Report on the Evaluation of the ARBED 1 Programme in Caerau

Prepared by

Nuvision Energy Wales Ltd

Report on the Evaluation of the ARBED 1 Programme in Caerau

for Bridgend County Borough Council

Prepared by
Nuvision Energy (Wales) Ltd

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1 Objectives and Scope of the Evaluation

1.1 Background

During 2013, domestic energy efficiency measures were installed within the village of Caerau under the Welsh Government Arbed 1 Programme. Some 100 properties, all in the private housing sector, were involved in the programme. Caerau is a high fuel poor area with the majority of the housing being constructed in the late 19th/early 20th Centuries, typically of the terrace archetype.

The aim of the Arbed 1 Programme was to install a number of energy efficiency measures into the properties with a view to reducing energy bills for the occupier and alleviate fuel poverty. These measures included loft insulation and external solid wall insulation. Some homes also received new gas boilers for space heating and hot water.

Shortly after completion of the works, some homes began to experience issues such as damp and black mould on internal walls. In 2019, Bridgend County Borough Council (BCBC) commissioned Nuvision Energy (Wales) Ltd to carry out a study on a representative sample of homes and to produce a report outlining the issues encountered. 32 homes in total were surveyed. A plan view of Caerau is given in Appendix A, showing the locations of the homes surveyed

1.2 Aim and objectives of the study

The aim of the study was to carry out a non-invasive investigation and to produce an evaluation report on the implementation of the works carried out within Caerau under the Welsh Government Arbed 1 Programme.

The objectives of the study were to;

- Establish the current condition of the measures.
- Make recommendations on any further actions that may need to be taken.
- Give indicative costs of any remedial work to be undertaken.

1.3 Excluded from the study

The study was focused specifically on evaluating the current state of the wall insulation measures. This included the External Wall Insulation (EWI) and Internal Wall Insulation (IWI). Issues relating to the performance of the workmen on site and the installation of other measures such as gas boilers are outside the scope of the study.

2 Evaluation Methodology

2.1 Methodology Summary

Our methodology and approach is based upon use of good practice guidelines and varied tools and techniques to fully understand the installation programme and its consequences. These include:

- **Desk research** of available best practice documents and literature related to the installation of EWI and IWI to establish a full understanding of the installation programme as it was applied at Caerau.
- **Surveys** of a sample of 32 properties, representative of the 100 plus homes that received the measures to establish their current condition.
- **Semi structured interviews** with homeowners to gain additional context.
- **Examination** of the work undertaken and comparison with best practice.
- **Analysis** of the options for repair including indicative costs.

Homes were given an identification number 'ARB01 to ARB36 which was used during the surveys and throughout the report. Of the 36 homes originally contacted, 4 homes (namely ARB05, 13, 27 and 32) did not ultimately participate in the survey.

Each **home surveys** comprised a non-intrusive inspection of the measures, noting all defects encountered. The condition of the properties both internally and externally was recorded, and photographs taken. Floor plans were prepared to establish and record the location of the measures and to assist in estimating quantities of materials used and hence indicative costs of any remedial action required.

Defects were identified for each home and the major issues were categorised and presented in section 3 of this report. A summary of the main defects found in homes is given in Appendix B and a condensed version of each individual home survey report is given in Appendix C.

An examination of (a) the defects found measured against good practice and (b) the surveys of the consequences of the work undertaken were used to draw the final conclusions.

3 Findings/Results

3.1 External Observations

Staining from windows and gutters

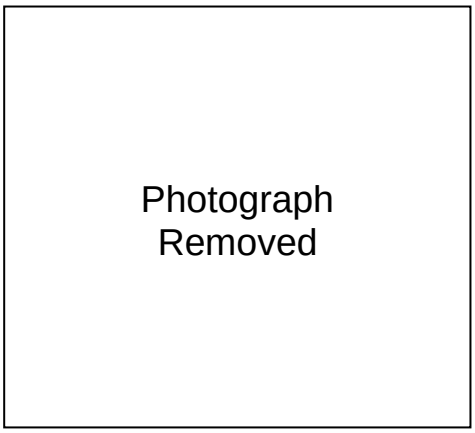
28 of the 32 homes exhibited poor finishing of details around gutter stop ends and EWI trims as shown in the adjacent photograph. Where this has occurred, water was observed to by-pass the gutter system and run down the wall, causing staining and mould growth. In many cases, damp areas were in evidence within the adjacent internal walls.

Due to the non-intrusive nature of the surveys, it was not possible to determine whether water had penetrated behind the EWI, and if needed, this could be the focus of future investigative work.

Main issue: The poor detailing and workmanship around gutters and EWI trims has resulted in unsightly staining and mould growth. Without remedial action, this will ultimately lead to a premature breakdown of the system and deterioration of the internal wall surface due to damp and mould build up. This will be further exacerbated where water has penetrated behind the EWI.

Further investigative work could check for water penetration behind the EWI.

Staining on walls general



In addition to specific areas such as poor detailing around gutters, 29 of the 32 homes exhibited staining generally. This was due to a variety of reasons such as water runoff from poorly constructed windowsills and surfaces more exposed to wind and rain.

Staining is not only associated with poor workmanship but also the type of render used. Cheaper Acrylic render does not have the same self-cleaning characteristics as Silicone render for instance. It was not possible to determine which manufacturer supplied the EWI system and hence the type of render was not known. If required, further investigative work could be undertaken to determine the type of render used.

Main issue: Excessive water runoff causes discolouration of the render. This discolouration is exacerbated where cheaper Acrylic render solutions are employed which allow the build-up of surface water. Good practice would be to use more appropriate Silicone render systems which repel water and are more self-cleaning than Acrylic renders. They should also be treated with biocides.

Further investigative work could check for the type of render used.

Green algae growth in evidence, no DPC

Green algae was present on the external walls of 22 of the 32 homes surveyed. There was no visible DPC on any of the walls. The EWI in most cases stopped short of the floor level with the render extended to the floor.

The lack of a DPC between the floor level and the start of the EWI has resulted in excessive damp forming at the lower levels of the walls which has encouraged the growth of green algae. The lack of insulation at the lower levels has also resulted in thermal bridges forming which in turn has caused damp and mould to form on the internal wall surfaces.

Main issue: Lack of a DPC has caused green algae growth to occur on the lower wall levels and lack of insulation at the lower levels has caused thermal bridging to occur within the lower walls.

Gas Pipes

In 20 of the32 homes, the EWI had been cut around existing gas pipes as shown in the adjacent photographs. In one case, no trims were used and hence gaps were evident where damp ingress could occur.

Good practice would have been to move the existing gas pipes but it's acknowledged that this is not always practicable given time constraints and budgets.

In all cases, there were no PPC aluminium vented cover plates fixed to the EWI to protect the location from water ingress and to make the installation more visually acceptable.

There is no evidence to suggest that the Gas supplier had been contacted to check that the detail was acceptable – this was the responsibility of the installer/main contractor.

