and over joists in suitable spacing or channels, provided by others and in line with the supplied CAD before, any wiring, hot or cold pipework, or other heating pipework. Timber floors to be laid after installation of under floor pipework. Failure to comply will incur additional installation costs. A wooden floor should not exceed 22mm in total thickness.



We recommend laying a weak biscuit mix of sand and cement (8:1) around the pipes and between the joists level to underside of floor finish. The biscuit mix gives the floor extra thermal mass; reduces expansion and contraction noises that can be experienced as the floor cools and warms during the heating cycles and improves the overall output and performance of your floor heating system.

NB. Use of screed adds an additional 20Kg/m².

Other systems may suggest the use metal spreader plates to improve response time and output. Our experience is, these systems are generally more expensive, they do not offer the same levels of thermal mass and as the plates expand and contract unwanted expansion noises are often experienced.

Please note that we do not include for the installation of any wiring, heating controls, hot water or heating apparatus or associated pipe work for connection to the heat pump within this quotation.

We do not include for the supply or installation of any under floor insulation/construction/biscuit fill materials within this quotation.

We only allow for one visit to site to complete installation. All floor areas should be prepared and ready, prior to the installation. To complete filling and pressure testing of completed installation, a mains water and electricity supply will also be required.

Equipment Specification for UFH. (Supply Only)

Kit includes 16mm PexB pipe, manifolds, pump, pipe clips, some controls, expansion vessel & CAD layout

Optional price for UFH Installation

Optional price for floor templates system for ground floor

OPTION 1 – GROUND SOURCE HEAT PUMP

10kW Single Phase Ground Source Heat Pump specification: (Supply Only)

The below heat pump information is an estimate only; the heat pump has been provisionally sized at this stage. To determine the exact size of the heat pump required we will need to know the heat losses for your building so we can adequately size it. We would recommend SAP calculations (Standard Assessment Procedure for Energy Rating of Dwellings) being carried out to determine this aspect. Once these are done could you please forward to us and we can then determine whether the heat pump quoted is adequate.

Heat pumps suit well-insulated, low energy buildings with a wet underfloor heating system or low temperature radiators throughout. The insulation levels in the properties will need to be such that there is a maximum peak heating demand of less than 50 Watts per square metre. This is approximately the level of insulation required to comply with part L (J in Scotland) of the current UK building regulations. It is essential that heat pumps are only used in well-insulated buildings to achieve maximum efficiency and energy savings.

Any type of heat pump provides its maximum efficiency when it is producing low temperature water ideally suited to underfloor heating or low temperature radiators. As domestic hot water requires a higher temperature there can be a slight loss of efficiency during hot water production.

By installing the correct type of hot water storage cylinder, an input from solar panels can be added at any time. This would mean that during the summer months in particular, the heat pump may not be required.

This will reduce running costs and prolong the life of the heat pump & compressor.

The heat pump is part of the current grant scheme; the estimated grant available under the Low Carbon Building Programme is £800-£1200.00 depending on the nature of the build and type of fuel being displaced.

1 x ECGS/Single Phase 10KW ground source heat pump
3 x 50 meter lengths of Slinky pipe work
1 x EC3WMAN (3 way manifold)
1 x 100 litres of antifreeze
1 x Smart start
1x Domestic Hot Water Switching Priority

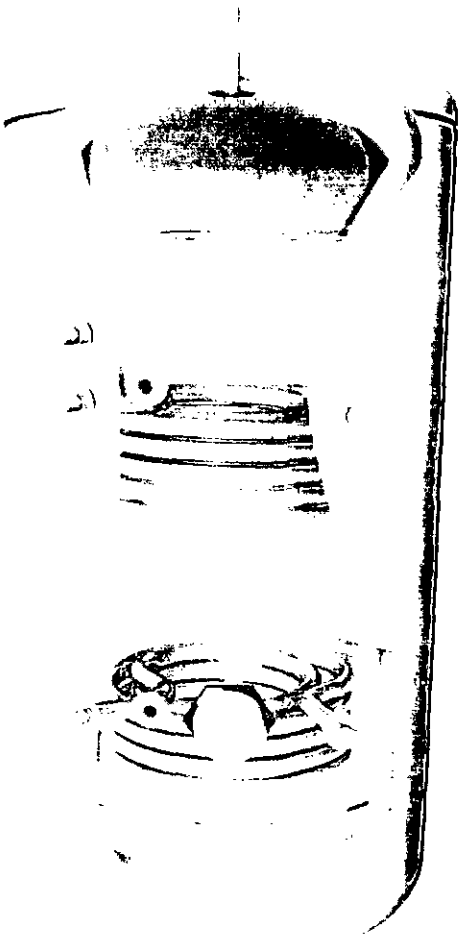
Total cost for supply only

Delivery to be confirmed

DHW Equipment Specification with GSHP: (Supply Only)

In order to meet the domestic hot water requirements, we would estimate the use of our twin coil SST250 litre, stainless steel, unvented DHW module.

