BMC

BELL MUNRO CONSULTING LTD.

STRUCTURAL APPRAISAL OF 2 MANCHESTER ROAD CHORLTON-CUM-HARDY MANCHESTER

April 2025

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1. Introduction

1.1. At the request of Mr and Mrs Martin and Olivia Edge, Bell Munro Consulting Ltd undertook a visual structural appraisal of the above property on 25th March 2025. This inspection was carried out to review and update the structural condition previously documented in the structural survey prepared by Structural Surveys Ltd (June 2024).

1.2. This appraisal report summarises the findings of our visual, non-intrusive inspection of readily accessible areas of the property, highlighting any observed deterioration or new structural concerns that have arisen since the previous survey. Comparative commentary is included, along with professional opinion regarding the feasibility and practicality of remedial structural works.

1.3. Our inspection was limited to visible structural elements, excluding any concealed features (e.g., hidden woodwork, foundations, or elements obscured by finishes). No opening-up, destructive testing, or intrusive inspections were performed. As such, concealed defects or conditions may exist beyond those identified by visual means.

1.4. Weather conditions during the inspection were fair, with a temperature of approximately 12ºC.

1.5. A measured survey of the property was recently undertaken by Geomatic Surveys Ltd, and these measurements have been referenced to quantify leans and tilts observed during our inspection where we were not able to take our own measurements.

1.6. All statements, conclusions, and recommendations presented within this report are professional opinions, based solely on the visual observations undertaken and our interpretation of the information available at the time of inspection. Our assessment and recommendations have prioritised structural safety and practicality which is often also the most economic solution. Clients should obtain independent cost estimates and feasibility appraisals, as well as any necessary statutory approvals from relevant authorities. This report considers only structural engineering aspects, and while alternative remedial methods may exist, our recommended approach represents what we consider to be the safest, most practical, and most economically sensible solution.

2. Review of Previous Structural Survey

2.1. A detailed structural survey of the property at 2 Manchester Road, Chorlton-cum-Hardy, was undertaken by Structural Surveys Ltd on 27th June 2024 (Ref NW13737). The survey identified a number of serious structural defects that posed significant risks to future stability and integrity, summarised briefly as follows:

- Significant historic subsidence affecting the entire structure, evidenced by severe distortion and substantial tilting of external walls and internal floors.

- Severe inward and outward tilting of walls accompanied by widespread structural cracking, some categorised as severe enough to suggest the need for localised rebuilding or underpinning.

- Extensive and significant distortion of suspended timber floors at all levels, considered structurally severe and practically irreparable due to the building-wide nature of deformation.

- Notable structural instability at roof level, severe deflections, distortion, and widespread deterioration of roof coverings causing significant damp ingress.

- Widespread water ingress and damp penetration through external walls, significant internal plaster deterioration, fungal decay (potentially dry rot), and timber defects throughout.

- Suspected significant defects in the original underground drainage system, requiring specialist CCTV inspection due to risks of ongoing water escape affecting ground stability.

- Severe structural distortions, extensive cracking, and persistently damp conditions at basement level, indicative of major structural issues necessitating extensive remedial action.

2.2. The previous survey concluded that the property exhibited severe structural defects, posing significant risks to future stability, likely requiring costly and extensive remedial action. These conditions were identified as sufficiently serious to discourage interest from insurers and lenders, potentially affecting future saleability and insurability.

3. Action Thresholds for Cracks and Tilts

3.1. The following sections of the report will review the walls and floors of the building. As outlined in the previous report, BRE Digest 251 and BRE Digest 475 set guidance for categorising cracks and tilting of walls and floors, with thresholds beyond which remedial action typically becomes necessary. To avoid extensive repetition, these thresholds will not be restated each time a defect is described, as doing so would unnecessarily lengthen this report.

3.2. BRE Digest 251 categorises wall cracks as follows:

Category	Description
3	Cracks which require some opening up and can be patched by a mason. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weather-tightness often impaired. Typical crack widths are 5 to 15 mm, or several of, say, 3 mm.
4	Extensive damage which requires breaking-out and replacing sections of walls, especially over doors and windows. Windows and door frames distorted, floor sloping noticeably*. Walls leaning or bulging noticeably*, some loss of bearing in beams. Service pipes disrupted. Typical crack widths are 15 to 25 mm, but also depends on number of cracks.
5	Structural damage which requires a major repair job, involving partial or complete rebuilding. Beams lose bearing, walls lean badly and require shoring. Windows broken with distortion. Danger of instability. Typical crack widths are greater than 25 mm, but depends on number of cracks.

3.3. BRE Digest 475 states the following advice regarding leans and tilts:

Tilt Limit	Description
Remedial action 1/100	Where tilts of this magnitude are measured, or the measured rate of increase of tilt indicates that this degree of tilt will be exceeded, some remedial action should be taken. This is likely to include re-levelling the building, perhaps by grouting or underpinning and jacking.
Ultimate limit 1/50	If tilt reaches this level, the building may be regarded as in a dangerous condition, and remedial action either to re-level or to demolish the building will be required urgently.

4. Findings, Discussion and Recommendations

This section of our appraisal broadly follows the structure established by the previous report (Structural Surveys Ltd, June 2024) to facilitate easy comparison between past findings and our current observations. It is intended that this appraisal be read in conjunction with the previous detailed structural survey, with our report specifically supplementing, updating, and providing additional professional commentary based on our visual inspection undertaken on 25th March 2025.

The following subsections outline our updated findings, discussions, and recommendations for each area of the property previously assessed.

4.1. External Observations – The Site

4.1.1. Topography, Trees, Vegetation, and Drainage – Findings and Discussion

4.1.1.1. Observations relating to topography, trees and vegetation, and drainage remain broadly consistent with the previous survey findings. However, vegetation growth has increased since the previous inspection, with trees, dense ivy, shrubs, bushes, and climbing plants in direct contact with the building.

4.1.2. Topography, Trees, Vegetation, and Drainage – Recommendations

4.1.2.1. Recommendations remain unchanged from the previous report.

4.1.3. Boundary Wall – Findings and Discussion

4.1.3.1. Although assessment of the boundary wall was not explicitly included within our original scope, we were requested by the client to briefly review this during our inspection.

4.1.3.2. The boundary wall is of natural sandstone masonry construction, typically waist-high but varying along its length, and borders Manchester Road and High Lane. The sandstone masonry was visibly weathered throughout, with typical surface erosion, widespread loss of mortar, and visible open joints. Although difficult to confirm, it appeared the wall may retain earth behind in areas.

4.1.3.3. When viewed from Manchester Road, the section of wall to the left-hand side of the site entrance initially comprised a waist-high masonry base topped with metal railings. Open joints were noted between the coping stones – potentially indicating corrosion of the embedded railings. Moving along Manchester Road, this transitioned into a taller section of wall, approximately 2.4m high, visibly leaning towards the highway with vegetation growing over the top from the site side.

4.1.3.4. A visible vertical crack was noted at the junction between this higher section and the adjacent lower-level masonry. Beyond this point and

towards the site entrance, the low-level wall section visibly leaned inward toward the site, becoming obscured by dense vegetation growth.

4.1.3.5. Beyond the site entrance, and around the junction onto High Lane, the wall was again heavily obscured by dense vegetation. As the wall became visible again along High Lane, further significant deterioration was noted, including extensively weathered sandstone with pronounced surface erosion and open mortar joints. Several areas of the wall exhibited complete loss of individual stones.

4.1.3.6. Adjacent to the road crossing on High Lane, two areas of local collapse were observed. These collapses appear primarily due to extensive weathering, loss of mortar, and resultant loss of structural integrity.

4.1.3.7. For reference, the boundary wall continues beyond the property boundary in notably better condition, indicating the deterioration observed is predominantly localised to this site.



Photo 1 – Open joint between coping stones (potential corrosion of embedded railings).



Photo 2 – Manchester Road elevation, illustrating the higher section of boundary wall visibly leaning towards the highway.



Photo 3 – Vertical crack at junction between high-level and low-level sections of boundary wall.



Photo 4 – Dense vegetation growth obscuring low-level boundary wall section.



Photo 5– Complete loss of individual stones due to severe weathering and erosion.



Photo 6 – Area of localised collapse of boundary wall (High Lane).



Photo 7 – Second area of localised collapse (High Lane).



Photo 8 – Contrast in condition of boundary wall either side of property boundary line, highlighting localised deterioration.

4.1.4. **Boundary Wall – Recommendations:**

4.1.4.1. The current condition of the boundary wall presents a significant and urgent risk to public safety, particularly given the evident leaning of the high-level section onto Manchester Road and areas of localised collapse along High Lane.

4.1.4.2. We recommend safeguarding measures, potentially including temporary shoring, partial dismantling, or secure fencing-off of affected areas, to ensure public safety.

4.1.4.3. Following these safety measures, a detailed structural assessment should be undertaken to inform comprehensive remedial proposals.

4.1.4.4. Severely deteriorated and collapsed sections require urgent rebuilding using matching sandstone masonry and appropriate lime-based mortar. Elsewhere, extensively weathered sections and areas with significant mortar loss or open joints should be fully repointed to restore stability and prevent further deterioration.

4.1.4.5. All vegetation obscuring or contributing to the deterioration of the wall should be cleared, to enable a detailed inspection, preventing further damage, and supporting ongoing maintenance and remedial works.

