Contents

Section A – Introduction

This is a report for the person named overleaf, upon internal dampness found within the property identified, at the date and time of the inspection. The inspection was carried out by David M. Kinsey, who is a Chartered Engineer, Surveyor, and Damp Consultant.

The report has been prepared in accordance with Part 2 of the Terms and Conditions of Engagement for the Preparation of a Damp Survey Report. Part 2 of these Terms and Conditions is replicated at Annex A.

Moisture assessment methods used

An electronic thermo-hygrometer was used to measure the air temperature and relative humidity, both internally and externally. This enabled the respective internal and external dew points to be calculated and compared. The internal dew point is important in establishing condensation risks on surfaces within the building, while comparison of the internal and external dew points helps to ascertain the adequacy of the background ventilation. The internal relative humidity is also a direct indicator of the risk of mould growth and dust mites.

Where there was a risk of condensation, a thermal imaging camera was used to measure the surface temperature of vulnerable locations, and highlight temperature variations across surfaces. The range of surface temperatures is important in establishing:

- where surface condensation is likely to occur;
- where mould growth is likely to occur independently of condensation;
- any localised insulation deficiencies;
- and the adequacy of the heating regime and associated air flows.

A pin probe electrical moisture meter calibrated for wood, was used to accurately measure the percentage moisture content of timber in the areas checked. Timber always absorbs or emits moisture* until it is in moisture equilibrium with whatever it is contact with, so these readings reveal important information about:

- the average humidity of the room;
- any water vapour escaping from beneath ground floors;
- and the moisture content of any surface the timber is touching.

The meter readings were recorded on a grid for later use.

*Timber generally absorbs 'free moisture'. 'Free moisture' is any form of moisture that is not bound to other materials, such as hygroscopic salts.

A pair of complimentary electronic radio wave moisture meters, were used to measure differences in the moisture content of the areas checked.

- One meter is triggered by any sub-surface moisture, to a maximum depth of 40mm (1½”) behind the surface, i.e. it registers both free moisture and moisture bound to hygroscopic salts, but is not triggered by surface moisture such as condensation.
- The second meter is triggered only by sub-surface 'free moisture', to a maximum depth of 300mm (12”) behind the surface.

In both cases, higher readings are produced by higher moisture levels or moisture that is closer to the surface. Both meters were used at the locations of the previously measured timber, as well as across and up the area at regular intervals, to complete the grid started by the pin probe meter (each grid square therefore contained up to 3 different meter readings).

Post inspection, the moisture meter readings for each grid square, were analysed so that any moisture found could be assessed as to:

- severity;
- type;
- and its position within the wall.

To establish the form in which any moisture was moving through the wall, and the directions of

travel, the individual grid square results were then compared with each other.

Consideration of the Report Conclusions.

The property is described as it appeared on the day of the inspection. The identification of location is expressed as viewing each elevation externally. The expressions, north, south, east, and west, do not necessarily represent exact compass locations.

The Report should be read entirely before carrying out any recommendations.

The Report does not consider how repairs are obtained, or the order in which they are carried out. These may have a significant impact upon any repair costs.

Priority Ratings.

The affect of any dampness upon the building will be assessed, together with the extent of any remedial work required. The recommendations will then be prioritised as follows:

Immediate:	**Immediate work or investigation required.** Action is needed to prevent imminent damage, or to arrest rapid deterioration of the building fabric or structure, or to avert a major health problem.
Urgent:	**Work required within the next 18 months.** Action is needed very soon to prevent more significant damage or deterioration, which could also increase costs or lead to long term health problems.
Necessary:	**Work required in the intermediate term.** Action needed to keep the building in good condition, but which could be scheduled in as part of other works.
Desirable:	**Work that is essentially cosmetic in nature, or consists of longer term improvements.** Action to make good damage which does not affect the building's performance, or improvements to prevent long term deterioration of the building.
S.I.:	**Significant Information.** Used to draw attention to important information concerning the fabric or structure of the building, or its maintenance.

Section B – The subject property

Type of property: Semi-detached house.

Approximate date built: 1780 and extended to the rear around 1860.

Orientation: The house faces east onto The Street.

