8 Pilgrims Lane

Ground Movement Assessment Report: New Basement Proposal

by **RKD Consultant Ltd.**
On Behalf of :

Greig-Ling

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4th floor
Wigham House
16-30 Wakering Road
Barking
IG11 8QN

Tel: 020- 8591 9747
Fax: 020- 8594 1331

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Table of Contents

1 Introduction 2
2 Assumptions of the Damage Category Assessment 2
2.1 General Assumptions 2
2.2 A Note on Heave 3
2.3 Nature and Design of the Underpinning and Piled retaining walls 3
2.4 Workmanship of the underpinning and wall installation & construction process 5
2.5 Geometry and Status of the neighbouring structures 5
3 Sources of Ground Movements & Assessment Methodology 6
3.1 General 6
3.2 Underpinning Movements 6
3.3 Piled Wall Movements 6
3.4 Assessment of Damage Category 8
4 Results of Ground Movement Assessment 9
4.1 Basement Excavation 9
4.2 Associated Damage Category 12
4.2.1 6 Pilgrims Lane 12
4.2.2 10 Pilgrims Lane 13
4.2.3 Downshire Studios 14
5 Summary 15

[Issued at Rev 1: 1st November 2012: deleted shallow underpinning adjacent 6 Pilgrims Lane]

1 Introduction

As part of the Planning Application process, an assessment is required for the Damage Category status of the adjacent structures adjoining number 8 Pilgrims Lane and in consequence of the proposed new basement works. This report has been prepared by Adam Pellew, MSc PhD CEng MICE on behalf of RKD Consultant ltd, to address this and is to be read together with the other parts of the Basement Impact Assessment work, including Arup's BIA document issued 8th August 2012 and the Site Investigation Report No. 12.01.017 of April 2012 in addition to an earlier SI Report ref J10228A of February 2011.

While this report does not represent a 'design' of the new basement, the following processes are required to be carried out in order to assess the Damage Category for adjacent structures:

(i) Preliminary analysis or assessment of basement excavation, including the underpinning arrangements and retaining walls and both their installation and method of retention;

(ii) Evaluation of the consequent implied ground movements outside of the excavation and leading to a 'contour map' of these movements;

(iii) Evaluation of the adjacent structures, how they lie on the proposed movement contours and the implications of distortion for these structures given their essential geometry. This process finally leads to an implied Damage Category due to the works.

These analytical processes are reported here, addressing the proposed basement works within the curtilage of 8 Pilgrims Lane. The process concludes with Damage Category Assessments for the adjoining structures of 6 Pilgrims Lane, 10 Pilgrims Lane and Downshire Studios to the rear of the property. The process involves both assumptions on design and workmanship and also necessarily includes some elements of judgement and particularly in relation to complex actual geometries.

2 Assumptions of the Damage Category Assessment

2.1 General Assumptions

The scheme described in all the information included and referenced in the Basement Impact Assessment is assumed for the work in this report together with the Greig-Ling structural drawings [incl. 612/02 rev October 2012 and 612/01 original issue November 2012] and Brod Wright architectural drawings, all issued for Planning and current at the issue date of this report.

The general approach adopted here for the movement of structures adjacent to ground works is that commonly used[1] and it assumes that the ground is not stiffened by the actual structures on or close to the ground surface. This is termed a 'greenfield' movement assessment as it should apply accurately in such an instance. The presence of the existing structure on the Site will tend to modify and 'even out' the gradients of the greenfield ground movement and similarly any adjacent neighbouring structures will see more even movements than implied by this interpretation. Since in this project the adjacent structures continue into areas in which the greenfield ground movements are trivially small this means that the implied actual differential and total movements will be smaller than interpreted and the determined Damage Categories are conservatively assessed.

[1] e.g. Assessments of most structures carried out by Crossrail (e.g.) follow the principles of this method.

Furthermore, if these adjacent structures themselves contain basements then, in this case, this will also further reduce the actual experienced building movements.
The ground and groundwater conditions have been examined in the referenced Site Investigation report. It has been found that the Claygate Member (Clay) exists up to a point close to the ground surface, in some places with Made Ground above. The London Clay occurs beneath the Claygate Member and generally at a depth beneath the proposed perimeter retention structures.

For the purposes of clarity of the approach adopted here to obtaining movement predictions, the resulting movements are quoted to decimals of a millimetre. However, the accuracy of the process and the nature of all geotechnical prediction is such that this implies a spurious level of accuracy. Geotechnical predictions made in this widely accepted empirical approach and with all the assumptions, in particular regarding workmanship, and the necessary judgement decisions that go into determining Damage Categories cannot be any more accurate at best than the original spread of data used to create these methods. The predictions are still very much of value but need to be understood in this context.

