LOW CARBON EXCHANGE

External Walls, Ventilation Inspection Report & Recommendations for Oadby Wigston Borough Council

Oadby and Wigston Borough Council

Date: 14th December 2016

Property Address, Elizabeth Court, Wigston, Leicestershire, LE18 2AE

Property Details: Property Type: General Needs, 80 Individual Flats with communal areas spread across 4 No. 2 storey and 3 storey blocks

Construction Type: Masonry Cavity Walls (70%) With hung tile solid wall infill's to window panels (30%) and solid wall decorative end elevation infill's

Construction Year: Circa 1970

Inspection Report: Inspection of all external walls and all internal walls of a selected number of ground floor properties.

Date of Inspection 24th November 2016

Elevation Photos:

Front:

End Elevation:

Rear:

Executive Summary:

We have been instructed by Oadby Wigston Borough Council (OWBC) to undertake some investigations into condensation and mould growth problems within 4No. Ground Floor (GF) flat areas (No.s 3, 9, 25 & 43) & a 2nd floor flat No.17, within the four Elizabeth Court blocks.

These flats were initially selected as having the potential to be most problematic, given tenant complaints and evidence of mould growth within the flats. In addition the client had highlighted some other potential cold bridging issues at ceiling corners, which were investigated.

Upon closer inspection of these flats and other building areas, we found a number of problematic/failed fabric and poor ventilation items, which are making significant contributions to the poor thermal performance of the building and increased humidity levels, giving rise to mould growth and likely higher than average energy bills for these tenants.

We have summarised below the status of each of the building elements, likely to be having an impact on the poor thermal performance of the building and make recommendations with budget costs for OWBC's consideration to address these problems.

A wider building technical survey, is recommended to both habited and communal areas, to firm up potential specification solutions and costs.

Construction & Property Overview:

Construction Type: Brick Cavity (70%) With Solid Wall Hung Tile & Tile Infill's (30%) to end gables and beneath windows - causing cold bridging issues

Pointing & Brickwork Condition: Good

Heating: Gas Central Heating Worcester Bosch Gas Condensing Boilers – older style

Glazing: Older type double glazing with poor seals, 12mm glazing gap, and badly damaged frames and transoms, windows also poor quality, accelerating mould growth (see window section)

CWI Insulation: Mineral Wool, sparsely populated, extensive voids within cavity, presence of debris/obstructions - insulation failed leading to cold spots, damp/mould growth

Loft Spaces: No insulation in some properties and communal areas, poorly laid in others causing cold bridging spots at eaves

Ventilation: Single axial humidistat controlled fans, no presence of cavity sleeves in some flats, not cleaned or maintained, filters blocked, noisy and often switched off by tenants - leading to severe condensation and mould growth:

Humidity: Very high leading to severe condensation & mould growth

Heat Loss: High, due to failed insulation and un-insulated window and solid wall void infills

Energy Bills: Likely to be high or at risk of heating not being used by vulnerable tenants exacerbating problems

Health Risks: There may be an increased risk with excessive airborne moisture content

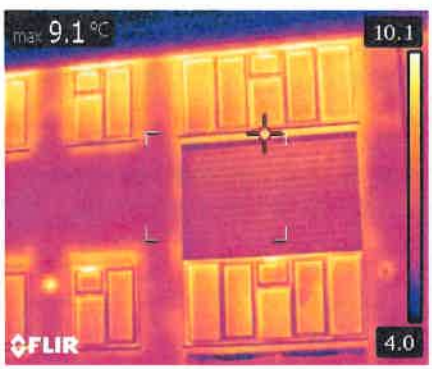
Visual Inspection of External Walls (Flats 1-24 3 Storey Block):

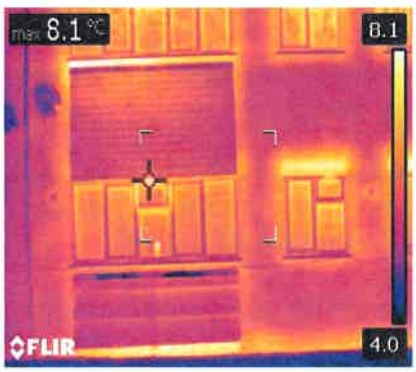
On visual inspection, the external walls are in good condition and show no signs of frost damage (spalling). The mortar between the external brickwork was found to be in a fairly healthy condition with 70% of walls of 80mm cavity construction and 30% hung tile solid wall construction, both of which have issues contributing to poor thermal performance of the overall building.

