

Report regarding the Roofing Works at: The Lower Falinge Development, Rochdale

Prepared for: P. Casey & Company Ltd

Date of Inspection: Tuesday 12th March 2024

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01 // Introduction

Phase 1 of the Lower Falinge development in Rochdale consisted of 26 No residential units. The properties were constructed under the terms of a JCT Design and build contract between RBH Design and Build Ltd. (RBH) and P. Casey and Co. Ltd. (Caseys).

Architectural services were provided by OMI Architects (OMI) who were originally employed by RBH and then novated to Caseys under the terms of the contract. Employers Agent services were provided by Poole Dick Associates. (PDA).

Practical completion was certified on 8th February 2016.

BTP were commissioned in February 2024, to investigate the cause of water ingress at 1-16 Samuel Ashworth Street, 2-18 Waterhouse Street, 37 to 41 Redcross Street and remediation options. Access to all properties was not possible, a sufficient sample of properties were surveyed internally. One external area was opened up for inspection.



The development comprises a mixture of 2-storey houses and bungalows. The external walling is of cavity masonry construction, and the pitched roof structures are of trussed rafter construction. Most of the 2-storey houses are arranged in blocks of 4No units resulting in a “back-to-back” type arrangement. The roofs are of dual pitch construction and the pitch to the front elevations is 35 ° and the pitch to the rear elevations is 17.5 °. The “back-to-back” arrangement has resulted in the requirement to form a valley or box gutter over the party walls between the 2No 17.5 ° roof slopes.

It is reported by Caseys that the Architects original proposal was to provide standing seam aluminium roof coverings and aluminium box gutters, but this was eventually amended as part of a value engineering exercise to interlocking concrete roof tiles to all pitched roof areas with plywood box gutters finished in a single ply roofing membrane.

It is also reported by Caseys that the roofing materials originally provided comprised the following:

- Roof Tiles – Russell Galloway
- Pitched Roof Membrane – Sandtoft Koramic VPM Classic
- Dry ridge system – RussFast
- Dry verge system -European Plastics Type R Profile
- Rafter roll – Harcon RT66
- Over-facia vent – Harcon FV25
- Single ply membrane to box gutters – Firestone EPDM sheet or similar.

Rochdale Borough Housing have carried out repairs to the roofs.

The water ingress was reported in April 2021 by PDA reporting that they had been advised by RBH that there has been historic issues with regards to the roofs at Lower Falinge Phase 1, with numerous residents reporting leaks and internal damage to their properties.



03 // Documents provided and sources of information

1. Original Construction drawings relating to the roof construction only.
2. Specific Defect Report on Water Ingress at Lower Falinge prepared by Wilkinson Cowan Partnership printed 14 October 2022.
3. Anderton Gable Report dated November 2022.
4. Endoscope Camera survey carried out by BTP on the 12th March 2024.
5. Measure laser scanner survey (LIDAR) carried out by BTP on the 12th March 2024.

Internal inspections were carried out on the 12th March 2024 to the following properties to numbers 6, 8, 10, 12, 16, 18 Waterhouse Street, 9 Samuel Ashworth Street and 39, 41, 43 Redcross Street.

Externally a roofing contractor opened up an area of the 17.5 degree tiled roof at 6 Waterhouse Street. The roof tiles were stripped approx. 1m² and the gutter detail was opened approx. 150mm x 150mm. The opening up externally correlated to the internal water ingress evident on the ceiling in the property below. The area opened was an original tiled area circa 2016. Three Lidar scans were completed and 2 Endoscope surveys were taken.

The previous reports listed have been read. I am not going comment upon the various reports as this has been covered by the Anderton Gable report. I have included extracts from the Anderton Gable report in this report.

It was raining during the survey.



Water ingress is occurring on the 17.5 degree pitched roofs and not occurring on the 35 degree roofs. Water staining is generally evident on plasterboard internally in the properties inspected, below the 17.5 degree roof and also at ceiling level junction with wall. Water ingress is evident in roof spaces too on the rafters in the lower third and white mould is evident on the underside of the felt on the 17.5 degree underside. On the box gutter junction between the 17.5 degree roof on the lower gutter, there is water ingress and damage to top layer of plywood.

Failures and defects occur due one or more of the following reasons.