Listed status: The house is not listed as being of any architectural or historic interest. The house forms part of the Pickleton Burgh conservation area and is considered an important local building by the council. This means, the local council conservation officer will need to be consulted before changing the type of materials used on any part of the exterior, or before making any visual alterations to the outside of the house (front or back).

Conditions at the time of the inspection: The property was occupied and furnished. The weather was sunny with a light breeze. The outside temperature was 3°C and the relative humidity was 71%, giving a dew point of -1.7°C.

General Construction

Roof

The roof is pitched and covered with 'S'-shaped clay tiles called pantiles.

Walls

The walls at the back of the house are covered with cement render. Behind the render, the walls to the older parts of the house appear to be timber framed with a brick outer cladding. There appears to be brick infilling to the timber frame on the ground floor. The timber frame on the first floor has been covered internally with plaster and lath without any infill to the timber frame.

The front and side walls, along with the walls of the Victorian kitchen extension, are solid in construction. The front wall is constructed of brick and carrstone, the original side walls are a mixture of brick and flint, and the extension walls are solid brickwork. All bricks, flints, and carrstones are bedded in lime mortar. The walls vary from 1-1½ bricks in thickness.

Floors

The dining room has a suspended timber floor consisting of floorboards supported by timber joists. All other ground floors are concrete.

All first floors consist of floorboards supported by timber joists.

Accommodation inspected:

Ground floor:

Entrance lobby; Sitting room; Dining room; Kitchen; Back hall; Utility; Cloakroom.

First floor:

3 bedrooms; Bathroom.

Section C – Findings and recommendations

Summary of important recommendations

Immediate action needed

At the front of the house, thick bands of cement mortar that have been overlaid onto the mortar joints need to be removed. Bricks and stones that have been damaged by the cement mortar will then need to be replaced.

A leaking gutter joint on the neighbour's house next to the boundary with this house, needs resealing to stop it leaking and making the wall of this house damp.

All render on the original walls at the back of the house, together with cracked render on the extension, needs to be removed. Where the render removal exposes any brickwork that has been rebuilt using cement mortar, the brickwork will need to be reconstructed with lime mortar. Where sections of brickwork need rebuilding, the opportunity should be taken to check and repair the concealed timber frame as required. To finish, the render should be repaired/replaced with lime render.

A defective toilet ball valve in the bathroom needs repair/adjustment to stop the overflow dripping.

Moss needs cleaning off the roof tiles at the back of the house.

Urgent action needed within the next 18 months

At the side of the house, some cement mortar needs replacing with lime mortar. Decaying and 'refaced' bricks should also be replaced at the same time.

The flue serving the sitting room stove needs to be thoroughly swept, cleaned, and lined.

In the pantry, mould needs removing from the walls and some of the shelving needs shortening to improve the circulation of air into the outside corner.

Work necessary to keep the building in good condition

At the front of the house, the ventilation grills at the base of the dining room wall need to be cleaned out.

Broken and badly damaged roof tiles at the back of the house need replacing.

Salt contaminated plaster and mortar in the sitting room needs to be replaced with fresh lime mortar and lime plaster.

