CLOUTMAN HARRIS NIXON
BUILDING SURVEYING & PROJECT MANAGEMENT

Damp Survey

4 Regent's Park Road
London
NW1 7TX

Prepared on behalf of

Beatrice Gulliford
4 Regent's Park Road
London
NW1 7TX
23 December 2021

CLOUTMAN HARRIS NIXON
BUILDING SURVEYING & PROJECT MANAGEMENT

4 Regent's Park Rd, London NW1 7TX

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1.1 Introduction

1.2 Beatrice Gulliford has requested a report investigating the water ingress and damp to 4 Regent's Park Rd, London NW1 7TX.

1.3 This report details the site observations, discusses the implications of these observations, and proposed recommendations. Photographs and sketches have been included to provide evidence and context to support discussion.

2.1 Inspection

2.2 The inspection of the property was carried out on 10th December 2021. The inspection concentrated on the basement.

2.3 The inspection included a visual inspection, the use of electrical resistance meters and some carbide testing of the solid brickwork walls.

2.4 A CCTV survey was undertaken on the 1st December 2021. This identified some damaged drains which we understand that you plan to repair.

2.5 Scaffold was installed to the property and therefore the external elevations and roof level were inspected.

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3. Property

3.1 The property is of traditional Victorian construction consisting of a house to the ground and upper floors and a flat to the basement. The property is situated in north London just outside of Regents Park and close to Primrose Hill. The property is built from solid brick walls. There are vaults to the front of the property. There are vaults located under the front drive.

The proposal is to convert the entire building back to one house by reinstating the internal stairs from ground to basement area. The client would like to adopt traditional methods to preserve the historic nature of the building.

There are works being undertaken to redecorate and repair the external elevations. These works were nearing completion during our visit.

4. Findings

4.1 Externally

There appear to be limited leaks noted the roof coverings or the associated detailing. There are defects noted to the gutters and rainwater pipes. Minor repairs and maintenance are recommended at roof level.

There is damage found in the below ground drainage which is causing water ingress to the front of the building. Repairs have been recommended by the CCTV drainage company.

There is little or no drainage to the rear light well area. This has caused the water ingress to the rear of the property. Drainage should be installed here. A waterproof covering has been installed externally which has failed.

The side path of the house is leading water towards the building. This combined with broken paving has led to water ingress on the side elevation.

There are some minor repairs required to the rear masonry elevation. Damaged render to the front and side elevations should be repaired.

A deteriorated cement fillet to the rear elevation is causing water ingress into the first-floor rear bedroom and remedial works are required.

Some window cills are missing drips details, or they have been painted over. These should be cut back into the underside of the cills.

There are areas of cracked and hollow render which should be cut out and repaired.

4.2 Internally

A Holland 'Damp Proofing' type system including a false cement-based wall has been inserted on to the base of some of the walls in the basement in a misguided attempt at managing moisture in the walls.

Some walls have a 40-50mm thick render indicating a cementitious water proofing system installed. This is now defective and damaged in areas.

Chimney vents have been blocked up slowing down the ventilation of the chimney stacks.

There is an external boiler flue leaking.

There is limited ventilation present to the basement.

The humidity and thermal camera readings when compared to the dew points indicate the basement is at low risk that condensation will form.

The gas carbide testing indicates that water is penetrating the walls at the front, rear and flank elevations.

Joinery has been painted with modern plastic paints.

5. Discussion

5.1 Rainwater goods, drainage and roof.

The rainwater from the main roof runs along the parapet gutters at roof level and then through openings in the parapet walls into hoppers and then runs externally down the elevations through downpipes to ground floor level where it runs into the main drain.

The lead parapet gutters are aged but are mostly in sound condition, there is some ponding and staining noted in areas. Where leaks are noted internally repairs and improvements are recommended to the lead gutters.

The down pipes to the building have been recently painted and therefore it was more difficult to spot if there have been any leaks. We have been provided with some photographs before these works were undertaken. There appears to be leaks around the rainwater pipes and bathroom drainage pipes located on the side elevation between the first and the second floors. These should be repaired or replaced.

