

2021 8866

Fisher house

Structural Investigation Report

Date of Report: 08/02/2022

Report Revision: A0


Revision	Author	Checked By	Approved By	Issued to	Issue Date
A0, First issue	Nick Forman IEng AMIStructE MICE	Nick Forman IEng AMIStructE MICE	Nick Forman IEng AMIStructE MICE	Client	08/02/2022

1. Client

Client	Warren Kozera & Laura Yardley
Address	Fisher House
	Rivington Lane
	Rivington
	Bolton
	BL6 7SL

2. Subject Property

Address	Fisher House
	Rivington Lane
	Rivington
	Bolton
	BL6 7SL

Property Location Map	
------------------------------	--

3. Survey Overview

BDI Reference	2021 8866
Date of visit	17/12/2021
Time of visit	11:00 AM (0 GMT)
Survey/Inspection by	<p>The Survey was undertaken by Nick Forman.</p> <p>Nick Forman is a qualified structural engineer, registered with the engineering council, and an associate member of the Institution of Structural Engineers and member of the Institution of Civil Engineers since 1993</p> <p>He has over 30 years' experience in low rise buildings and has reported on building defects for over 25 years.</p>
Weather at Time of Visit	Sunny, Clear and dry
Background and reason for Structural Survey	<p>The client owns the subject property.</p> <p>The client proposes works to extend and alter the existing building.</p> <p>The client engaged BDI Structural Solutions to inspect and report on the general structural condition of the building.</p> <p>The report considers and reports on the structural aspect identified within the Jubb Clews report dated November 2021.</p> <p>We understand that the building is Grade 11 listed.</p>


4. Terms of Reference

Terms of Reference	Attend the subject property and undertake a visual Structural inspection and report upon the condition of the structural load bearing elements of the building.
Survey Limitations	We have not inspected the property for evidence of timber rot, infestation or Dampness to walls and floors. If you have concerns in relation to these aspects, we recommend that you engage a suitably qualified specialist surveyor who is a member of the BWPDA.

	<p>We have not lifted carpets, moved items of furniture or generally broken into the fabric of the building to undertake this visual structural inspection.</p> <p>The report is limited to a visual inspection of the load bearing elements of the building structure and does not consider or report on the condition of windows, roof coverings, flashings, gutter, finishes, services, etc.</p> <p>The external and internal observations are limited to aspects that we consider to be of relevance to the terms of reference. The observations relate to the significant aspects and should not be considered a detailed condition survey.</p>
--	--

5. General Description of Building and site


Building type	Detached House
Age of Property	Circa late 18c.
Structural Form	Load Bearing Masonry
Structural Stability	Buttressing Walls and Floor plates
Number of Stories	3
External Walls	Solid Brick Walls
Roof Covering	Slates and stone slates
Roof Structure	Cut Timber roof with rafters and purlins
Upper Floors	Timber floor joists with plastered ceilings.
Ground Floors	Timber floors
Internal Walls	Brick walls, Stud wall lathe and plaster
Cellar/Basement	<p>There is a partial cellar to the left side of the main house.</p> <p>The does not extend fully front to rear.</p>
Site Topography	Generally, level left to right, generally level front to rear. The overall site topography is a slope from rear to front.
Trees and Vegetation	There are a number of mature trees to the front and rear of the property. Key areas/items of vegetation are detailed below.


Vegetation	Tree
Distance From	Front Left corner of building
Distance metre	8.0metre (approx)
Approx Height of Vegetation	20.0Metre
Photograph of Vegetation	


Vegetation	Trees
Distance From	Rear of building
Distance metre	8.0metre (approx)
Approx Height of Vegetation	20.0Metre
Photograph of Vegetation	
Below Ground drainage	There is below ground drainage to the front and rear of the property.


