The Morton Partnership
Structural Engineers

Brunel House, Norwich, Halesworth, Suffolk IP19 8HX
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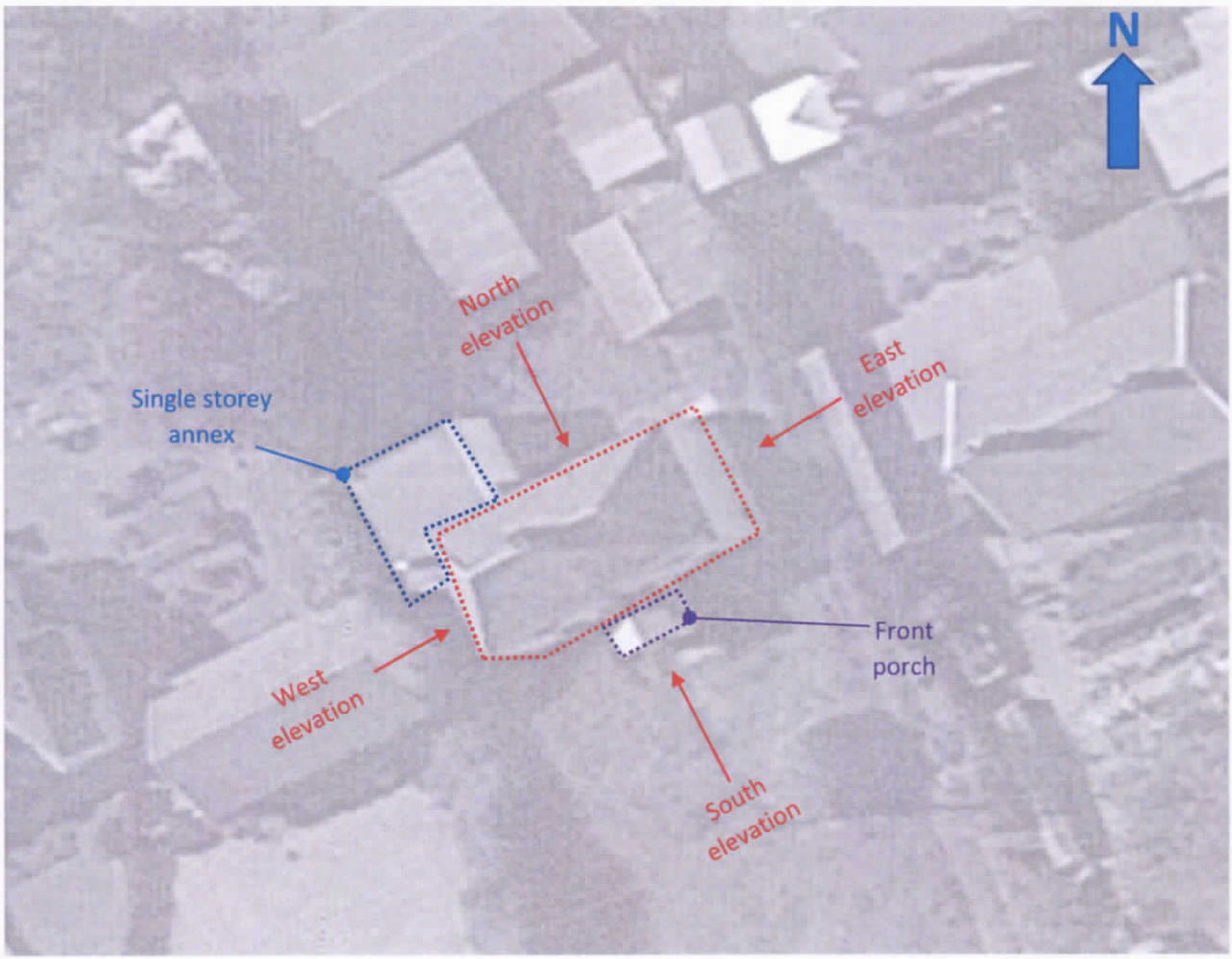
Prepared by: PP Project No. 22215/P01

We have surveyed the property on Wednesday the 25th of January and we found the property to be in poor condition, as you may already be aware of.

The east and part of the north elevation were found collapsed, with the debris still on the ground, forming a heap over the existing brick plinth.

The snip below (from google earth) should help identify the elevations in relation to the north.



The external wall panels of the property are clay bricks (clay lump structure). Although the existing wall plates have slots, which could indicate the existence of former timber stud structure, it is most likely that this is re-used material from other structure. This is more evident near the north-east corner where the slot in the timber plate is too large for an anticipated corner bracing element, showing that this formed part of the frame of a larger scale structure.