- Specification
- Workmanship
- Materials

4.1 Specification

A. Roof Covering to Pitches

The original specification was for a metal standing seam roof, which should be installed on a pitch no lower than 6 degrees (best practice), the roof pitches are 17.5 degrees and 35 degrees therefore the original design intent was well within the design constraints of a metal standing seam roof. However, the roof material finish was changed to a tile prior to installation, possibly due to value engineering and the tile was laid at its lowest pitch.

Using a roof tile at its lowest pitch is not recommended because,

1. Water Drainage: Roof tiles are designed to shed water effectively. When installed at a low pitch, they may not drain water efficiently. This can lead to water pooling, leaks, and potential damage to the underlying structure.
2. Wind Uplift: At a low pitch, roof tiles are more susceptible to wind uplift. Strong winds can lift the tiles, causing them to dislodge or break. Proper pitch ensures better wind resistance.
3. Aesthetics: Low-pitched tiles can look awkward and uneven. They may not align properly, affecting the overall appearance of the roof.



A roof pitch of 17.5 degrees is considered relatively low for tiles and to specify a tile at its manufacturers lowest pitch is not good practice. Moss growth is evident on the tiles suggesting water is not clearing the roof.

The tiles are “air open”, therefore condensation will not gather on the underside. Frost may be present on the underside of the tile on occasion. Condensation would occur between the insulation and underside of the felt.

The condensation risk is the same for the 35° degrees pitch as in the 17.5° degrees pitch.

B. Roof covering to gutters between the back-to-back houses

The Anderton Gable report refers to Firestone EPDM rubber sheet or similar, I could not find any manufacturers reference on the EPDM sheet which was removed when the roof was opened. The EPDM is black in colour. EPDM roofing has a reputation for being durable, has a seamless installation and is flexible and usually offers a 10-year guarantee. The EPDM is laid directly onto plywood followed by an air gap onto another layer of plywood with mineral infill and foiled backed plasterboard ceiling.

A high level condensation check has been run by BTP with matching materials and it did not reveal any issues with condensation. However, it revealed a 60 day condensation risk between the EPDM and plywood, and the second layer of plywood. The first layer of plywood is rotting and without ventilation this may worsen. The endoscope camera identified white blooming on the upstand batten which would indicate water ingress behind the EPDM at the eaves.

The configuration of the gutter is a cold roof, this would require ventilation to the void below the upper plywood deck, ventilation was not evident.

The plywood and timber is becoming damp due to water penetration due to poor eaves detailing and condensation.



4.2 Workmanship

A. Roof Covering to pitches

The rafter length is 6.7 metres on the 17.5 degree, measurements taken from the Lidar scan record 17.3 to 18 degrees pitch. The rafters are at 600mm centres. The maximum rafter length for the tile is 8 metres.

The battens are at 306mm centres, they are 50 x 25mm laid onto felt which has a 200mm overlap where measures, the felt is lapped correctly. The tiles are all nailed once, they have two nail holes. The overlap of the tiles was recorded at 100mm.

Extract from manufacturers technical literature below.

Galloway Tile	
Technical Data	
Compliance	Manufactured in accordance with the requirements of BS EN 490 "Concrete Roof Tiles and Fittings-Product Specifications" and BS EN 491 "Concrete Roof Tiles and Fittings-Test Methods"
Manufacture	Produced by high pressure extrusion and compaction
Fire	Non-combustible when tested to BS476: Part 3:1975 (spread of flame and fire penetration). SAA Classification
Guarantee	Tiles are guaranteed for a period of 60 years from the date of supply (subject to the normal terms of guarantee)
Maximum Pitch	60° (Subject to fixing specification)
Minimum Pitch	17.5° (100mm headlap) normal exposure, rafter length not exceeding 8m 17.5° (125mm headlap) severe exposure, rafter length not exceeding 8m 22.5° (75mm headlap) normal exposure, rafter length not exceeding 8m 22.5° (100mm headlap) severe exposure, rafter length not exceeding 8m
Headlap (minimum)	75mm (22.5° and above) 100mm normal exposure (below 22.5°) 125mm severe exposure (below 22.5°)
Gauge (maximum)	343mm
Covering Width	300mm



The installation on the area inspected complies with the manufacturers technical data. The air movement in the loft was generally limited.

The felt when cut has not been turned so it folds against the penetration. There is evidence of holes cut in the felt which have been tiled over in some roof spaces. BTP were advised by Casey that holes cut in the felt were carried out by a third-party contractor employed by RBH. This was at high level near the ridge on the 35 degree roof and no signs of water ingress were present. When installing Koramic VPM Classic on roof pitches below 22.5 ° it is advisable to seal all laps using Sandtoft double sided tape and all junctions using Sandtoft multi tape. All nail hole penetrations into battens should be protected by laying Sandtoft butyl nail tape over the underlay, coinciding with all rafters and any other fixing points.