6. Observations


6.1 External Observations


No	6.1.1
Location	Front Elevation
Description	General view front elevation of building from garden.
Photograph	


No	6.1.2
Location	Front Elevation
Description	<p>At low level the front elevation leans outwards slightly within a minor bow.</p> <p>At higher level it appears visually the wall leans outwards further, possibly due to some evidence of roof spread.</p>
Photograph	


No	6.1.3
Location	Front Elevation
Description	<p>There is cracking evident at second floor level.</p> <p>The cracking is hairline in width within the render finishes and extends generally horizontally across the front of the property between the windowsills.</p>
Photograph	


No	6.1.4
Location	Front Elevation
Description	<p>Left ground floor still slopes towards the right slightly around 10 mm/ metre appears to be historic movement with the window frame appearing to be relatively level within the out of square opening.</p> <p>The lintel over the ground floor window has a similar slope to the right.</p> <p>The sill to the window over at first floor appears however to be more level</p>
Photograph	 <p>The photograph shows a white-painted building facade with two windows. The upper window is a first-floor window with a wooden lintel and a stone sill. The lower window is a ground-floor window with a wooden lintel and a stone sill. Red arrows are drawn on the image to indicate the slope of the lintels and sills. The ground floor window's lintel and sill are relatively level, while the first-floor window's lintel and sill show a slight slope towards the right. The ground in front of the building is paved with large, dark stones.</p>


No	6.1.5
Location	Front elevation of the attached garage/workshop
Description	<p>Lower section of wall is formed with a stone plinth over random stone walling.</p> <p>We noted no evidence cracking of structural significance.</p>
Photograph	


No	6.1.6
Location	Front elevation of the attached garage/workshop
Description	<p>There is outwards bowing of the fascia board and gutter and similar bowing to the front wall at high-level.</p> <p>This is consistent with roof spread</p>
Photograph	


No	6.1.7
Location	Left Elevation
Description	<p>There is cracking evident in render to left elevation. The cracking extends from the roof verge down to the roof over the garage/workshop</p> <p>The cracking it appears to be slightly tapered probably hairline to 2mm</p> <p>The cracking appears that it may follow line of chimney flues.</p>
Photograph	


No	6.1.8
Location	Left elevation of the attached garage/workshop
Description	We noted no evidence of structurally significant cracking within the render finishes.
Photograph	


No	6.1.9
Location	Rear Elevation of the attached garage/workshop
Description	<p>The rear elevation of the garage/workshop has significant outward bowing at mid height. There is an historic restraint tie/spreader plate that appears to be situated at the maximum magnitude of the bowing.</p> <p>There is no evidence to suggest the movement is progressive and externally we noted no structural cracking to the render.</p>
Photograph	


No	6.1.10
Location	Rear Elevation
Description	General view of rear elevation of house.
Photograph	


No	6.1.11
Location	Rear Elevation
Description	<p>Historic deformation evident to the kitchen window opening. The window frame appears to have been installed within the distorted opening.</p> <p>There is a similar slope evident within the structural opening of the first floor and second floor windows over.</p>
Photograph	 A photograph of the rear elevation of a three-story white building. The building has three windows: a small square window on the top floor, a medium square window on the middle floor, and a large rectangular window on the ground floor. Red arrows point to the frames of each window, highlighting their alignment and any potential distortion. To the left of the white building is a brick building. To the right of the white building is a door with a glass panel. A small black box is mounted on the wall between the middle and ground floor windows.


No	6.1.12
Location	Rear Elevation
Description	There is below ground drainage to the rear elevation adjacent the kitchen window.
Photograph	


No	6.1.13
Location	Rear Elevation
Description	Random cracking to render above landing window consistent with failure of the render finishes.
Photograph	


No	6.1.14
Location	Rear Elevation
Description	There is a drainage manhole and below ground drainage local to the rear left corner of the main house adjacent the area of the WC internally.
Photograph	 A photograph showing the rear elevation of a house. In the foreground, there is a concrete drainage manhole cover partially covered with brown autumn leaves. To the right of the manhole, a black downspout pipe runs vertically down the side of the house. The ground is covered with a thick layer of fallen brown leaves. The house wall is light-colored with a dark baseboard.

No	6.1.15
Location	Left Elevation right two storey annex
Description	We noted no evidence of significant structural cracking.
Photograph	 A photograph showing the left elevation of a two-story stone annex. The wall is constructed from rough-hewn, grey and brown stones, showing signs of weathering and moss growth. A white-framed, multi-paned window is set into the wall, with a dark stone lintel and sill. To the right of the window is a small, dark wooden box, possibly a meter or utility access. The ground in front of the wall is paved with large, flat stones, some of which are covered with fallen leaves. A small potted plant is visible in the bottom right corner. The sky is overcast and grey.