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The internal floor comprises of the main floor beams and secondary timber beams, all boarded with what seems to be the original fabric.

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Internal partitions (where they could be identified) are either masonry (as part of the chimney structure in the middle) or wattle and daub. Some of these walls appear to have been repaired in the recent past (softwood studs pairs with original fabric below).

The perimeter wall of the original structure is a (approx.) 200mm wide clay brick.

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The chimney structure is made out of clay bricks. Random patches of past repairs indicate are evident at 1st floor level between west and east partition). Some of these repairs are carried out with cementitious agents.

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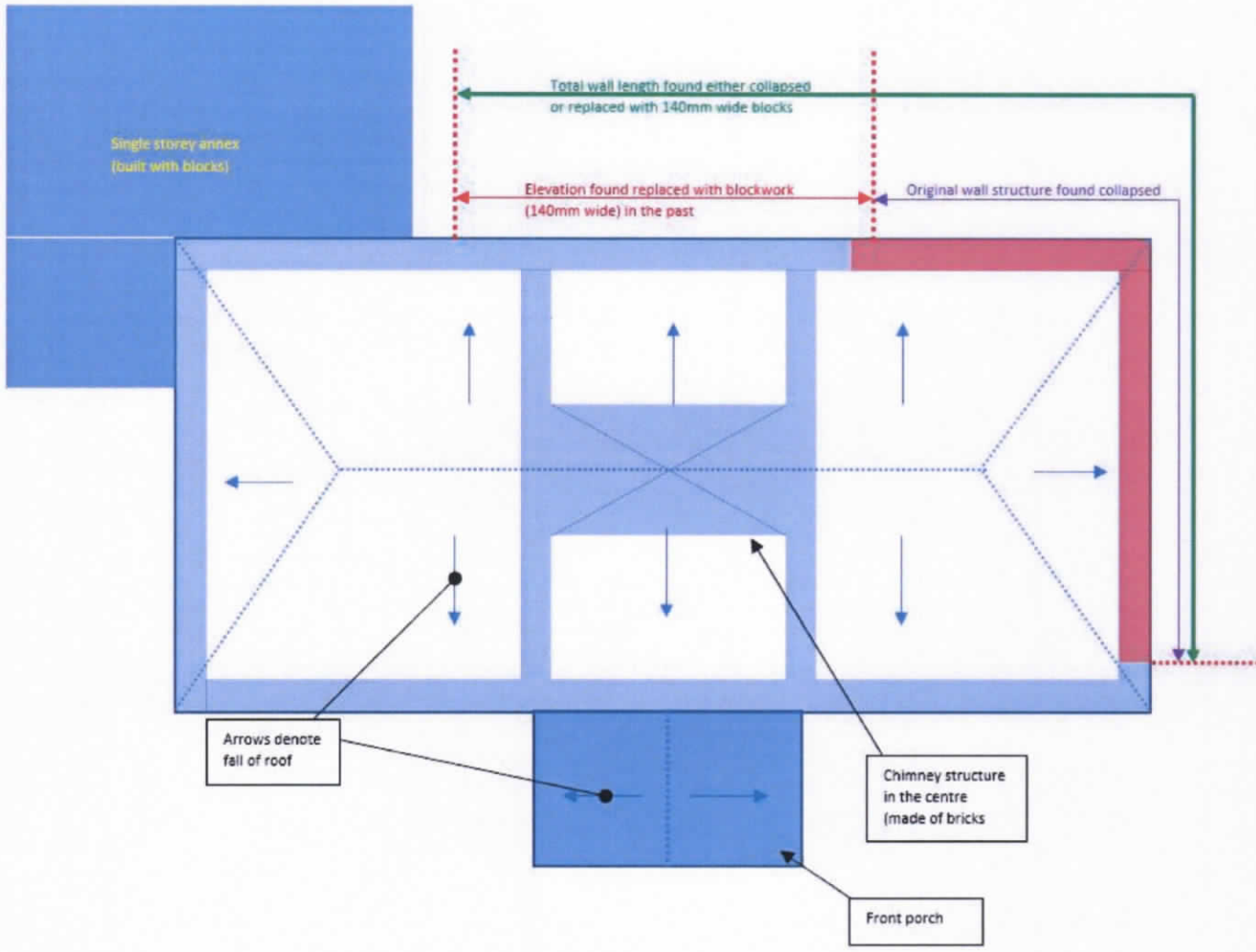
The sketch below, although not in scale, should help identify the extent of the failure, as it retains the analogies of the failed elevations in relation to the total elevations.