4.2. External Observations – The Building

4.2.1. Roof – Findings and Discussion

4.2.1.1. Observations remain broadly consistent with the previous survey. The roof structure and coverings continue to exhibit signs of distortion, deflection, slippage of tiles, moss growth, and weathered mortar, all of which were previously identified. The chimney stacks remain significantly weathered, distorted, and cracked, with visible vegetation growth indicating ongoing deterioration.

4.2.1.2. In addition to these previously recorded defects, we noted ongoing deterioration of timber fascias, with localised but significant decay observed, particularly at the left-hand side of the front elevation.

4.2.1.3. A vertical crack was also identified in the timber fascia of the flat roof above the square bay window on the front elevation, a defect not explicitly referenced previously. This cracking is likely exacerbated by the substantial outward tilt of the front elevation, the structural implications of which are discussed in more detail later in this report.



Photo 9 – Vertical crack in timber fascia of bay window flat roof (front elevation).



Photo 10 – Typical deterioration and decay of timber fascia at high-level eaves, left-hand side front elevation.

4.2.2. Roof – Recommendations

4.2.2.1. We acknowledge the recommendation from the previous report to engage a specialist roofing contractor for detailed appraisal and necessary repairs to prevent further water ingress and subsequent structural deterioration.

4.2.2.2. Given the significant leans and structural instability identified, safe conventional access to the roof is currently not advisable. Moreover, isolated roof repairs would be largely ineffective without addressing the underlying structural instability of the supporting walls. Consequently, roof repairs must be considered as part of an overall structural stabilisation programme, with careful attention to the sequencing and safe method of access. Temporary protective measures – such as installing a weatherproof scaffold canopy or undertaking repairs from external mobile platforms – could be explored to limit further deterioration. The roof is discussed again later in this report.

4.2.3. **Walls – Findings and Discussion**

Front Elevation:

4.2.3.1. The front elevation exhibits significant distortion in the brickwork, both vertically and horizontally. Although not explicitly detailed in the previous report, this distortion is visually pronounced and clearly indicative of structural movement.

4.2.3.2. The main front wall currently tilts outwards approximately 80mm over an 1800mm height (1 in 23), a substantial increase compared to the previously recorded tilt of 15mm over 1000mm height (1 in 67). This indicates significant continued structural movement or deterioration.

4.2.3.3. Horizontally, the brick courses now slope approximately 40mm per 1000mm length (1 in 25), representing a marked deterioration from the previously measured 10mm per 1000mm slope.

4.2.3.4. The bay window was measured to tilt outward approximately 45mm over 1000mm height (1 in 22), showing a slight but notable increase from the previous measurement of 40mm per 1000mm (1 in 25).

4.2.3.5. Cracks previously reported in the stone lintels above the bay window (approximately 10mm wide) remain broadly consistent. Brickwork above these lintels was observed to be loose and significantly displaced relative to adjacent bricks.

4.2.3.6. The previously documented sagging and severe cracking of the stone lintel above the porch entrance remains evident. The cracking now appears more pronounced than in the previous survey, indicating ongoing structural distress.

4.2.3.7. Additional cracking, not previously reported, was identified in the brickwork at the corner of the front elevation adjacent to historic tie plates and rods, suggesting further progressive structural movement.



Photo 11 – Pronounced cracking in the stone lintel above porch entrance.

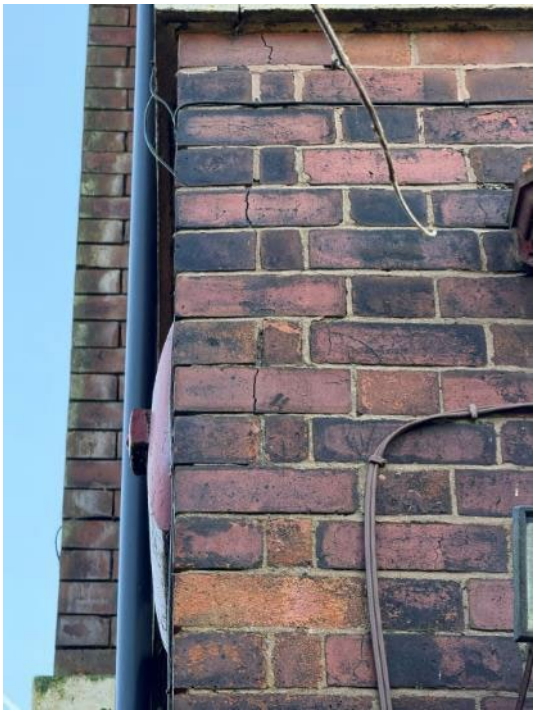


Photo 12 – Newly observed cracking in brickwork adjacent to historic wall tie plate and rod.



Photo 13 – Full-size image demonstrating the visual extent of wall leans and tilts, providing a representative illustration of structural distortion in the region of 1 in 25, as described throughout the report.



Photo 14 – Full-size image demonstrating the visual extent of wall leans and tilts, providing a representative illustration of structural distortion in the region of 1 in 25, as described throughout the report.

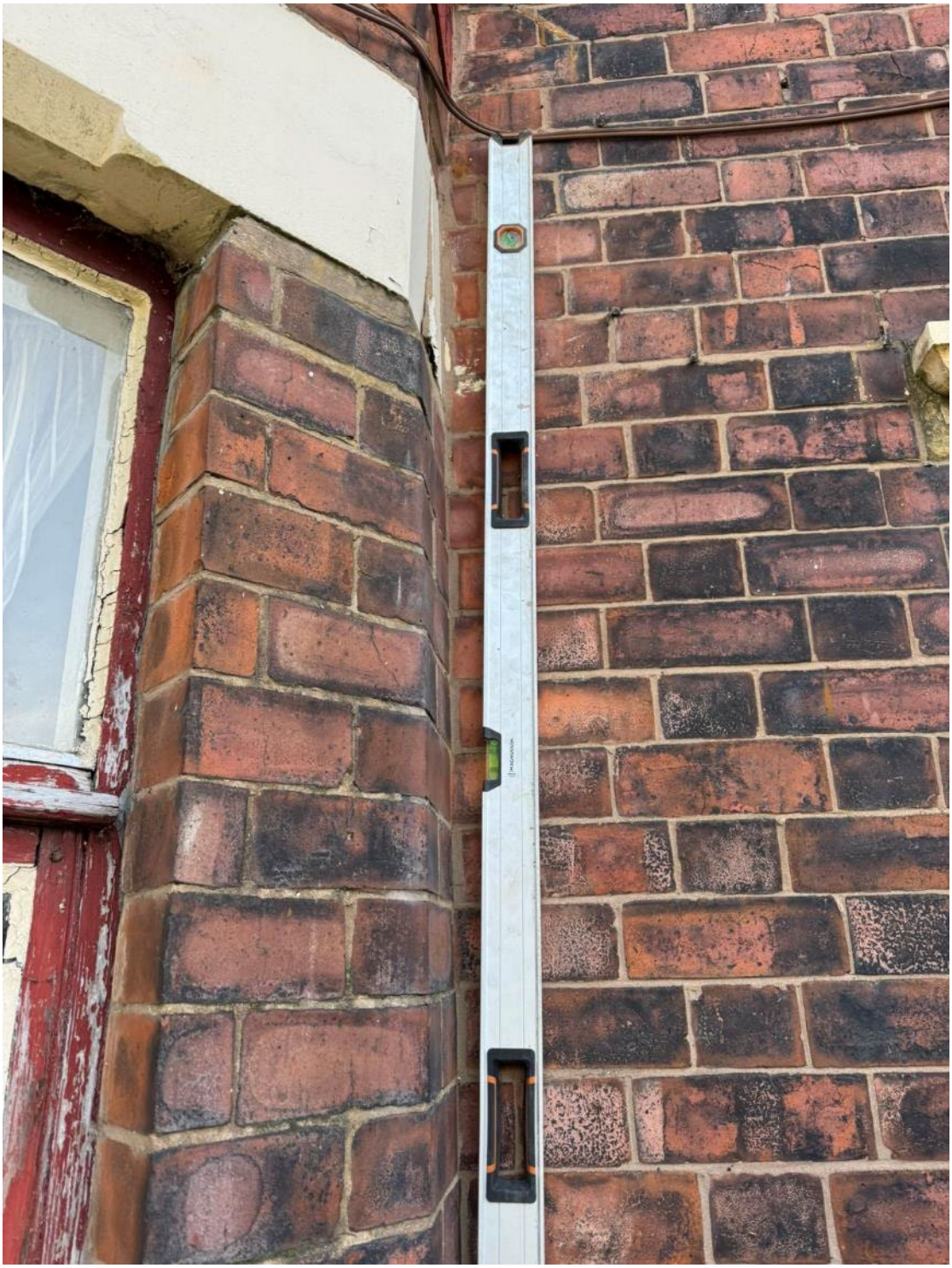


Photo 15 – Full-size image demonstrating the visual extent of wall leans and tilts, providing a representative illustration of structural distortion in the region of 1 in 25, as described throughout the report.

Right Elevation

4.2.3.8. As previously reported, dense vegetation restricted detailed measurement of the right-hand elevation. However, visual inspection confirmed a significant outward tilt, consistent with earlier observations.

4.2.3.9. A recent measured survey indicates a tilt of approximately 1 in 49, confirming structural distortion is considerable.

4.2.3.10. The previously noted cracking (approximately 25mm wide) above the ground-floor window remains clearly evident and appears broadly unchanged.