There is vegetation including moss growing on the roof surface and leaves noted in some of the hoppers and gutters. This should be cleared and cleaned on a regular basis. The outlets through the parapet walls were not blocked during the inspection.

There are some defects noted to the main roof including broken and slipped tiles, which should be replaced. We understand these are being replaced.

Where inspected in the roof void internally there were no roof leaks. However, there was foil insulation attached to the rafters which may hamper the identification of any leaks.

There is some loose mesh installed to some of the rainwater hoppers. This should be resecured and/or installed to all hoppers.

To the rear of the property there is a semi sunken below ground lightwell next to the rear elevation. This extends back around 1m form the rear elevation and from there is a steep sloped flower bed leading to the remainder of the garden. There is little or no drainage in this area. There will be considerable amount of water running off the garden and the bed into this area. There may be further water draining into this area from the side elevation passage. Water has been building up in this area and penetrating into and below the building.

It is vital that water is removed from this area. If the level of the existing drain system is low enough then a new soak away drain should be installed leading to the existing system (It should be checked if it is a combined system first). If the levels are not low enough then a pump is required to remove the water from this area. The final finish of the floor in this area should fall way form the building to help divert water away.

The path to the side of the building and garden will be adding to the water found in the lightwell area. The gravel path has been laid on top of the previous finish therefore raising the finished floor level and directing water into the building and the lightwell. This is also leading to water ingress at the front of the property at the front of the main entrance steps. The levels here should be lowered, and a fall should be installed to direct the water away from the building.

It is also noted in this area that the stone slabs and stone steps are damaged and there are signs of previous repairs. This is the area where there is water ingress noted internally. The stone should either be replaced or repaired and waterproofing measures undertaken to stop the water from running to the building.

It is also noted that there are some leaves in the external ground level drain, if not cleared this will add to the surface water run off affecting the building. These should be cleared on a regular basis.

5.2 External Walls

The walls to the building are solid masonry brick walls. The front and side elevations have a render finish. The rear elevation remains as exposed brickwork and mortar joints.

At roof level the internal face of the parapet walls and chimneys are rendered. The render is in poor condition and should be repaired or replaced. We understand that repairs to the render is being undertaken in the current project. The parapet walls have been capped with lead.

To the rear there is minor damage to bricks and some cracked pointing. Any loose pointing and damaged bricks should be cut out and replaced.

To the first floor at the rear is a cornice running the full width of the building us below the first floor windows. A lead capping has been installed likely to stop previous leaks. A cement fillet has been installed on top of this and has deteriorated leading to water ingress in this area. The cement has deteriorated and is not guiding the water away from the building. The water is ponding in this area and penetrating the building fabric. There is water noted internally in this area. The cement and lead should be removed from this area and a fillet installed underneath the new lead. Then new lead should be dressed over the fillet. Although there are no leaks noted elsewhere at this level, the other cement fillets are starting to deteriorate and therefore we recommend this repair is undertaken to the entire width of the rear elevation at this level.

There are various air vents installed to the elevations which should be maintained and opened where painted shut.

Window cills have drip details to direct the rainwater away from the surface of the wall. In some areas the drip detail has been painted over and should be reinstated by cutting away the paint that has clogged them up.

The front and side elevations of the building have a rendered and painted finish. There are multiple areas of cracked and hollow render. The full extent of the hollow render is unknown. The entire front and side elevations should be checked and any loose, cracked or hollow render should be cut out and replaced.

At basement level of the rear elevation a waterproofing system (likely a slurry type) has been installed to the lowest areas about 1m tall of the rear wall. This has failed and is not holding back the water from penetrating the basement walls.

