

PROPOSED OUTBUILDING CONVERSIONS HILL VIEW FARM, FRESSINGFIELD

STRUCTURAL APPRAISAL

JA/23/036
08th April 2023

General Description

The property comprises a two-storey outbuilding with single storey wings of approximately 180m² floor area, on the outskirts of a complex of agricultural outbuildings within the grounds the main dwelling which lies to the East. The building comprises four different sections, a large two-storey historic, duo-pitched, cement-rendered timber framed building divided into three bays by principal frames, with duo-pitch wing structures believed to date back to the 1970's projecting from the West elevation. The buildings are capped by profiled metal sheet, cement sheet and clay pantiles. The Western wings are a mixture of painted clay lump, blockwork and weatherboard-clad timber frame constructions. The two-storey building is a former granary, the northernmost West wing is a former dairy, the central wing a former milking parlour, and the southernmost wing former Living quarters.

Set on relatively level ground the North elevation faces the Northern boundary, offset by a concrete access track, serving the gardens to the West. The East elevation faces onto gardens, beyond which lie further outbuildings and the main dwelling. The South elevation faces outbuildings, offset by a wide concrete courtyard. The West elevation faces onto gardens, offset by a concrete path. The other outbuildings within the nearby vicinity typically comprise agricultural storage, these did not form part of the survey. There are a number of trees around the building, including mature Lime and Poplar trees no less than 6 meters off the Northwest corner of the dairy. Semi-mature Leylandii and Fir hedges sit 6 meters off the buildings' North elevation, projecting East to West along the Northern boundary line. A semi-mature Walnut tree is also present 2.5 meters off the Northeast corner of the two-storey building to the East.

Access to the outbuilding is via the driveway to the East, which then projects Northwards, beyond which lies 'Laxfield Road', running East to West along the North boundary, serving access to the property. Due to the present condition of the building access was limited, the survey works comprised a visual survey externally from ground level. The general structure of the building is shown on drawing '1025 - Existing Plans' prepared by KFD Architecture.

| Element | Description | Comments and Recommendations |
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| Granary Barn Roof Structure | The granary barn roof comprises a traditional 'collared purlin' arrangement. The profiled metal sheet roof covering is supported on oak common rafters varying in size, generally 3" x 3" at 400mm centres, | In approximately half of the central and Southern bays parts of the roof sheeting are missing however the roof timbers are predominantly intact, with the principal framework including both eaves ties, knee braces and purlin strutting all |

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| | <p>propped off 4" x 4" purlins, spanning between principal rafters buttressed by 6" x 2" collars at approximately 2 meter intervals across the roof. The purlins take additional support from diagonal strutting down onto historic approximately 7" x 6" oak eaves ties, spanning between principal posts with bolted knee braces at the eaves wall lines. Two eaves ties are present, dividing the building equally into three bays. Tie beams of similar profile are also present at the gable walls. The wall plates comprise approximately 6" x 6" oak, spanning across the barn, restrained by the eaves and gable tie beams.</p> | <p>present. The Eaves tie connections appear to be sound as there is no visible evidence of outward bowing or spreading of wall plates here. The remaining areas of roof are either partly or fully detached, the wall plates are mostly present but are decayed as a result of moisture ingress.</p> <p>The bolted knee braces to the eaves tie interfaces with the principal posts provide racking stability against lateral wind pressures.</p> <p>Preliminary calculations indicate the common rafters, purlins, principal rafters, gable ties, purlin struts and wall plates where present are all capable of accommodating the additional loads imposed from ceiling finishes as part of a domestic conversion without any strengthening works being necessary. The eaves ties and collars are undersized, but these could be simply rectified by providing additional infill roof timbers and/or utilising internal partitions as part of a domestic conversion. Substantial areas of the roof will require replacement as they have decayed and/or fully detached from their bearings, provision should be made for this during the tendering process. Where the roof remains, undertake localised repairs, splicing in 'like-for-like' sections on any decayed timbers.</p> <p>The gutters are missing and rainwater presently discharges directly onto the ground around the external walls. Provide new gutters, discharging to suitable drainage system away from the building.</p> |
| <p>West Wing Dairy Roof Structure (North Bay)</p> | <p>Clay pantiles are supported off a softwood roof structure, comprising approximately 4" x 2" common rafters at 400mm centres, propped by 4" x 3" purlins near the midspan. The purlins are supported at regular intervals by principal rafters with 6" x 1 ½" collars. The rafters spring from 3" x 4" wall plates. The wall plates are restrained by three softwood eaves tie beams of varying size (typically 5" x 3"), dividing the building into four bays.</p> | <p>Across this wing the ridge line is level, the principal framework is well structured and in good condition and there are no signs of any notable roof sagging or distortion to date.</p> <p>Preliminary calculations indicate the common rafters, purlins, principal rafters and eaves tie beams are capable of accommodating loads imposed as part of a conversion. The wall plates and collars are undersized, but these could be simply rectified by providing additional infill</p> |