4.2.3.11. Additionally, irregularities and widened vertical (perp) joints were observed adjacent to the right-hand side of the ground-floor window, accompanied by clear cracking extending through decorative banding and surrounding brickwork. These previously unrecorded defects indicate further progressive structural deterioration.



Photo 16 – Cracking above the ground floor window.



Photo 17 – Cracking visible through feature banding and brickwork to the right-hand side of window.

Rear Elevation

4.2.3.12. Observations remain consistent with the previous inspection. Mortar pointing continues to be severely weathered, significantly affecting structural integrity and weather resistance. Areas of frost damage and spalled brickwork remain extensive, leaving permeable brick exposed and vulnerable to further deterioration. Overall, brickwork condition is poor and progressively deteriorating.

4.2.3.13. Although not explicitly measured previously, a recent measured survey indicates a structural tilt of approximately 1 in 39 across this elevation. Additionally, the chimney stack exhibits a pronounced lean of approximately 1 in 20.

4.2.3.14. Closer inspection reveals extensive mortar loss and weathered brickwork, partly obscuring but clearly indicating ongoing structural distress. Newly observed open joints and cracks, were noted in the brickwork area between the chimney stack and rear outrigger.

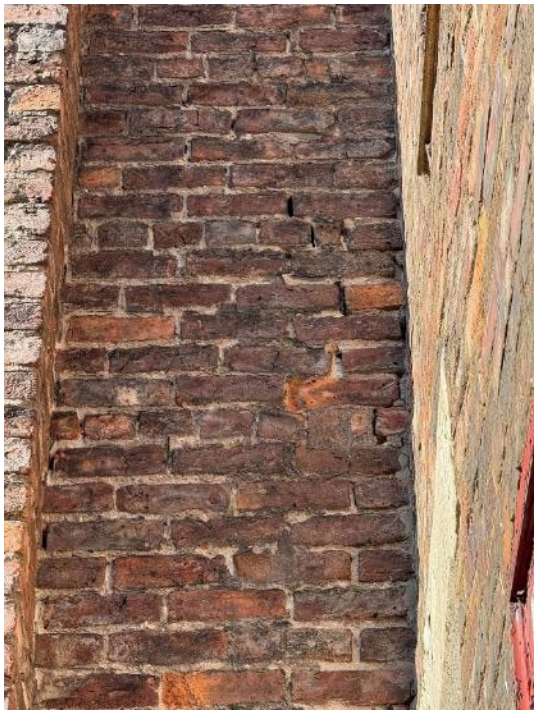


Photo 18 – Extensive mortar loss and severe weathering of brickwork, partially obscuring but clearly indicating cracks/open joints.

Left Elevation

4.2.3.15. Observations remain broadly consistent with the previous survey findings. Dense vegetation again severely restricted detailed inspection, particularly at ground-floor level. The previously measured outward tilt of approximately 30mm over 1000mm height (1 in 33) remains evident, representing structurally significant distortion. Significant cracking, previously reported at approximately 25mm wide, continues to be clearly visible. Mortar pointing remains severely weathered, with extensive areas of frost-damaged and spalled brickwork further compromising overall structural integrity.

4.2.3.16. Additional defects identified during our recent inspection include:

- Cracking over stone lintels, extending through decorative stone banding.
- Vertical cracking at the junction of the bay window brickwork.
- Extensive cracking around window frames, lintel ends, and within brickwork piers, with notably distorted vertical mortar joints.
- Significant diagonal cracking through a stone lintel, indicative of structural failure, accompanied by brickwork cracking above.
- Clear evidence of open joints and cracking at the ends of stone lintels, suggesting structural movement.



Photo 19 – Crack over lintel extending through stone banding.



Photo 20 – Diagonal crack through stone lintel, indicating structural failure, with associated cracking above.



Photo 21 – Crack at the corner of bay window brickwork.



Photo 22 – Crack/opened joint at end of stone lintel.



Photo 23 – Cracking around window frames, lintel ends, central pier, and irregular mortar alignment.



Photo 24 – Cracked bricks in brickwork pier.

Rear Outrigger

4.2.3.17. Observations remain broadly consistent with the previous report. Previously measured tilts remain clearly evident, with the right-hand side elevation leaning inward approximately 30mm per 1000mm height (1 in 33) and the left-hand side elevation leaning outward approximately 50mm per 1000mm height (1 in 20). Both conditions significantly exceed the structural intervention thresholds identified in BRE Digest 475, indicating urgent remedial action is required.

4.2.3.18. Brickwork above the cellar access door remains visibly distorted and sagging. The steel beam supporting masonry in this location continues to show significant corrosion. Vertical and stepped cracking between the ground floor and cellar door openings remains clearly evident, previously categorised as Category 4 (cracks approximately 25mm wide) under BRE Digest 251, confirming severe structural distress.

4.2.3.19. Mortar pointing remains severely weathered and continues to significantly compromise structural integrity and weather resistance. Extensive frost damage, spalled brickwork, and overall masonry deterioration are broadly unchanged from previous observations.

4.2.3.20. Additionally, previously noted cracking (approximately 25mm wide) has noticeably progressed upward beyond the ground-floor window. The brick arch lintel above this window has failed completely, with a number of bricks becoming dislodged. This crack has extended upwards to the first-floor window, indicating active and ongoing structural movement. Further significant cracking, not explicitly identified in the previous survey, has been observed and recorded in the following photographs. Additionally, cracking and differential movement in the external concrete slab adjacent to this area suggest potentially unstable ground conditions generally.



Photo 25 – Cracking over basement opening arch lintel.



Photo 26 – Cracking extending from ground-floor window to first-floor window, including failed lintel.



Photo 27 – Failed brick arch lintel over ground floor window.



Photo 28 – Cracking extending upwards below first floor window.



Photo 29 – Open brick joints and potential cracking visible at eaves level.



Photo 30 – Cracks in external concrete finishes adjacent to the outrigger, indicating possible ground movement.



Photo 31 – Cracking below the ground floor window, directly above basement opening supported by steel beam.



Photo 32 – Further detail of cracking below ground floor window adjacent to basement opening with steel beam.

4.2.4. **Walls – Recommendations**

4.2.4.1. The structural defects observed across all elevations and the rear outrigger significantly exceed the critical thresholds defined in BRE Digest 475, surpassing the ultimate limit for structural safety (1 in 50). This indicates that urgent and extensive remedial action is required to address the current structural instability.

4.2.4.2. In all measured instances, wall leans are severe enough that the centre of mass of the walls falls outside their base. This indicates that, even without external forces such as wind loads, the walls are inherently unstable and currently rely entirely on incidental support provided by the floors and roof structure for stability under their own self weight.

4.2.4.3. Observed cracking is categorised as Category 3 and Category 4 damage (BRE Digest 251), indicating structural distress necessitating major remedial intervention.

4.2.4.4. Temporary propping or shoring would mitigate the risk of structural collapse. However, the external walls currently rely entirely on incidental restraint provided by floors and roof structure, meaning the introduction of temporary supports could unintentionally disrupt existing load paths, potentially triggering sudden structural instability. Additionally, extensive structural repairs – likely involving partial dismantling, underpinning, or realignment – mean temporary supports would need frequent adjustment or removal during remedial work. It is also crucial to recognise that any temporary propping must bear onto stable foundations; given the suspected inadequacy of existing foundations, safely implementing temporary works presents significant practical challenges.

4.2.4.5. Across all elevations and the rear outrigger, comprehensive remedial works are advised. These include:

- Extensive repointing using an appropriate lime-based mortar to restore weather resistance and structural durability.
- Selective replacement of damaged or spalled bricks and structurally compromised lintels.
- Application of a suitable breathable waterproofing treatment to external masonry to mitigate ongoing damp ingress and associated deterioration.

However, due to the severity of cracking, pronounced tilting, and clear evidence of ongoing ground instability, it must be recognised that isolated repairs or superficial remedial measures alone would be wholly insufficient.

4.2.4.6. Detailed ground investigations would fully establish the underlying causes and extent of the structural movement observed across the property.

Clearly, significant foundation movement has already occurred. The existing foundations are likely to be simple brick spread foundations. These investigations should prioritise evaluating ground conditions and confirming the adequacy – or otherwise – of the existing foundations, as foundation inadequacy is strongly suspected to be the primary cause of the structural tilts and leans observed. These investigations would assist in the production of the design of new or strengthened foundations.

4.2.4.7. However, even following thorough investigation and remediation at foundation level, correcting structural leans and tilts of the magnitudes recorded – routinely in excess of 1 in 30 – is generally recognised in structural engineering literature and technical guidance (BRE Digest 475; Charles, J. A. (2004) Settlement and tilt of low-rise buildings) as impractical. Methods to realign severely leaning structures, such as hydraulic jacking or pressure grouting, are inherently high risk and prohibitively costly, and finding suitably experienced contractors willing to undertake such specialist operations would be challenging. Moreover, attempts at structural re-alignment through mechanical means would not only carry a significant risk of sudden structural collapse, due to disruptions in the current incidental load paths (as discussed previously), but would also likely result in secondary damage to the building fabric. Specifically, numerous historic cracks and structural gaps have been infilled and finishes adapted over time to accommodate the existing distortion. Correcting the structural tilt would re-open these repaired areas, damaging internal finishes and fittings, and likely result in a building still structurally compromised and requiring extensive further repairs.