5.3 Damp Proof Coursing, External Ground Levels, and Internal Floors

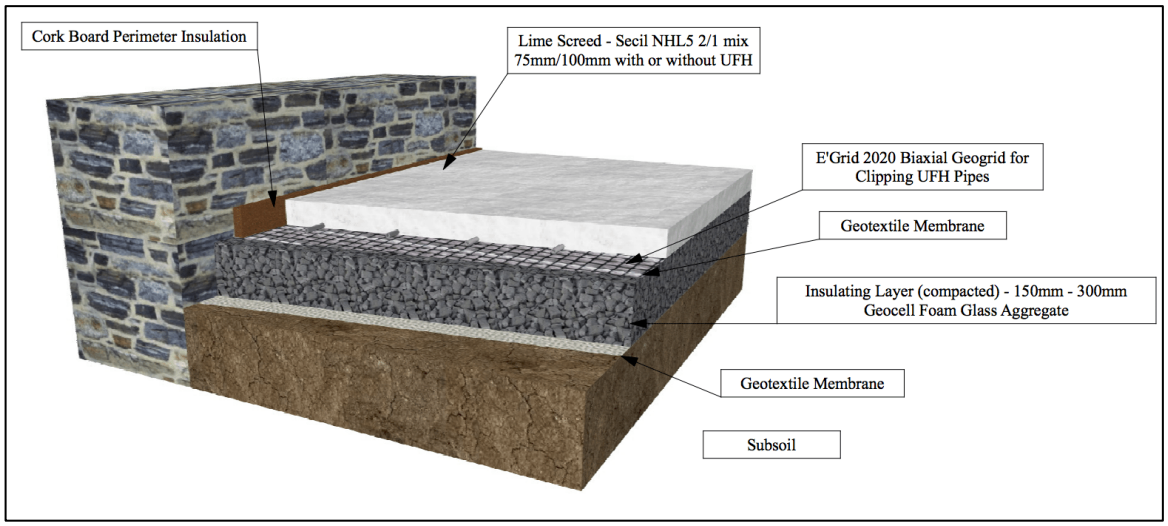
The external elevations were inspected and there were no signs of a damp proof course installed. However this may have been behind the low level concrete upstand or the render finish.

With or without a DPC the building fabric would have relied on appropriate external ground levels, adequate internal ventilation and the breathability of the lime bedded and pointed masonry and plasters to allow moisture to evaporate and breathe harmlessly away from the base of the walls.

It appears that the floors throughout the basement are solid concrete ground bearing slabs with a Damp Proof Membrane (DPM) incorporated. Concrete ground bearing slab floors with or without Damp Proof Membrane (DPM), or any impermeable solid floor, will tend to push any moisture under the slab towards the walls at its edges. This is opposed to traditionally loose laid flagstones, which through adequate internal ventilation and breathability will allow the evaporation of moisture.

As infilling floors with concrete is inappropriate in older solid walled properties, common conservation practice is to use a LABC (Local Authority Building Control) approved Lime-Crete flooring system instead. The make up of the floors sub-base is made up of foam glass gravel. Due to the shape of the material any ground moisture present is unable to move around the material as there are not any continuous surfaces to transport moisture through the forces of surface tension. This natural phenomenon can be described as capillarity (not capillary action). Lime-Crete floors are naturally insulated and are ideal for the installation of under-floor heating and can be finished with flagstones. Under floor heating also provides the benefit of helping to keep the base of the surrounding walls dry and helps maintain a regular heat in the area.

Typical section through a lime-crete floor system



5.4 Internal Walls

Basement

A Holland 'Damp Proofing' type system including a false cement-based wall has been inserted on to the base of some of the walls in the basement in a misguided attempt at managing moisture in the walls.

Some walls have a 40-50mm thick render indicating a cementitious water proofing system installed. This is now defective and damaged in areas.

The basement to the side elevation is below the external ground level and in situations like this where earth is being retained against external walls or the external ground levels are higher than the internal floors there will usually be moisture present in the ground and thus a backpressure of moisture against the masonry, which can and does lead to dampness.

In situations where external influences such as raised ground levels cannot be altered it is recommended that dry-linings are applied to the walls. The Georgians developed the first dry-linings for these types of situations. The dry-linings were made up of laths attached to the walls on to battens and then plastered.