Main issue: Thermal bridging occurs where the insulation has been cut around gas pipes which in turn caused damp and mould growth at that location within the property. In addition, where trims have not been installed, there is further risk of damp ingress.

Services and protrusions

EWI on 18 of the 32 homes surveyed had pipe protrusions that had not been sealed as shown in the adjacent photographs.

It is essential that opening around pipe protrusions are weathertight to prevent cold and the ingress of water which will compromise the insulation and also increase the risk of interstitial condensation.

Unsealed protrusions will result in water penetration into the insulation and wall, causing the insulation to lose its effectiveness. Interstitial condensation is also more likely to occur as the temperature drops sufficiently for the dew point to be reached within the Wall. Interstitial condensation could cause problems such as mould growth within the wall which would not be visible.

Main issue: Deterioration in the EWI coupled with damp and mould growth on the internal surface of the wall and within the fabric of the wall itself.

No sealant around window sills

EWI on 11 of the 32 homes surveyed had window sills that had been left unsealed. Whilst the sill overhand will prevent driving rain from entering the insulation, the lack of a sealant will nevertheless enable some water to ingress. In addition draughts can enter through the gap and a thermal bridge will occur, causing damp to form on the internal surfaces of the wall.

Main issue: Unsealed window sills will result in some water ingress and thermal bridging which in turn will lead to damp and mould growth on the surfaces of internal walls.

Sills less than 40mm

In 14 of the 32 homes surveyed, it was observed that the overhang on the installed window sills was less than 40mm. In one case there was a window where a sill had not been installed at all. Examples of this defect are shown in the adjacent photographs.

Main issue: The lack of overhang in the sills has resulted in excessive damp areas on the render from water run-off. This has resulted in staining and mould growth on walls.

Window sills Poorly installed

Window sills In 11 of the 32 homes had been poorly installed with various unintended outcomes, including sill surface at a very steep angle, bent and loose. An example of a poorly installed sill placed at a steep angle is shown in the adjacent photograph.

Windows Jammed

In 12 of the 32 homes it was observed that some windows would not open due to jamming against the newly installed render. An example of a jammed window is shown in the attached photograph. This

Main issue: Poorly installed sills are visually unacceptable as well as causing issues in relation to the integrity of the system. Jammed windows prevent adequate ventilation as well as restricting the use of the window as a fire escape.

EWI cut around stone walls

15 of the 32 homes surveyed had not addressed the issue of thermal bridging caused by natural obstructions, such as walls, fences and gates connected to the properties. In the 15 properties, EWI had been cut around the walls. This increases the risk of thermal bridging and hence cold damp areas leading to mould growth forming on the surfaces of internal walls.

Good practice to reduce the risk of thermal bridging, would be to cut back the walls so that the EWI could be installed seamlessly along the wall. The wall could then be rebuilt back up to the face of the insulation.

Main issue: EWI cut around obstructions increases the risk of thermal bridging resulting in cold damp areas and mould growth forming on the surfaces of internal walls.

Poor verge trims & sealant detailing

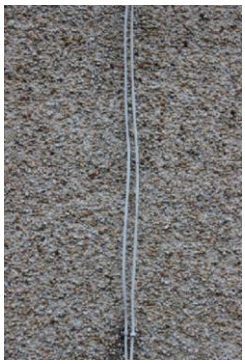
20 of the 32 homes surveyed had poor details produced at roof line and gable end with mastic sealant being used to provide resistance to water penetration. In many cases the sealant had already failed, allowing water to ingress into the EWI and wall of the house. In other cases, there was no sealant visible between the verge trims and EWI resulting in water ingress and thermal bridging problems.

Main issue: Poorly installed verge trims with overreliance on mastic sealant has resulted in damp ingress and thermal bridging problems.

Cables not clipped to walls

In 8 of the 32 homes surveyed, it was noted that cables were not clipped to the external walls. This can cause accidental damage to the cables by being snagged. It's good practice for contractors to fit cable clips at maximum spacing of 250mm intervals for horizontal runs and 300mm for vertical runs.

Main issue: Damage to cables through snagging.



Pipes not fixed to walls

5 of the 32 homes surveyed had downpipes that had not been secured to the walls. This looks unsightly and has resulted in damage to some downpipes with water cascading out through breaks in the jointing.

Main issue: Damage to downpipes due to inadequate wall fixings.

Poor detailing

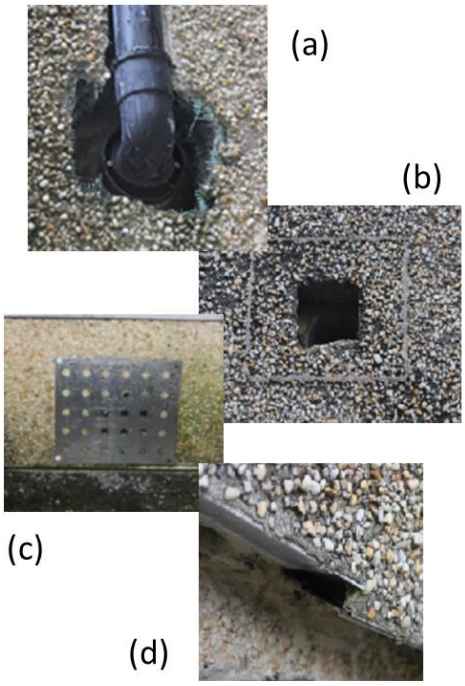
In addition to the defects described in other sections, 25 of the 32 homes exhibited general poor detailing as show in the attached photographs.

EWI was installed over flues and vents in many homes (a). Many vents were covered over during the surveys, however EWI had subsequently been removed from areas where boiler flued had been covered over.

Some extract fan grills had been fixed with mastic (b) which had quickly failed, leaving a large hole in the wall.

One home had been left with a large hole through the wall at ground level (c), resulting in the risk of rodents entering the home. The homeowners had installed their own grill post installation.

Some starter tracks had not been fixed properly (d) or left with fence posts protruding through.



Main issue: Miscellaneous poor detailing and insulation causing a variety of opportunities for water to ingress into the property and for thermal bridging to occur. Installing EWI over the boiler flues were particularly concerning.

3.2 Internal Observations

The internal observations from the survey are summarised here by describing one home, ARB007 which represented one of the more severe examples. This home had EWI installed to the front and rear of the property.

Damp in evidence in Lounge (front ground floor)

Damp and black mould in evidence in kitchen (rear ground floor)

Damp on walls, ceiling and windows in all three Bedrooms

Damp on walls, ceiling and windows in all three Bedrooms

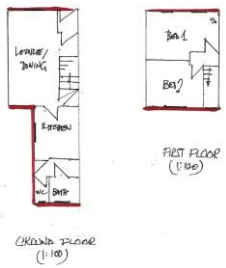
4 Discussion of findings and options for repair

It can be seen from Appendix B 'Summary of main defects found in homes' that the EWI and IWI on every property exhibited issues associated with poor workmanship and/or materials. Internally, there was also evidence of damp and mould on walls and ceilings, plaster spalling and wallpaper peeling off walls in all but 5 homes.