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| | | <p>roof timbers and/or utilising internal partitions as part of a domestic conversion. Where cladding has detached from the West gable this has left the adjacent rafters and purlins locally exposed to the elements, which have subsequently decayed. Splice repair like-for-like.</p> <p>Sections of the roof were concealed internally due to limited accessibility and vegetation externally at the time of the survey, however they did not present any immediate concerns. Expose and verify condition of all structure.</p> <p>A small number of roof and ridge tiles are missing, these should be reinstated. Gutters are detached or missing throughout, provide suitable drainage as discussed previously. Where still present the gutters are formed of profiled cement. Take sample of guttering for testing for asbestos. A method statement is to be provided by contractor detailing associated risk mitigation on any construction works relating to the guttering if found to be present.</p> |
| <p>West Wing Milking Parlour Roof Structure (Central Bay)</p> | <p>Profiled cement sheet is supported off rows of approximately 3" x 4" softwood purlins. The purlins span between 4" x 2" principal rafters buttressed by 8" x 2" collars, dividing the building into four bays. To the North, the roof bears off a 5" x 3" eaves beam, spanning between timber posts against the Dairy wall. To the South, the eaves beam bears off profiled steel parallel flange channel section stubs at the principal rafter locations, bolted to the adjacent blockwork wall that forms the Living quarters.</p> | <p>The bay closest to the Eastern granary appears to all be intact, with the roof sheeting present and timbers in reasonable condition with no signs of significant bowing or distortion where visible. One end of the purlin collar adjacent to the East granary barn wall has detached from its principal rafter bearing, this should be reinstated.</p> <p>Preliminary calculations indicate the principal rafters, and collars where present are capable of accommodating loads imposed as part of a conversion. The purlins and eaves beams are undersized, but these could be simply rectified by providing additional infill roof timbers and/or utilising internal partitions as part of a domestic conversion.</p> <p>The central and Westernmost roof bays have either partially or fully detached from their bearings, these will require replacement. Expose and verify condition of all structure concealed or inaccessible at time of survey.</p> |