No	6.1.16
Location	Rear elevation right two storey annex
Description	We noted no evidence of significant structural cracking.
Photograph	 A photograph showing the rear elevation of a two-storey stone annex building. The building is constructed from dark grey stone blocks and has a gabled roof. A black downpipe runs vertically along the right side of the building. There are several windows: a small square window in the upper gable, a small rectangular window on the first floor, and a larger rectangular window on the ground floor. A yellow circular object, possibly a fire alarm or emergency call point, is mounted on the wall near the ground floor window. The building is surrounded by overgrown grass and some trees in the background.


No	6.1.17
Location	Right elevation right two storey annex
Description	We noted no evidence of significant structural cracking.
Photograph	 A photograph of a two-story building. The upper portion of the building is constructed of dark, rough-hewn stone and features a gabled roof with a brick chimney. The lower portion of the building is finished with white-painted walls. A large, multi-paned window with a white frame is visible on the ground floor. To the right of this window is a dark door. The building is set against a clear blue sky.


No	6.1.18
Location	Right Elevation
Description	<p>The garden wall abutting the right gable is in poor condition.</p> <p>The mortar jointing is badly eroded and is no lintel present to the front leaf of the wall and a rotten failed timber lintel to the rear leaf over the old window opening.</p> <p>The wall has a significant lean/rearwards bow.</p> <p>We understand that this wall may form part of a demolished section of an older building.</p>
Photograph	


No	6.1.19
Location	Right Elevation
Description	<p>There is movement evident boundary garden wall to the adjacent property.</p> <p>There is evidence of the foundation movement and lateral rotation of the wall.</p> <p>The wall will need to be locally rebuilt. The ownership of the wall and responsibility for these repairs should be established.</p>
Photograph	


6.2 Internal Observations


No	6.2.1
Location	Ground Floor, Hall
Description	The head of the door slopes to the left.
Photograph	


No	6.2.2
Location	Ground Floor, Dining Room
Description	There appears to be in existing beam spanning left to right across the dining room supported on masonry piers either side.
Photograph	 A photograph of a dining room interior. The room features white walls, a light-colored carpet, and a wooden baseboard. A small, square, framed picture hangs on the wall. A wooden door is visible on the left side, and a portion of a patterned armchair is visible on the right. The ceiling is white with a recessed lighting fixture.


No	6.2.3
Location	Ground Floor, Kitchen
Description	<p>The timber first floor over the kitchen appears to be supported on a series of timber primary beams spanning left to right with presumably timber joists spanning front to rear.</p> <p>There is significant damp evident to the right external wall adjacent one of the timber beam bearings. There is cracking and distress within the finishes below the beam.</p>
Photograph	 <p>The photograph shows a close-up of a dark wooden beam running horizontally across the ceiling. Below the beam, the white plaster is heavily stained with brown water marks and has several vertical and diagonal cracks. In the lower part of the image, a window with a floral patterned valance is visible, showing some light coming through.</p>


No	6.2.4
Location	Ground Floor, WC/Ground Floor bathroom
Description	<p>Significant structural cracking over existing the infilled old door opening in the original left gable wall between house and the garage.</p> <p>The cracking is tapered and is positioned at the rear extent of the cellar below.</p>
Photograph	 A photograph of a bathroom interior. On the left, there are white built-in shelves. In the center, there is a doorway leading to another room, with a white coat rack mounted on the wall above it. On the right, there is a glass shower enclosure. A thin, dark crack is visible in the white wall above the doorway, extending from the top left towards the center. The floor is made of dark wood.