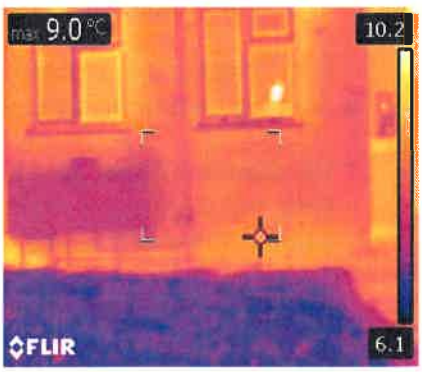
The remainder blocks (25-32, 2 storey block and 33-56 & 57-80 3 storey blocks) were all found to be in similar condition, having been constructed at the same time.

Hung Tile Solid Wall Infill's:

Upon inspection we found the hung tile areas, beneath window voids to be of solid block construction with no cavity. The thermal images below show the amount of heat loss from these areas, contributing to the poor thermal performance of the building. This combined with other building elements is giving rise to high humidity, excessive condensation and accelerated mould growth within the properties.







Ground Floor DPC:

DPC appeared to be in good condition, with no GF obstructions above the DPC level

Roof Verges:

Would benefit from closer inspection, initial visual inspection looked sound.

Cavity Wall Inspections Uitilising Internal Borescope's:

We carried out an internal inspection of the cavity walls to assess the condition of the cavity wall insulation (CWI). The property has been insulated using a fibre insulation system (white mineral wool fibre), possibly installed late 80's early 90's, there are no CIGA guarantees.

We drilled a number of Boroscope inspection holes at different heights around the property, it was clear to see that the CWI was sparse with very low density and voids were being created leading to cold spots on internal walls.

In addition there is evidence to suggest that remedial actions may have been undertaken to reduce damp and mould with the attempt to introduce airbricks. This has led to some debris sitting on top of the failed insulation, causing obstructions and preventing the cavity from doing its intended job, allowing moisture to penetrate internal brickwork above skirting levels.

There is evidence of this from the range of borescope and internal pictures below

Debris within cavity causing obstruction

Voids within cavity causing cold spots

Voids within cavity

Debris within cavity

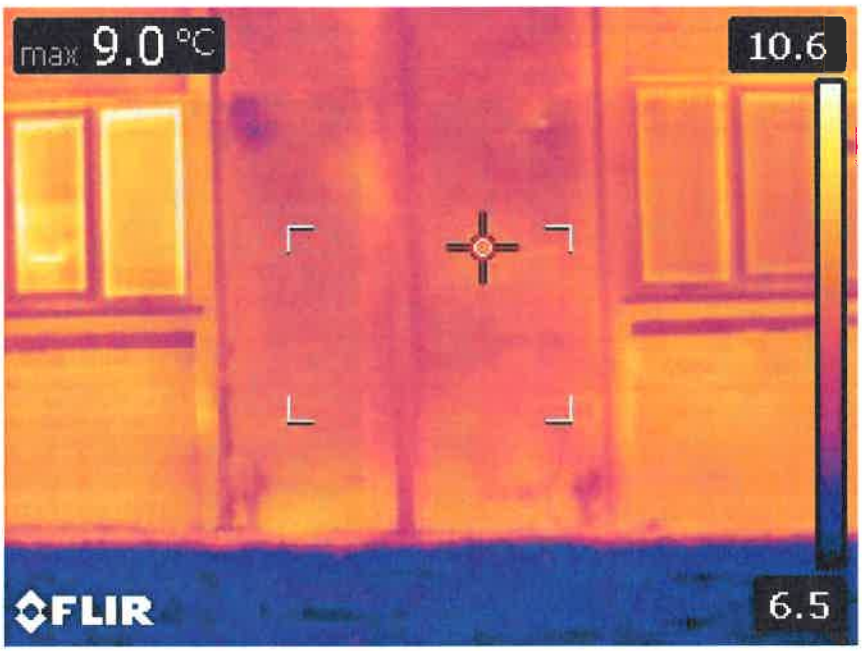
Airbricks installed

Moisture penetration of internal wall

Overall External Wall Observations:

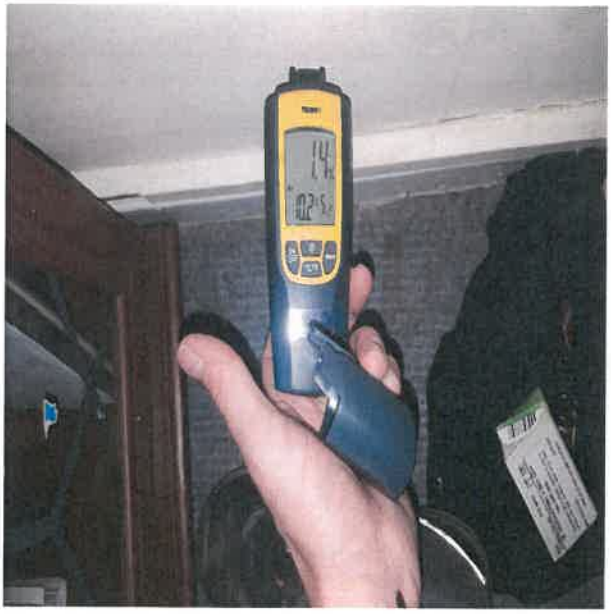
The construction of the fabric is unusual, in that the cavity wall is interspersed with a vertical band of solid wall strips, above and below the windows. The solid wall element makes up 30% of the overall building, the result of which is you have two completely different thermal efficient product types within the external wall elements, neither of which are currently effective.

The following thermal image highlights the heat loss at the junctions of cavity meeting solid wall and window reveals:



Cold Spots, Internal Condensation & Mould Growth:

The low density of the fibre insulation within the cavity, causes voids and cold spots within the building structure, damp patches on the inside walls (external) and low thermal performance of the building, encouraging mould growth on internal walls, particularly at the elevation junctions.



High moisture content of internal walls

High Humidity Readings

Accelerated mould growth high moisture

Excessive condensation on cold spots

Accepted wall moisture levels 0.4 - 0.6% and humidity 40-60%

Ventilation:

The ventilation within all properties visited, was found to be in a poor state of repair and inadequate for the existing building performance. The fans were old type axial fans, poorly sited, poorly serviced and maintained with cavity sleeves missing. Fan blades were blocked, fans were very noisy and energy inefficient and in some cases it would appear that tenants had turned them off, exacerbating the building condensation and mould growth problems.

Poorly sited, poorly maintained

inadequate ventilation for building

The condition of the ventilation equipment within these buildings is insufficient to cater with the existing building performance and is adding to the problem of high humidity, increased/excessive condensation, encouraging mould growth within the living and habitable areas.

The fans we witnessed were full of dust, lint and general long-term airborne pollutants, suggesting a complete lack of maintenance and even lack of use, which would have forced most of this outside. In one flat, the owner had recently had a shower and was using all of the ventilation methods available to her, the moisture readings were very high and would suggest that the current methods are inadequate and would benefit from a re-design.

We also observed the lack of drying areas for the tenants and the use of tumble drying equipment, inadequately ventilated to an outside wall, increasing the humidity levels and adding to the already poor living conditions. This needs to be addressed as part of the final building solution.

Existing Windows:

The existing windows are estimated to have been installed between 12-15 years ago, they are the older style double glazing, with 12mm glazing profile, poor or failing seals, cracked frames with the odd window sealed casement replaced in the larger units.

The cavity construction had a brick return at the windows, which are not thermally broken and leading mould problems at the window returns. The drop in temperature from the heated wall area to the window is causing high moisture content at the brick returns, rather than within the window zone, which is designed to accommodate the moisture build up (either by having surfaces that do not allow the water to be absorbed, or by having a purpose designed drainage systems).

The windows appeared to be of poor quality, with only a few having trickle vents, if it is within the clients budget, it would be advisable to replace these windows at the same time as the other recommended actions, to reduce costs on prelims such as scaffold and improve the overall thermal efficiency of the building and reduce future condensation and mould issues.

You could potentially re-site the windows closer to the outside, to help reduce the area of cold bridging, but given their condition it is likely that they would break up and this may prove counter productive.