A modern interpretation of this construction design can be made up of treated battens attached to the walls with stainless steel fixings in plastic raw plugs, with plastic trouser-leg packing's to isolate the timber from the masonry. Moisture resistant gypsum plasterboard can then be attached to the batons and 'taped and jointed' ready for decoration. Note; gypsum plasterboard is made up with aerated gypsum and is breathable and if a breathable paint such as clay is applied the dry-lining is a breathable system. If tiles are to be attached to the dry-lining, cement based tile-backer board can be used but it is important that the dry-lining is vented at the top and bottom, to allow cross-flow ventilation to the walls.

Example of a vented plasterboard dry-lining system, with lighting incorporated

Upper Floors

On the ground floor there was an area of damp noted to the front room behind the bookcase which was investigated further.

The cause and remedy to the water ingress to the rear first floor bedroom is found in section 5.2 External Walls, further investigation was undertaken in the remaining areas.

5.5 Services including fireplaces

There are multiple chimneys noted to the property, where inspected these have ventilation installed. Some vents blocked over or blocked by furniture. These should all be uncovered and allowed to let air circulate through the chimneys.

The soil and vent pipes were inspected and no damage was noted. There are some rubber joints noted, these joints are susceptible to leaks. There are no guards installed to the top of the soil and vent pipes. A guard should be installed to stop leaves blocking the pipe.

It is notes that there is an external boiler flue which is leaking. The boiler should be checked by an engineer.

A CCTV survey was undertaken, and damage was found around the front lower basement area. We recommend that you undertake the repairs advised. This damage will be a leading cause to the water ingress near the front of the property.

There is little ventilation installed to the basement and where it has been installed to the basement some areas have been blocked up. Ventilation will help to remove some of the moisture in the air.

Ventilation to the basement bathroom was operational but the external cover was broken. This should be maintained.

When the property was first built, it was heated by open fires and a cooking range in the basement. The fires and the cooker would have pulled air into the basement through 9-inch square vents in the walls, creating significant through-flow ventilation. The heat from the fires and the constant ventilation through the area and up the chimney flues would have managed the humidity and the moisture content in the building fabric.

It is recommended that a site specific through flow humidity controlled ventilation system be designed and installed in the basement area. We work closely with a firm called VapourFlow, they can design and supply a ventilation system that will manage the internal environment in the basement. We would also recommend that good quality humidity controlled ventilation be provided in the bathrooms in the rest of the building. Contact VapourFlow via their website; https://www.vapourflow.com/consultation/

5.6 Joinery

The joinery (where seen) was found to have been painted with modern plastic paints. Modern plastic paints are inappropriate on timber as the impervious nature of the material traps moisture, which can and does lead to decay. See video for more information on why these types of paints are inappropriate on timber;

https://www.youtube.com/watch?v=2IZIC1rRIA0

Plastic paints keep building up and architectural details end up obscured and can and do lead to doors and windows not opening and closing properly. Plastic paints should only be removed with infrared speed strippers.

See link for more information on infrared speed strippers; https://linseedpaint.com/speedheater-cobra/

We recommend that linseed paints be used for re-decoration of external joinery. Linseed paints where used extensively until plastic paints took over due to their relatively quick drying times. See links for more information;

https://linseedpaint.com/linseed-paint/

https://linseedpaint.com/paint-and-wood-oil/linseed-paint-interior-range/

Refurbishing doors and windows provides the ideal opportunity to brush strip them. Reducing draughts is one of the biggest and least invasive energy saving interventions there is to be gained in an old building. Brush stripping also significantly reduces acoustic infiltration. Magnetic acrylic panels can be applied to windows to provide non invasive and removable secondary glazing, which also increases sound proofing. See links;

https://www.extraglaze.co.uk

https://www.youtube.com/watch?v=aEBbSkjkCik

5.7 Measuring Dampness

1. Along with visual assessment of the property, various pieces of surveying equipment were used to measure dampness:

   - A thermo-hygrometer was used to measure the humidity and temperatures inside the property.
   - A thermal imaging camera was used to view any differences in the temperature of the building fabric; damp building fabric has lower temperatures compared to dry building fabric
   - A resistance meter was used to measure the moisture content of timber and timber products.
   - A UKAS laboratory calibrated gas carbide meter was used to test masonry samples taken form the walls

2. The ambient internal and external humidity and temperatures were recorded as controls, these controls can be compared to the localised recorded measurements that were taken form various places around the property.