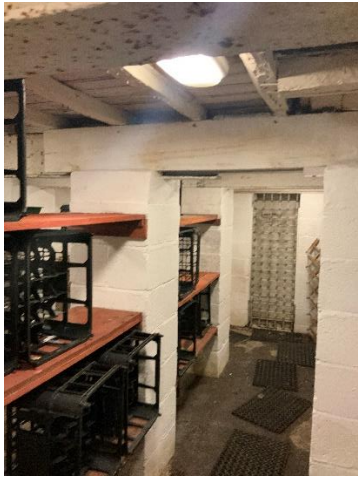
No	6.2.5
Location	Ground Floor, Utility, right two storey annex
Description	<p>Cracking and distortion over internal door within the internal wall within the utility room.</p> <p>The cracking extends towards the left external elevation of the right two storey annex. The crack patterns and movement are consistent with potential foundation movement.</p>
Photograph	 <p>The photograph shows an interior utility room with a wooden door. A prominent crack is visible in the white wall above the door, extending from the top left corner towards the center. To the left of the door, there is a white shelf with two dark hooks. The door has a dark metal hinge on the top left and a handle on the right side.</p>


No	6.2.6
Location	First Floor, Bathroom
Description	<p>There is cracking evident to the left external elevation of the bathroom around the infilled window.</p> <p>The cracking is consistent with foundation movement. The floor slopes towards the rear and left and appears to be both historic in nature as well as potentially of more recent origin.</p>
Photograph	


No	6.2.7
Location	First Floor, Front Left Bedroom
Description	<p>The floor within the front left bedroom is it's very bouncy.</p> <p>Loading the floor and inducing deflection and bounce in the floor results in the window sash in the front wall rattling and movement/vibration can be felt in the front elevation.</p>
Photograph	 A photograph of a bedroom interior. The room features light-colored walls and a concrete floor. A window with white curtains is positioned on the right wall, providing a view of greenery outside. In the center of the room, there is a dark wooden desk with a matching chair. A small table lamp hangs from the ceiling. The room appears to be in a state of transition or renovation.

No	6.2.8
Location	Second Floor, Front Left Bedroom
Description	The floor within the front left bedroom is it's very bouncy, similar to the first floor below.
No	6.2.8
Location	Second Floor, bathroom
Description	<p>Within the airing cupboard there is tapered diagonal cracking.</p> <p>The cracking is within the external left wall. The cracking appears to be quite old and is consistent with foundation movement.</p>
Photograph	

No	6.2.9
Location	Second Floor Landing
Description	The external rear wall changed in thickness from 330mm to 220mm at second floor chamber level.
Photograph	


No	6.2.10
Location	Cellar
Description	<p>The cellar is situated below the Parlour to the left of the hall.</p> <p>The cellar does not extend below the hallway or below the rear WC/ground floor bathroom.</p>
Photograph	
No	6.2.11
Location	Cellar
Description	<p>Within the cellar there are a series of later block piers that support timber and steel beams. These are more recent additions to the cellar area.</p> <p>These in turn support the original timber floor joists.</p> <p>It appears that historically the timber ground floor has been strengthened. This is likely due to rot or deterioration of the original supports.</p>
Photograph	


No	6.2.12
Location	Roof Space
Description	<p>An inspection was completed from the loft hatch. The absence of crawl boards and the depth of insulation prevented safe access</p> <p>The roof is of traditional construction with a structural ridge and purlins supporting the timber rafters.</p>
Photograph	 A photograph showing the interior of a roof space. The structure consists of a network of wooden rafters and purlins. A prominent horizontal wooden beam runs across the upper part of the frame. Below it, several vertical rafters are visible, supporting the roof structure. In the foreground, there is a thick layer of yellow insulation material. A black plastic sheet or bag is draped over some of the rafters. The lighting is somewhat dim, highlighting the textures of the wood and insulation.


No	6.2.13
Location	Roof Space
Description	There is moisture and damp staining evident to the timber purlins and evidence of some deterioration of the timbers.
Photograph	 A photograph showing the interior of a roof space. On the left, there is a brick wall. The roof structure consists of several horizontal timber purlins supported by vertical timber rafters. The timber purlins show significant signs of moisture damage, including dark staining and discoloration. The rafters also appear to be affected by moisture. The overall appearance is one of a damp and deteriorated roof structure.


6.3 Site Investigations


We engaged a contractor to excavate a number of hand dug trial holes to determine the arrangement of the existing foundations. The trial holes were extended in depth with a hand auger to establish the bearing strata.