External findings and recommendations

		Priority
Front of house	At the front of the house, all of the mortar joints have had their surfaces overlaid with thick bands of inappropriate cement mortar. Cement mortars lack the pore structure needed to keep walls that rely on traditional moisture management dry (see annex B). Cement mortars also cause salts to migrate into the adjoining bricks and stones, where they build up and destroy the pore structure, causing the wall face to decay. This destruction has already begun – many of the red bricks are now decaying (the arch over the main window being particularly badly affected), and a large number of the carrstone blocks are decaying at their edges. Much of the cement mortar overlaying the joints has cracked and is either starting to come loose, or can be easily loosened. This makes the cement mortar even more damaging than when in good condition, as rainwater will be drawn into the wall behind the cement mortar and then become trapped. The increasing amounts of trapped moisture will accelerate the salt build-ups and make the masonry vulnerable to frost damage in winter months. As much of the cement mortar as possible should be removed from the front wall, taking care to avoid further damage. Bricks and blocks of carrstone, that are eroding/decaying badly, will need to be carefully cut out and replaced with sound examples bedded in an appropriate lime mortar (see annex C). Providing the damage is not too great, it may be possible to reverse regularly shaped blocks of carrstone and standard bricks so they can be reused, but the red brick arches will need to be hand made to order. Any mortar joints that have eroded by a depth equal to their thickness, should then be raked out and flush filled (repointed) with a suitable lime mortar as described in annex C.	**Immediate**
	At the front of the house, the neighbour's gutter is leaking where it meets the gutter to this house. The dripping water is bouncing off the paving and splashing the front wall of both houses. Internally, there is evidence that the water is migrating through the wall to create a damp patch in the sitting room. The neighbour's leaking gutter joint should be resealed.	**Immediate**
Side of house	At the side of the house, large areas of surface mortar (pointing) in the joints of the walls, have been replaced with an inappropriate cement mortar. Cement mortars lack the pore structure needed to keep walls that rely on traditional moisture management dry (see annex B), and cause the adjacent bricks to decay. In places, decaying bricks have been 'refaced' with pink coloured cement mortar that will speed up their decay behind the facings. Flintwork is particularly prone to developing dampness and longer term structural failure when the lime mortar is replaced with cement mortar. All cracked and loose cement mortar on the side walls, along with all cement mortar within 12” (300mm) of any decaying bricks, should be removed, taking care to avoid further damage to the adjacent bricks. The 'refaced' and decaying bricks should also be carefully cut out. If the decay is not too severe, it should be possible to clean the bricks up and reverse them so they can be reused, otherwise sound matching bricks will need to be obtained. The bricks should then be rebedded in an appropriate lime mortar (see annex C). Any mortar joints that have receded by a depth equal to their thickness, should be	**Urgent**

raked out and flush filled (repointed) with a lime mortar suitable for repointing.

Ideally, all of the cement mortar on the flintwork would be replaced, but forcibly removing it is likely to destabilise and crack the flints, leading to rebuilding of the sections concerned. Given time, the cement mortar will naturally crack and loosen, so where the mortar is tightly adhering, it may be preferable to wait until the mortar deteriorates before replacing it.

Back of house

All walls at the back of the house have been covered with a textured cement render. Cement renders lack the pore structure needed to keep walls that rely on traditional moisture management dry (see annex B). The render will cause the water vapour that migrates from the rooms to build up within the walls and condense to form damp patches. Cracks in the render will also draw moisture into the brickwork behind, trapping it behind the render to form, or contribute to, damp patches. Any damp patches or increased humidity within the walls will endanger the timber frame. **Immediate**

The brick cladding to the timber framed sections has been partially or wholly rebuilt, using cement mortar instead of lime mortar. The cement mortar will stop moisture from cracked render dispersing, making any dampness much more intense (see annex B).

There are a number of cracks in the render. Internally, there is evidence of excess moisture within the walls, and sections of the walls to the utility and back hall are visibly wet (see internal findings and recommendations).

On the original walls at the back of the house, all render should be removed. On the walls of the Victorian kitchen extension, only the render within 12" (300mm) of any crack needs to be removed, but ideally, all of the render on these walls would also be removed.

When render is removed from the walls of the original house, the mortar used to construct the brick facings should be checked. Any sections that have been rebuilt using cement mortar, should be taken down and rebuilt with an appropriate lime mortar (see annex C) – on the gable end, this is likely to require the reconstruction of the facing to the entire first floor and gable. When any brickwork is removed, the state of the timber frame behind should be checked by a conservation carpenter, and any sections found to be badly damaged by wood boring beetles, repaired.

After carrying out any checks and repairs to the brickwork and timber frame, the render should be replaced with a suitable lime render (see annex C).

At the back of the house, the overflow from the W.C. in the bathroom is dripping and saturating the wall below, just above the ground. This is starting to cause dampness internally. **Immediate**

The defective ball valve in the toilet cistern should be corrected – it probably just needs a new washer.

There is heavy moss growth on several roof slopes, particularly on the north side of the gabled projection. Moss stops rainwater draining from the tiles, causing the tiles to break up in winter frosts. Many of the tiles over the gabled projection are already starting to break up (see annex B). Some of the tiles over the kitchen extension are also broken, possibly by falling tree branches in the past.

