

Structural chimney appraisal

17 The Close, Salisbury

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1.0 Preamble

Andrew Waring Associates (AWA) are providing structural consultancy advice to Salisbury Cathedral regarding works at 17 The Close. This report is a structural review of the chimneys.

This report has been prepared for the sole use of Salisbury Cathedral and is not transferrable. It shall not be relied upon by any third party without prior approval in writing from AWA.

2.0 Introduction

2.1 Brief

AWA were initially instructed (17/03/2026) to attend site and review the existing chimneys. The aim is to understand the necessity and extent of possible works to stabilise the chimneys.

2.2 Investigation procedures

The structure was inspected by AWA Engineer Harry Giblin on 27th March 2026. The weather was overcast during the survey. It had rained in the days preceding the inspection.

Equipment used for the survey included: a 3m tape measure, 3m extending spirit level, hand held LiDAR scanner, torch, camera and bradawl.

2.3 Guide to this report

Buried, below ground and obscured parts of the structure were not inspected. No material or load testing was carried out. Appraisals contained within this report are based on the areas investigated in the belief that they are representative.

2.4 Data sources

Planning documents obtained from the online planning portal.

2.5 Site location

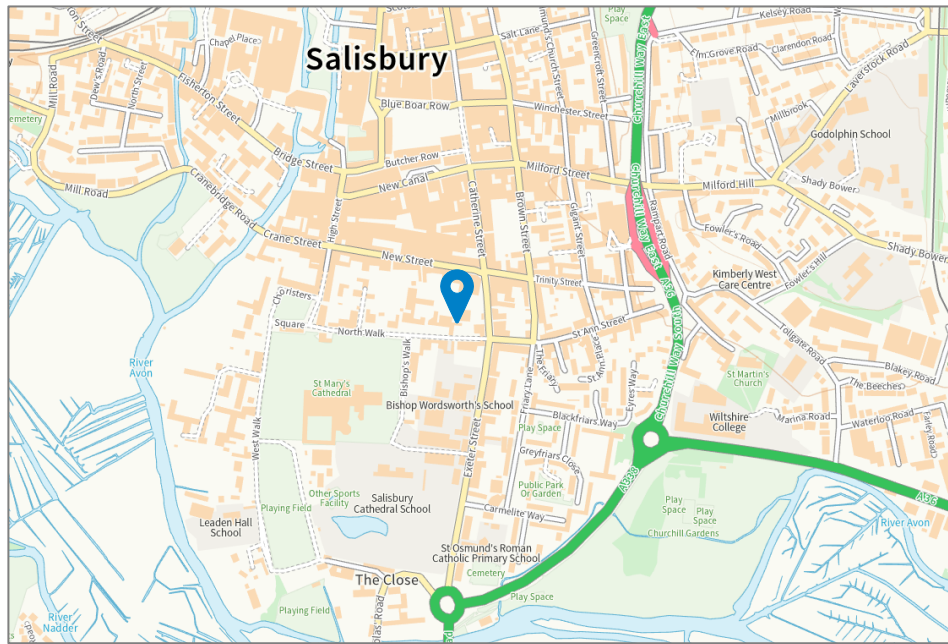


Figure 1 - Location plan

[source: Ordnance Survey (Crown copyright & database rights 2026 Ordnance Survey)]

