

Fenay Hall

Fenay Lane

Almondbury

Structural Engineers Review of Existing Chimney Stacks

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CONTENTS

1.0	Stack 1
1.1	Structural Condition
1.2	Recommendations
2.0	Stack 2
2.1	Structural Condition
2.2	Recommendations
3.0	Stack 3
3.1	Structural Condition
3.2	Recommendations
4.0	Stack 4
4.1	Structural Condition
4.2	Recommendations
5.0	Stack 5
5.1	Structural Condition
5.2	Recommendation
6.0	Stack 6
6.1	Structural Condition
6.2	Recommendations
7.0	Stack 7
7.1	Structural Condition
7.2	Recommendations
8.0	Stack 8
8.1	Structural Condition
8.2	Recommendations
9.0	Stack 9
9.1	Structural Condition
9.2	Recommendations

Appendix A - Chimney Stack References – Key Plan

1.0 Stack S1

1.1 Structural Condition

Stack S1 appears to have been reconstructed relatively recently using new ashlar stonework. However, there is some evidence of movement in the stones to the top three ashlar courses of the stack where perpendicular joints have opened up. This is particularly evident viewing from the South (refer photo 2)



Photo 1 – Stack S1 from South



Photo 2 – Stack S1 from South, open joints to head of stack



Photo 3 – Stack S1 from North, open joint to top course

1.2 Recommendations (Subject to Listed Building Consent)

Carefully dismantle the top section of chimney stack, to remove the top 3 courses which appear to have experienced movement. Rebuild from this level, providing stainless steel ties with stainless steel dowels drilled and resin anchored into horizontal face of ashlar stone block to provide tie across the perpend joint

2.0 Stack S2

2.1 Structural Condition

The ashlar stonework to Stack S2 is heavily weathered, particularly to the top 2 courses, where faces of the stonework are spalling, which can clearly be seen to the top course to the South West corner (Photo 5 and 6). An open joint can be clearly seen in the perpend joint to the capping above the string course to the West elevation (Photo 7)



Photo 4 – Stack S2 from North



Photo 5 – Stack S2 from South East



Photo 6 – Stack S2 from South



Photo 7 – Stack S2 from West

2.2 Recommendations (Subject to Listed Building Consent)

Carefully dismantle the top section of chimney stack, to remove the top 2 courses (below the string level) which are particularly heavy weathered. Rebuild from this level, providing replacement ashlar stone to match existing to replace the heavily weathered and spalling stones. Incorporate stainless steel ties with stainless steel dowels drilled and resin anchored into horizontal face of ashlar stone block to provide tie across the perpend joint to new sections of stone.

3.0 Stack S3

3.1 Structural Condition

The ashlar stonework to Stack S3 is heavily weathered throughout, with stones delaminating, spalling and damaged. There has been lateral movement to the West section of the stack, and the straight joint between the two sections of stack is opening up over the top two courses of stack (Photo 12)



Photo 8 – Stack S3 from North (Top Section)



Photo 9 – Stack S3 from North (Base section) – Note heavy weathering and delamination of stonework



Photo 10 – Stack S3 from West (Top Section) Heavy Weathering and delamination of stones.



Photo 11 – Stack S3 from West (Base Section) Heavy Weathering and delamination of stones.



Photo 12 – Stack S3 from South, Top Section. Lean of West section of stack and sections of stack parting from one another.



Photo 13 – Stack S3 from South, Mid Section. Heavy weathering, delamination and damage to stones.



Photo 14 – Stack S3 from South, Lower Section. Heavy weathering, delamination and damage to stones.

2.2 Recommendations (Subject to Listed Building Consent)

Due to the extent of heavy weathering and delamination of ashlar stone, it is considered necessary to carefully dismantle the existing stack over its full height to allow for replacement of the damaged sections of stonework. The stack should be carefully rebuilt, incorporating replacement section of ashlar stone to replace the heavily weathered, delaminating, and damaged units. Incorporate stainless steel ties with stainless steel dowels drilled and resin anchored into horizontal face of ashlar stone block to provide tie across the perpendicular joint to new sections of stone.

Stack S3 is particularly high and slender and inherently vulnerable to lateral movement and associated instability. To help mitigate risk of future movement and instability of the rebuilt stack with associated health and safety risk and ongoing maintenance liability, it is recommended that consideration is given to reducing the height of the stack to match Stacks S1 and S2, subject to necessary listed building consent.

4.0 Stack S4

4.1 Structural Condition

Stack S4 appears to have been reconstructed relatively recently using new ashlar stonework. There is some evidence of minor opening up of perpendicular joints in the ashlar stonework throughout.

The stack is built off render covered brickwork, corbelling from the main external wall line (Photo 16). The render is locally spalling away to expose the brickwork. Direct access was not possible at the time of our survey to inspect the condition of the corbelling brickwork.