4.2.4.8. An alternative approach would involve stabilising the existing walls in their current distorted positions. Following foundation remediation—likely via underpinning or a similar method—this strategy would require extensive structural strengthening measures. These would include formalising connections between walls and floors, introducing bracing, localised steelwork, and potentially installing a comprehensive internal steel frame to provide reliable load paths. Although technically feasible, this approach presents significant complexity and risk. It would require intricate sequencing and extensive temporary propping to allow safe access and modification of the existing fabric. The process effectively involves retrofitting an entirely new structural system into a severely distorted and unstable building, which is far more challenging than constructing such a system in isolation. A critical issue is the need for temporary shoring and propping to be installed against unstable walls. This presents clear health and safety risks, as workers would be required to carry out intrusive works in close proximity to elements currently reliant on informal and unpredictable load paths. The risk of collapse during the enabling works phase cannot be acceptably mitigated.

4.2.4.9. Considering the significant practical and structural areas discussed above, the safest, most reliable, and likely most cost-effective solution to repairing the walls, involves a carefully managed sequence of demolition and reconstruction of all structurally compromised walls. Before

reconstructing these walls, it is critical that the existing foundations – which have clearly proven inadequate – are strengthened or replaced with suitably designed foundations capable of safely supporting the rebuilt structure. The detailed design of these new foundations would depend on the outcomes of the ground investigations and assessments described in above.

4.3. Internal Observations

4.3.1. Roof – Findings and Discussion

4.3.1.1. Observations remain broadly consistent with the previous report. The roof space provides historically habitable accommodation, and internal linings obscure direct inspection of structural timbers. However, the previously reported significant external deflections clearly indicate underlying structural inadequacy or deterioration.

4.3.1.2. Dampness previously noted on internal roof slopes remains evident and has visibly worsened. Specifically, the right-hand and left-hand attic rooms now exhibit extensive plaster damage, severe dampness, and evidence of ongoing water ingress. Prolonged dampness is likely to have significantly deteriorated concealed roof timbers, further compromising structural integrity.

4.3.1.3. Cracking in plaster finishes around the rear roof slope purlin appears notably more pronounced since the previous inspection, suggesting continuing structural distress and ongoing movement.

4.3.1.4. The previous report noted that front eaves access was jammed shut. During our inspection, we successfully accessed this space and observed substantial internal deterioration, including extensive plaster loss and significant dampness, indicative of prolonged water ingress.

4.3.1.5. Our internal inspection at second-floor level was significantly constrained by severely sloping floors, creating an unstable sensation underfoot and prompting a shortened inspection duration due to safety concerns.

4.3.1.6. Inspection of the outrigger roof revealed extensive diagonal cracking patterns, widespread plaster damage, in patterns strongly indicative of ongoing structural movement.



Photo 33 – Further cracking, extensive plaster loss, and apparent ongoing water ingress at roof level.



Photo 34 – Cracking and evidence of water ingress at roof level.



Photo 35 – Cracking, extensive plaster loss, and clear evidence of water ingress within the eaves space (previously not inspected).



Photo 36 – Diagonal cracking patterns observed on the underside of the outrigger roof.



Photo 37 – Cracking accompanied by evidence of damp conditions to the underside of the roof.



Photo 38 – Additional diagonal cracking patterns to the underside of the outrigger roof.



Photo 39 – Wide-angle view showing extensive cracking to outrigger roof indicative of significant structural movement in addition to aging deterioration.



Photo 40 – Evidence of damp conditions on the soffit beneath the ground floor bay window.

4.3.2. **Roof – Recommendations**

4.3.2.1. Repairs or replacement of roof coverings, flashings, and rainwater goods would ordinarily be recommended to arrest ongoing water ingress and prevent further structural deterioration. Typically, this would be followed by the removal of internal plaster and finishes in affected areas to enable a thorough inspection of the underlying roof timbers, and a specialist timber condition survey to assess the extent of any decay, rot, or insect infestation. However, in this specific case, such actions must be approached with caution. As previously discussed, the roof structure is currently providing unintended diaphragm action, significantly contributing to the lateral stability of the severely leaning walls. In addition, the existing internal lath and plaster finishes may also be playing a structural role in bracing the walls. The premature removal of these internal finishes, or uncontrolled disturbance of the roof structure, could inadvertently reduce overall stability and significantly increase the risk of structural failure. Similarly, direct access to the roof to carry out repairs or replacement of coverings, flashings, or rainwater goods is not advisable, due to the risk of destabilising the structure through vibration or load redistribution. Any interim works to arrest ongoing water ingress should therefore be carried out remotely, using a remote access platform or similar non-invasive means, without physically loading or disturbing the existing roof structure.

4.3.2.2. Due to the severe structural tilts, leans, and distortions identified throughout the building, the roof structure is almost certainly performing a critical but unintended structural role, acting effectively as a diaphragm stabilising the severely compromised external walls. Although roofs typically provide lateral restraint to walls, the extreme degree of deformation observed suggests that significantly increased lateral forces are now being transferred through the existing roof structure. Attempting isolated repairs or dismantling the roof without first addressing the severe

wall and foundation instabilities could dangerously disrupt these incidental load paths, potentially causing sudden collapse or uncontrolled structural movement.

4.3.2.3. Undertaking roof repairs independently is not advisable given the current condition. Due to the significant distortion and deterioration of both the roof timbers and external walls, any effective roof repairs would first require stabilisation of the supporting walls.

4.3.2.4. Therefore, comprehensive structural repairs – specifically addressing foundation inadequacies and the leaning walls – must precede any meaningful roof works. Attempting isolated repairs would be unsafe and ineffective due to the interdependent nature of the roof and wall structures.

4.3.2.5. Depending on the chosen structural solution for the walls, the roof will either need extensive repairs and strengthening (given its observed deflections and deterioration) or complete removal and reconstruction once overall structural stability has been re-established.

4.3.3. **Floors – Findings and Discussion**

4.3.3.1. Observations remain broadly consistent with the previous report, with significant downward sloping noted across suspended timber floors at all levels.

4.3.3.2. Our internal inspection revealed extensive plaster cracking, damage, and evidence of prolonged damp conditions across the soffits of the ground, first, and second-floor structures, as illustrated in the appended photographs. These observations reinforce concerns regarding the severity of structural movement, compromised structural integrity, and ongoing deterioration due to damp ingress and timber decay. The progression of this decay and damage aligns with expectations given the time elapsed since the previous survey.

4.3.3.3. A direct comparison with the previous structural report clearly indicates worsening floor slopes in several areas, demonstrating ongoing structural movement and deterioration since the earlier inspection. Key comparative measurements include:

Second Floor Level:

- Left-hand Bedroom: Now approximately 50mm over 1800mm (1 in 36), broadly consistent with the previous measurement of 25mm over 1000mm (1 in 40).
- Right-hand Bedroom: Approximately 100mm over 1800mm (1 in 18), previously not measured but clearly severe.

First Floor Level:

- Landing: Approximately 60mm over 1800mm (1 in 30), previously 25mm over 1000mm (1 in 40), showing a clear increase in slope severity.
- Front Left Room (Green/Beige Decoration): Approximately 80mm over 1800mm (1 in 23), previously not explicitly measured but evidently significant.
- Front Right Room (Pink Decoration): Approximately 60mm over 1600mm (1 in 27), again previously unmeasured but significant.
- Bathroom: Approximately 100mm over 1800mm (1 in 18), previously recorded as 40mm over 1000mm (1 in 25), demonstrating progression.

Ground Floor Level:

- Front Left Room: Approximately 90mm over 1800mm (1 in 20), previously 40mm over 1000mm (1 in 25), indicative of ongoing movement.

4.3.3.4. Inspection at the second-floor level was constrained by severe floor slopes, creating an unstable sensation underfoot. Consequently, the inspection duration was limited due to safety concerns.



Photo 41 – Cracking and damage to plaster on soffit of second-floor structure, with evidence of damp conditions.



Photo 42 – Extensive loss of plaster on soffit of second-floor structure, accompanied by evidence of damp conditions.



Photo 43 – Plaster damage and clear evidence of damp conditions on soffit of second-floor structure.



Photo 44 – Cracking, plaster damage, and evidence of damp conditions on soffit of second-floor structure.



Photo 45 – Cracking visible in plaster finishes on soffit of second-floor structure.



Photo 46 – Cracking observed in plaster finishes on soffit of second-floor structure.



Photo 47 – Cracking to plaster finishes on soffit of second-floor structure.



Photo 48 – Cracking to plaster finishes on soffit of second-floor structure.



Photo 49 – Evidence of damp conditions on soffit of first-floor structure.



Photo 50 – Cracking to plaster and potentially compromised bearing of support beam within first-floor structure adjacent to staircase.



Photo 51 – Cracking to plaster, potentially compromised support beam bearing within first-floor structure, and adjacent wall cracking near staircase.



Photo 52 – Cracking to plaster and potentially compromised support beam bearing within first-floor structure, with adjacent wall cracking.



Photo 53 – Cracking in plaster finishes on soffit of first-floor structure.



Photo 54 – Cracking in plaster finishes on staircase soffit.



Photo 55 – Longitudinal cracking to plaster finishes at the spring point on soffit of staircase.



Photo 56 – Cracking in plaster finishes on soffit of first-floor structure.



Photo 57 – Additional cracking to plaster finishes on soffit of first-floor structure.

4.3.4. **Floors – Recommendations**

4.3.4.1. The observed issues with the floors at all levels are fundamentally twofold:

- Dampness and associated timber decay have compromised local areas of floor timbers. Repairs or replacements to these areas would typically be recommended in isolation, provided the surrounding structure was stable. However, given the context, isolated repairs alone will be insufficient.