Trial Hole No	1
Location	Rear left corner of main house at intersection with garage/workshop
Observations	<p>600mm below ground: Underside of wall foundation. No foundation spread.</p> <p>Foundation bears upon Soft moist/wet Orange/Grey sandy CLAY probable MADE GROUND</p> <p>600mm to 1600mm: Soft moist/wet Orange/Grey sandy CLAY with black topsoil inclusions, Probable MADE GROUND.</p>
Photograph	

Trial Hole No	2
Location	Midway along left elevation of right two storey annex.
Observations	<p>300mm below ground: Underside of wall foundation.</p> <p>Foundation consists of 90mm thick stone with 30mm projection from wall face.</p> <p>Foundation bears upon Soft moist/wet Orange/Grey sandy CLAY with black inclusions possible MADE GROUND</p> <p>300mm to 1200mm: Soft moist/wet Orange/Grey sandy CLAY with black inclusions possible MADE GROUND</p>
Photograph	

Trial Hole No	3
Location	Midway along right elevation of right two storey annex.
Observations	<p>700mm below ground: Underside of wall foundation not confirmed, wall obscured by large, inclined flag bottom of flag or foundation not established. spread.</p> <p>700mm to 1400mm: Soft to firm moist Orange/Grey sandy Clayey MADE GROUND with some roots.</p>
Photograph	

Trial Hole No	4
Location	Front right corner right elevation of right two storey annex adjacent door.
Observations	Excavation inconclusive ground full of rubble and bricks impossible to excavate more than 300mm below ground level.
Photograph	

Trial Hole No	5	
Location	Front right corner of house on right elevation	
Observations	<p>0 to 900mm stone plinth to wall over random stone walling.</p> <p>900mm obstruction in ground appears to project from the wall. Possible foundation.</p> <p>900mm moist orange/brown firm Sandy CLAY.</p>	
Photograph		

Trial Hole No	6
Location	Front elevation of garage/workshop midway along.
Observations	<p>0 to 480mm stone plinth to wall over random stone walling.</p> <p>480mm large stone projection/stone foundation spreader 60mm thick.</p> <p>Founded onto moist brown/orange topsoil and sand.</p> <p>780mm to 1680mm Orange brown moist sandy CLAY with occasional large obstructions believed rocks/stone.</p>
Photograph	

We recovered a sample of clay from one of the trial holes and undertook laboratory test to determine the plasticity index of the soil. A copy of the test results are included with this report

The sample was determined to have moisture content of 30%, a plasticity index of 21% and 90% of soils passing a 425 micron sieve.

The modified plasticity index has been calculated a 18.9%

Soils with a modified plasticity index of 20% are considered to a low classified as having a low volume change potential.

7. Discussion and Conclusions

The property is of traditional construction with load bearing internal and external walls supporting timber ground and upper floors and a tradition timber cut roof of purlins and rafters.

The property is typical in structural arrangement to other properties of this age and type. We noted no aspects of unusual structural arrangement.

From our inspection there are a number of areas of movement/concern structurally

Upper Floors

The upper floors are of timber construction and appears to consist of primary timber beams supporting smaller secondary joists or substantial timber floorboards which is typical of a property of this age.

A number of the upper floors are very bouncy with deflection being easily induced by dynamic loading from the surveyor's movement.

The ease and degree of dynamic movement of the floors is of concern and suggests that the floors are overstressed.

Overstress in the floors may be due to inadequate initial design. In reality in a property the floors will not have been subjected to design by calculation but will have been designed by the experience of the tradesman/builder.

The overstress of the floors could be a result of deterioration of the timbers due to rot or infestation which would result in a weakening of the timber. This may be an issue as we have noted areas of dampness and rot around the property.

In addition to the deflection and movement of the timber floors we noted that the movement of the floor was transmitted to the external walls, this was particularly noticeable in the first-floor left bedroom where vibration/movement could be felt within the front external wall.

Further investigations are required to lift the floor coverings and floorboards to expose the construction of the floors so that a thorough inspection and assessment can be completed. This inspection should also review the floor wall interface so we can establish the reason for transmission of movement from wall to floor.

It appears likely that some strengthening of the floors may be required.