Photo 15 – Stack S4, from East, top section

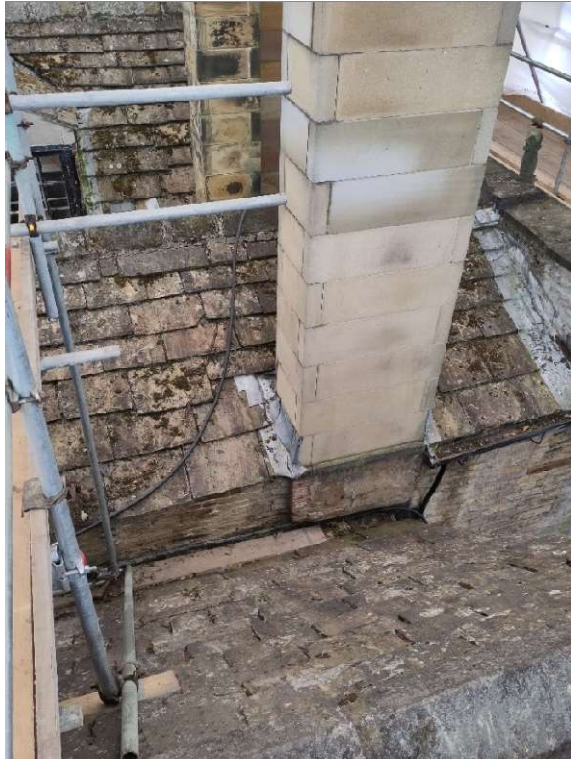


Photo 16 – Stack S4, from East, base section – Note rendered brick corbelling at base



Photo 17 – Stack 4, from North, top section.

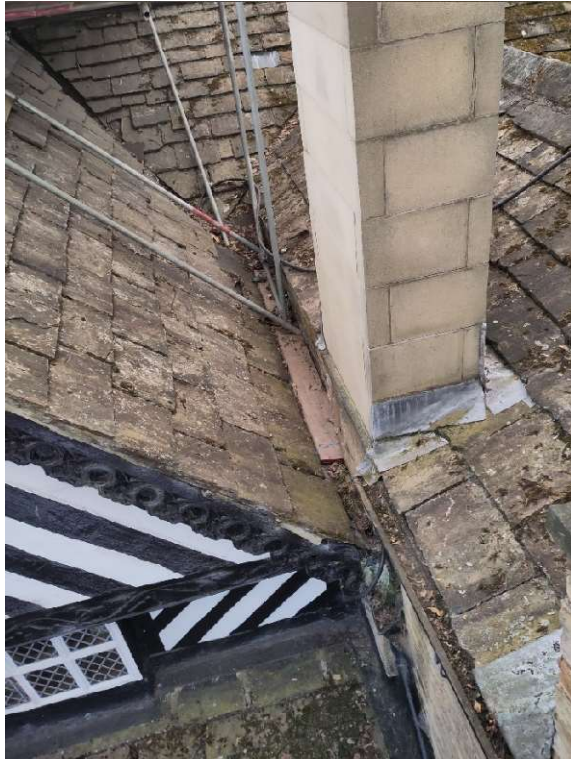


Photo 18 – Stack 4, from North, base section



Photo 19 – Stack S4, from West, base section

4.2 Recommendations (Subject to Listed Building Consent)

Repointing of the stack is considered necessary to mitigate risk of the minor opening and movement in existing joints becoming more significant through freeze/thaw action. It is recommended that direct access to the corbelling brickwork to the base of the stack is provided, to allow for careful removal of the existing render and to allow for further inspection of the existing brickwork supporting the stack.

Stack S4 is particularly high and slender and inherently vulnerable to lateral movement and associated instability. To help mitigate risk of future movement and instability of the (relatively recently reconstructed) stack with associated health and safety risk and ongoing maintenance liability, it is recommended that consideration is given to reducing the height of the stack to match Stacks S1 and S2, subject to necessary listed building consent.

5.0 Stack S5

5.1 Structural Condition

The top 2 courses of ashlar stonework (below the string course) are particularly highly weathered and delaminating. Joints to ashlar stonework are heavily weathered and washed out, leaving open joints. Brickwork to the inside face, immediately below the line of the original flashing, has completely perished.



Photo 20 – Stack S5 from North West, highly weathered and delaminating stone to top courses.



Photo 21 – Stack S5, from North West, base, highly weathered and open joints.



Photo 22 – Stack S5 from South, high level, highly weathered and open joints.



Photo 23 - Stack S5 from South, low level, highly weathered and open joints.



Photo 23a – Stack S5 from East. Brickwork to inner face (below original flashing line) has completely perished.