There is a case for remedial action to be undertaken to every property surveyed although it's quite possible that a few homeowners may not wish any further work to be carried out. With this in mind, there are potentially two options to be considered, namely;

- Option 1 - do nothing (at the homeowner's request).
- Option 2 – remove and return to the original state.

On the assumption that the option for repair would be offered to all homeowners, preliminary costs for options 2 were estimated.



Floor plans for each home were prepared and the quantity of EWI and IWI calculated. From these quantities, the costs of removal and remedial work for each property was estimated. The figures presented in the options below are an average cost of repair for each property.

Costs vary from property to property and it should be emphasised that they are indicative only. Should an option for removal and repair be taken forward, then each property would require a more detailed survey to ascertain exact costs.

Option 2 – Remove and return to the original state

Cost of removal (EWI / IWI)	£ 4,000.00
Cost of making good (Re-render)	£ 5,000.00
Contingency Drying out	£ 4,000.00
Internal decoration	£ 3,000.00
TOTAL	**£16,000.00**

5 Conclusions.

5.1 Conclusions

The evaluation finds that;

1. The EWI and IWI on all 32 properties surveyed exhibited issues associated with poor workmanship and/or materials.

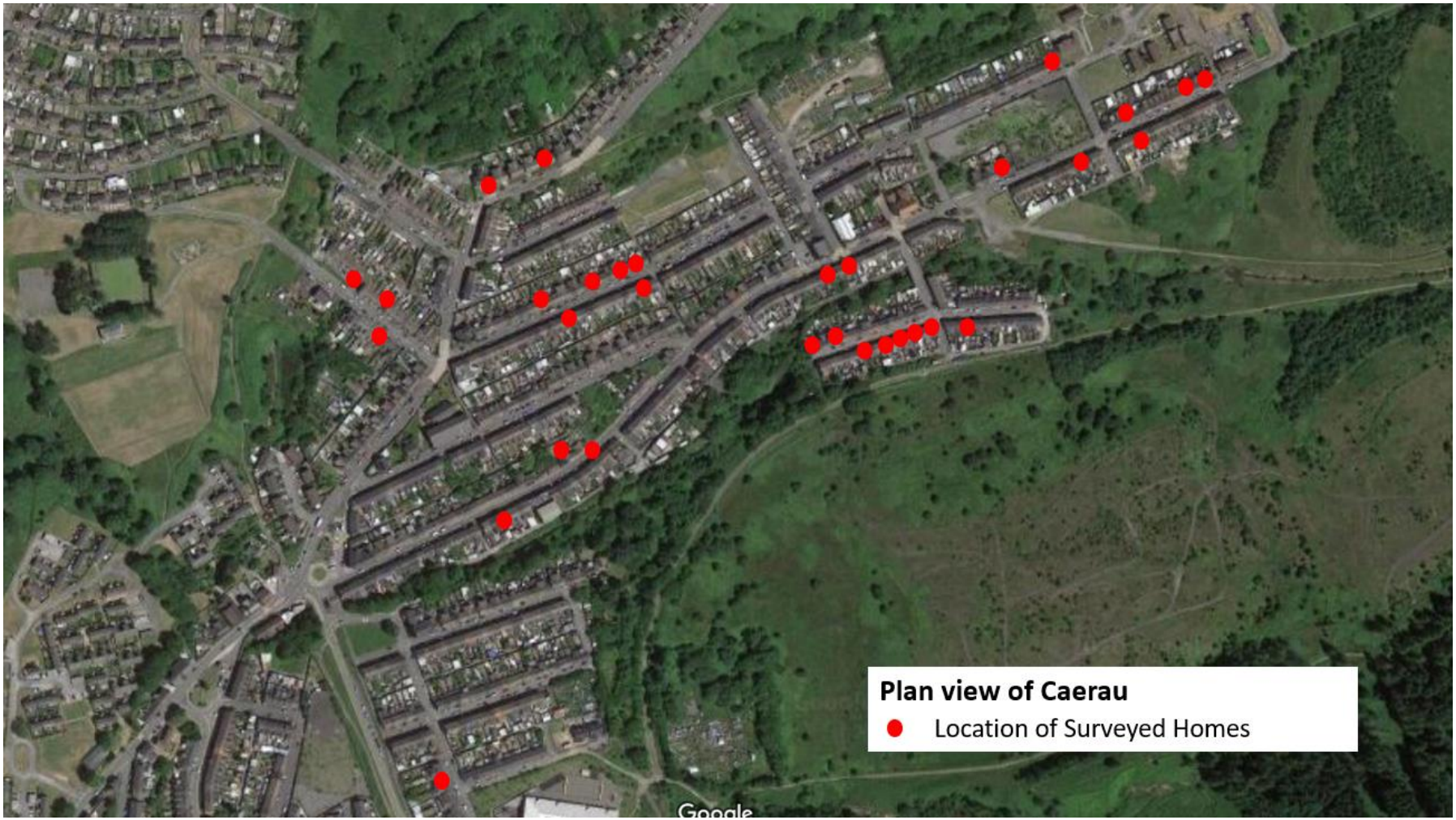
2. Internally, there was also evidence of damp and mould on walls and ceilings, plaster spalling and wallpaper peeling off walls in all but 5 homes.

3. There is a case for remedial action to be undertaken to every property surveyed although it's quite possible that a few homeowners may not wish any further work to be carried out.

4. There are potentially two options to be considered, namely;
    - Option 1 - do nothing (at the homeowner's request).
    - Option 2 – remove and return to the original state.