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| | | <p>The principal rafter steel bearers to the South have generally suffered superficial surface corrosion. Clean all affected areas of steelwork thoroughly with a wire brush, prime and coat using a proprietary protective coating, e.g. 'Hammerite'.</p> <p>Reinstate guttering and test cement roof sheeting for asbestos as previously discussed.</p> |
| <p>West Wing Living Quarters Roof Structure (South Bay)</p> | <p>Clay pantiles are supported off a hip-ended softwood roof structure, comprising approximately 4" x 2" common rafters at 400mm centres, propped by approximately 4" x 3" purlins near the midspan. The purlins are supported at regular intervals by collared principal rafters where visible. The rafters spring from approximately 3" x 4" wall plates. The wall plates are restrained by eaves tie beams of varying size (typically 7" x 3"), spanning between the eaves wall lines.</p> | <p>The central and Westernmost bays to this wing appear to all be intact, the ridge and hip lines are level, the principal framework is well structured and in good condition and there are no signs of any notable roof sagging or distortion to date.</p> <p>The eaves tie beams closest to the East granary building have detached from their bearings, causing the roof in this bay to drop down from the main ridge line. Eaves tie beams should be reinstated, strapped back onto wall plates, and infill timbers provided to reinstate the original roof profile in this bay.</p> <p>Preliminary calculations indicate the common rafters, principal rafters and eaves tie beams where present are capable of accommodating loads imposed as part of a conversion. It is unknown whether the purlins and wall plates are sufficiently sized due to limited access. Any undersized members could be simply rectified by providing additional infill roof timbers and/or utilising internal partitions as part of a domestic conversion.</p> <p>Expose and verify condition of all structure concealed or inaccessible at time of survey. A small number of roof tiles are missing, these should be reinstated. Gutters are detached or missing throughout, provide suitable drainage as discussed previously.</p> |
| <p>Granary Barn Superstructure</p> | <p>The external walls to the building typically comprise oak studwork framing of varying size, seated on a substantial oak sole plate off a brick plinth. The walls are clad internally and externally in a mixture of historic wattle and daub, and modern cement</p> | <p>The majority of wall structures are either inaccessible or concealed by vegetation at the time of survey. Across the central and Northern bays the render conceals most of the timber framing. Where render has delaminated locally the exposed framework shows signs of</p> |

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| | <p>render. Where exposed, a number of areas of studwork are infilled with clay lump. The eaves tie beams either side of the central bay are supported off the studwork frame, concealed behind the render, with bolted oak knee braces providing wind racking stability.</p> | <p>decay. Both gable walls above eaves level and on the East elevation of the southernmost bay are missing and will require reinstatement. The sole plates are rotten where exposed, cut back to sound timber and replace with ‘like-for-like’ sections. Strip the vegetation and cement render from the building and inspect all concealed structure. Due to the loss of roof cladding and subsequent timber decay across the frame it is possible the cement render is currently providing a level of support to the building, suitable temporary support and shoring works must be installed before any remedial works are carried out. Any render reapplication should be lime-based to promote breathability of the building fabric.</p> <p>The South gable wall has a 4” thick brickwork external skin. This appears to have become detached from the principal timber framework. Refix the masonry back to the studwork using suitable remedial ties, e.g. Simpson Strong Tie ‘Heli-Ties’, or equivalent. Repoint eroded mortar beds in brickwork.</p> |
| <p>West Wing Dairy Superstructure (North Bay)</p> | <p>The walls to the East bay of the Dairy typically comprise painted clay lump construction, built off a flint plinth.</p> <p>The central and Western bays comprise 4” x 2” softwood studwork framing, clad externally in weather board, constructed off a dense concrete block plinth.</p> | <p>The wall structures across the North wing are generally straight, plumb and in good condition where visible. There are small areas of clay lump erosion directly above the plinth, which should be repaired. Where cladding has detached from the West gable this has left the adjacent studwork exposed to the elements, which has subsequently decayed. Splice repair like-for-like.</p> <p>There is a hairline (<1mm) vertical crack in the blockwork plinth near the West gable end on the North elevation, see foundation discussion below. Cladding and vegetation concealing any areas of external walls should be stripped out and their condition verified.</p> |
| <p>West Wing Milking Parlour Roof Structure (Central Bay)</p> | <p>The eaves beam to the Milking parlour roof is supported off three approximately 4” x 4” principal softwood posts along the North elevation. The eaves beam to the South is supported on steel bearers off the Living quarters wall as discussed above. The Milking Parlour wing is enclosed by the external walls of the</p> | <p>Clean and treat steel eaves beam bearers as discussed above. The posts to the North presently bear directly onto the concrete slab at ground level. In some cases there is localised timber decay. Cut all affected sections back to sound timber and splice ‘like-for-like’ sections in onto proprietary galvanised or</p> |