5.2 Recommendations (Subject to Listed Building Consent)

The completely perished brickwork to the inner face of stack (below the line of the original flashing) requires removal and replacement with new to maintain long term stability of the stack. To allow for the safe removal and replacement of this low level brickwork, taking into consideration the general condition of the stack with open and washed out joints, it will be necessary to carefully dismantle the stack. From our initial visual inspection, it should be possible to retain existing ashlar stone masonry for re-use in rebuilding the stack, with the exception of the top two courses below string course, where heavily weathered and delaminating units will require replacement. The stack should be rebuilt to match existing..

6.0 Stack S6

6.1 Structural Condition

Stonework above the lower string course is heavily weathered to both the East and West elevations. The East elevation is particularly heavily weathered.



Photo 24 – Stack S6 from West. Heavily weathered stonework above lower string course



Photo 25 – Stack S6 from South East. Very heavily weathered stonework above lower string course.

6.2 Recommendations (Subject to Listed Building Consent)

The chimney stack needs to be carefully dismantled down to the level of the lower string course. The stack should be rebuilt, using replacement stone to replace the heavily weathered stone units.

Repointing of the full stack will be necessary following rebuilding above the lower string course.

7.0 Stack S7

7.1 Structural Condition

Masonry to the capping above the upper string course appears to be highly weathered. There is some weathering to the pointing, but otherwise the stack appears to be in good overall structural condition.



Photo 26 – Stack S7 from East



Photo 27 – Stack S7 from West. Note heavy weathering to masonry above upper string course.

7.2 Recommendations (Subject to Listed Building Consent)

Masonry above the upper string course will require carefully removing and rebuilding, replacing any highly weathered stones with new. Following local rebuilding works, the stack will require repointing throughout.

8.0 Stack S8

8.1 Structural Condition

Masonry above the lower string course is heavily weathered. The stack is built off a render covered brick flue wall built into the stone gable wall. A small area of render has locally failed to expose the existing brickwork, but otherwise the render prevented direct inspection of the existing brickwork to assess its structural condition. Stonework to towards the verge of the gable peak has become loose.



Photo 28 – Stack S8 from East. Weathered stonework above lower string course.



Photo 29 – Stack S8 from West. Heavily weathered stonework above lower string course. Loose masonry to verge of gable wall and rendered brickwork flue wall within gable.



Photo 30 – Loose masonry to verge of gable peak

8.2 Recommendations (Subject to Listed Building Consent)

Masonry above the upper string course will require carefully removing and rebuilding, replacing any highly weathered stones with new. Following local rebuilding works, the stack will require repointing throughout. The loose masonry towards the verge of the gable wall requires carefully removing and resetting.

The render to the brickwork flue wall should be carefully removed to allow for further assessment of the structural condition of the brick flue wall. We understand that new render has been specified by the Architect – the condition of the exposed brickwork should be assessed, and any necessary repairs carried out prior to the new render being applied.

9.0 Stack S9

9.1 Structural Condition

Stack S9 is in reasonably good overall structural condition with just local weathering of pointing and stonework.