- The severe tilt and deformation of the floors represent a critical structural issue. The extent of distortion – consistently measured in excess of approximately 1 in 30 – significantly surpasses the limits set out by industry-recognised technical guidance (BRE Digest 475 and Charles, J. A. (2004) Settlement and tilt of low-rise buildings). These authoritative references clearly categorise such extensive distortion as structurally unsafe and practically irreparable through isolated remedial measures.

4.3.4.2. Given the severe distortion of external walls, the floors are inadvertently providing critical lateral restraint. Attempting isolated floor repairs without first stabilising walls and foundations risks sudden structural collapse.

4.3.4.3. Due to these interdependencies, floor repairs must form part of a coordinated structural repair strategy on the building as a whole.

4.3.4.4. Where supporting walls require rebuilding, floors should be carefully dismantled, with sound or repairable timbers retained, repaired as necessary, and reinstated onto stable, reconstructed walls at level positions. Severely damaged timbers should be replaced entirely.

4.3.4.5. If stabilisation of walls is undertaken without full rebuilding, localised timber repairs would be necessary. The severe tilt would then require correction either by removing and reinstating floors level (with appropriate temporary shoring), or by adding structural build-ups above (floor) and below (ceiling), ensuring joists are strengthened accordingly to safely carry additional loads.

4.3.4.6. There is significant potential for concealed defects, such as compromised joist bearings, given observed structural displacements of over 200mm. Intrusive inspection is recommended prior to finalising remedial strategies to fully understand hidden conditions and ensure safety.

4.3.5. **Walls – Findings and Discussion**

Second Floor:

4.3.5.1. Observations remain broadly consistent with the previous report. Internal walls continue to exhibit severe and visually apparent tilting at second-floor level. Measurements confirmed the previously reported wall tilt of approximately 40mm over 1000mm (1 in 25), substantially exceeding the thresholds identified in BRE Digest 475 as structurally significant and unsafe.

4.3.5.2. Cracking was observed prominently at wall heads, roof level, and around rooflights, accompanied by evidence of water ingress. These conditions suggest ongoing deterioration and structural distress, with continued movement and progressive weakening of wall structures.



Photo 58 – Cracking in second-floor walls at roof level, with evidence of potential water ingress around roof lights.



Photo 59 – Cracking at the head of second-floor walls at roof level.

First Floor:

4.3.5.3. Observations remain broadly consistent with the previous report, with significant internal wall tilting, cracking, plaster deterioration, and clear evidence of water ingress.

4.3.5.4. Notably, our recent measurements indicate that the internal wall lean in the front right-hand room (previously not explicitly measured) now records approximately 80mm over 1800mm (1 in 23). This represents severe structural distortion, significantly exceeding the thresholds set out by BRE Digest 475.

4.3.5.5. The previously noted plaster deterioration and damp conditions are confirmed as ongoing, with extensive plaster cracking, damage, and damp in multiple areas.

4.3.5.6. Additional observations from our inspection (illustrated in the appended photographs) further highlight progression or previously unreported defects, including:

- Significant diagonal, horizontal, and vertical cracking, particularly around window and door openings, extending across ceiling-wall junctions and into adjacent structural elements.
- Potential structural failure of the bay window bressumer beam, indicated by substantial cracking patterns observed at ceiling level above the bay window.
- Clear indications of structural movement visible at floor-wall junctions, with noticeable gaps forming between floorboards and skirting boards.
- Pronounced diagonal cracking and structural distress within the outrigger walls, particularly beneath roof purlins, strongly indicative of progressive structural movement and internal stresses.
- Continued deformation of window and door frames, visibly adapted to distorted openings.



Photo 60 – Evidence of prolonged water ingress and damp conditions to the first-floor wall.



Photo 61 – Vertical and horizontal cracking at junction between first-floor wall and floor, with a visible gap opening between floorboards and skirting board.



Photo 62 – Diagonal cracking visible in first-floor outrigger wall.



Photo 63 – Diagonal cracking in first-floor outrigger wall extending downward from roof purlin.



Photo 64 – Cracking visible on first-floor outrigger wall.



Photo 65 – Vertical, diagonal, and horizontal cracking above window and around the corner of the external first-floor wall.



Photo 66 – Vertical and horizontal cracking at junction between first-floor wall and floor, with a visible gap opening between floorboards and skirting board.



Photo 67 – Cracking to the first-floor wall accompanied by evidence of water ingress and damp conditions.



Photo 68 – Significant cracking and damage to ceiling and wall finishes, indicative of ongoing water ingress and structural movement.



Photo 69 – Close-up indicating an internal wall lean of approximately 80mm over 1800mm in the first-floor front-right room.



Photo 70 – Cracking and evidence of prolonged water ingress and damp conditions affecting first-floor wall finishes.



Photo 71 – Significant cracking to first-floor wall, potentially indicating failure of the bay window bressumer beam, with cracking continuing into ceiling above.



Photo 72 – Significant cracking and damage to first-floor wall structure and finishes, with evidence of water ingress.



Photo 73 – Cracking along head of first-floor wall, with extensive damage to finishes and evidence of water ingress.



Photo 74 – Cracking along head of wall, with diagonal cracking extending from corner across first-floor wall.



Photo 75 – Extensive cracking, finish deterioration, and evidence of water ingress on first-floor wall.



Photo 76 – Cracking above an opening in the outrigger, potentially indicative of lintel failure.



Photo 77 – Movement evidenced by cracking and pulling of wallpaper finishes on first-floor walls.



Photo 78 – Diagonal cracking in first-floor outrigger wall, indicative of substantial structural movement.



Photo 79 – Typical condition of window and door frames, clearly adapted over time to fit non-square openings, with daylight visibly penetrating around frames.

Ground Floor:

4.3.5.7. Observations remain consistent with the previous inspection, with significant internal wall tilting, extensive damp, widespread plaster deterioration, and clear evidence of ongoing structural movement evident throughout the ground-floor walls.

4.3.5.8. Recent measurements indicate a notable worsening of wall tilt conditions. Specifically, the right-hand side wall in the left-front room, previously recorded as approximately 25mm over 1000mm (1 in 40), now exhibits an increased tilt of approximately 80mm over 1800mm (1 in 23). This substantial progression in structural distortion significantly exceeds the BRE Digest 475 thresholds and confirms ongoing structural instability.

4.3.5.9. Previously reported issues – including widespread dampness, extensive plaster deterioration, and cracking – remain clearly evident and have visibly deteriorated since the last inspection. Evidence of polystyrene-backed lining paper at ground-floor level raises additional concerns about concealed defects, suggesting the underlying structural deterioration may be more extensive than currently visible.

4.3.5.10. Additional defects, not explicitly noted in the previous report, include pronounced cracking at junctions between adjacent walls, cracking above lintels and openings, and recent movement within tiled areas, clearly demonstrated by cracking grout lines. These new observations further indicate active and ongoing structural displacement.



Photo 80 – Significant damp conditions observed on ground-floor walls.



Photo 81 – Cracking at the junction between two ground-floor walls, indicative of structural movement.



Photo 82 – Cracking between wall tiles with evidence of the grout on the worktop below, indicating recent structural movement.



Photo 83 – Visible distortion and lack of squareness in ground-floor window frames.

Basement:

4.3.5.11. Observations remain broadly consistent with the previous inspection, with significant cracking, distortion, and lateral movement evident to both perimeter and internal basement walls. These walls continue to act partially as retaining structures, increasing structural stresses due to external ground pressures. An older vertical crack, previously infilled, was noted in the internal basement wall beneath the front-right room, further confirming historical structural movement and previous repair attempts. However, widespread, active cracking indicates ongoing movement.

4.3.5.12. Previously reported severe cracking (exceeding 30mm width) indicative of subsidence remains clearly visible. Our recent inspection identified diagonal and vertical cracks, particularly at junctions between internal and external walls, and notably within external walls beneath bay window areas. These newly identified cracks clearly demonstrate continuing structural instability and movement.

4.3.5.13. The basement environment remains persistently damp, poorly ventilated, and deteriorated, indicative of prolonged water ingress and inadequate ventilation. Such conditions pose an ongoing and significant risk of timber decay and rot affecting structural timber elements, notably the floor joists above the cellar, further undermining the structural integrity of the property.

4.3.5.14. Distortions and unevenness noted previously to the basement floors remain visibly pronounced, reinforcing concerns about substantial ground instability and associated structural movement.



Photo 84 – Diagonal cracking in brickwork to the front bay at basement level.



Photo 85 – Diagonal cracking in internal wall beneath the front-left ground-floor room at basement level.



Photo 86 – Diagonal cracking in external basement wall beneath front-right ground-floor room.



Photo 87 – Vertical crack at junction between internal dividing wall (front to rear-right basement rooms) and external wall.



Photo 88 – Vertical crack at junction between internal outrigger basement wall and external wall.



Photo 89 – Typical condition of basement rooms, highlighting widespread dampness affecting walls, floors, and ceilings.

4.3.6. **Walls – Recommendations**

4.3.6.1. Internal walls across all floors exhibit severe structural distortion, tilting, and cracking significantly exceeding acceptable limits outlined in BRE Digest 475. Tilt measurements routinely surpass approximately 1 in 30, clearly indicating structural instability. Notably, cracking observed in basement walls reaches Category 5 severity (approximately 30mm wide), per BRE Digest 251.