The moss should be cleaned off the tiles. **Immediate**

Broken and badly damaged tiles should be replaced with sound matching tiles. Tiles with only minor flaking will continue to deteriorate but can be retained until the damage becomes more severe. The curvature of pantiles varies markedly by age and maker, so it may take time to source suitable matching replacements that fit correctly. **Necessary**

All outside walls

Much of the ground next to the walls of the house is slightly too high. In places, it has also been covered with concrete paving slabs that directly abut the walls.

When the ground level is too high, moisture entering the base of the walls from the foundations and from beneath concrete floors or paving (see annex B) cannot escape before it reaches the rooms. At the back of the house, the ground next to most of the walls has been reduced in the past but then backfilled with coarse gravel. This will allow rainwater to drain through, but will hold moisture against the brickwork instead of allowing moisture to escape from the walls.

Concrete paving will encourage rainwater to soak the bottoms of the walls in bad weather, leading to damp patches internally at floor level.

At the front of the house, to stop the ventilation grills for the space under the dining room floor (see annex B) from being blocked by the paving, or acting as drains for rainwater on the paving, small wells surrounded by raised brick curbs have been formed in front of the grills. The curbs in front of the ventilation grills will inhibit air flows and trap debris in front of the grills, causing blockages – the grills were partially blocked at the time of the inspection.

The ventilation grills at the base of the dining room wall should be cleaned out. **Necessary**

Where possible, the ground within 12” (300mm) of the house, should be lowered to leave at least 3 complete courses of bricks (8” / 200mm) exposed below the solid ground floors, and at least 1 complete course of bricks exposed below the ventilation grills for the space under the dining room floor. When the ground is reduced, the curbs in front of the ventilation grills should also be removed. **Desirable**

When removing the excess soil, if the bottom of any wall is discovered, or any wall suddenly becomes thicker, this will indicate the top of the foundations has been reached. Should this occur, the last 3” (75mm) of soil removed should be reinstated to protect the foundations.

The finished ground surface within 12” (300mm) of the walls, should be vapour permeable and naturally free draining. Suitable surfaces include turf, coarse gravel, and stable bricks bedded in sand.

Internal findings and recommendations

Heating and humidity

The walls of this house have high thermal mass. This means when heat is first applied, the walls absorb it. When the walls are subjected to continuous heating, the heat will build up in them until they reach their working temperature. When heating the walls of this house from cold during the winter months, this is likely to take several days. **S.I.**

When the walls reach their working temperature, they will help to stabilise the room temperatures. They do this by giving heat out when room temperatures fall, and absorbing more heat as temperatures rise.

If the house is heated with short bursts of intense heat, or is allowed

to become cold during winter nights or when unoccupied, the walls will not reach their working temperature, so will just continually absorb heat, leaving the rooms perpetually cold and prone to localised mould or condensation. At the time of the inspection, parts of several outside walls were cool enough to raise the relative humidity of the adjacent air sufficiently to trigger mould growth, and mould was present in the pantry (see below).

Desirable

The house should be heated in a way that is efficient for the type of building. The heating needs to be on continuously with a low to moderate room temperature setting. At night or when the house is unoccupied, the heating should still remain on, but the temperature can be allowed to fall back slightly.

Some experimentation will be required to establish the best temperatures, but the minimum setting is likely to be around 15°C at night and no lower than 12°C when the house is unoccupied.

The heat settings should remain identical throughout the year. When the walls have achieved their working temperature, on many occasions the heating will not be triggered, even on odd cold days, as the walls will supply the heat required. If a prolonged period of cold weather should occur in summer, the heating will need to cut in to stop the walls falling below their working temperature. A modern boiler, controlled by a room thermostat, will do this by heating the radiators to just luke warm as the house temperature drops to the minimum permitted – this happens to be when a modern boiler develops its peak efficiency. When the house is unoccupied, cupboard doors should be left open to improve the heat circulation, and reduce the likelihood of cold spots developing.

Sitting room

Urgent

The stove in the inglenook fireplace has not been fitted correctly. The original lining to the flue has long since decayed, leaving the brickwork exposed. When the stove was fitted, the flue should therefore have been lined all the way up to the chimney pot. Instead the base has simply had a fireproof blanking plate fitted across, and a short section of flue pipe has then been fed through into the unlined flue. This was a common defect when stoves were fitted in the 1970s and 1980s. Due to the size of the unlined flue, the flue gases have swirled around within the flue and allowed soot and tar to condense on the brickwork, instead of rising quickly and leaving.