5. An average cost for each option has been estimated as follows;
    - Option 1 – no cost
    - Option 2 – £16,000.

APPENDIX A
PLAN VIEW OF CAERAU SHOWING LOCATIONS OF HOMES SURVEYED



APPENDIX B
SUMMARY OF MAIN DEFECTS FOUND IN HOMES

Home Identification Number ARB0																																	
Home ID >	**01**	**02**	**03**	**04**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**28**	**29**	**30**	**31**	**33**	**34**	**35**	**36**
External Defects																																	
EWI cut around gas pipes	●			●		●		●	●	●	●	●	●			●	●	●	●		●	●	●			●		●	●			●
Staining from windows and gutters	●	●		●		●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Staining on walls general		●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●
No sealant around windowsills		●				●			●		●	●	●					●	●				●			●				●		
Windowsills poorly installed	●					●	●				●						●	●				●			●				●	●		●
Windows jammed	●					●	●		●		●				●		●	●		●					●					●		●
Sills less than 40mm	●		●	●			●			●					●	●			●		●			●	●	●			●	●		
No sealant around pipes	●	●	●	●				●	●	●	●	●	●	●	●				●	●	●				●	●	●					
Cables not clipped to walls	●						●		●	●	●		●	●		●		●	●						●	●			●			
Pipes not fixed to walls									●				●											●					●	●		
EWI cut around garden walls			●		●				●	●	●		●		●	●				●	●		●	●	●				●		●	
Poor detailing	●	●			●	●	●	●	●	●		●	●	●	●	●		●	●	●	●		●	●	●		●	●	●	●	●	
Poor verge trims & sealant detailing					●	●		●			●	●		●	●	●			●	●	●		●		●	●	●	●	●	●	●	●
Algae in evidence	●	●		●			●		●	●	●	●	●	●		●		●		●	●		●		●	●	●	●	●	●		
Internal Defects																																	
Ground floor																																	
Damp in walls & ceilings	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●	●				●		●	●	●	●			●	●	●
Mould on walls & ceilings	●	●	●		●	●	●	●	●		●	●		●	●		●	●				●		●	●	●	●			●	●	●
Plaster/Artex spalling	●			●					●		●				●			●														●
Wallpaper peeling		●	●																												●		
First floor																																	
Damp in walls & ceilings	●	●	●		●	●	●	●	●						●		●	●			●			●	●		●	●	●		●	●
Mold on Walls & ceilings					●	●	●	●	●						●		●	●			●			●	●		●	●	●		●	●
Plaster spalling	●				●																												
Wallpaper peeling																					●			●									

APPENDIX C
INDIVIDUAL HOME SURVEY REPORTS.

ARB001

Description
Traditional Welsh semi-detached house of solid wall construction with a two-storey extension to the rear containing kitchen and bathroom on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the side and rear of the property
- Internal Wall Insulation (IWI) applied to the front.
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

Main observations

- has been installed down to ground level with no visible DPC.
- Cable runs have been clipped at over the recommended intervals of250mm.
- Algae growth in evidence along the lower section of the wall.
- Disused pipe has not been sealed.
- Corner detail around the gutter is poorly designed/fitted. This has resulted in water running off the roof and down the wall, causing significant staining and algae growth.
- Window reveals have been rendered but no EWI, resulting in the creation of thermal bridges in these areas.
- Several windows cannot open due to the additional thickness of render applied in the window reveals.
- There was no sill beneath the kitchen window resulting in water runoff and staining on wall below.
- Window reveals have been rendered but no EWI, resulting in the creation of thermal bridges in these areas.
- Window sill overhang is too small resulting in water flowing down and staining the wall below.
- Large gap between facia board and EWI with birds nesting in eaves (see photograph14)
- Cable protrusions not sealed.
- Window sill overhang less than 40mm
- EWI has not been continued along boundary wall for a short distance giving the potential for a thermal bridge to occur in this corner.
- Pipe penetrations not sealed.

Internal observations

- IWI installed on lounge front wall. New plasterboard installed to cover damp issues
- Corrosion in evidence on gas meter base plate due to damp ingress.
- Damp around ceiling support beam in lounge.
- EWI installed to floor with no visible DPC around kitchen door area. Note thinner layer of EWI to a height of 300mm above door causing a cold bridge in kitchen wall (see photograph 22).
- Plaster spalling around kitchen windows due to cold bridge caused by no insulation in window reveals.
- Damp on kitchen wall around door caused by cold bridge from poorly installed EWI.
- Plaster stained and flaking around back bedroom window due to cold bridging as no EWI installed in window reveals.
- Plaster stained and flaking around back bedroom side wall.

ARB002

Description
The property is a traditional Welsh terraced house of solid wall construction and with a three-storey extension to the rear. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the side and rear of the property
- Internal Wall Insulation (IWI) applied to the front.
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 99%
- Percentage of boarding completed. 99%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 99%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- EWI not continued into window reveals. Discolouration in evidence
- Poor corner detail with no DPC in evidence
- Discolouration around window reveal
- No sealant between EWI and windowsill
- Discolouration and algae growth on EWI at floor level
- Poor detailing resulting in discolouration on render
- Poorly placed and sub-specification sealant
- No sealant around pipework

Internal observations

- Black mould around windows
- Damp on walls with wallpaper peeling away
- Black mould on window reveal

ARB003

Description
The property is a traditional Welsh mid-terraced house of solid wall construction and with a two-storey extension to the rear containing kitchen and bathroom on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the side and rear of the property
- Internal Wall Insulation (IWI) applied to the front.
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Window reveals mortared
- Staining on EWI. Also, EWI cut around garden wall causing potential cold bridging
- EWI stopped short around vent, causing potential cold bridging.
- EWI stopped short along extension roof causing potential cold bridging. Cabling not clipped to wall but fixed with cable tie to downpipe.
- No sealant around pipe, causing cold bridging and water ingress.
- Window sill less than 30mm protrusion from wall, with poor sealant.
- Render at ground level but no DPC visible.
- No sealant around pipes, causing cold bridging and water ingress
- Damp along floor and base of wall
- EWI stopped short around garden wall, causing cold bridging, also no sealant.
- EWI not fixed to wall, with large gap forming causing cold bridging and ingress of water
- Staining and bulging of render

Internal observations
- Poor detailing of IWI, causing visually unacceptable feature through lobby window
- EWI installed to floor with no visible DPC around kitchen door area. Thinner layer of EWI to a height of 300mm above door causing a cold bridge in kitchen wall
- Plaster spalling around kitchen windows due to cold bridge caused by no insulation in window reveals
- Damp on kitchen wall around door caused by cold bridge from poorly installed EWI
- Damp and black mould around kitchen door
- Damp and black mould on ceiling
- Wallpaper damp and peeling off
- Damp along floor and base of wall

ARB004

Description
Traditional Welsh semi-detached house of solid wall construction with a two-storey extension to the rear containing kitchen and bathroom on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the side and rear of the property
- Internal Wall Insulation (IWI) applied to the front.
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- No visible DPC and Algae growth in evidence.
- No sealant in place beneath starter track. This has resulted in a void in the EWI thus exposing the wall to thermal bridge issues.
- Timber fence post left in place with EWI placed around it, allowing damp ingress and cold bridging.
- Discolouration on wall and window reveal caused by dripping water from poorly formed guttering and flashing.
- Sagging window sill and window cannot open due to the poor installation of render.
- Pipework cut but not properly sealed, causing water ingress and cold bridging.
- Contractor's waste left in garden.
- Algae and staining in evidence around window reveal due to poorly formed EWI around windows.
- No sealant under window sill causing cold bridging within kitchen
- Sill less than 30mm and end breaking away
- Plastic trim detail allowing water to spill and stain wall.
- Holes in EWI from scaffolding left open allowing water to penetrate and cold bridging to occur.
- Render built around door frame making it difficult to replace in future
- Extraction vent cover inadequately fixed with sealant resulting in a large hole being exposed in the EWI.
- No DPC visible.
- Render damaged and stained above window
- Flashing and guttering poorly fixed, resulting in water ingress through sealant
- No sealant around pipework causing damp ingress and cold bridging