Site grid reference: SU 14488 29668

Site postcode: SP1 2EE

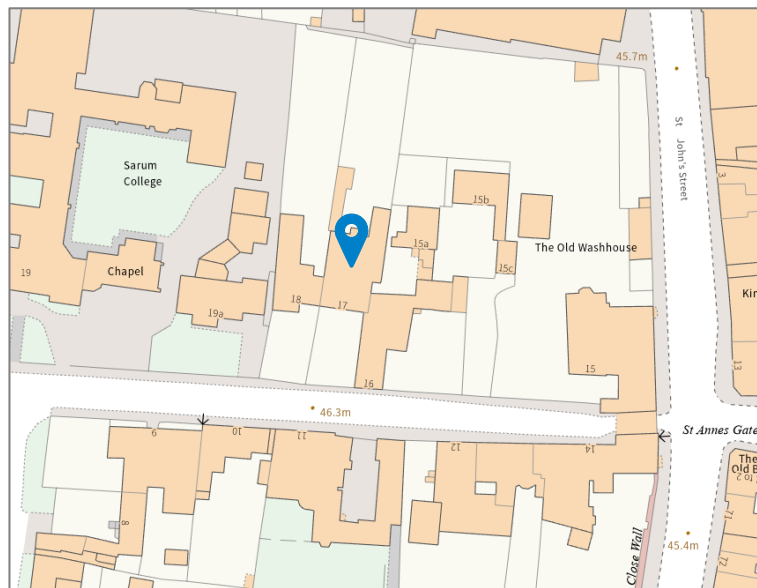


Figure 2 - Site plan

[source: Ordnance Survey (Crown copyright & database rights 2026 Ordnance Survey)]

3.0 Existing structure

3.1 Overview

The building is a Grade II* C16 building. It is understood that the building was formerly two separate residences. The building has three stories. The north side is a historic extension onto the original building. The roof comprises duo pitch roof in 'U' plan formation with a central valley.



Figure 3 – Principal (south) elevation



Figure 4 – Rear (north) elevation

The building has several chimneys. The stacks (projection above roofline) were visually inspected and checked for verticality where possible.