2.2 A Note on Heave

The effect of the net ground heave within the Site of 8 Pilgrims Lane and due to the new proposed works has been assessed. A maximum net vertical uplift of 10mm has been derived for a theoretical no vertical constraint to basement slab movement. A maximum net heave pressure for a theoretical perfect constraint in the worst case unloaded areas has also been determined as 25 kN/m^2 beneath a stiff basement slab. These aspects are not of direct consequence to neighbouring structures and are stated here to show that the design has considered heave as a point of principle.

The existing and proposed new perimeter loads have been considered in relation to the new proposals and there is no net heave movement at the location of the site perimeter at places potentially affecting neighbouring structures.

2.3 Nature and Design of the Underpinning and Piled retaining walls

The proposed retention structures consist of a mixture of 2 varying depths of underpinned wall section and a single depth section of contiguous or secant piled wall.

The underpinned sections are assumed to be:

- Constructed in a sequence such that the temporary load increase within any single continuous footing does not at any time exceed 20% of its existing load. This is usually given on a long wall by a 5 pin sequence. This also constrains the numbers of pins shown on the Greig-Ling drawings that may be constructed at any one time;
- Constructed of structural concrete;
- Constructed to a thickness not less than the total wall thickness at the wall base, excluding any footing corbelling;
- The existing footing corbelling must only be trimmed for each underpinning section in turn as the pin is created, not all trimmed along a wall prior to commencing the pins;
- Provided with a bearing area at the base of the pins that is not less than the existing total provided bearing area of the wall, including any footing corbelling;
- Carried out in accordance with the geometry indicated on the Drawings;

- Deep section underpins must be backfilled, each in turn, either with embedded temporary horizontal props taking load across appropriately to virgin ground or achieving this over full height with imported granular 6F2 fill compacted in layers in accordance with Highway Specification requirements.

The shallow underpinning is proposed to the front of the property and is assumed not to be propped.

However, it is assumed that the deep level underpinning to the rear of the property is temporarily propped until both the lining wall and the basement and ground/lower ground level slabs are constructed and such that they can adequately carry any lateral loading that might arise. The temporary propping includes:

1) Required support to the existing masonry walls above current footing levels where the removal of the existing basement slab and subsequent bulk excavation would lead to these walls cantilevering to retain earth behind them for more than 0.9m of depth. This would exclude very localised excavation for a single underpin;

2) Propping within the top 0.5m of the underpins sections prior to bulk excavation below this level;

3) Bulk excavation continued only to a general level of +77mOD, i.e. still 1m above the basement slab formation level;

4) Excavation in limited strips, i.e. sequence excavation, to give in turn approximate 1m wide zones across the full width and in which a structural blinding is placed at formation level and to the footing of the underpin and to the piled wall and to take compressive load;

Particular care is required in relation to the underpinned footing structure in the Car Port area. This footing will need to have some form of additional support or else the load temporarily removed from the column before the pad can be underpinned, even in part.

The piled walls, either contiguous or secant type are reinforced concrete bored piled walls. They will be created with a guidewall and continuously maintained support to the base of the garden wall. Due to the high level of the garden wall foundation, the guidewall will therefore need to be created in sections of only 4 pile lengths at a time to maintain this foundation support.

For the purposes of preliminary analytical work carried out as part of this exercise, the following details have been used[2] and together with a characteristic undrained analysis using E = 750.Cu:

- The shallow section underpin area: adjacent ground level up to +82.0mOD [Road frontage to 8 Pilgrims Lane], existing level of +79.7mOD and retained ground above calculated as surcharge, no Made Ground and Claygate Member to depth and beneath zone of significance (+74.0mOD), underpin founded at +78.6mOD, slab formation level at +79.2mOD. Small rotational restraint provided at top of pin from finite wall & pin thickness;

[2] All levels given here to 0.1m accuracy.

- The deep section underpin area: adjacent ground level up to +81.3mOD [6 Pilgrims Lane], existing level of +80.1mOD and retained ground above calculated as surcharge, Made Ground to +79.0mOD over Claygate Member to +74.0mOD, underpin founded at +75.7mOD, slab formation level at +76.0mOD. Temporary Prop at +78.8mOD (top zone of u/pin) and structural blinding (placed to base of pin with general excavation level at +77mOD) both with assumed stiffness of k = 30 000 kN/m/m. Small rotational restraint provided at top of modelled wall section from wall above;

- The piled wall has 450mm diameter piles at 600mm centres assumed for wall stiffness and to a toe level of +73.5mOD and slab formation level at +76mOD. The base of the adjacent garden wall footing is at +79.5mOD. Made Ground to +79.5mOD over Claygate Member to +74.0mOD. The piled wall will carry just sufficient cantilever to allow placement of the temporary props at +78.8mOD. Formation level blinding support will be placed with the general excavation level at +77mOD consistent with the underpin propping requirement. Both these prop levels with assumed stiffness of k = 30 000 kN/m/m.