- Starter track not placed properly resulting in void and cold bridging
- Render placed in window reveal preventing window from opening fully
- Staining of render and sill bowing
- EWI poorly formed around pipework
- EWI bowing out, possibly due to failure of insulation anchor fixings

Internal observations
No notable internal observations

ARB006

Description
The property is a privately owned traditional Welsh semi-detached house of solid wall construction and with a two-storey extension to the rear containing kitchen and bathroom on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the front, side and rear of the property
- Internal Wall Insulation (IWI) applied to the front.
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Roof line damaged
- EWI down to ground level, no DPC, algae forming
- No sealant between EWI and windowsill
- No EWI in window reveal
- Poor detailing of flashing
- Side elevation
- Staining on render
- EWI cut around wall, causing thermal bridging.
- Roof line not covering flashing, leaving seal and causing ingress of damp.
- Poor flashing detailing causing ingress of damp
- Rear elevation
- Guttering loose causing rainwater spillage
- Guttering uneven with downpipe positioned too high to allow water through
- Staining on wall
- Building waste left by installers
- No sealant around pipes

Internal observations

- Black mould on wall
- Damp and black mould on kitchen wall
- Damp and plaster breaking down around bedroom window
- Damp in bedroom ceiling

ARB007

Description
The property is a privately owned traditional Welsh terrace house of solid wall construction and with a single-storey extension to the rear containing kitchen and bathroom on the ground floor and a workshop in the cellar. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the front and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

Main observations

- EWI installed down to ground level with no DPC visible. Rain dripping from window sill causing discolouration of render
- Sealant breaking down between EWI and wall causing potential for water ingress into wall.
- EWI cut around gas pipe, causing potential for thermal bridging
- Side and rear elevation
- Staining on render caused by rainwater dripping from sill
- Slope in window sill
- No sealant between EWI and window sill
- Poor gutter and facia board detailing causing staining on side of wall
- Staining around window sill
- EWI cut around garden wall causing thermal bridging
- Staining on render
- Damaged EWI with gaps in render causing cold bridging and ingress of water

Internal observations

- Damp in Lounge walls
- Black mould and damp on kitchen walls
- Damp and black mould on tiles in WC
- Damp on wall in front bedroom
- Extensive damp and black mould on walls around various rooms in house
- Plaster stained and flaking around back bedroom side wall.

ARB008

Description
The property is a privately owned traditional Welsh semi-detached house of solid wall construction and with a two-storey extension to the rear containing kitchen and bathroom on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the side and rear of the property
- Internal Wall Insulation (IWI) applied to the front.
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- The thinner layer of EWI has been installed down to ground level with no visible DPC
- The cable runs have been clipped at over the recommended intervals of250mm
- There is algae growth in evidence along the lower section of the wall
- Disused pipe has not been sealed
- Corner detail around the gutter is poorly designed/fitted. This has resulted in water running off the roof and down the wall, causing significant staining and algae growth.
- Window reveals have been rendered but no EWI, resulting in the creation of thermal bridges in these areas
- Several windows cannot open due to the additional thickness of render applied in the window reveals
- There was no sill beneath the kitchen window resulting in water runoff and staining on wall below
- Window reveals have been rendered but no EWI, resulting in the creation of thermal bridges in these areas.
- Window sill overhang is too small resulting in water flowing down and staining the wall below.
- Algae in evidence around lower wall.
- Large gap between facia board and EWI with birds nesting in
- Cable protrusions not sealed
- Window sill overhang too small
- EWI has not been continued along boundary wall for a short distance giving the potential for a thermal bridge to occur in this corner
- Pipe penetrations have not been sealed

Internal observations

- IWI installed on lounge front wall. New plasterboard installed to cover damp issues
- Corrosion in evidence on gas meter base plate due to damp
- Damp around ceiling support beam in lounge
- EWI installed to floor with no visible DPC around kitchen door area. Note thinner layer of EWI to a height of 300mm above door causing a cold bridge in kitchen wall
- Plaster spalling around kitchen windows due to cold bridge caused by no insulation in window reveals
- Damp on kitchen wall around door caused by cold bridge from poorly installed EWI
- Plaster stained and flaking around back bedroom window due to cold bridging as no EWI installed in window reveals
- Plaster stained and flaking around back bedroom side wall

ARB009

Description
The property is a privately owned traditional Welsh semi-detached house of solid wall construction and with a two-storey extension to the rear containing kitchen and bathroom on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the side and rear of the property
- Internal Wall Insulation (IWI) applied to the front.
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Flashing has become detached from wall, causing ingress of water and cold bridging
- Discolouration on render and flashing becoming detached along height of wall.
- EWI continued to ground level with no visible DPC.
- Inadequate drip beading.
- Discolouration on render, no drip beading
- Poorly constructed detail around pipework causing thermal bridging
- Discolouration on render, no sealant on pipework, EWI not continued around windows
- Poor detailing around flashing, staining on render and ingress of water into property
- No sealant around pipe and poor detailing of flashing
- No EWI around window and poor flashing. Detailing as P19 and 11
- Gap in EWI causing ingress of water and cold bridging
- EWI cut short around pipe causing cold bridging
- Discolouration on render
- Staining at base of EWI around door reveals
- No sealant between flashing and EWI
- No sealant between EWI and wall
- No sealant around pipe
- No sealant around ventilation grill
- Staining and cracking of window reveal

Internal observations
- Black mould and damp throughout various locations in house on walls
- Black mould on various windows throughout house

ARB010

Description
The property is a privately owned traditional Welsh semi-detached house of solid wall construction and with a two-storey extension to the rear containing kitchen and bathroom on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the front, side and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI applied to all elevations is presented below:

- Percentage of wall completed. 99%
- Percentage of boarding completed. 99%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 99%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Cracks in window reveal
- The cable runs have been clipped at over the recommended intervals of250mm
- Insulation cut around gas pipe
- Cable not clipped back to wall at regular intervals - 300mm for vertical runs recommended
- Discolouration on render
- Discolouration on window reveal. Note thin render layer only applied to window reveal
- Cold bridge exacerbated by placement of insulation around an obstruction. Best practice is to cut back obstruction to allow EWI to be placed. Also, no sealant used to fill gap
- Pipe fixings not completed
- Render not completed
- Render patched up
- EWI curtailed around extract pipe
- Staining on render
- No EWI in window reveals, only think render
- Sealant failing around window sills
- Pipe fixings not completed
- Render not complete and flaking off
- Cracking in render

Internal observations

- No observations made as home had recently undergone refurbishment and no visible issues could be attributed to measures undertaken

ARB011

Description
The property is a privately owned traditional Welsh terrace house of solid wall construction and with a one-storey extension to the rear containing kitchen and bathroom. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the front and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