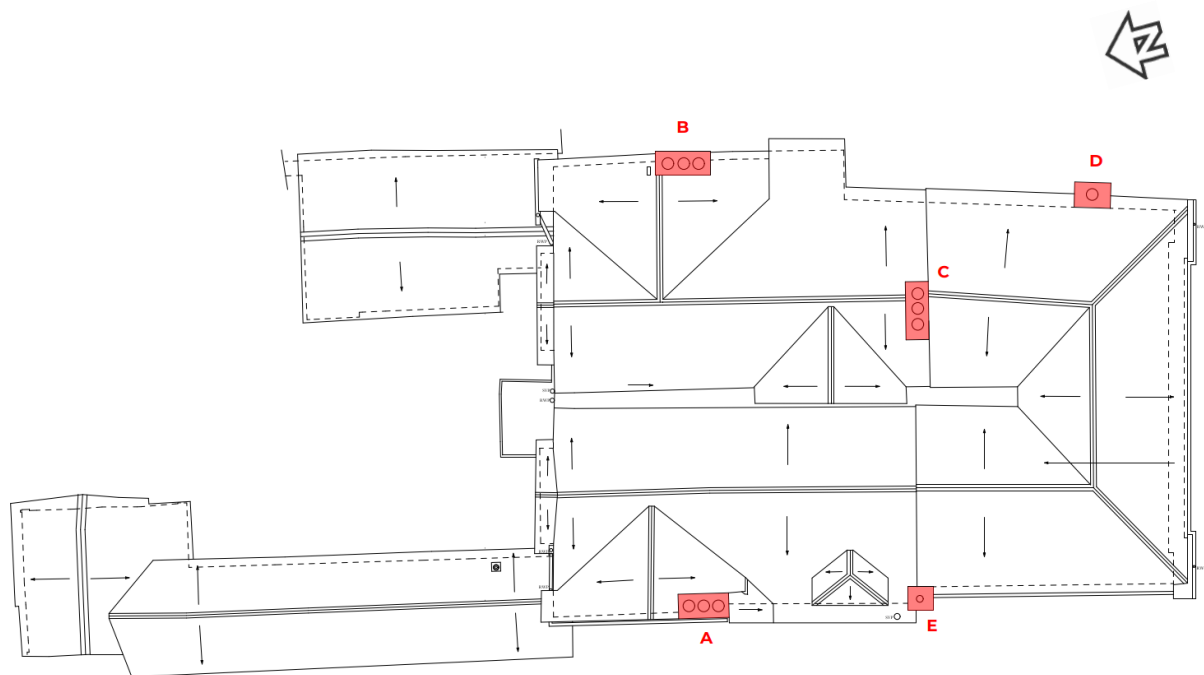


Figure 5 – Roof plan showing chimney notation

3.2 Chimney A

The stack is partially built into the north west gable. There is a visible change in brick and pointing quality from the adjacent window head upwards. The stack contains three grouped flues. The brick is laid in stretcher bond. No headers were noted and it is assumed that the withes (brick flue divider), which can be seen when looking down the pot, are not bonded to the outer stack masonry. The flaunching has cracked and 15mm loss of pointing is typical across the elevations.

Site data obtained

- Plan dimensions = 580mm x 1280mm
- Maximum exposed height (from lowest roof tile) = circa 3.5 metres
- Verticality check
 - South elevation = plumb over 3.15m height
 - West elevation = chimney leaning 50mm east at top over 2.23m height (2.3mm lean per 100mm height)
 - *Measurement of the south elevation is from the u/s of the cap corbel, and the west is from the u/s of the top scaffold lift.*



Figure 6 – Chimney A LiDAR scan images [L-R = west, SW]



Figure 7 – North corner



Figure 8 – west elevation



Figure 9 – South elevation



Figure 10 – Looking south east across roof



Figure 11 – South verticality check



Figure 12 – West verticality check



Figure 13 – Typical depth of pointing loss



Figure 14 – Penetration with bradawl

3.3 Chimney B

The stack is partially built into the north east gable. As per chimney A, the stack contains three grouped flues and the brick is laid in stretcher bond. The north and east elevations appear to have been previously repointed in lime but are now failing. A separation crack is present in the south elevation, suggesting that the east and west elevations are moving apart, possibly as a deformation/tension effect on the side away from the lean.

Site data obtained

- Plan dimensions = 580mm x 1280mm
- Maximum exposed height (from lowest roof tile) = circa 4.5 metres
- Verticality check
 - South elevation = stack leaning 30mm north at top over 2.03m height (1.5mm lean per 100mm height)
 - East elevation = plumb over 3.15m height
 - *Measurement of the south elevation is from the u/s of the top scaffold lift., and the west is from u/s of the cap corbel*
- Level check
 - East elevation string course = 50mm lower at north end



Figure 15 – Chimney B LiDAR scan images [L-R = east, SE]