4.3.6.2. The severe tilting and associated internal cracking observed throughout the building, together with ongoing damp penetration and plaster deterioration, further highlight the extent of progressive structural damage. Any attempts at isolated internal wall repairs would similarly risk sudden structural failure, as incidental load paths provided by the floors and roof bracing between the tilting walls could be inadvertently disrupted. Recommendations previously set out for external walls (Section 4.2.4) regarding temporary propping, underpinning, and partial reconstruction and/ or stabilisation apply equally to the internal walls.

4.3.6.3. Localised plaster deterioration and dampness issues should be addressed as part of the broader reconstruction and remedial process. However, it must be emphasised that addressing superficial plaster defects or dampness without resolving the underlying structural instability would offer no lasting structural benefit or stability.

4.3.6.4. Measured internal wall tilts and leans are of similar magnitude to those recorded externally, with notably more extensive cracking observed internally. Consequently, recommendations outlined for external walls (Section 4.2.4) equally apply to internal walls.

4.4. Summary of Measurements Taken

4.4.1. The table below presents a direct comparison between structural measurements recorded in the previous survey and those obtained during our recent inspection.

Location	Element	Type	Previous Survey Measurement	Current Survey Measurement
External				
Front Elevation	External Wall	Lean	15mm in 1000mm (1 in 67)*	80mm in 1800mm (1 in 22)
Front Elevation	External Wall	Tilt	10mm in 1000mm (1 in 100)*	40mm in 930mm (1 in 23)
Front Elevation – Bay Window	External Wall	Tilt	40mm in 1000mm (1 in 25)	45mm in 1000mm (1 in 22)
Left Elevation	External Wall	Lean	30mm in 1000mm (1 in 33)	30mm in 1000mm (1 in 33)
Rear Outrigger – Right Elevation	External Wall	Lean	30mm in 1000mm (1 in 33)	80mm in 1800mm (1 in 22)
Rear Outrigger – Left Elevation	External Wall	Tilt	50mm in 1000mm (1 in 20)	Not measured
Internal Floors				
Second Floor – Right Room	Floor	Tilt	Not measured	100mm in 1800mm (1 in 18)
Second Floor – Left Room	Floor	Tilt	25mm in 1000mm (1 in 40)	50mm in 1800mm (1 in 36)
First Floor – Landing	Floor	Tilt	25mm in 1000mm (1 in 40)	60mm in 1800mm (1 in 30)
First Floor – Bathroom	Floor	Tilt	40mm in 1000mm (1 in 25)	100mm in 1800mm (1 in 18)
First Floor – Rear en-suite	Floor	Tilt	30mm in 1000mm (1 in 33)	Not measured
First Floor – Front Left Room	Floor	Tilt	Not measured	80mm in 1800mm (1 in 22)
First Floor – Front Right	Floor	Tilt	Not measured	60mm in 1600mm (1 in 27)
Ground Floor – Typical	Floor	Tilt	40mm in 1000mm (1 in 25)	75mm in 1800mm (1 in 24)
Ground Floor – Front Left	Floor	Tilt	Not measured	90mm in 1800mm (1 in 20)
Internal Walls				
Second Floor – Typical	Internal Wall	Lean	40mm in 1000mm (1 in 25)	
Second Floor – Left Bedroom	Internal Wall	Lean	40mm in 1000mm (1 in 25)	Not measured
First Floor – Typical	Internal Wall	Lean	40mm in 1000mm (1 in 25)	
First Floor – Landing LH	Internal Wall	Lean	25mm in 1000mm (1 in 40)	Not measured

First Floor – Front Left Bedroom	Internal Wall	Lean	30mm in 1000mm (1 in 33)	60mm in 1800mm (1 in 30)
First Floor – Rear Left Bedroom	Internal Wall	Lean	40mm in 1000mm (1 in 25)	Not measured
First Floor – Outrigger Ensuite	Internal Wall	Lean	40mm in 1000mm (1 in 25)	80mm in 1800mm (1 in 22)
First Floor – Front Right Room	Internal Wall	Lean	Not measured	80mm in 1800mm (1 in 23)
Ground Floor – Typical	Internal Wall	Lean	40mm in 1000mm (1 in 25)	
Ground Floor – Hall RHS	Internal Wall	Lean	40mm in 1000mm (1 in 25)	70mm in 1800mm (1 in 25)
Ground Floor – Front Left Room	Internal Wall	Lean	25mm in 1000mm (1 in 40)	Not measured

* – Differ significantly from the previous survey. The original measurements may have been incorrect; however, we have double-checked our current measurements and confirm their accuracy. Refer to the accompanying full-sized photographs illustrating these locations.

4.4.2. The measurements illustrate a slight deterioration of structural stability since the previous inspection. Nearly all re-measured locations have worsened, with all external and internal walls leaning or tilting substantially beyond recognised safety thresholds defined by BRE Digest 475 (1 in 50).

4.4.3. Assessment of Stability Using the Centre of Mass

To clearly demonstrate structural stability implications, we have performed a basic centre-of-mass (gravity) assessment. This method supplements the BRE Digest 475 guidelines by visually confirming wall instability.

4.4.4. Explanation of the Centre-of-Mass Principle:

The method assesses wall stability based on the wall's centre of gravity position relative to its base:

- A theoretical vertical plumb line is dropped from the wall's centroid to its base.
- For structural stability, this line should ideally fall within the middle third of the wall's base thickness.
- If the plumb line falls outside the middle third but remains within the wall's base thickness, the wall is considered borderline but potentially unstable.

- If the plumb line falls outside the base thickness entirely, the wall is inherently unstable and considered at imminent risk of collapse.

This approach is grounded in fundamental physics: walls whose centre of gravity falls beyond their base must rely on external restraints (floors, roofs, buttresses) for stability, inherently indicating structural instability.

4.4.5. We have undertaken an assessment based on 3m high internal walls and 8m high external walls which determines:

- Single-skin internal walls:
  - Leans beyond 1 in 45: borderline unstable
  - Leans beyond 1 in 30: inherently unstable

- Double-skin external walls:
  - Leans beyond 1 in 56: borderline unstable
  - Leans beyond 1 in 37: inherently unstable

4.4.6. Applying these criteria:

- All external walls are classified as inherently unstable.
- All internal second-floor walls are inherently unstable.
- Internal first-floor walls are mostly inherently unstable, with two borderline cases.
- Internal ground-floor walls are predominantly inherently unstable, with one borderline case.

4.4.7. **Watercourse**

4.4.7.1. The previous report referenced an old watercourse believed to run beneath the property. Desktop historical research identified a historical stream and culvert named "Rough Leech Gutter," visible on the 1851 OS mapping. This watercourse no longer appears on modern mapping, and United Utilities' asset records contain no information about the culvert, meaning its exact current location, condition, or even existence remains uncertain.

4.4.7.2. The historical presence of this culverted stream directly beneath or close to the property provides a plausible explanation for the unusually severe structural settlement and damage observed, especially given that the surrounding area generally exhibits stable geological conditions. Historic watercourses can deposit soft, silty, or poorly consolidated soils, resulting in inherently weak ground conditions unsuitable for supporting building loads. Similarly, the potential presence of undocumented, deteriorated, or collapsed culvert structures beneath or adjacent to the property would significantly increase the likelihood of differential settlement.

4.4.7.3. In normal circumstances, confirming ground conditions via trial pits or boreholes might clarify the precise cause of settlement. Yet given the property's dangerously distorted state, even if investigations confirm or disprove the watercourse's presence, it would not alter our overarching conclusion. The extent of movement and cracking observed here places the building beyond the threshold where partial or conventional remedial works could restore structural adequacy.

4.4.7.4. Consequently, while references to "Rough Leech Gutter" help explain a likely background cause for the unusually severe settlement, it remains secondary to the fundamentally unsafe structural condition now evident. Clients and interested parties may find local historical records illuminating, but the ultimate conclusions stem from the present magnitude and progression of structural distress rather than the precise nature of any underlying watercourse.

5. Comparison of Structural Repair and Rebuild Options

5.1. Our recommendations within this report are based solely on structural engineering considerations, prioritising structural safety, stability, and practicality. To assist the reader in understanding why our recommended approach has been selected, this section outlines alternative structural repair strategies that have been considered.

5.2. Each remediation option has been evaluated purely on structural merits, considering viability, risk, disruption, and overall structural integrity. Planning considerations and detailed cost comparisons are outside the scope of this report.

5.3. Where the property is located within a Conservation Area, one might consider façade retention or partial rebuilding to preserve external appearance. This report has considered such approaches in strictly structural terms.

5.4. The following section outlines various remediation options, with discussion around which offers the safest, most stable, and practically viable structural solution.

5.5. This is not intended to be an exhaustive list of remediation options and permutations. Rather, it outlines various potential structural approaches, acknowledging that numerous variations and combinations around these themes are possible.

5.5.1. Option 1 – Foundation Repairs (Underpinning or Similar) + Localised Repairs Only

This method involves addressing underlying foundation issues identified by the ground investigation – likely underpinning or an alternative suitable stabilisation method – alongside localised structural repairs such as replacing rotten timbers and spalled bricks. While this would halt future foundation-related movement, it would not address the severe existing tilts and leans present throughout the structure. The significant distortion, particularly the severe outward leaning of walls and floor slopes, would remain unresolved, leaving an unsafe, unsightly, compromised structure. Despite being conservation-sensitive and less intrusive than extensive rebuilds, this option does not resolve the structural issues present and is therefore discounted.