Internal observations

- EWI installed to ground level with no DPC in evidence, algae growth in evidence around base of EWI
- EWI cut around pipe, causing cold bridging
- Window reveals rendered and out of alignment
- Algae growth around base of EWI
- Drip beading uneven
- EWI cut around garden wall, causing cold bridging
- Discolouration from damp due to water flowing from window sill
- Window still protruding less than recommended 30mm causing water to drip onto render
- Window reveals rendered and out of alignment see
- EWI cut around gutter causing potential cold bridging
- EWI cut around gutter causing cold bridging and loose cables
- Poor joint detail resulting in potential water ingress
- Cables from satellite dish have not been clipped to wall
- Cables left loose and hanging free
- No sealant around pipe and flashing causing potential for water to ingress into property
- No sealant around pipe
- No sealant between flashing and EWI
- Poorly formed window reveal
- Poor Flashing detail with loose cables
- Hole cut through bedroom wall, not used and not made good

ARB012

Description
The property is a privately owned traditional Welsh semi-detached house of solid wall construction and with a single-storey extension to the rear containing kitchen and bathroom on the ground floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the front and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Discolouration in door reveal
- EWI cut around pipe causing potential for cold bridging. No DPC visible
- Discolouration in window reveal
- Render slumped beneath window sill with no sealant between EWI and sill. Thus, gives potential for damp ingress and cold bridging
- Staining on window reveal
- Damage caused to footpath by scaffolding
- A hole cut through EWI became a home for rodents, homeowner subsequently placed a metal grating to cover hole
- EWI cut around garden wall resulting in cold bridging. Staining in evidence on wall and insulation within EWI loose on floor after being chewed by rodents
- Loose cables not clipped to wall
- EWI taken to ground level with no visible EWI
- Sealant around Facia boards breaking down causing damp ingress
- Staining around walls and window sills
- Window cannot open due to EWI and render being installed too close to the window
- Flat roof replaced by installers (due to damage caused by installers) failing

Internal observations
- Damp on ceiling with Artex breaking down and flaking away
- Black mould around kitchen door reveal

ARB014

Description
The property is a privately owned traditional Welsh semi-detached house of solid wall construction and with a two-storey extension to the rear containing kitchen and bathroom on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the front and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- EWI has been installed down to ground level and there is no visible DPC. Green algae is in evidence
- EWI cut around gas pipe creating the potential for thermal bridging. Also, dampness and green algae around bottom of EWI
- Window reveal rendered but EWI has not been carried around to the window giving rise to the potential for cold bridging.
- EWI cut around cable fixing causing potential for thermal bridge.
- Poor detailing around corner
- Green algae in evidence at base of wall with no visible DPC
- No sealant between window sill and EWI
- No sealant around pipe
- Poor gutter detail causing water spillage and staining to render
- Hollow sound is heard when the wall is tapped, suggesting that the EWI has become detached from wall

Internal observations

- The main issue observed was the damp and black mould in bathroom

ARB015

Description
The property is a traditional Welsh semi-detached house of solid wall construction and with a two-storey extension to the rear containing kitchen and bathroom on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the front and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- EWI installed down to floor level, no DPC visible. Some Algae growth in evidence
- Cracks in window reveal
- The cable runs have been clipped at over the recommended intervals of250mm
- Insulation cut around gas pipe
- Cable not clipped back to wall at regular intervals - 300mm for vertical runs recommended
- Discolouration on render
- Discolouration on window reveal. Note thin render layer only applied to window reveal
- Cold bridge exacerbated by placement of insulation around an obstruction. Best practice is to cut back obstruction to allow EWI to be placed. Also, no sealant used to fill gap
- Pipe fixings not completed
- Render not completed
- Render patched up
- EWI curtailed around extract pipe
- Staining on render
- No EWI in window reveals, only think render
- Sealant failing around window sills
- Pipe fixings not completed
- Render not complete and flaking off
- Cracking in render

Internal observations
This home had recently been decorated throughout and there were no visible issues that could be attributed to the measures undertaken.

ARB016

Description
The property is a privately owned traditional Welsh terraced house of solid wall construction and with a single-storey extension to the rear containing kitchen bathroom and WC. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the rear of the property
- Internal Wall Insulation (IWI) was in the end not installed due to owner losing confidence in the installers
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI applied to all elevations is presented below:

- Percentage of wall completed. 50%
- Percentage of boarding completed. 50%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 50%
- Is the home suitable for system? Yes, subject to the DPC being identified.

Main observations
- Discolouration and algae in evidence on EWI with no visible DPC
- Discolouration down wall and cable not clipped to wall
- Cables loose down length of wall having not been clipped to EWI
- No sealant provided around tap
- Discolouration on wall
- Weep hole in window damaged and not repaired
- Inadequate flashing detail resulting in water ingress
- No sealant between EWI and flashing allowing water ingress and potential for cold bridging
- No sealant between gutter and EWI allowing ingress of water and potential cold bridging
- Poor flashing detail causing water ingress

Internal observations
- Mould around window in Living Room
- Note some areas of mould had been covered up by plastic cladding
- Plaster stained and flaking around back bedroom side wall

ARB017

Description
The property is a traditional Welsh terrace house of solid wall construction and with a two-storey extension to the rear containing kitchen and WC on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the side and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Badly formed corner
- Flashing has not been extended over EWI, thus allowing water to ingress into the cladding and causing dampness within the building
- Garden block wall was not cut back to allow EWI to be installed right through to the corner of the home. This has resulted in a cold bridge forming
- Discolouration in window reveal.
- Discolouration in render adjacent to window
- Render damaged and window unable to open due to positioning of EWI
- Window sill less than 30mm, causing water to drip onto wall
- No sealant around pipe through EWI causing a pathway for water ingress and the formation of a cold bridge within the wall
- Render at corner flaking away and no sealant between flashing and render
- Window unable to open due to render in window reveal
- No sealant around pipes

Internal observations

- Black mould in evidence and plaster cracking in WC
- Black mould in evidence around door where cold bridge occurred due to EWI not being carried through past the external wall
- Black mould in evidence on bathroom wall
- Black mould in evidence on bedroom wall

ARB018

Description
The property is a traditional Welsh end-of-terrace house of solid wall construction and with a three-storey extension to the rear containing basement below, kitchen on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the front, side and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Poor detailing around drip bead with render taken down to ground level and no DPC in evidence
- Sill less than 30mm with staining visible around wall
- EWI not carried around window reveal giving potential for cold bridging. Staining in reveal. Also, cable not clipped at the recommended spacing of 250mm.
- EWI cut short around gas pipe giving rise to potential cold bridging.
- Render taken down to ground level and covers up pipe No DPC in evidence
- EWI cut short around fence post, giving rise to potential cold bridging.
- EWI cut short around flue support, causing thermal bridging
- Poor detailing around fascia board and guttering, causing staining down wall
- EWI cut short around door reveal, no DPC in evidence, green algae present.
- Poor detailing around gutter and fascia board causing staining down wall and potential cold bridging.
- EWI stopped short of wall, causing thermal bridging. Note! Wall should have been cut back and EWI extended through.
- The homeowner's main issue was that many downpipes had not been replaced along the street. This resulted in rainwater runoff from the street flowing down to No11 and overflowing due to the gutter being unable to take the excess water.