Figure 16 – View from Chimney A

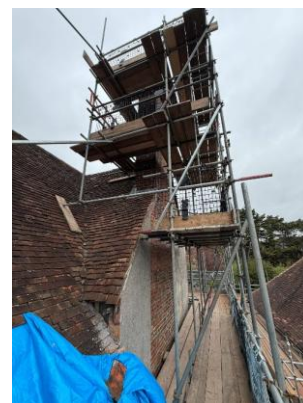


Figure 17 – South elevation



Figure 18 – East elevation within gable

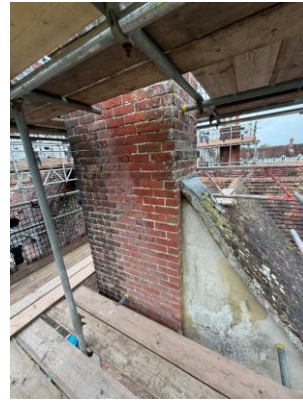


Figure 19 – East elevation at ridge



Figure 20 – west elevation



Figure 21 – Top of stack looking north west

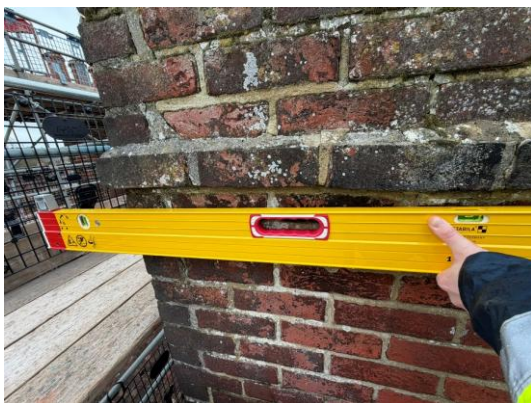


Figure 22 – 55mm string course dip at north

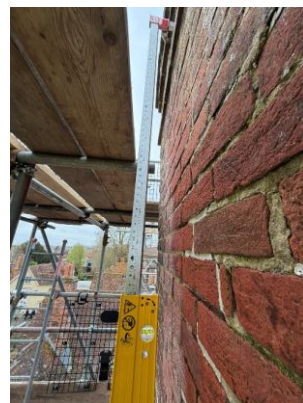


Figure 23 – Penetration with bradawl



Figure 24 – South verticality check



Figure 25 – East verticality check



Figure 26 – Separation cracks at south elevation



Figure 27 – Close view of typical south elevation separation crack



Figure 28 – Soft pointing on east elevation



Figure 29 – Base of stack within roof space



Figure 30 – Internal, top floor



Figure 31 – Internal, ground floor

3.4 Chimney C

The chimney is located at the suspected original rear elevation of the house before it was historically extended. As per chimney A & B, the stack contains three grouped flues and the brick is laid in stretcher bond. However, the stack is wider than the other two. The flue was viewed from the pot and no parge coat appeared to be present.

Site data obtained

- Plan dimensions = 580mm x 1525mm
- Maximum exposed height (from lowest roof tile) = circa 4.5 metres
- Verticality check – *measurements are from u/s cap corbel*
 - North elevation = chimney leaning 78mm south at top over 2.3m height (3.4mm lean per 100mm height)
- Level check
 - North elevation string course = 10mm lower at west end
- Individual flue plan opening size = 1.5 brick square

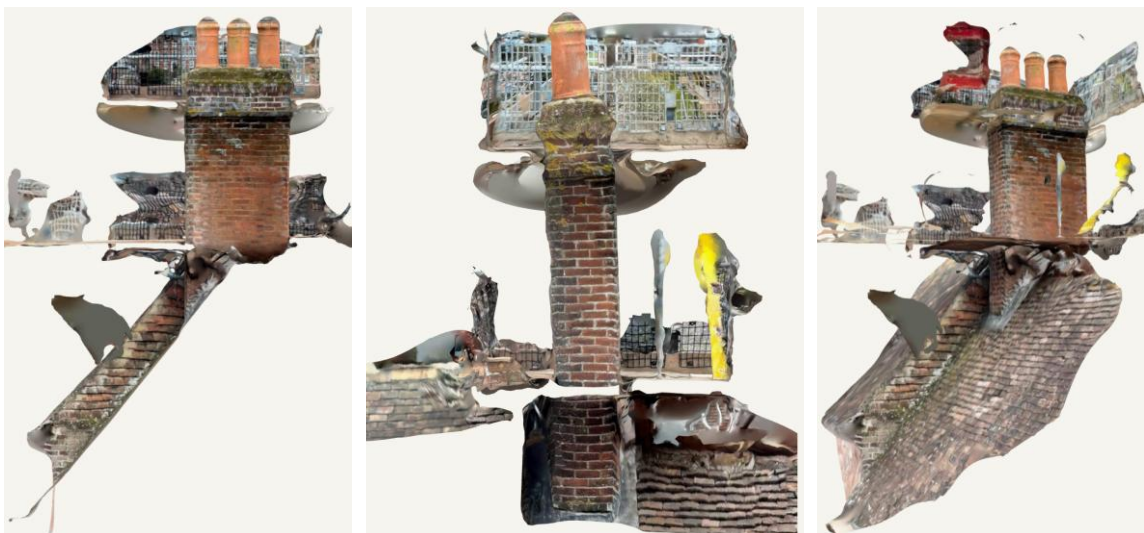


Figure 32 – Chimney C LiDAR scan images [L-R = north, east, NE]