5.5.2. Option 2 – Foundation Repairs + Localised Repairs + Rebuilding of Unstable Walls Only

This approach entails correcting deficiencies in the foundations, likely via underpinning or equivalent structural techniques, combined with targeted demolition and reconstruction of walls identified as structurally unstable. Executing these works would require extensive temporary supports (propping and shoring) to stabilise remaining walls, floors, and the roof throughout the demolition and reconstruction phases. Practically delivering

these temporary works would be exceptionally challenging and hazardous, particularly because underpinning would itself necessitate preliminary propping to adequately stabilise the structure for safe excavation.

Critically, temporary supports must be founded on stable foundations; however, given the suspected inadequacy of the existing foundations, the installation of such temporary works presents significant practical obstacles. A paramount concern is the safety risk posed to construction personnel, who would need to enter and perform works within a currently unstable structure reliant only on informal and precarious load paths. There is a tangible risk that installing temporary supports could inadvertently disrupt these informal load paths or introduce vibrations, thereby triggering partial or total collapse during the installation process itself.

Additionally, even upon completion of these partial repairs, major structural issues would persist. The floors and roof would continue to exhibit significant tilting, resulting in ongoing usability and habitability problems that markedly exceed BRE guidelines for acceptable structural distortion.

While structurally superior to Option 1, this method carries substantial drawbacks. The complexity and inherent dangers associated with extensive temporary stabilisation measures are considerable. Moreover, given that most of the building's walls demonstrate instability and significant lean according to measured data, the extent of partial rebuilding required would be extensive, making the overall strategy exceptionally disruptive and complex, and posing serious health and safety risks to construction personnel involved in the works.

5.5.3. Option 3 – Foundation Repairs + Comprehensive Dismantling and Rebuilding

This approach involves fully addressing foundation inadequacies, as identified by the ground investigation, followed by carefully dismantling and rebuilding the property on stable, level foundations. Structurally, this method is inherently safer, significantly more straightforward, and more predictable than partial or phased repair alternatives. Additionally, it enables some reuse of original building materials, maintaining heritage value wherever practical.

Crucially, Option 3 comprehensively resolves both the severe leaning and extensive tilting present throughout the structure, resulting in a safe, visually acceptable, and fully habitable building with acceptable levels of health and safety risk to the construction personnel involved in the works.

5.5.4. Option 4 – Pressure Grouting or Hydraulic Jacking

This method involves rectifying the foundation inadequacies and then attempting to physically lift the entire structure back to its original alignment via hydraulic jacking or extensive pressure grouting techniques. Given the measured tilts, the jacking required would be estimated at approximately 400–500 mm, this method—typically reserved for nationally significant

heritage structures—is highly specialised, complex, and demanding in terms of engineering expertise.

Implementing these works in practice would be exceptionally challenging and hazardous. Substantial temporary shoring and stabilisation measures would be required before undertaking any other works could take place, as the masonry structure would not naturally tolerate the large forces involved during re-levelling. Of particular concern is the considerable risk posed to construction personnel who would be required to enter and carry out work within a currently unstable structure, relying only on informal, precarious load paths. There is a substantial risk that the installation of temporary supports, they could inadvertently disturb these delicate load paths, leading potentially to partial or complete structural collapse during the installation of the temporary shoring process itself.

Moreover, the lifting and re-levelling process would significantly disrupt historic cracks, previously filled openings, and modifications accumulated over decades. This disruption would likely result in substantial secondary structural damage, necessitating extensive additional repair and reconstruction work following the jacking operations.

Consequently, although in theory feasible as a highly specialised engineering solution, the practical complexity, the likelihood of extensive consequential damage, and crucially the severe inherent risks to construction personnel undertaking the work make this option unrealistic and strongly inadvisable.

5.5.5. Option 5 – Foundation Repairs + Structural Strengthening (e.g. Helibars, Cintec Anchors, Tie Rods etc.)

This option involves foundation remediation, most likely through underpinning, followed by extensive internal structural stabilisation. Strengthening measures would include the use of steelwork posts and beams, tie rods, pattress plates, and masonry reinforcement techniques such as helibars and Cintec anchors. The intention of these structural reinforcements would be to establish formal load paths to stabilise the severely tilted and leaning walls.
Given the substantial extent of tilting and leaning identified, these strengthening works would be necessary for the majority of walls, floors, and roof elements, resulting in an extremely disruptive, complex, and prolonged installation process.

Critically, practical implementation would require extensive temporary works (propping and shoring) at multiple stages. Initially, significant temporary stabilisation would be necessary simply to allow safe access and excavation for underpinning works. Following the completion of underpinning, further extensive propping and shoring would be required to safely undertake the internal structural strengthening works, particularly as significant areas of masonry and internal structures would need to be cut back or modified to facilitate reinforcement installation.

The primary concern, consistent with the issues highlighted in Option 2, is the severe risk to construction personnel posed by entering and working within a currently unstable building. The structure presently relies solely on informal, delicate, and precarious load paths. Installation of extensive temporary supports itself introduces a tangible risk of inadvertently disrupting these informal load paths or causing vibrations, which could trigger partial or complete structural collapse during the temporary works installation phase.

Additionally, the intrusive nature of structural reinforcement installation would inevitably result in substantial loss of original building fabric and necessitate selective rebuilding of extensive masonry areas. Even after comprehensive strengthening and underpinning, the building would retain substantial residual tilts and unevenness, typically around 1 in 30, significantly exceeding the recognised BRE guidelines for acceptable structural distortion. There would be a loss of internal usable space where new steelwork and strengthening has been installed.

Addressing these residual tilts to achieve visually acceptable internal spaces would require extensive secondary remedial works. Internally, floors would need levelling through substantial structural build-ups either above or below existing floor structures, adding considerable additional load and necessitating further reinforcement of floor joists and timbers. Similarly, walls would require extensive internal studding-out to achieve straight and acceptable finishes, leading to a substantial reduction in usable internal space. Furthermore, trapezoidal window and door openings resulting from structural distortion would remain visually compromised, even with remedial detailing.

In summary, while theoretically structurally viable, this method is critically compromised by significant complexities, severe practical challenges, and inherent health and safety risks associated with temporary stabilisation, propping, shoring, and sequencing. The extensive secondary remedial works required, substantial internal space loss, significant disruption, and ongoing aesthetic and usability issues render this approach fundamentally unsatisfactory from both practical and functional perspectives.

5.5.6. **Option 6 – Foundation Repairs + Internal Steel Skeleton Frame**

This option involves correcting foundation inadequacies, most likely through underpinning, combined with the construction of a substantial internal steel skeleton frame. This steel framework would be designed to independently support and stabilise the severely leaning walls, floors, and roof by providing formal load paths.

Given the significant severity of tilts and instability identified, implementing an internal steel frame solution would require extensive and highly disruptive structural interventions across most internal areas. Practically delivering these works would be exceptionally challenging and complex due to the need to install extensive temporary works (propping and shoring) at multiple

critical stages. Initially, extensive temporary stabilisation would be necessary to enable safe access and excavation during underpinning operations. Subsequently, further extensive temporary supports would be required to facilitate safe internal installation of the substantial steel framework, particularly as existing masonry walls, floors, and internal structures would need to be cut back or partially demolished to accommodate the new steel elements.

Critically, similar to Options 2 and 5, the overriding concern is the significant safety risk posed to construction personnel, who would need to undertake extensive structural interventions within a currently unstable building. The existing structure relies entirely on informal, fragile, and precarious load paths. The installation of extensive temporary supports inherently carries the risk of inadvertently disrupting these delicate load paths or causing vibrations, potentially triggering partial or total structural collapse during the temporary works installation phase itself.

Furthermore, installing an internal steel skeleton frame would inevitably result in substantial loss of original fabric, masonry disturbance, and extensive rebuilding. Even upon completion, significant residual structural distortions (tilts typically around 1 in 30) would remain, significantly exceeding BRE guidelines for acceptable structural distortion. There would be a loss of internal usable space where new steelwork and strengthening has been installed.

To mitigate these residual distortions and achieve visually acceptable internal finishes, considerable secondary remedial work would be essential. Floors would require significant levelling through structural build-ups above or beneath existing floor structures, increasing loads and necessitating further reinforcement of existing floor timbers and joists. Similarly, walls would require extensive internal studding-out, reducing usable internal space considerably. Additionally, distorted and trapezoidal window and door openings resulting from structural deformation would require extensive remedial detailing and would remain visually compromised.

In summary, although structurally viable in principle, this method is severely undermined by the practical complexities, extreme health and safety risks associated with temporary stabilisation and shoring, and the substantial secondary works needed. The resulting loss of internal space, disruption, and ongoing aesthetic and usability problems render this approach inherently unsatisfactory from both practical and functional perspectives.

5.5.7. Option 7 – Foundation Repairs + Independent Internal Masonry Shell

This option involves correcting the foundation inadequacies, most likely through underpinning, and subsequently constructing a completely independent internal structural shell within each room, leaving the existing internal and external walls in place but effectively redundant. Each internal space would have a new structural lining formed of masonry or steel framing

built within the confines of the existing walls, designed to independently support floors, roof, and to brace the severely leaning external walls.

In practice, this approach poses significant practical challenges and drawbacks. Constructing structurally sufficient internal shells capable of independently supporting and bracing the substantial existing lean would require either extremely thick masonry walls or substantial internal steelwork frameworks. Masonry walls alone would need to be exceptionally thick—far beyond typical practical dimensions—to adequately resist and stabilise the leaning external walls, resulting in substantial and unacceptable losses of internal space.