There is not yet any evidence of aggressive salts migrating through the chimney breasts, or tars bleeding through to the plaster. To stop this happening, before the stove is next used, the flue should be thoroughly swept and cleaned before being lined by a HETAS registered installer, who should also check and service the stove.

Necessary

There is evidence of a severe build-up of salts in all walls apart from the front wall. In many places, the salts are staining the decorations brown (see annex B). The salts are also absorbing moisture from the air to form extensive damp patches. The skirting boards, sides of the stairs, and shelf brackets in the understairs cupboard, are all absorbing excess moisture from the damp patches, putting them at risk of attack by wood rotting fungi. The salts have gradually accumulated in the walls over many decades, having been carried into the walls by moisture migrating from beneath the concrete floors.

Some salts have also accumulated just above the skirting board on the front wall due to the high outside ground, but these have not yet produced noticeable staining.

To eliminate as much of the salt contamination as possible, the plaster should be removed from the following locations:

- the wall backing the dining room, between the inglenook fireplace and door to the back hall, to a height of 4ft (1200mm) – including the understairs cupboard;
- the entire outside side wall;
- the back wall to a height of 5ft (1500mm);
- and the front wall to a height of 12" (300mm).

The walls should be left exposed for at least a month to allow the worst of the excess moisture to dry out and bring more salts to the surface. Any salts that appear during this time should be brushed off and vacuumed up to prevent them recontaminating the walls. The mortar in the exposed joints will be heavily contaminated with salts at the end of the drying period, so should be renewed to a depth of 2" (50mm) with an appropriate lime bedding mortar (see annex C), before replastering with a suitable lime plaster.

Dining room

The front wall of the dining room has been lined with plasterboard. This is often done to hide dampness. There is evidence of excess moisture behind large areas of the plasterboard. This is likely to be due to a combination of condensation arising from insufficient heating of the building (see above), and moisture being trapped behind the inappropriate external cement mortar (see external findings and recommendations). The recommendations for the outside of the house and the heating, should correct this.

S.I.

In the dining room, there is evidence of a severe accumulation of salts behind the plaster above the skirting board on the party wall. There is also evidence of slightly raised moisture levels across the lower parts of the wall. The moisture has been caused by poor underfloor ventilation, which has allowed moisture to condense on the cold party wall and be absorbed by the brickwork. As the the moisture has migrated up through the wall, it has carried salts with it.

At the time of the inspection, the moisture and salts were not causing any problems, but if the salts reach the surface of the plaster, they will cause staining and damage to the decorations. Should this occur, the defective area will need the plaster, and mortar in the joints behind, replacing with appropriate lime plaster and lime mortar (see annex C).

The raised concrete floor of the kitchen prevents the ventilation of the space under the dining room floor from being improved. This raises the risk of future decay affecting parts of the dining room floor structure. This would show itself up as a 'springy' area and is most likely to occur in the corners next to the kitchen. If any 'springy' areas are discovered in the future, the affected area will need the floorboards lifting so a carpenter can carry out the necessary repairs – these are normally very straightforward and constitute no more than half a day of work if caught early.

Kitchen

Desirable

Large parts of the outside walls are badly contaminated with salts. The salts are causing some of the plaster to decay just above the skirting board in the pantry. In many areas, the problem is worse higher up. The moisture content is also slightly higher than normal over large areas, with some isolated pockets of more severe moisture.

The salts and moisture are being caused by the use of cement render externally (see external findings and recommendations). The recommendations for the outside of the house should stop the salt

contamination getting any worse, and allow the excess moisture to dry out.

When the external recommendations have been completed, to eliminate the worst of the salt contamination, and to help the walls to dry out, the plaster should be completely removed from both outside walls in the pantry. The walls should be left exposed for 4 weeks to enable excess moisture to escape and bring any further salts to the surface. Any salts that appear on the surface should be brushed off and vacuumed up to prevent them recontaminating the walls. The walls should then be replastered with an appropriate lime plaster (see annex C).