Figure 33 – View from Chimney A

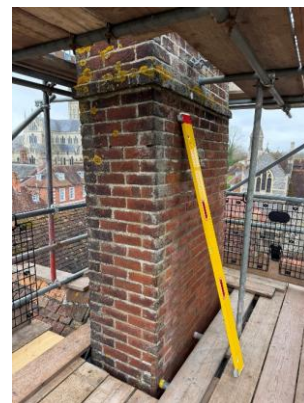


Figure 34 – North east corner



Figure 35 – East elevation



Figure 36 – Top of stack



Figure 37 – 10mm string course dip at west



Figure 38 – North elevation measurement



Figure 39 – North verticality check



Figure 40 – North verticality check



Figure 41 – Cement pointing at north



Figure 42 – Soft pointing at south



Figure 43 – Base of stack within roof



Figure 44 – Internal

3.5 Chimney D

The stack is located against the east elevation, toward the front of the house. It appeared to be in fair condition. The top could not be inspected from within touching distance due to the top scaffold lift being much lower. Verticality measurements are estimated and accurate readings would be beneficial before making a decision on any remedial works.

Site data obtained

- Plan dimensions = 580mm x 920mm
- Verticality check *← measurements are from u/s corbel*
 - North elevation = stack leaning approx. 30mm south at top over 3.15m (0.95mm lean per 100mm height)
 - East elevation = stack leaning 50mm east at top over 3.15m height (1.6mm lean per 100mm height)
 - *Note, dimensions are approximated. Remeasure on site recommended.*



Figure 45 – North elevation



Figure 46 – South elevation



Figure 47 – East elevation measurement



Figure 48 – South elevation measurement

3.6 Chimney E

The chimney is located on the west side of the house. Is it a single flue stack, much shorter than the others. The brickwork is in poor condition toward the top and the flue has been capped with a concrete slab. The leadwork at the roof interface is in poor condition.



Figure 49 – North elevation



Figure 50 – Internal, top floor



Figure 51 – East elevation measurement



Figure 52 – South elevation measurement

4.0 AWA review and recommendations

4.1 Review

Chimneys A to C are particularly wide and tall. The significant lean observed is likely a product of their dimensions, allowing a very different weather exposure on opposite faces. Wind driven rain and rapid drying on one side and a sheltered slow drying case on the opposite side. The mortar was generally in poor condition across the chimneys with a significant loss of depth and strength.

Limits on the acceptable lean of chimneys is set out in BRE's Good Repair Guide 15. This states that a 1mm lean per 100mm of height is acceptable. For a 3.5m or 4.5m high stack, this would be 35mm or 45mm respectively. A more general industry limit is to apply the middle third rule to the stack wall. This is where the centre of gravity (mid-height) shouldn't move horizontally to a position where it is outside of the central 1/3 of the wall base. In this case, a ½ brick thick (102mm) wall would be limited to a 35mm lean at the top.

The chimneys are wide, and we are generally only interested in the minor axis (short direction) lean:

Minor axis lean over measured height

- Chimney A = 50mm toward east (circa 2.3mm lean per 100mm height)
- Chimney B = Plumb
- Chimney C = 78mm toward south (circa 3.4mm lean per 100mm height)
- Chimney D = ~50mm toward east (circa 1.6mm lean per 100mm height)

The measured lean is well outside of the limit values for all chimneys except Chimney B. Their current stability is likely derived from bonding to the return masonry and cellular (rectangular plan) nature of the stack. Aside from the lean creating instability in the stack, it will also increase compressive stresses across the masonry which is below the lean direction. It is difficult to determine the implication of this without know the exact geometry and condition of the whole chimney, but it could result in overloading of lintels etc.