The domestic hot water is heated and stored within a high quality stainless steel vessel. The indirect coils are designed to heat the whole of the cylinders contents and sit very low in the base of the unit (unlike conventional coils). Add to this the coils large surface area, a very fast recovery is achieved on 100% of its volume. High heat retention is then achieved by use of 50mm thick CFC/HCFC Free (ODP Zero) lagging.



Built to conform to both BBA and WRAS requirements to building regulations G3, the SST250 cylinder comes complete with all of the necessary equipment for installation into a mains pressure domestic water system, such as an expansion vessel, tundish, 3 bar safety valve and a two port motorised shut off valve. A high limit thermostat, temperature control thermostat, line strainer, pressure equalisation valve are also supplied.

A pocket to accommodate the temperature sensor is also provided.

The SST250 litre cylinder is capable of producing mains pressure hot water to all outlets and can be connected to secondary domestic hot water circuit if required.

The cylinder carries a 25 year manufacturer's warranty.

1 x SST 250 unvented Twin Coil DHW module, complete with all necessary equipment in order to conform to BBA and WRAS requirements

Grundfos UP20-14BXUT bronze pump (if required)

Delivery to be confirmed

OPTION 2 – AIR to WATER HEAT PUMP (ASHP)

10kW Single Phase Air Source Heat Pump. *(Please advise if three phase available)*

With this option we price for the use of a buffer vessel as standard. The buffer vessel is designed to provide system separation of the heat pump and heating system. This means that individual room control can be used on the UFH, as quoted. The buffer vessel also reduces short cycling of the heat pump therefore extending the runtime.

Please note that the heat pump has been provisionally sized at this stage. To determine the exact size of the heat pump required we will need to know the heat losses for your building so we can adequately size it. We would recommend SAP calculations (Standard Assessment Procedure for Energy Rating of Dwellings) being carried out to determine this aspect. Once these are done could you please forward to us and we can then determine whether the heat pump quoted is adequate.

Heat pumps suit well-insulated, low energy buildings with a wet underfloor heating system throughout (ie. no radiators anywhere), which consists of pipes embedded in deep concrete screed on the ground floor with varying methods of creating a thermal mass on the first floor.

The insulation levels in the properties will need to be such that there is a maximum peak heating demand of less than 50 Watts per square metre. This is approximately the level of insulation required to comply with part L (J in Scotland) of the current UK building regulations. It is essential that heat pumps are only used in well-insulated buildings to achieve maximum efficiency and energy savings.

Any type of heatpump provides its maximum efficiency when it is producing low temperature water ideally suited to underfloor heating or low temperature radiators. As domestic hot water requires a higher temperature there can be a slight loss of efficiency during hot water production.

In order to meet the heating and hot water demand for this property we recommend our HP1AW-10SE Air to water heat pump. This pump requires a single phase electrical supply.

This model is a split unit where the twin evaporator is external and the heat pump unit is internal. Please note that the maximum distance between these units is 10 metres.

Air to Water Heat pump split system single phase
1 x 10KW HP1AW air to water Heat pump
1 x Circulation pump for secondary circulation
1 x An automatic, energy saving system providing evaporator defrosting
1 x Mixing valve regulator
1 x Bivalent heating control
1 x Three port valve for hot water heating
1 x On-board electric boiler
Including commissioning

NB: Two piece delivery (interior and outdoor unit) units are not filled with refrigerant, individual parts filled with nitrogen for transport purposes. Out door unit made of corrosion resistant materials contains a heat pump evaporator, expansion valves, ultra silent fans.

Total cost for supply only

Delivery to be confirmed

DHW Equipment Specification: (Supply Only)

SPECIAL NOTE:
With this particular unit, due to the heat transference that this unit requires it is unfortunately not possible to connect it to a solar system at this time. To this end we have quoted for our duo tank cylinder; details below.

If solar is required when using an ASHP, we would recommend that the heat pump is used for heating only. The DHW would then be taken care of via solar panels feeding a cylinder with an electrical immersion back-up. We would only look at this option being viable if there was access to either economy seven or economy ten.

Details of DHW Options below:

Option A: DHW Stainless Steel Un-Vented Cylinder Equipment Specification – No Solar:

In order to meet the domestic hot water requirements, we would include for our Duotank 240litre, stainless steel, unvented DHW module. The domestic hot water is heated and stored within a stainless steel vessel, which is immersed within a primary tank. This unique 'tank within a tank' design not only provides exceptional efficiency but also ensures rapid and even heating of the domestic hot water.

Built to conform to both BBA and WRAS requirements, the Duotank 240 comes complete with all of the necessary equipment for installation into a mains pressure domestic water system, such as an expansion vessel, 3 bar safety valve and a two port motorised shut off valve. A high limit thermostat, temperature control thermostat, line strainer, a pressure equalisation valve and a 2.2kW immersion heater are also supplied.

The Duotank 240 is capable of producing mains pressure hot water to all outlets and can be connected to secondary domestic hot water circuit if required.