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| | Eastern Granary, Northern Dairy and Southern Living quarters. | stainless steel shoes, e.g. Simpson Strong Tie type 'PBH', or equivalent. |
| West Wing Living Quarters Roof Structure (South Bay) | <p>The walls to the East bay of the Living quarters typically comprise painted clay lump and blockwork construction, built off a flint plinth.</p> <p>The central and Western bays comprise painted dense concrete block wall construction.</p> | The wall structures across the central and Western bays are generally straight, plumb and in good condition where visible. The East bay walls have significantly rotated outwards with corresponding cracking in the blockwork as a result of the roof spreading above, following the detachment of the eaves ties. Areas of clay lump on the South elevation have also been eroded by Miner bees. The walls to this bay should be taken down to a point where level with the main wall line and rebuilt as part of any conversion. |
| Ground floor – All Buildings. | A concrete floor slab is present throughout. | The floor slabs are in reasonable condition where visible. No improvements necessary. Expose and verify condition of all concealed areas. |
| Foundations – All Buildings | Trial holes had not been excavated prior to our survey due to a concrete apron obstructing access around the building perimeter. A Mackintosh ground probe survey was carried out adjacent to the West wing, approximately 6 meters away from the trees and hedges lining the North boundary. Probe results were consistent, with readings ranging between 8 and 15 blows per 100mm, down to a depth of 1 meter below ground level. Samples taken from the base of the probe hole indicated moist, firm, light brown clay subsoil. | <p>Drift geology maps for the area indicate the site lies on 'Lowestoft Formation Diamicton', a chalky till mix of clay, silt, sands and gravels, the presence of clay was confirmed in the ground probing. Shallow foundations on shrinkable clay subsoil are prone to movement due to variations in soil moisture content, the effects of which may be exacerbated by the well-established high moisture-demanding Lime and Poplar trees and Leylandii hedge to the North as they extract moisture from the ground. However, where conditions around the building are uniform and consistent, the seasonal movements are relatively minor and the robust masonry and flexible timber frame constructions can accommodate such movement without significant damage.</p> <p>Although the footings were not visible at the time of the survey the foundations appear to have performed adequately to date, with no signs of any significant settlement movement, despite having recently experienced the driest summer on record since the great drought of 1976. The only settlement crack visible was hairline in size on the North wing closest to the largest, highest moisture-demanding trees. Given such a minor level of building movement following such a protracted dry period the indications are that the foundations are</p> |

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| | | <p>performing satisfactorily and no improvements should be required. Trial holes should be excavated to confirm their profile and suitability as part of any potential domestic conversion. It is acceptable to retain the foundations if they are shown to bear on the clay subsoil, in prolonged drought conditions excessive clay shrinkage may lead to cracking in the brickwork or plaster finishes, although not a structural concern such a risk would need to be accepted by the client.</p> <p>A traditional trench foundation should be provided to any door thresholds formed within existing openings where there may be no footing present. Footings are to bear onto firm, undisturbed subsoil, depths should be similar to existing foundation profiles to minimise risk of differential movement.</p> <p>It is recommended the existing trees are maintained to minimise substantial changes in moisture content levels in the clay. A more detailed soil investigation should be undertaken to investigate the subsoil properties if the trees are proposed to be removed, to establish that this would not result in excessive heave occurring.</p> |

Summary.

The outbuilding structures are in varying condition. A number of areas of superstructure require substantial repairs or reinstatement, however areas of roof and wall structures across the buildings are suitable for retention as part of a domestic conversion. The footings, whilst unexposed, also do not show any evidence of notable defects indicative of widespread foundation settlement movement and should be suitable for retention, subject to verification through trial hole excavations. Provided that the conversion work is carried out carefully using skilled labour and materials that are compatible with the existing, the building will be structurally sound and suitable for the proposed use. The Principal Contractor will need to design and detail a comprehensive temporary propping works scheme for risk mitigation prior to undertaking the remedial works, alongside a Construction Phase Health and Safety Plan in accordance with CDM 2015, all to be logged within the Health and Safety file.

I trust that this is clear and sufficient for your immediate requirements, but please let me know if you have any queries or require further advice. I should be pleased to prepare detailed drawings and calculations to support any Building Regulations application in due course.



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