External Walls

Whilst considering the external walls it is likely that lintels over the doors and window within the external walls are formed in timber. Again, moisture ingress and dampness within the external walls may impact on the strength of these lintels and could result in deterioration and rot.

It would be appropriate to expose a number of lintels over windows and doors to establish the condition and where of concern these should be replaced.

Roof Structure

There is minor to moderate deflections evident with the roof slopes and ridge to the main house. The visual inspection of the roof structure suggests that there may be some deterioration issues due to rot and infestation. Reviewing the Peter Cox timber and damp report we noted that they identified dampness within the timbers.

Structurally the original roof timbers will have been designed by the experience of the tradesman/builder and it is unlikely that the if we checked these to current codes of practice that these will considered structurally adequate.

The roof has however been serviceable structurally for many years and we would suggest that we approach the adequacy of the roof structure based on a combination of the condition, structural calculation and degree of deflection/movement.

At present the roof insulation prevents safe access. Once the roof space has been boarded, we suggest that a furthermore in-depth inspection is completed by ourselves and a timber and damp specialist.

The roof has differing roof coverings front and rear, with a heavier stone slate to the front roof slope.

This differing load can cause an imbalance in the roof and can result in a lateral distortion of the roof. This tends to be a more significant issue where a roof structure may only have a single row of slender purlins to each roof slope and a ridge board rather than a structural ridge.

In this instance the roof has a structural ridge beam and two non slender purlins to each roof slope and therefore the risk of distortion from differing loads is, in our opinion, reduced.

There is some evidence of potential roof spread to the front and rear elevation. This is not unusual in a property of this age.

Over time the roof structure will deflect due to creep, which is the increase in deflection of the roof timber due to long terms loading. As the ridge and purlins deflect the roof will tend to push our or spread at the wall plate pushing the wall out.

This spread is often resisted by the fixing between the roof rafters and the ceiling joists. This junction will need to be inspected and some further fixing or tying may be required to prevent further spread developing over time. This issue will need to be considered in conjunction with the overall assessment of the roof structure.

Foundations/Foundation movement

There is evidence of foundation movement to a number of areas to the main house and right two storey annex

Much of the movement evident appears to be longstanding in nature as there is distortion evident by way of sloping floors and sills, etc. but no cracking or damage which suggests no recent movement has occurred.

It is not unusual to see evidence of historic foundation movement to older properties and this movement often relates to initial settlement that occurred as the building settled after construction.

The trial holes suggest that the building is founded on a sandy clay and clay soils are more susceptible to a longer period of initial settlement.

Properties with partial cellar or basements are more susceptible to differential movement as the foundations are at differing levels and likely to be founded in differing soil conditions.

In addition, early settlement of walls adjacent to cellar areas is common as the non cellared areas are often founded at a shallow level on backfill to the cellar walls and this backfill often consolidates.

There are two areas where more recent foundation movement and damage is evident.

There is significant recent damage to the ground floor WC/Bathroom, first floor bathroom and second floor bathroom which are all located in the rear left corner of the main house.

This area is directly adjacent the cellar and the trial hole investigations suggest the walls are founded shallowly of a sandy Clay that appears to be a made ground.

There is also a concentration of below ground drainage local to this area. The drainage survey suggests that drains are not defective in this area, but the CCTV Survey generally suggests the below ground drainage is generally in poor condition and likely to be leaking.

Leaking drainage caused foundation movement due to the escaping water washing away fines in granular soils or softening clays resulting in reduced bearing capacity and thus triggering foundation movement.

In this area of the house the foundations are bearing onto a fill material and whilst leaking drainage may be a factor I of the opinion that repairing leaks from the drainage may not guarantee that further foundation movement may not occur.

In this regard and given the extend of renovation proposed it would be prudent to underpin the left and rear walls in this area to eliminate the risk of further foundation movement.

The underpinning would be completed externally to the rear and from within the garage and completing this now prior to conversion of the garage would appear to be sensible.

Foundation movement is also evident to the left wall of the rear two storey annex, the movement here is relatively minor and could be related to leaking drainage. In this regard repairing/replacing the drains is likely to reduce the risk of further movement.