Internal observations
No visible problems observed within the home

ARB019

Description
The property is a traditional Welsh terraced house of solid wall construction and with a two-storey to the rear housing the kitchen on the ground floor and back bedroom above. A single storey extension also to the rear houses the bathroom. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI applied to all elevations is presented below:

- Percentage of wall completed. 50%
- Percentage of boarding completed. 50%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 50%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Elevations of the extensions showing discolouration from overflowing gutter
- The works around the waste stack is inadequate
- The underside of the EWL is incorrectly finished
- EWI around pipe outlet defective

Internal observations

- Mould Throughout various parts of the house, such as on windows and in room corners

ARB020

Description
The property is a privately owned traditional Welsh semi-detached house of solid wall construction and with a single-storey extension to the rear. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the front and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- The drip bead situated at first floor level has been poorly placed with discolouration in evidence
- EWI installed down to floor level, no DPC visible. Some Algae growth in evidence
- Insulation cut around the gas pipe causing a cold bridge to occur within wall
- Poor corner detail potentially causing ingress of water
- Insulation cut around cable causing a cold bridge to occur within wall
- Window unable to open and discolouration on reveal
- Discolouration around door reveals
- Poorly placed render slipped down wall during construction leaving a distinctive indent over much of the wall which has also discoloured
- Window cills are loose with no sealant between cills and the EWI. There were also some cigarette marks on the cills reported by the homeowner as being caused by the installers
- Cables have not been clipped back to the wall
- Some areas, render was not completed or flacking away, with the mesh below exposed
- Sealant around cills peeling away with the potential to allow the ingress of water
- Cables not clipped back and discolouration on walls

Internal observations

- Plaster blistering and flaking away off front wall in lounge.
- Plaster blistering on front wall in lounge. Water ingress was very prominent here with a very high moisture content reading in the wall around the BT box. The BT box frequently failed with BT reporting the ingress of water a cause
- Damp was in evidence all along party wall, with plaster flaking away
- Black mould in evidence on ceiling of back bedroom
- Black mould in evidence throughout attic ceiling

ARB021

Description
The property is a privately owned traditional Welsh semi-detached house of solid wall construction and with a single-storey extension to the rear. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.
Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI applied to rear elevation is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Poor corner detail potentially causing ingress of water
- Cabling left hanging and not fixed
- Discolouration at rear of extension
- Pipework not fixed to discoloured
- New windows installed to mitigate damp ingress
- Pipework not sealed correctly
- Base of patio doors poorly finished

Internal observations

No photographs were taken as all of the damp areas in the bathroom have been covered with plastic panels and there is no visible evidence of damp or mildew on the rear walls of the house

This is house is in good conditions internally as the home owner has invested in a high level of decoration and any faults have been repaired and decorated over them.

ARB022

Description
The property is a privately owned traditional Welsh semi-detached house of solid wall construction and with a two-storey extension to the rear containing kitchen and bathroom on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the front and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- EWI installed down to floor level, no DPC visible. Some Algae growth in evidence.
- Cracks in window reveal
- The cable runs have been clipped at over the recommended intervals of250mm.
- Insulation cut around gas pip
- Cable not clipped back to wall at regular intervals - 300mm for vertical runs recommended
- Discolouration on render
- Discolouration on window reveal. Note thin render layer only applied to window reveal
- Cold bridge exacerbated by placement of insulation around an obstruction. Best practice is to cut back obstruction to allow EWI to be placed. Also, no sealant used to fill gap
- Pipe fixings not completed
- Render not completed
- Render patched up
- EWI curtailed around extract pipe
- Staining on render
- No EWI in window reveals, only think render
- Sealant failing around window sills
- Pipe fixings not completed
- Render not complete and flaking off.
- Cracking in render

Internal observations

This home had recently been decorated throughout and there were no visible issues that could be attributed to the measures undertaken.

ARB023

Description
The property is a privately owned traditional Welsh terraced house of solid wall construction and with a two-storey extension to the rear containing kitchen on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.
Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the side and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- EWI installed down to ground level, no DPC visible
- Cabling not fixed to wall correctly
- Algae and staining next to front door
- Sealing strip at EWL separating from insulation
- Rear elevation and staining
- Pipework fixing inadequate and no DPC visible
- Rainwater pipe incorrectly connected to foul drainage
- Facia reinstatement poor, cabling not fixed to wall and gas pipe surround not in compliance
- Corner beading not finished correctly on return
- Window sill fixing defective

Internal observations

- Mildew in back bedroom of house (photograph 11)
- Wallpaper separating form wall in lounge due to damp (photograph p12)

ARB024

Description
The property is a privately owned traditional Welsh end of terrace two storey house of solid wall construction with the kitchen and bedroom bathroom in an extension at the rear. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension has single skin walls.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the side and rear of the property
- Internal Wall Insulation (IWI) applied to the front.
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Gable wall showing termination close to ground with staining/damp ingress at rear corner
- Rear wall showing staining from water overflowing guttering
- Defective installation of facia and guttering on house above extension which extends to 81 Victoria street which also has EWL
- Inset allowed for garden gate so no insulation; gate does not open fully
- Rear of extension showing staining and poor sealing of outlet pipe

Internal observations

- Mould in room corners and windows

ARB025

Description

The property is a privately owned traditional Welsh terraced two storey house of solid wall construction with the lounges, kitchen and bathroom on the ground floor and three bedrooms on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension has single skin walls.

Measures undertaken

Measures undertaken include:

- External Wall Insulation (EWI) installed to the side and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations

Summary of percentage of EWI applied to all elevations is presented below:

- Percentage of wall completed. 50%
- Percentage of boarding completed. 50%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 50%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Rear of house with extension showing staining
- Extension roof showing staining from water pooling on roof after damage by EWI installers
- Rainwater outlet not compliant with good practice
- EWI at rear door poorly installed

Internal observations

These home owners are very factitious and maintain the house to a high standard internally such that there is no evidence of damp /mildew but instrument show thermal break through at some windows in the extension, so no photographs taken

ARB026

Description
The property is a privately owned traditional Welsh semi-detached three storey house of solid wall construction with a very small extension to the basement which houses kitchen and bathroom. The ground floor houses the lounge with the first floor having two bedrooms. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension has single skin walls.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the front, side and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- EWI installed over three floors , no DPC visible. Extensive staining on front and gable
- Badly fitted window cill(s) with excessive use of mastic
- Poor sealing around dwarf wall on access bridge
- EWL on basement wall at front
- Staining and unfixed pipework on rear wall
- End joint on facia of extensions poor and leaks water
- Damp/mildew on inside rear bedroom

Internal observations

- This house is very damp indeed especially the inside of the gable wall with wallpaper separated from the plaster in several location. The use of heavy emulsion wallpaper disguises the problem. Damp meter readings exceeded 40%
- The bathroom in the basement was very wet (as advised by homeowner) so the entire room has been lined with plastic decorative panelling to cover mildew and damp walls
- The house felt damp and humid and ‘unhealthy’. Both homeowners were dependent upon medication to control lung ailments.