   Note;
   The important measurements are the Absolute Humidity (AH) and the relationship between the Temperate (ºc) and Thermal Dew Point (TD). Relative Humidity (RH) will vary with differing temperatures but the AH is the actual amount of water vapour in the air at the time and will be a constant. AH is measured by the amount of grams of water per cubic meter of air and is expressed as g/m3.

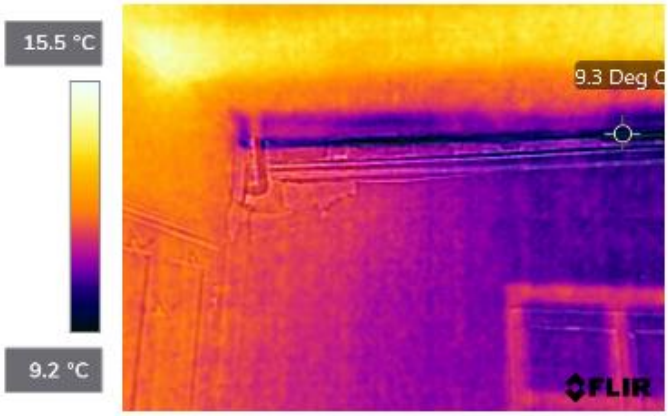
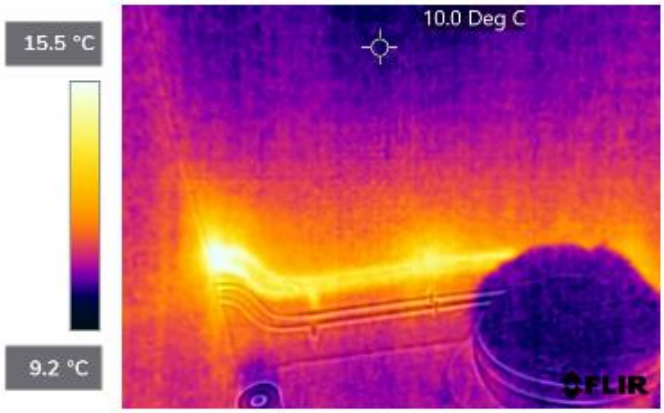
   Water vapour will condense on and inside materials when the temperature drops to or below the TD.

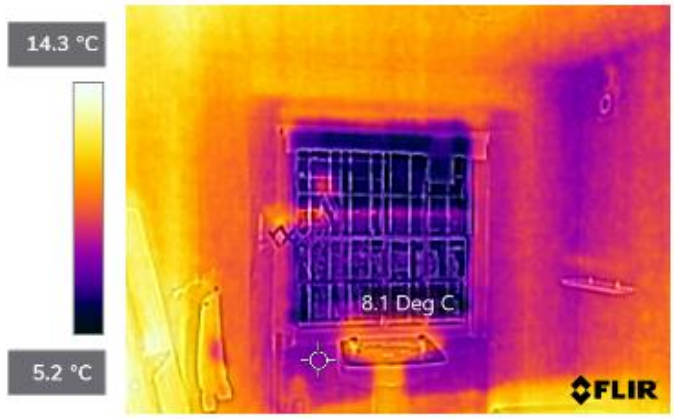
Positions and readings the humidity and temperatures were recorded:

Location	Relative Humidity %	Temp. Deg C	Thermal Dew Point Deg C	Absolute Humidity - g/m3
Outside Front	71.00	7.1	2.2	5.57
Basement - Kitchen by window	68.30	10.1	4.5	6.49
Basement - Kitchen central	58.80	11.0	3.2	5.91
Basement - Hallway	57.60	12.2	4.0	6.23
Basement - WC	56.40	12.4	3.9	6.18
Basement - Bathroom	55.10	12.8	4.0	6.18
Basement - Bedroom	54.30	12.3	3.3	5.91
Ground - Front room	44.90	16.9	4.8	6.48
Ground - Front room by wall	50.40	15.7	5.4	6.78
First floors - Rear bedroom	47.70	15.4	4.3	6.27
Second floor - Rear bedroom	49.20	17.6	6.9	7.43

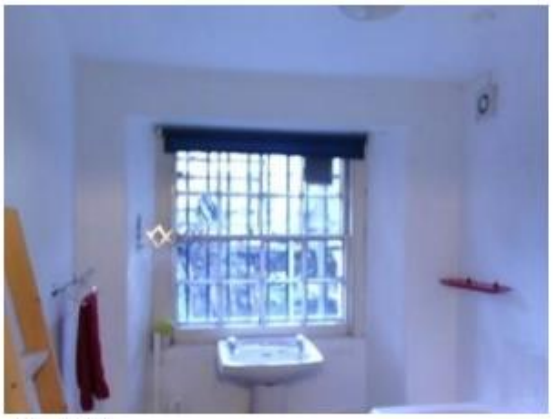
The difference between the thermal dew point and the air temperature in the basement ranges from 5.6 to 10.3 degrees. The above ground areas range from 10.7 to 11.1 degrees.

3. The thermal imaging camera picked up indicative temperatures that showed the front and back walls to be near thermal dew point.

Thermal images	Comparative digital images
 FLIR0873.jpg	 894009202
Basement – Kitchen side elevation wall	
 FLIR0889.jpg	 894009202
Basement – WC	



FLIR0893.jpg



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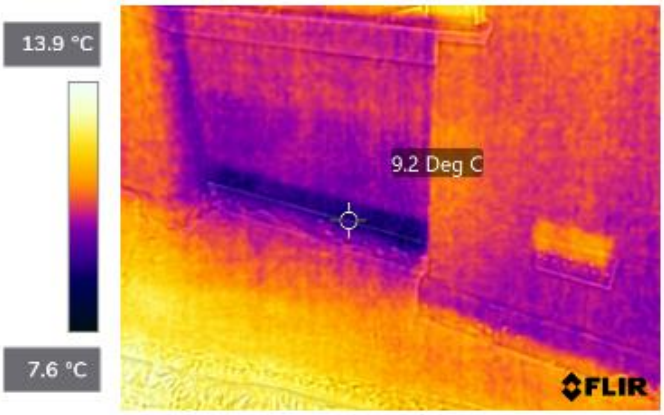
Basement – Bathroom rear elevation



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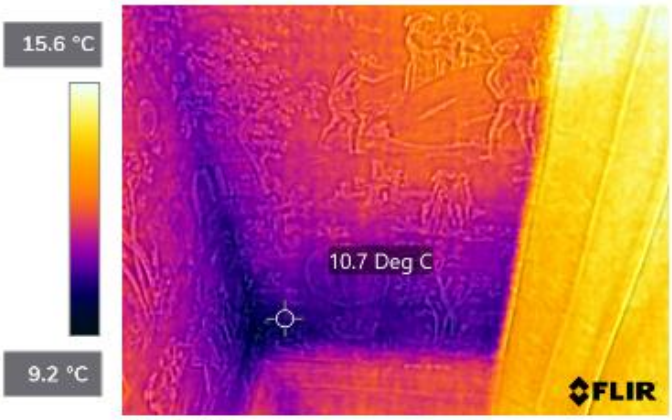
Basement – Bedroom rear elevation



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First floor - Rear bedroom

The risk of condensation causing moisture building up in a building starts at 70% humidity. The readings in the basement and upper floors are above this figure and therefore there is a low risk of condensation.