Chimney B is plumb in the minor axis but has a significant lean in the major axis. Although the stability of the stack is less concerning here, the stress concentrations in the masonry below are likely to be high. The separation cracks noted are an indication that the lean may be causing some tensile related deformation on the opposite side.

The safest course of action for all chimneys is to rebuild the stacks with salvaged bricks in suitable lime mortar. A durable NHL5 may be suitable but an experienced mason should be consulted to conclude if this is compatible with the existing bricks. However, as a less drastic measure, it may be justifiable to strengthen chimneys A and B by installing stainless helical bar stitching (Helibar or similar) with extensive repointing. This would need to be combined with periodic future monitoring, say yearly, which will require close access (within touching distance) to the stacks. The helical bars will ensure that the chimney continues to function as a cellular stack by robustly tying each shaft wall to the return walls. Chimney C will need to be rebuilt from close to the ridge line.

Alternative solutions to strengthen the stacks without rebuilding or helical/monitoring would include intrusive strengthening from within the flue or visible external bracing.

To prevent water ingress, it is recommended that cowls are installed on the pots. This should prevent water ingress but permit adequate ventilation. The chimneys are not currently in use, but if future use is proposed, a suitable lining will be required.

4.2 Summary of recommendations

Chimneys A and B

- **Option A** - Dismantle and rebuild chimney stacks
- **Option B** – Install Helibar around full perimeter at every third course and repoint in lime. Monitor within touching distance yearly.
- Install cowls onto pots which prevents water ingress but permits air flow.

Chimney C

- Dismantle and rebuild chimney stack
- Install cowls for ventilation

Chimney D

- Remeasure verticality on site with suitable access
- Remedials TBC but may simply include repointing
- Install cowl for ventilation

Chimney E

- Rebuild top courses of stack
- Repoint in lime
- Install cowl for ventilation

Listed Building consent may be required for these works.

5.0 Conclusion

Each chimney was checked for verticality. Each was found to be far outside of the acceptable limit. However, the limits are based on the shaft thickness alone, without the strength of the return walls. Careful dismantling and rebuilding has been recommended for Chimney C. This solution may also be suitable for Chimneys A & B, but an alternative helical bar strengthening solution has also been proposed, but it will require monitoring.

As a conservation minded engineer, the recommendation to rebuild is not given without due consideration. Alternative proposals either require periodic monitoring in a difficult to access locations or are considered more harmful and do not provide an equivalent service life to a traditional rebuild.

Disclaimer

Our report concerns only the parts of the structure we that were appointed to inspect. Any other parts, adjacent structures, buildings or other areas are explicitly not considered unless deemed to pose some risk to the inspected structure.

Our inspection was visual in nature only. We did not include any intrusive investigations unless specifically noted otherwise. Where reasonably practicable we have attempted to access and inspect safely accessible areas.

We have not inspected all structural members in their entirety, but have examined a representative sample of areas that we believe offers a reliable indication of the overall structure. Localised areas with different construction types may not have been identified as a result.

All external observations of the structure are made from ground level only.

No guarantee can be given against the presence of rot, disease, beetle infestation or other defects within the timber elements of the structure.

No guarantee can be given against the presence of dampness, asbestos, harmful gases or other hazardous materials within the structure.

No testing or enquiries as to the presence of or susceptibility to pollution contamination, radiation, methane, radon and toxic mould, fungus or spore or other hazardous substances has been carried out.

Our inspection concerned structural aspects only and no comment or guarantee can be made on the condition of services, architectural finishes or decorations.

Any potential work valuations mentioned are estimated based on prior experience and should not be relied upon without consulting a professional cost consultant.

No responsibility is accepted to any third party for the whole or part of the contents of this report, which has been exclusively compiled for the use of our client.

The client should also note that liability to the client, whether in contract or tort, shall not exceed the amount as stated in the agreement, recoverable by way of indemnity insurance taken out by Andrew Waring Associates at the time we received instruction from the client.