Loft Insulation:

We managed to gain access to some of the loft areas above flats and within the communal areas. The communal areas were empty (no insulation) and we were able to observe poorly fitted insulation in 2 of the top floor flats, leading to cold bridging at the roof eaves, the following photographs depict the findings:

Summary of Main Building Fabric Issues

1. Two different thermal efficient product types within the external wall elements, neither of which are currently effective.
2. Poor and inadequate Insulation
3. Poor ventilation inadequately serviced and maintained
4. Poorly installed glazing and energy inefficient
5. Poor building design
6. Numerous cold bridging points accelerating mould growth
7. Lack of drying areas or facilities for tenants

Consequences of Building Issues:

1. High humidity
2. Severe condensation & mould growth
3. High energy bills
4. Increased potential for health hazards
5. Potential reduced life expectancy of building

Main Recommended Remedial Actions:

The building would benefit from a full extraction of the failed CWI and new External Wall Insulation (EWI) of all buildings, to provide the most thermally efficient solution and accommodate the other failed elements. However this is likely to be a very costly item and may be beyond the range of clients existing budgets, we have however indicated this as a separate budgetary cost.

As an alternative, the inclusion of solid wall insulation to the existing solid wall infill areas will make a big difference to the control of moisture movement within the structures and should aid in the issues with mould growth around the windows. These areas immediately above and below the worst affected windows currently have no insulation.

This will improve the overall thermal performance of the building and in addition, the removal of the hung tiles, replaced with a proprietary insulated panel, will reduce the future cyclical maintenance and repair costs. Planning details will need to be considered.

We would recommend that the existing old fibre insulation be extracted utilising an accredited extraction process, LCX are accredited to Stroma Cavity Clearance Scheme (CCS). This should be allowed to dry out during spring/summer months and then re-filled with a high quality bonded bead solution.

Remove any other loose debris from cavities likely to cause obstructions, providing an extract audit report. Replace the existing CWI with high performance bonded beads (Thermabead Carbon Saver) recommended.

Having checked with CIGA we are satisfied that there are no guarantees in place for the existing CWI and therefore LCX would be in a position to claim the carbon saving value on behalf of the client for any insulation improvement works, value to be confirmed.

Re-design and improve the ventilation with either Positive Input Ventilation (PIV) or Mechanical Ventilation Heat Recovery (MVHR)

Remove existing loft insulation where installed, re-install loft insulation to all roof void areas

Although maybe not practical for the client budgets, replacement of the windows would reduce the risk for future mould and condensation problems within these buildings. OWBC should at least review when the windows are due for replacement to consider duplication of future scaffold and preliminary costs.

In summary & Budgetary Costs Option 1:

EWI to entire building budget sum	**£**	***875,000 + VAT***
Extract the failed CWI insulation and remove debris budget sum	**£**	***36,000 + VAT***
New ventilation systems and replace fans budget sum	**£**	***94,000 + VAT***
*Install and re-instate loft insulation**	**£**	***21,500 + VAT***
Option 1 Total Budget Sum:		***£ 1,026,500 + VAT***

In summary & Budgetary Costs Option 2:

EWI infills to hung tile window areas all buildings budget sum	£	***121,000 + VAT***
Extract the failed CWI insulation and remove debris budget sum	£	***36,000 + VAT***
New CWI bonded bead	£	***21,250 + VAT***
New PIV ventilation system and replace fans budget sum	£	***92,000 + VAT***
*Install and re-instate loft insulation**	£	***21,500 + VAT***
Option 2 Total Budget Sum:	£	***291,750 + VAT***

It should be noted that both these options currently exclude works associated with the replacement windows. Replacing the older windows would significantly improve the overall thermal effectiveness of the building.

Option 1 would be the most thermally efficient method to deal with the failed building elements, improve the heat loss and overall thermal efficiency of the building.

Option 2 provides a suitable alternative solution to option 1, but may still give rise to some building heat loss, which will require the client to support a behavioural change and education process for the tenants.

All the above costs are budgetary and would be subject to further site surveys and formal discussions with the client. Items with an asterisk * are likely to attract carbon saving funding, which will offset some of the capital costs, value to be confirmed following detailed surveys.

Should you require further information about the inspection report please feel free to contact me.

Mark Reed (Business Manager)

Mark Reed

Low Carbon Exchange Ltd

Email: mark.reed@lowcarbonexchange.com Telephone: 0117 3591411