Using the thermal camera to capture the temperature of the wall instead of the air temperatures we can see that the basement walls are more than 4 degrees above the thermal dew point. Therefore, there is currently a low risk that water vapour will condense in this area.

The wall to the first-floor rear bedroom is more than 6 degrees above the thermal dew point. Therefore, there is currently a low risk that water vapour will condense in this area.

Gas Carbide testing / Moisture Profiling

4. 11 samples of masonry were taken from the internal basement walls at selected positions to gain a moisture profile of the building fabric. The samples were tested chemically with a UKAS laboratory calibrated gas carbide meter to establish the Total Moisture Content (TMC) of the plaster and masonry. Gas carbide testing is the definitive onsite method for accurately measuring the TMC in masonry.

5. Gas Carbide (GC) readings in masonry of over 2% TMC indicate that there are raised moisture contents which caused by something other that normal conditions. Any timbers in contact with masonry with a TMC of > 3% can become damp and gypsum plasters may be damaged. TMC's up to 4 or 5% can be considered reasonably dry in a traditional masonry unit but may cause damage to some decorative finishes other than natural breathable materials. TMC of >5% can be considered an appropriate threshold where action is needed to remedy a problem.

6. As the gas carbide testing is an intrusive survey it was not undertaken to the basement tanked walls.

GC Ref	Location	Height above floor level	Result in TMC%
1	Behind front lightwell door – external wall	200mm	11.7%
2	Behind front lightwell door – external wall	500mm	11.6%
3	Kitchen by hallway – external wall	200mm	11.7%
4	Kitchen by hallway – external wall	1500mm	10.6%
5	Hallway – Internal column	200mm	9.4%
6	Hallway – Internal column	1000mm	2.8%
7	WC – external wall	300mm	7.8%
8	Bathroom – external wall	300mm	11.3%
9	Hallway – internal wall with bedroom	200mm	0.8%
10	Rear bedroom – external wall	200mm	6.0%
11	Rear bedroom – external wall	200mm	10.0%

7. Section summary

Water ingress is expected to the flank elevation basement wall as it is below the external ground level. Water will therefore find its way into the walls if they are not fully waterproofed.

To all of the areas tested with the carbide meter to the basement (except the internal wall between the hallway and the bedroom) are showing readings of above 5% and are therefore considered over the threshold for action to be taken.

It is therefore recommended that a vented dry-lining be fixed to all of the brickwork basement walls including the internal walls.

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6. Recommendations

Our recommended remedial actions are as follows -

Externally

- Minor repairs and maintenance are recommended at roof level.
- Repairs to below ground drainage as recommended by the CCTV drainage company
- Install drainage to rear lightwell – a pumping system may be required
- Alteration and repairs to the side path to guide water away from the building
- Remedial works to cement fillet detail to rear cornice.
- Repair damaged render to the front and side elevations
- Cut drip details into window cills
- Remove all leaves and moss from the external areas on a regular basis.
- Remove modern impermeable building materials from the rear external wall.
- Boiler engineer to check leaking flue.

Internally

- Remove modern impermeable building materials from the internal walls at basement level and strip back to brick.
- Dry out the exposed walls with commercial de-humidifiers and air movers in the basement for at least four weeks.
- Unblock chimney vents
- Maintain a constant temperature of at least 20.0ºc throughout the year and by managing the internal environment with good quality humidity-controlled ventilation
- Strip the paint from the joinery and paint with linseed paints.
- Replace concrete floor with Lime-Crete flooring system
- Install dry-linings to the basement walls