Before refixing the skirting boards, they should be given a good coat of gloss or bituminous paint on their backs and bottom edges to protect them against moisture escaping from beneath the concrete floors.

Urgent

Some black mould growth was present up the outside corner of the pantry. Mould growth occurs on surfaces when the relative humidity of the air in contact with the surface is regularly 70% or more. It is also a sign that the mould affected area is prone to condensation, as only a small additional fall in surface temperature will normally raise the humidity of the adjacent air to 100% (see annex B).

Outside corners are always the coldest parts of any building due to their large outside wall surface. To avoid mould and condensation problems, it is therefore important to ensure that warm air currents can easily circulate unimpeded into all outside corners. At the time of the inspection, any wall temperature of 12°C or less would trigger mould growth – the temperature of the outside corner in the pantry was just 8°C.

The shelves extending right into the outside corner have stopped warm air from readily circulating into the corner. This has been made worse by the placing of larger items close to the corner. Underneath the bottom shelf, the storage of bags and boxes etc. against the outside wall has again stopped warm air from circulating across the bottom of the wall. This is enabling condensation to occur behind the skirting boards. The skirting boards have absorbed the condensation, making them vulnerable to attack by wood rotting fungi – part of the skirting board has already rotted.

The existing mould should be washed off with soapy water, before rinsing with a dilute bleach to kill any remaining spores. **Note: when dealing with the existing mould, children under 5 should be kept well away, as their still developing immune systems make them particularly vulnerable to health problems caused by the mould spores.**

To improve the air circulation, the ends of the shelving should stop about 12” (300mm) short of the outside corner, and boxes etc. should not be stored against the outside wall under the bottom shelf. When the wall is replastered (see above), it may be worth redecorating with limewash. Limewash on lime plaster was the traditional finish for pantries and cold stores. This is because limewashes are natural fungicides and absorb excess water vapour, so inhibit mould growth and reduce the humidity that causes it.

Back hall and utility

Desirable

The outside walls and wall backing the kitchen, appear to have been plastered with an earth plaster composed of clay, beach sand, and small amounts of lime to stabilise the mixture. This was then given a normal top coat of lime plaster. At least one batch of the earth plaster mix contained insufficient clay or lime to bind it properly, as a result

of which large sections are loose and disintegrating. The salts from the beach sand are absorbing moisture from the air and the walls, to create extensive areas of dampness. Timber in contact with this salt rich plaster, is absorbing the moisture from the plaster, theoretically putting the timber at high risk of attack by wood rotting fungi. There are no signs of decay in any of the affected timber – almost certainly because the salts from plaster are also protecting the timber.

In the back hall, the salts have migrated into the surface plaster, staining it brown and crystallising behind the decorations to force them off the wall.

The salt laden plaster should be removed from the outside walls and wall backing the kitchen, so a 'clean' lime plaster can be applied (see annex C). The areas needing replacement are:

- the outside wall of the utility to a height of 4ft (1200mm);
- the stained outside wall of the back hall to a height of 3ft (900mm);
- and the wall backing the kitchen to a height of 6ft (1800mm).

Bedroom overlooking the garden

Desirable

There is evidence that salts have migrated through the wall overlooking the garden and are accumulating in the plaster. The salts have disrupted the decorations in the wardrobe cupboard. At the time of the inspection some salts were just starting to become visible on the main part of the wall, but it is understood that sometimes damp patches appear in humid weather conditions as the salts absorb moisture from the air (see annex B). The salt migration has been caused by the use of incorrect mortar on the outside of the wall (see external findings and recommendations). The recommendations for the outside of the house should stop future salt migrations.

After the external recommendations for the wall have been completed, the salt contaminated plaster will need to be removed to stop the damp patches continuing to appear. Although the patches currently only appear to the left of the window, in view of the widespread contamination, realistically it is better to remove all of the plaster from the wall overlooking the garden (including inside the cupboard). It should not be necessary to replace the mortar in the joints exposed by the plaster removal, but as it cannot be guaranteed that residual salts will not migrate from the mortar in sufficient quantities to cause further problems in future years, optionally the mortar could be renewed with an appropriate lime mortar to a depth of 2” (50mm). The wall can then be replastered with an appropriate lime plaster (see annex C).