Alternatively, integrating steel frames would essentially replicate the structural approaches described in Options 5 and 6, but with even greater internal space lost, as these shells must sit completely clear of the existing walls, further reducing usable floor areas within each room. This would result in considerable internal space sacrifice without providing any structural or practical benefit over previously outlined strengthening solutions.

Additionally, this method would necessitate extensive and complex temporary works (propping and shoring) at multiple stages. Initially, comprehensive temporary stabilisation would be required to safely undertake underpinning operations, followed by significant further temporary propping to safely construct the new internal shells. The building currently relies on fragile, informal load paths; hence, installation of these temporary supports introduces substantial health and safety risks for construction personnel, including the tangible risk of inadvertent disruption or structural collapse during installation.

Furthermore, upon completion, substantial residual structural distortions (typically around 1 in 30) would remain, significantly exceeding BRE guidelines for acceptable structural distortion. Extensive secondary works would be necessary internally, including floor levelling and reinforcement, extensive studding-out of internal walls, and remedial detailing of distorted window and door openings, which would still remain visually compromised.

In summary, this approach combines the practical complexities, substantial internal space loss, and inherent safety risks of Options 5 and 6, while offering no discernible structural, functional, or practical benefit. It is thus fundamentally impractical and inherently unsatisfactory.

5.5.8. **Option 8 – Foundation Repairs + Façade Retention + Rebuilding**

This option involves the remediation of the foundations—most likely via underpinning or similar methods—followed by the retention of the existing external façades, with the remainder of the structure fully demolished and rebuilt behind them. In principle, this reduces the scope of temporary works compared to other partial-retention schemes, as only the external walls are retained.

However, the external walls in this case lean by up to 1 in 20, which is well beyond typical tolerances for façade retention and introduces significant complexity and risk. While the extent of temporary works may be reduced, the risks associated with installing them remain very serious. The existing structure is currently relying on fragile and informal load paths, and to implement this strategy, construction personnel would need to install substantial temporary restraint systems directly adjacent to these unstable walls.

This in itself introduces a significant hazard: the act of installing temporary works—such as shoring and their associated foundations—adjacent to or bearing onto these leaning façades risks disturbing the fragile equilibrium currently holding the structure up. Vibrations from digging foundations for the shores or piling, even when using low-vibration techniques such as mini-piles or screw piles, still require someone to physically work beside an unstable wall. The installation of foundations for temporary works in such close proximity to severely leaning and inadequately supported masonry introduces the same core risk as the other options: that the structure may collapse during the enabling works phase, putting operatives at serious and unacceptable risk.

Moreover, retaining façades with such extreme lean would require a complex and robust retention design. A new structural steel frame would be needed, with extensive secondary members to grip and restrain the wall effectively across its height. While such a design is technically feasible, the real challenge lies in safely installing that system. The level of distortion means that simple planar restraint is insufficient, and three-dimensional restraint systems would be needed—further complicating both the design and installation sequencing.

In summary, although this approach appears less invasive rebuilding, the severe lean of the façades and the inherent risks associated with stabilising them remain fundamentally problematic. The practical act of installing the retention system itself carries substantial health and safety risks that we do not believe can be mitigated to an acceptable level. As such, while the façade retention design may be feasible in theory, the real-world implementation of this strategy renders it unsuitable and unjustifiable in this context.

5.6. Summary Table of Structural Repair and Rebuild Options

5.6.1. The table below compares each structural option in terms of technical feasibility, health and safety risk during implementation, and the level of disruption to the existing building fabric.

- Technical Feasibility considers how specialist or complex the proposed solution would be, and whether a viable design could be developed that would work in theory, assuming it could be physically implemented.
- Health and Safety Risk reflects both the practical feasibility of physically implementing the proposed technical solution and the level of risk to construction personnel in doing so. A low score indicates high risk or impracticality of safely carrying out the work, regardless of whether it is technically sound in theory.
- Disruption to Existing Fabric measures the extent to which the original structure would be disturbed, lost, or replaced as part of the works.

5.6.2. Each factor is scored from 1 (poor / highest risk / highest disruption) to 5 (viable / lowest risk / lowest disruption). The Overall Rating is a simple sum of the three scores for comparative purposes (higher is better).

Option	Description	Technical Feasibility	Health and Safety Risk	Disruption	Overall Rating
1	Foundation Repairs + Localised Repairs Only	0	N/A	N/A	N/A
2	Foundation Repairs + Rebuilding Unstable Walls	3	1	2	6
3	Foundation Repairs + Comprehensive Rebuild	5	5	1	11
4	Pressure Grouting or Hydraulic Jacking	1	1	2	4
5	Foundation Repairs + Structural Strengthening	2	1	2	5
6	Foundation Repairs + Internal Steel Frame	3	1	3	7
7	Foundation Repairs + Internal Masonry Shell	1	1	2	4
8	Foundation Repairs + Façade Retention + Rebuilding	4	2	2	8

5.7. Given the structural complexities, risks, and practical considerations summarised above, Option 3 – Foundation Repairs + Comprehensive Dismantling and Rebuild represents the most appropriate and robust solution overall. This option fully addresses the severe leaning and tilting issues affecting the structure, ensuring compliance with recognised structural safety thresholds, such as those set out in BRE Digest 475. Unlike other options, it avoids exposing construction personnel to undue and unacceptable risk during the works, as it removes the need to work within or around unstable elements held up by informal and unpredictable load paths. Importantly, this approach also provides opportunities for the sympathetic reuse of original materials, helping to preserve the building's character where possible, while delivering a structurally sound and safe final outcome.

5.8. It should be noted that the property lies within a designated Conservation Area, which introduces important planning and heritage considerations. While demolition and rebuilding is structurally justified, it will require explicit approval from the Local Planning Authority. It remains the client's responsibility to obtain all necessary consents, including planning permission and any relevant heritage or conservation approvals. Should permission for demolition be withheld or restricted, it would be necessary to revisit alternative structural remediation strategies. However, as outlined in this report, all alternative options involve significant health and safety risks to construction personnel, which, from a designer's perspective, cannot be acceptably mitigated. These risks arise from the need to work within or adjacent to unstable structures with unpredictable load paths, and cannot be eliminated through design or sequencing alone.

6. Summary

6.1. Findings

6.1.1. The previous structural report, together with our inspection identified significant and extensive structural issues throughout the property. These exceed recognised structural limits for cracking and tilt defined by BRE Digests, indicating the need for substantial remedial intervention. Key findings include:

6.1.2. Roof Structure

- Widespread damp ingress causing visible plaster deterioration.
- Timber elements likely suffering decay due to prolonged exposure to damp conditions.

6.1.3. Walls

There are two primary structural issues:

1. Condition:

- Extensive weathering, localised spalling, mortar deterioration, and cracking of external masonry.
- Internally, widespread damp penetration, plaster deterioration, exacerbated by cracking and movement of the building.

2. Structural Stability and Aesthetics (Tilting and Leaning):

- All elevations exhibit severe structural tilts and leans, significantly exceeding the BRE ultimate limit (1 in 50).
- Internal walls exhibit similar tilts and leans, significantly exceeding the BRE ultimate limit (1 in 50).
- The severe tilt of the building overall is primarily indicative of differential foundation settlement and underlying ground instability, not simply superficial masonry deterioration.

6.1.4. Floors

Again, there are two primary concerns:

1. Condition (localised timber decay):

- Evidence of damp and decay affecting localised areas of timber floor structures.

2. Useability (Tilt):

- Substantial floor slopes recorded, significantly exceeding the BRE ultimate limit (1 in 50).

6.2. Discussion and Recommendations

6.2.1. We evaluated several structural remediation strategies based on structural viability, safety, practicality, and long-term stability.

6.2.2. After careful evaluation, dismantling and rebuilding emerged as clearly the preferred solution. Structurally, this option addresses all identified issues, offering a long-term robust outcome with significantly reduced risk and complexity compared to alternative partial repair or stabilisation methods. Importantly, it ensures that the solution does not put undue risk onto construction workers in undertaking the works.

6.2.3. Although other options may be theoretically feasible to design a structural scheme that would potentially stabilise the structure, each is associated with significant residual structural distortion, excessive complexity, ongoing usability concerns, but the overriding concern is over the risk involved in physically implementing the works required on-site in what is currently an inherently unstable structure. Therefore, Option 3 represents the safest, most structurally sound, and practically achievable approach.

6.2.4. Recognising that the property lies within a designated Conservation Area, the preferred approach (Option 3) is subject to obtaining appropriate approvals and consents from the Local Planning Authority, as discussed previously in the report.

7. **Caveats and Limitations**

7.1. This report is confined to the terms referred to in section 1.0 of this report and no responsibility can be accepted in respect of defects in inaccessible or un-inspected parts of the property.

7.2. This report is in our opinion based upon a visual inspection of conditions as they exist at this moment in time and is confined to the terms of our brief, as laid down in section 1.0 of this report.

7.3. We have not inspected woodwork or other parts of the structure which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect. All inspection took place from ground level with the naked eye.

7.4. We did not test any drains, water, electrical or gas services, nor did we open-up or break-out any of the building structure which is not highlighted in the report.

7.5. We did not have any consultation with British Coal, the Waste Management Authority or indeed any other statutory undertaker.

7.6. This report is solely for the use of the addressee and no responsibility can be accepted to any third party for the whole of it or any part of the content.

7.7. The final decision regarding demolition within the Conservation Area rests solely with the Local Planning Authority; this report provides structural advice only.

Report Prepared By:

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