B. Roof covering to gutters between the back-to-back houses

The EPDM is laid loose onto 19mm Plywood. Under the outer plywood layer is a 50mm batten spacer followed by a second 19mm plywood layer with mineral wool below and foilbacked plasterboard. There is a lack of ventilation in the void between the 2 plywood layers and water ingress is evident at eaves tracking under the EPDM.

4.3 Material failure

A. Roof Covering to pitches

The Russell Galloway tile is a thin leading-edge with two fixing holes and a drain channel. The drain channel if broken can allow water ingress as would an unused fixing hole. Fixing was observed to be only is one nail per tile with some broken drain channels. Water can be blown in through the hole or via broken drain channels. Water is evident on the rafters and water ingress was seen dripping from the rafters onto the insulation in the roof space at 6 Water House Street. The gap between the rafter and felt is wet. The tile is laid at its minimum pitch at the rear and in this location is not preventing water ingress into the roof. The ingress is generally on the lower third of the roof. Where the pitch is steeper on the 35 degree roof section, no water ingress is evident, the only variable is the pitch.



It is worth noting changes in the industry:

The Manthorpe Rathmore manufacturers a thin leading edge tile, which is comparative to the Russell Galloway. Manthorpe in November 2023 changed the minimum pitch from 17.5 degree to 22.5 degrees as the minimum. This would suggest issues have been encountered within the industry when using a thin leading-edge tiles at relatively low pitches. Russell Galloway literature continues to state 17.5 degree as the minimum pitch.

The battens, felt and trusses appear to be in reasonable condition other than the evidence of water ingress.

B. Roof covering to gutters between the back-to-back houses

The black EPDM does not have any visible defects and looks intact and in reasonable condition. The plywood directly below has disintegrated for large parts for the lower gutter.

The upper gutter is showing no signs of deterioration at the point of inspection. The timbers forming the upstand also have evidence of water ingress. The material failure is due to poor detailing and condensation.



05 // Summary and Conclusions

It is also our opinion that the most probable cause of the water ingress is.

1. The Russell Galloway tile is laid at minimum pitch and is not performing in this situation, water ingress is due to broken tiles and open nail holes and failure to clear the water from the roof due to the 17.5-degree pitch.
2. Lack of understanding of condensation within the gutter design and poor details to effectively place water in the gutter when transitioning from the tiles.
3. There is a general lack of ventilation in the roof space to prevent 'white' blooming on the felt.



Proposal

1. Replace the 17.5 degree roof tiles with Marley Mendip with 125mm head lap which is suitable for use on a 12.5° slope roof. This is a profiled tile not flat.
2. Replacing the box gutter arrangement to junctions of the 17.5 degree roof slopes with a traditional eaves gutter by extending the rafters to project beyond the face of the external walling at eaves level.
3. Replace the 35 degree roof tiles to match the 17.5 degree roof tiles with Marley Mendip
4. Drape the underlay between the rafters and sealing of the underlay to the underlay support tray
5. Allow for increase by 2 bricks to parapet wall
6. Introduction of a warm roof detail at gutter to junction of the 17.5 degree roof slopes. Allow for stainless steel flashing at crown of 3 degree gutter pitch
7. Introduction of VCL in gutter to junction of the 17.5 degree roof slope.
8. Replace any remaining original abutment flashing materials with a new secret gutter detail as recommended by the tile manufacturer.
9. Tape felt installation and butyl tape on the rafter

Note. Planning application will need clarification, material change to the external appearance of a building.



Standards

NHBC Standards

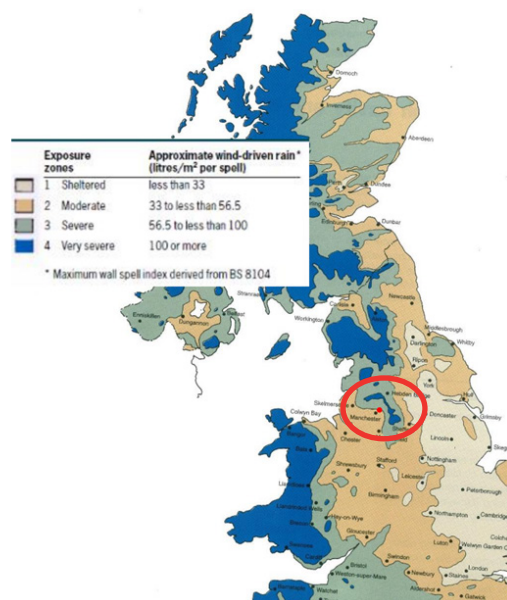
BS 5534: Slating and Tiling for Pitched Roofs and Vertical Cladding:

BS 8000-6: 2013: Installation of Slate and Tiled Roofs

BS 5250: Ventilation and Moisture Control

Rochdale is approximately indicated by the red dot, it is in the moderate to severe Exposure Zones 2/3

Figure 1: Map of UK exposure zones from BR 262, based on BS 8104 calculation methodology



07 // Appendices

Please find the following appendices

Appendix A - Photo Schedule

Appendix B - Point Cloud showing Pitch

Appendix C - Extract from Endoscope

Appendix D - Location Plan



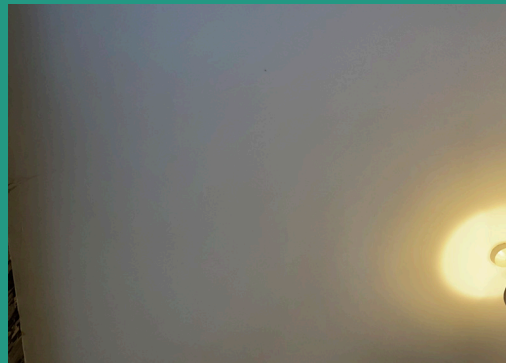
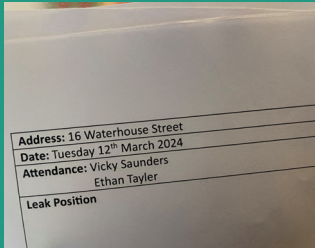
07 // Appendix A - Photo Schedule

12 Waterhouse Street



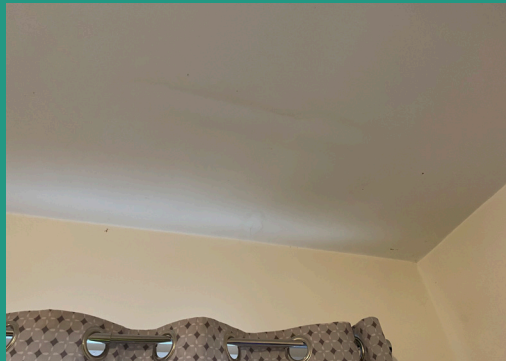
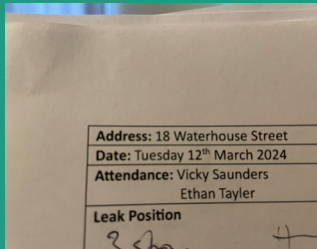
07 // Appendix A - Photo Schedule

16 Waterhouse Street



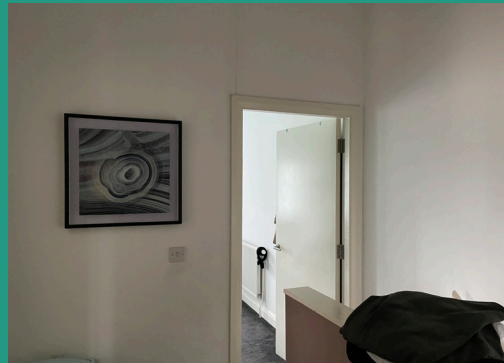
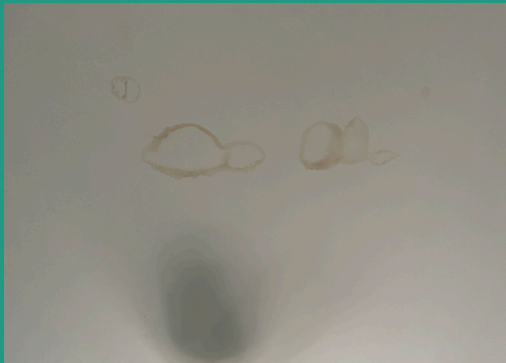
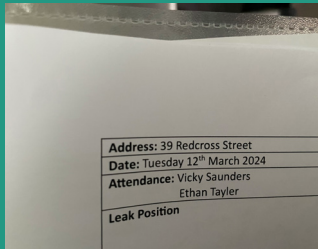
07 // Appendix A - Photo Schedule