Option B: DHW Stainless Steel Un-Vented Cylinder Equipment Specification – With Solar:

In order to meet the domestic hot water requirements, we would include for our direct single coil SST250 litre, stainless steel, unvented DHW module.

The domestic hot water is heated and stored within a high quality stainless steel vessel. The indirect solar coil is designed to heat the whole of the cylinders contents and sit very low in the base of the unit (unlike conventional coils). Add to this the coils large surface area, a very fast recovery is achieved on 100% of its volume. High heat retention is then achieved by use of 50mm thick CFC/HCFC Free (ODP Zero) lagging. The cylinder also comes with 2 x 3kW immersion heaters.

Built to conform to both BBA and WRAS requirements to building regulations G3, the SST250 cylinder comes complete with all of the necessary equipment for installation into a mains pressure domestic water system, such as an expansion vessel, tundish and 3 bar safety valve. A high limit thermostat, temperature control thermostat, line strainer, pressure equalisation valve are also supplied. A pocket to accommodate the temperature sensor is also provided.

The SST250 litre cylinder is capable of producing mains pressure hot water to all outlets and can be connected to secondary domestic hot water circuit if required. The cylinder carries a 25 year manufacturer's warranty.

For a secondary return pump for use with either of the above we would recommend using the Grundfos UP20-14BXUT bronze pump, this unit includes an in-built analogue timer, non-return valve, balancing valve and an adjustable thermostat.

Option A
1 x SST Duotank 240 unvented DHW module, complete with all necessary equipment in order to conform to BBA and WRAS requirements including immersion heater

Option B
1 x SST 250 unvented Single Coil Direct DHW module, complete with all necessary equipment in order to conform to BBA and WRAS requirements

Grundfos UP20-14BXUT bronze pump (if required)

Delivery to be confirmed

Solar Options Specification (GSHP or ASHP): (Supply Only)

A result of years of continuous development the **eco-sol** system now performs even on cloudy days. The **eco-sol** system makes solar energy affordable for the home and is attracting much interest from private homeowners, local authorities and housing associations.

In hundreds of installations the **eco-sol** system provides 90% to 100% of hot water in the summer and around 75% throughout the year.

Solar energy availability in the UK is much greater than most people imagine. The UK receives on average approximately 65% of the annual radiation experienced by the South of Spain. The solar energy that we experience is accounted for by approximately 40% direct radiation (received when it is sunny) and some 60% diffused, or scattered, radiation (received on cloudy days).

The **eco-sol** system is an economical and virtually maintenance free way to harness this valuable and free supply of renewable energy. Through the advances in the design and performance of the **eco-sol** water heaters we can now capture more of that energy.

Finally by choosing **eco-sol** from eco hometec as part of your energy efficient heating system you are guaranteed to save fuel, you will achieve valuable reductions in C02 emissions, and as more and more of make use of this free source of natural energy, our exposure and that of future generations to climate change and dangerous technologies such as nuclear power will be reduced.

Solar Equipment Options (supply only)

Solar fitted on a south facing pitched roof.

3 x 1.83 sq.m. KS2000 Solar collectors complete with mounting frame or in roof flashing, masking profile, installation kit & extension kit
1 x ZPS 6/12-22 Solar Differential Controller pumping station & sensor pack
1 x ZNP 18 litre expansion vessel with connecting kit
2 x CoolFlow FX80 Bio-degradable Anti-freeze (25 Kg) Protects to -20°C
1 x Filling and pressurising pump

Total cost for supply only

Delivery to be confirmed

Summary

OPTION 1 – UFH in conjunction with a Boiler

Kit includes 16mm PexB pipe, manifolds, pump, pipe clips, some controls, expansion vessel & CAD layout

Optional price for UFH Installation

Optional price for floor templates system for ground floor

OPTION 2 – UFH in conjunction with a Heat Pump

Kit includes 16mm PexB pipe, manifolds, pump, pipe clips, some controls, expansion vessel & CAD layout

Optional price for UFH Installation

Optional price for floor templates system for ground floor

OPTION 1 – Ground Source Heat Pump (Supply Only)

GSHP kit includes 10kW unit with slinkies, manifold, antifreeze, smart start & DHW switching priority

1 x SST 250 unvented Twin Coil DHW module, complete with all necessary equipment in order to conform to BBA and WRAS requirements

Grundfos UP20-14BXUT bronze pump (if required)

3 Panel Solar kit inc. panels, pumping station etc.

Delivery to be confirmed

OPTION 2 – Air Source Heat Pump (Supply Only)

ASHP kit includes 10kW single phase ASHP & equipment as listed

Option A (no solar)
1 x SST Duotank 240 unvented DHW module, complete with all necessary equipment in order to conform to BBA and WRAS requirements including immersion heater
OR
Option B (with solar)
1 x SST 250 unvented Single Coil Direct DHW module, complete with all necessary equipment in order to conform to BBA and WRAS requirements

Grundfos UP20-14BXUT bronze pump (if required)

3 Panel Solar kit inc. panels, pumping station etc.

Delivery to be confirmed