Where the wall is denoted with red arrow, the majority of the clay bricks have been replaced with slenderer structure (140mm wide blockwork). There are parts where clay bricks are keyed in the blockwork, but the interface generates eccentricity and should be rebuilt as explained in this report.

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The collapsed wall (purple arrow) leaves either some or all the brick plinth in place. The east elevation brick plinth is wider than the west elevation. That could indicate past works to protect erosion of the wall.

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One the major interventions for this, to restore the structure to its original structural order, it would be to rebuilt the walls, maintaining the original thickness. Of course the 140mm blockwork would have to be removed and rebuilt as 200mm wide structure as this is too slender fort his type of application (a 140mm wide wall unrestraint at 1st floor level is not structurally sound). The operation can be carried out in two ways. The first way is to rebuilt as clay lump and the other is the less sympathetic to the original fabric which is to rebuilt using blocks of 215mm width (blocks laid to side). While the latter is the less preferable in terms of conservation, it has some advantages which should be considered in this process.

The clay lump is obviously more appropriate historically. It is more likely to achieve a positive Listed Building Consent. However, such operation cannot be performed throughout this time of the year (it's basically limited to the drier sessions), which would let the remaining structure erode.

The blockwork is modern construction and is widely available. It will match the thickness of the existing wall and should work well in terms of minimum slenderness. In terms of weight, certain block types (some have even low thermal conductivity) can be lighter than clay lump which could guarantee that the existing footings will not be overstressed. Aerated blocks have an average density of 450kg/m^3, while clay lump has a density of approximately 980 kg/m^3.

The U-value of the wall should be considered. Any new wall should satisfy modern U-Value requirements. A single skin 215mm wide wall with 100mm internal insulation can easily achieve these numbers.

The blockwork is obviously more resistant to exposure to weather, so even under potential foundation movement can retain its structural integrity and ensure longevity.

In the scenario where the walls are rebuilt as 215mm wide blockwork, an approximate 60% of the original fabric of the external walls will be retained.

Foundations can be another neuralgic part of the repair. It needs to be noted at this states that, in either case (rebuilding as clay lump or with blocks), foundations will have to meet building control requirements and may need to extend to certain depth due to the presence of clay in the area. While this sounds reasonable for the part of the external walls to be repaired, it may cause further problems at boundary conditions between new wall fabric and existing where foundations are only 200~300mm deep. A big step there could induce differential movement cause cracks and because of this a non-compliant solution to modern standards should be considered. Such building control decisions cannot be guaranteed at this stage and will be discussed further once at that stage.

Once the external walls are rebuilt, the render (which is currently a cementitious mixture) must be replaced with a more sympathetic to the original fabric material such as lime-based render. As all walls have signs of cracks (due to the continues movement of the ground through time), the addition of the savolit wood wool boards externally, could restore more of the structural performance of the original fabric and can be used as a base for the application of lime based render. While this may increase slightly the dimensions of the building and could affect the offset of the windows/ window sills etc, the material is known for its insulating properties and when applied to overlap between blockwork and clay lump, it can reduce the risk of minor cracking appearing between material that have different pace of expansions/shrinkage and thus should be considered as potential addition to the repairs. The savolit covering the plinth, should stop a few hundred millimetres above ground.

The roof currently finishes short on the external face of the perimeter wall. We believe that sprockets should be added to extend the roof footprint further and reduce risk of moisture entering the wall fabric. This could pose though a question to the contractor as it may result in re-roofing.

The main floor beam, that previously provided support for the collapsed 1st floor partition could not be inspected (as it was covered with debris), but given the extend of the damage, it could be deemed as broken and may require

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repairs or replacement depending on the extend. A type of repair is to cut a channel across the centreline and install a steel plate which will be bolted to the beam and can be explored once more information is gathered. The floor joists can be re-used depending on condition or paired with new joists where condition is poor.

The ceilings over first floor appear to suffer from excessive deflection. To rectify this additional timber could be introduced over the existing pole ceiling joists. The ceiling finishes should be replaced with finishes of same type, which is a clay mixture with straw. The photo below shows the 1st floor ceiling of the west partition resting on the door.

The main roof was inspected from the inside. The sunlight coming in indicates that a basic level of repair is required to become weather tight. The timber rafters and purlins looked in reasonable condition, although some had eroded and were paired in the recent past with softwood sections. A more thorough inspection could identify more eroded sections, which could be repaired, or paired with new to ensure an adequate level of structural performance.

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