ARB028

Description

The property is a privately owned traditional Welsh terraced house of solid wall construction and with a two-storey extension to the rear containing kitchen and bathroom on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction. Measures undertaken include:

- External Wall Insulation (EWI) installed to the rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations

Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 50%
- Percentage of boarding completed. 50%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 50%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Elevations of the rear and extension showing discolouration
- Elevation of rear of extension with badly installed waste stack
- Edge beading at side of extension – works not completed
- EWI stopped at too high a level
- Pipe fitting badly made
- Ground floor window sills of extension not changed

Internal observations

- Damp around back door

ARB029

Description
The property is a privately owned traditional Welsh terraced house of solid wall construction and with a two-storey extension to the rear containing kitchen and bathroom on the ground floor and bedroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the rear of the property
- Internal Wall Insulation (IWI) applied to the front.
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Elevations of the rear and extension showing discolouration
- The guttering and downpipe connections are inadequate and allow water to overflow on adjoin property resulting in discolouring of wall beneath gutter
- Pipe installed with mild steel fitting and Insulation cut around gas pipe
- Damp and mould on wall beneath window of house

Internal observations

- Mould on inside of house beneath window
- Mould on inside of back bedroom of extension

ARB030

Description
The property is a privately owned traditional Welsh semi-detached house of solid wall construction and with a single-storey extension to the rear containing kitchen and bathroom. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the side and rear of the property
- Internal Wall Insulation (IWI) applied to the front.
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Staining on render
- Staining on render and poor gutter detailing causing water to overflow resulting in staining
- Staining along wall
- Poor detailing around flue causing ingress of water and cold bridging
- EWI extended to floor level with no DPC in evidence. Staining at lower level
- EWI extended around door reveal causing potential thermal bridging
- No sealant between EWI and flashing
- Poor flashing detailing around gutter/downpipe

Internal observations
- Homeowner painting over damp at window reveal
- Damp in evidence in bedroom ceiling
- Damp and black mould on bedroom wall
- Damp and black mould on window reveals in bedroom
- Damp and black mould in evidence around back door

ARB031

Description
The property is a privately owned traditional Welsh semi-detached house of solid wall construction and with a single-storey extension to the rear containing kitchen and WC. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the side and rear of the property
- Internal Wall Insulation (IWI) applied to the front.
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Discolouration at base of EWI, no DPC visible
- Drip bead uneven, hence render finish is uneven
- EWI formed around window, restricting opening
- No sealant around flashing
- EWI stopped short around gas pipe, causing thermal bridge
- EWI taken to ground level, and not extended past stone wall, causing thermal bridge
- EWI not sealed at end elevation, causing potential ingress of water and thermal bridging
- EWI not taken to apex on gable end.
- Poor detail around flashing, causing potential ingress of water and thermal bridging

Internal observations

- Black mould and damp in evidence in front bedroom window
- Condensation forming on windows
- Condensation and black mould forming on bedroom window
- Black mould forming on bedroom window

ARB033

Description
The property is an end of terrace traditional Welsh terraced house of solid wall construction and with a single storey kitchen extension to the rear. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the front, side and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Front elevation with all surfaces covered except for supports to dwarf roof (Photo 1)
- Side and rear elevations showing staining
- Patch repairs at front corner
- Window sills bowing upwards at end
- Cable box out and EWI over cabling
- New rainwater pipe by home own to reduce staining by facia run off

Internal observations
- Mould in back bedroom ceiling
- Bathroom ceiling bowing

ARB034

Description
The property is a privately owned traditional Welsh terraced house of solid wall construction and with a two-storey extension to the rear housing kitchen on ground floor and bathroom on the first floor. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.
Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 50%
- Percentage of boarding completed. 50%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 50%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Elevations of the rear and extension showing discolouration
- The guttering and downpipe connections are inadequate
- Lounge window does not open
- Waste outlet pipe not fixed to wall
- Excessive use of mastic on ill-fitting windows

Internal observations
- Mould on inside of kitchen units

ARB035

Description
The property is a privately owned traditional Welsh detached house of solid wall construction. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the side and rear of the property
- Internal Wall Insulation (IWI) applied to the front first floor.
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 80%
- Percentage of boarding completed. 80%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 80%
- Is the home suitable for system? Yes, subject to the DPC being identified.

- Sealant between flashing deteriorating, causing staining of render along length of wall
- Poor detailing around flashing allowing water to potentially ingress into EWI
- Poor detailing around flashing causing staining of render on face of wall
- EWI taken down to ground level with no DPC in evidence. Green algae growth visible at base of wall
- EWI cut short around external garden wall, causing cold bridging. Also, hole cut in EWI causing water ingress and cold bridging
- No sealant between end of EWI and wall, with void visible between EWI and facia board. These would be potential areas for old bridging and water ingress

Internal observations

- Damp around window reveals in lounge, with wallpaper peeling off wall
- Wall paper peeling off damp wall in front bedroom
- Black mould in evidence on walls and ceiling of bedroom

ARB036

Description
The property is a privately owned traditional Welsh terrace house of solid wall construction and with a single-storey extension to the rear containing kitchen and bathroom. The property has a pitched roof covered with slates, plastic facia boards, plastic guttering and UPVC windows and doors. The extension is of cavity wall construction.

Measures undertaken
Measures undertaken include:

- External Wall Insulation (EWI) installed to the side and rear of the property
- EWI covered with a pebble dashed finish with window and door reveals rendered.

External observations
Summary of percentage of EWI and IWI applied to all elevations is presented below:

- Percentage of wall completed. 100%
- Percentage of boarding completed. 100%
- Percentage of mesh coat completed. Unable to verify due to non-invasive survey.
- Percentage of finish coat completed. 100%
- Is the home suitable for system? Yes, subject to the DPC being identified.

Main observations
- EWI cut around gas pipe causing potential cold bridging
- Window sill less than 30mm with staining on render due to water runoff
- No insulation in window reveal and cables not clipped to wall at recommended spacing
- EWI installed to ground level with no DPC visible
- Flashing bent in middle with potential for water to ingress
- Flat roof damaged by scaffolding
- Window sill bent with discolouration on render due to water runoff
- Gutter sloping wrong way, causing ponding, cables not clipped to wall
- Discolouration on render around window and in window reveal
- Damp in kitchen roof due to water ingress from damaged flat roof

Internal observations

- Plaster damp and blistering due to water ingress around rear window.
- No sealant around window sill giving potential for water ingress.