The foundations in this area are however quite shallow at 300mm and are at risk of movement due to clay shrinkage.

Clay soils are shrinkable soils are subject to changes in volume as their moisture content is altered.

Soil moisture contents vary seasonally and are influenced by a number of factors including the action of tree roots. The resulting shrinkage or swelling of the soil can cause subsidence or heave damage to foundations, the structures they support and services.

The soil laboratory tests suggest the clay soils on site have a low volume change potential.

Recommended foundation depths in Clay with low volume change potential outside the influence zone of trees would be 0.75m or 750mm.

There are a number of trees around the property that would be considered within influencing distance of the building, and it would be prudent to engage an arboriculturist to undertake a tree survey such that the influence of the trees and risk of building foundation movement can be fully established.

It is worth noting that with the exception of the cellared areas most of the foundations are quite shallow and will likely represent some level of risk from clay shrinkage given the number of trees around the property.

It may be to reduce the risk that you elect to undertake underpinning to deepen the foundations or undertake tree management to reduce the risk factors.

Garden Walls

There are a number of garden walls to the right side of the property that are in very poor condition and localised repairs, or rebuilding would be recommended

We are aware that the wall abutting the right elevation appears to be an old building wall and this may be of historical interest.

This wall has a significant bow/lean and whilst ideally, we would recommend rebuilding is required, we could look at developing a scheme of repairs and then restrain the wall back to the next extension.

Garage/Workshop

Extensive works have been completed to the workshop/garage area, sections of the external walls have been rebuilt and the building has a more recent trussed roof.

We noted that the trussed roof has no strapping restrain the end gable and we also noted no wall plate straps.

The end gable and wall plates should be strapped in accordance with good practice and the requirements of the building regulations.

The rear wall of the garage/workshop has a significant bow. This appears to be long standing. There is an historic tie evident but to supplement this it would be prudent to install restraint ties/straps between the floor and the front and rear walls.

The conservation officer will need to be consulted and the scope of any investigations agreed before being undertaken and any repairs, replacement or strengthening of floors, lintels, foundations, roof works, etc. will need to be agreed before being undertaken.

Below Ground Drainage

The CCTV drainage survey completed by Metro Rod suggests the drainage system is in quite poor condition with cracking displaced joints, holes, etc.

As discussed leaking drainage creates a potential risk of foundation movement.

In addition, the condition of the drain runs suggest that functionality may be compromised with displaced joints potentially hindering flow of solids.

Given the scale of works and renovation proposed we would suggest installing a new drainage system would be prudent.

Appendix A | Understanding This Report

This report is written for the benefit of the named client in relation to the subject property only. It should not be used for any other purpose and may only be copied to a third party with the permission of the Client or BDI structural solutions.

The scope of this report is limited to the consideration of the issues described under the term of reference.

Unless specifically referred to in the report we have not inspected woodwork or other parts of the structure, which are covered, unexposed or inaccessible and are therefore unable to report that any such part of the property is free from defect.

The various sections of the report contain information as follows:

General Description of Property

A brief summary of the type of building. This is factual information and does not describe the condition of the property.

Background

Outlines the reasons for the client instructing BDI structural solutions to carry out the survey and report. Any special instructions or particular relevant background information given to us will also be included in this section.

Observations

The damage or other characteristics of the subject property are described in this section. Factual observations are recorded, including any measurements taken, but opinions on causes and recommendations are not given in this section.

Discussions and Conclusions

This section summarises our expert consideration of the damage and any other characteristics relating to the subject property. In many cases the options will be discussed and where appropriate the advantages and disadvantages of different solutions are discussed.

Suggested Timescale and Budget Costing

Where appropriate we give an indication of the timescale that should be considered for any recommended solutions. Where budget costings are provided these are purely provided as a guide and are based upon our experience of costs of similar repairs to similar properties. Accurate costings should be obtained from suitably qualified and experienced building contractors.

Queries

We try wherever possible to avoid the use of unfamiliar technical terms or jargon and to provide practical technical advice. If you are unclear about the meaning of any words or phrases, or the conclusions of our report, please call us and we will clarify matters for you. If necessary, we will revise and reissue this report.