18 Waterhouse Street



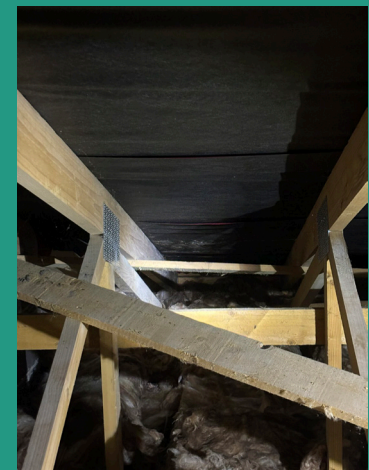
07 // Appendix A - Photo Schedule

39 Redcross Street



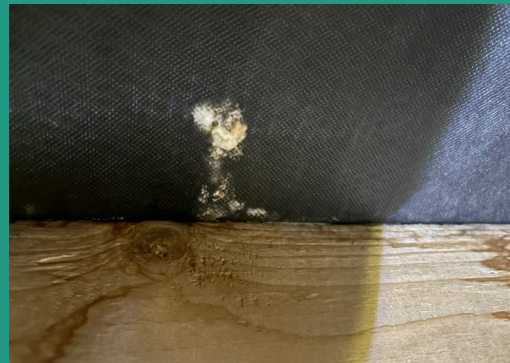
07 // Appendix A - Photo Schedule

Typical Loft Access Images



07 // Appendix A - Photo Schedule

Typical Loft Access Images



07 // Appendix A - Photo Schedule

Typical Examples of internal water ingress



07 // Appendix A - Photo Schedule

External investigations



07 // Appendix A - Photo Schedule

External investigations



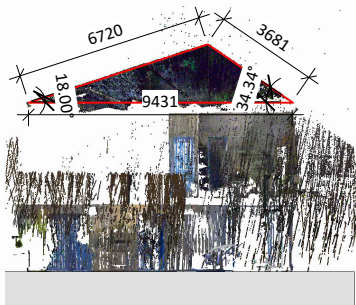
07 // Appendix B - Point Cloud showing pitch

3D Views taken from Point Cloud



07 // Appendix B - Point Cloud showing pitch

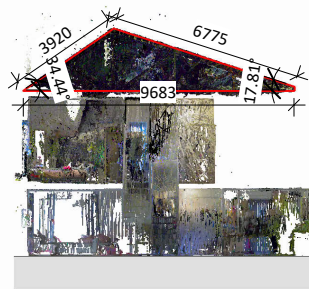
Sections taken from Point Cloud



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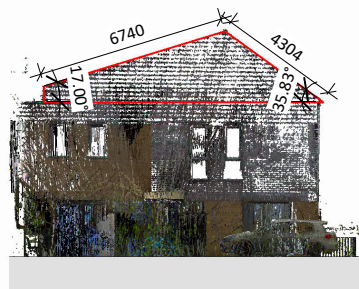
12 Waterhouse Street



Section 6

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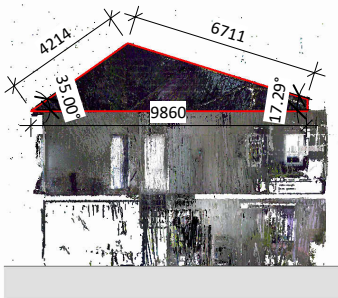
14 Waterhouse Street



Section 8

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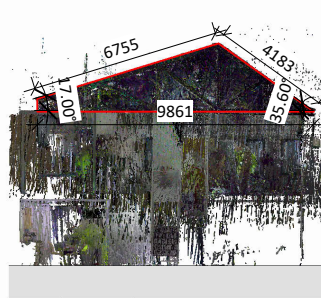
8 Waterhouse Street



Section 5

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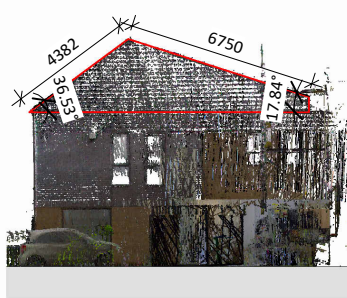
6 Waterhouse Street



Section 7

1 : 200

6 Waterhouse Street



Section 9

1 : 200

10 Waterhouse Street

07 // Appendix C - Extract from Endoscope

Images taken from the Endoscope



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