All outside walls to first floor at back of original house

There is evidence of excess moisture scattered over large areas of the hidden brickwork to the older parts of the house. The excess moisture is mainly confined to the outer brickwork, but where the brickwork extends through the full thickness of the walls, roughly level with the first floor, the moisture has crossed to the interior of the house in places and is making the first floor joists damp. Downstairs, in the utility and in the adjacent back hall, this is causing noticeable dampness at ceiling level.

The excess moisture is accumulating as a result of inappropriate external render (see external findings and recommendations). Its effects on the back gable wall are being made worse by the previous inappropriate reconstruction of the brickwork, which is encouraging water to run down onto the top of the ground floor brickwork.

Where an inspection panel has been created into a void behind the plaster and lath on the back gable wall, the humidity within the void at

the time of the inspection was very high, and the moisture content of the timber frame was also too high. As a result, the timber frame was being actively attacked by wood boring beetles (see annex B).

The recommendations for the outside of the house should resolve these problems and enable the brickwork and timber to dry out.

All sloping ceilings — **Desirable**

None of the sloping ceiling sections are insulated. This will make them vulnerable to mould growth on clear winter nights. At the time of the inspection, some very minor mould spotting was visible to some sections. To correct this, rigid insulation should be glued to the undersides of all sloping ceiling sections.

As the ceiling areas to be insulated are so small, vapour permeability is not important, so any type of rigid insulation can be used. Some types will require covering with a finish that can be decorated, some can be decorated direct, and some are composites consisting of insulation bonded to a facing material such as plasterboard.

Roof space — **S.I.**

The tiles have been relaid over a mixture of glass fibre insulation and impermeable bituminous underfelt. This has cut off the bulk of the natural ventilation needed to maintain a healthy roof structure. Sufficient ventilation is still occurring through the eaves to avoid problems. If the insulation over the tops of the ceilings is increased, care will need to be taken to maintain the airways from the eaves.

There is evidence of an historic wood boring beetle infestation (common furniture beetle) in several of the roof timbers. This is likely to date to when the roof was first constructed, and as the timbers are too dry to support an active infestation, it will have gone extinct naturally after around 5 years. As with most wood boring beetle attacks, it is purely cosmetic and has no structural implications (see annex B).

Section D – Conclusions

In my professional opinion, moisture and salts are being trapped within many of the walls by inappropriate cement based finishes. At the front of the house, the thick bands of cement mortar used to highlight the joints are now starting to cause significant damage. At the back of the house, the construction of the timber framed walls is enabling trapped moisture at first floor level to run down within hidden voids, before soaking the tops of the ground floor walls, enabling the problem to become visible internally. More generally internally, the salt contamination is causing 'damp stains' on several walls. Some of the staining and damage has been made worse by the use of salt contaminated beach sand for the backing plaster when the house was built. The replacement of highly permeable ground floors with concrete has contributed to the internal problems, as the replacement concrete floors are displacing moisture into the adjacent walls.

Replacement of the unsuitable wall finishes with permeable materials, internally and externally, in the worst affected areas, together with some renewal of salt contaminated material, should correct and control most of the problems. At the front of the house though, where the cement mortar is destroying the bricks and carrstone blocks, the affected bricks and stones should also be replaced or, if possible, reversed and rebedded. At the back of the house, at least part of the brick cladding behind the cement render will need to be rebuilt, and some repairs to the timber frame are also likely to be needed. Some additional minor repairs are likely to be required in future years as a result of the concrete floors, but these do not justify extensive preventative works.

Some areas of the house have suffered from mould growth and condensation as a result of cold wall areas. The mould and condensation is quite modest and very localised, so should be controllable by alterations to the heating regime, and ensuring warm air can circulate freely whenever the house is left unoccupied for several days.

Section E – Areas not able to be inspected

The concealed timber frame could not be inspected.

Section F – Further investigations

The condition of the timber frame should be checked whenever the opportunity arises during other repair work.

Section G – Report certification

I hereby certify that I did personally inspect the property known as Cottage House, The Street, Pickleton Burgh and that I prepared this report based upon my inspection findings.

David M. Kinsey **DipHI CEng MBCS CITP** 28 June 2017
Chartered Engineer, Surveyor & Damp Consultant