Photo 31 – Stack S9 from South West



Photo 32 – Stack S9 from West



Photo 33 – Stack S9 from North East

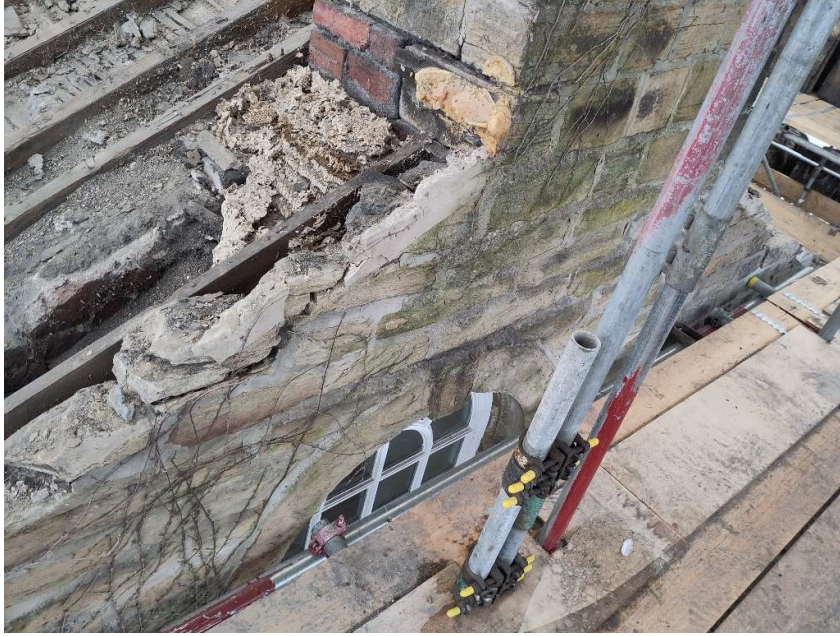


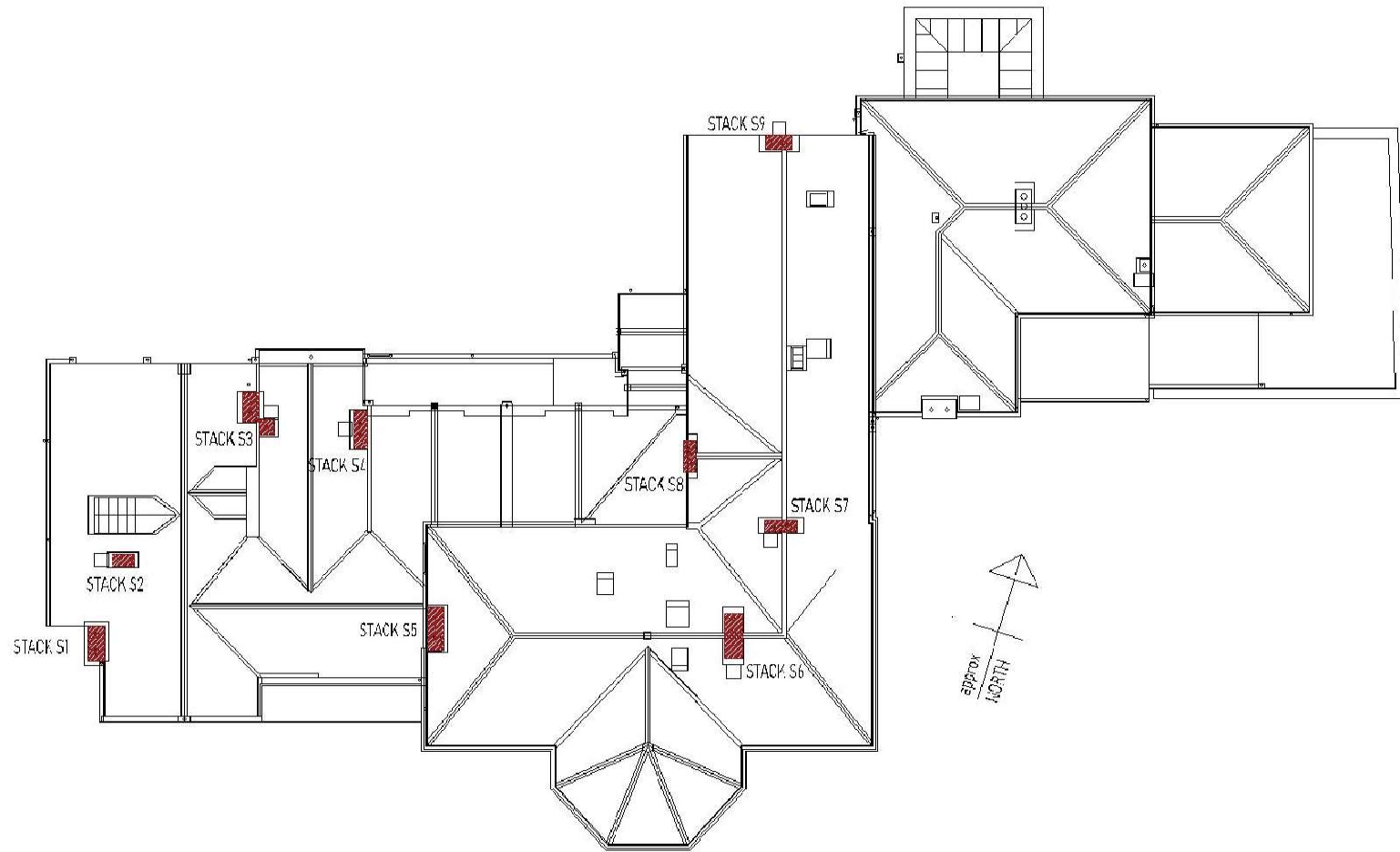
Photo 39 - Stack S9 above stone arch scheduled for removal/replacement

9.2 Recommendations (Subject to Listed Building Consent)

Stack S9 appears to be in reasonably good condition, and only local repointing and assessing/replacing haunching is considered necessary. However, the stack is located directly above, and relies on the support of, the stone arch above the window opening to the gable wall at attic floor level. The stone arch members are heavily weathered and eroded and require replacement. To allow for the safe removal and rebuilding of the stone arch, it will be necessary to carefully dismantle the existing chimney stack and stonework immediately around the arch. The stack should be rebuilt to match existing, replacing any stones that are found to be heavily weathered or damaged during rebuilding works.

Appendix A

Chimney Stack References – Key Plan



CHIMNEY STACK REFERENCES - KEY PLAN