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Appendix A. Photographs

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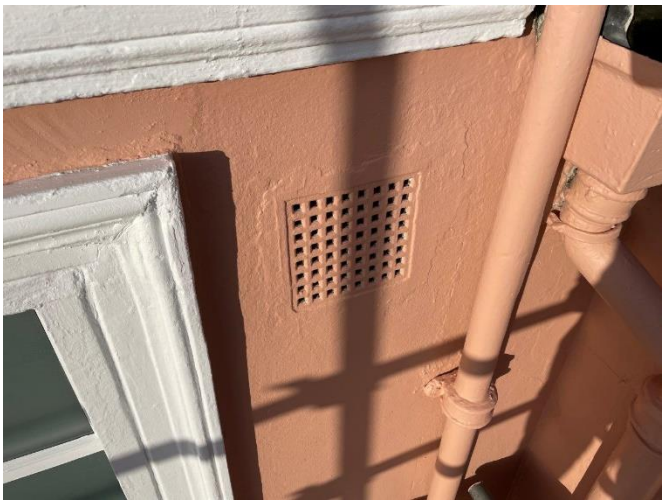

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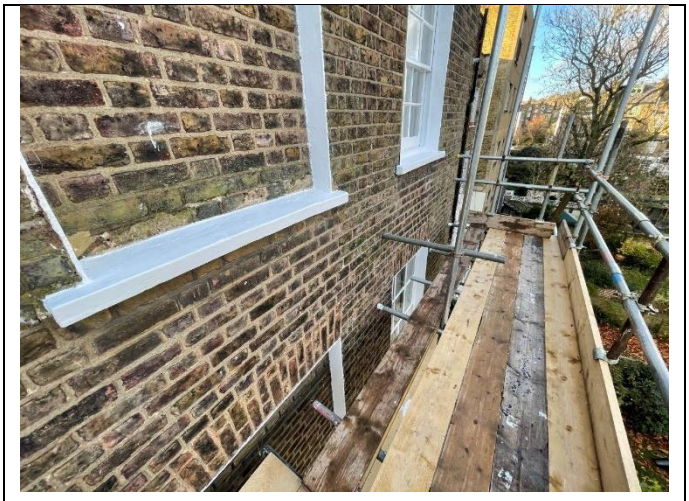

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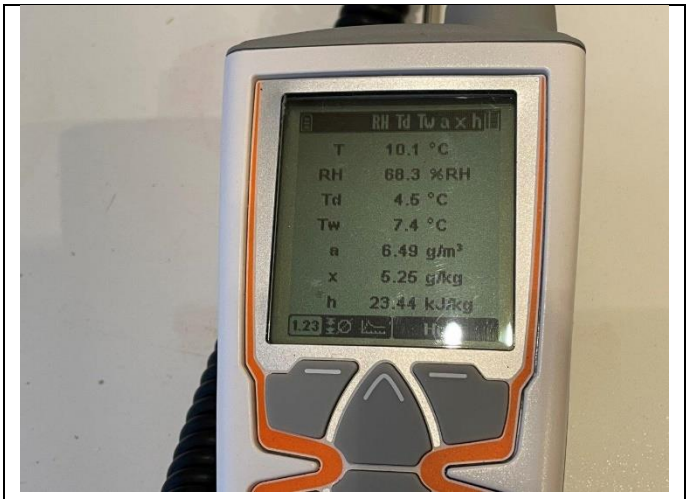

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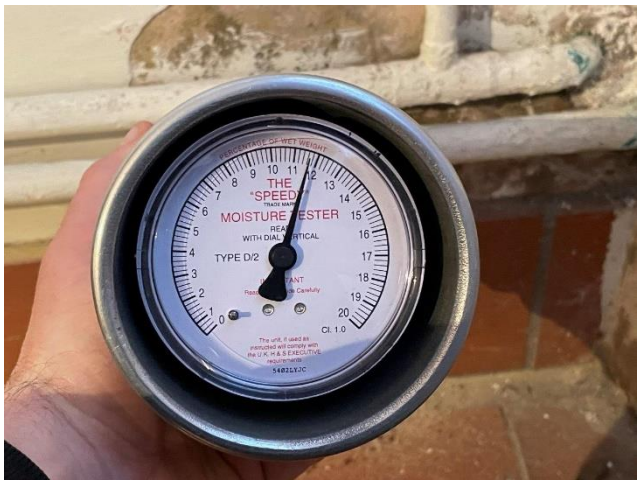

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