2.4 Workmanship of the underpinning and wall installation & construction process

Good practice in construction is necessarily assumed. In particular, each of the wall piles are installed and concreted within a working shift and without allowing free (or surface water) into the bores prior to concreting.

It is assumed that the Contractor is expecting to have to pump away ground water and has made adequate provision for this before work elements are started. A leaking drain was noted in TP02 and it is important that such leaking drain issues are all fully resolved such that the Site is dry and with controlled ground water before underpinning and excavation work is attempted. It is assumed that the Contractor is experienced and adequately equipped to provide all necessary temporary support to all temporary excavations.

It is assumed that the Contractor achieves a clean, dry, cut finish for the base of the underpins and that these are immediately blinded and sealed with 75mm thickness of blinding concrete. The groundwater needs to be adequately controlled to enable this to be achieved.

It is also assumed that the project is constructed at commercially sensible rates of construction given the site constraints, in particular (e.g.), that the works are not left after an excavation phase in an unfinished state for many months and prior to continuation and completion of the permanent structural works.

2.5 Geometry and Status of the neighbouring structures

The neighbouring structures of number 6 and number 10 Pilgrims Lane and the Downshire Studios have not been inspected from within these properties themselves. It is not known for example how recently they have been rendered/plastered and therefore what historic damage to the fabric may already exist that has been hidden by this process. Although it is not considered likely, were these structures to be already fragile with historic damage having occurred then the structures are more readily able to be damaged in relation to new imposed movements. The assessment made here necessarily assumes that the fabric of the structures has not already been subject to any significant historic damage.

3 Sources of Ground Movements & Assessment Methodology

3.1 General

In relation to all the new basement works, the sources of ground movement that have the potential to affect significantly the adjacent structures of numbers 6 & 10 Pilgrims Lane and the Downshire Studios are:

- The installation of all underpinning prior to bulk excavation;
- The bored pile wall installation; and
- The basement excavation process.

3.2 Underpinning Movements

In the case of underpinning, there is no publicly available dataset of movement case histories as there is in the case of bored pile walls and as given in CIRIA Report C580. RKD's experience of underpinning movements show these to be very workmanship dependent. There will always be a finite settlement of an underpinned wall as it transfers load through the 'dry-packed' area and onto the new pins and to their formation levels, however carefully this process is carried out. This vertical wall settlement could be up to 5mm for a typical well-constructed underpinned wall and may not be greatly dependent on the pin depth but rather vary in accordance with the uniformity of actual loading along the underpinned section and the care with which the work is carried out. However, the subsequent movements on excavation are often much smaller for such well-constructed underpins and possibly for reasons such as the restraint occurring in the dry-pack area. All these movements are not very readily amenable to analysis. Notwithstanding this, some analysis of the excavation in front of the underpinning has been carried out to inform the process, using a 'stiff' wall and otherwise similarly to that undertaken for the piled wall and described below.

The methodology to assess movement behind the wall assumes a uniform 5mm wall settlement on installation and the ground movement behind the wall decaying away as for the piled wall installation case described below; then the ground settlement on excavation is taken as ½ of the analysed horizontal displacement and according to the method adopted for piled walls and also as described below. These movements will be combined into a proposed single movement 'contour' diagram for settlement behind the wall. Note the process does not address movements within the excavated zone.

In the shallow excavated section at the front of number 8 Pilgrims Lane and adjacent to number 6 Pilgrims Lane the decision not to reduce the ground level beneath the footing itself has been taken and the small excavation will be battered to the side of the footing. There is therefore no underpinning to this Party Wall. The resulting ground movement from this process has been analysed using PLAXIS[3] Finite Element modelling and the results are described in Section 4.1 below.

3.3 Piled Wall Movements

The data reproduced in the Figure here below is taken from CIRIA C580 Report figure 2.8 for a variety of bored pile wall installations. The data shows much scatter and includes a number of relatively large projects historically. The recommended line for a contiguous piled wall shows a

[3] See: http://www.plaxis.nl/shop/135/info//PLAXIS+2D/

maximum settlement of 0.04% at the wall line and this is adopted here. The rate of decay of the movement in the case histories shown in the figure may in general be better represented by values that fall to near zero within a distance equivalent to a single wall depth rather than the 2 x wall depth distance indicated by the solid lines shown. So for the purposes of interpretation used here it is assumed that there is no settlement beyond a distance of 1 x the total wall depth in consequence of installation.

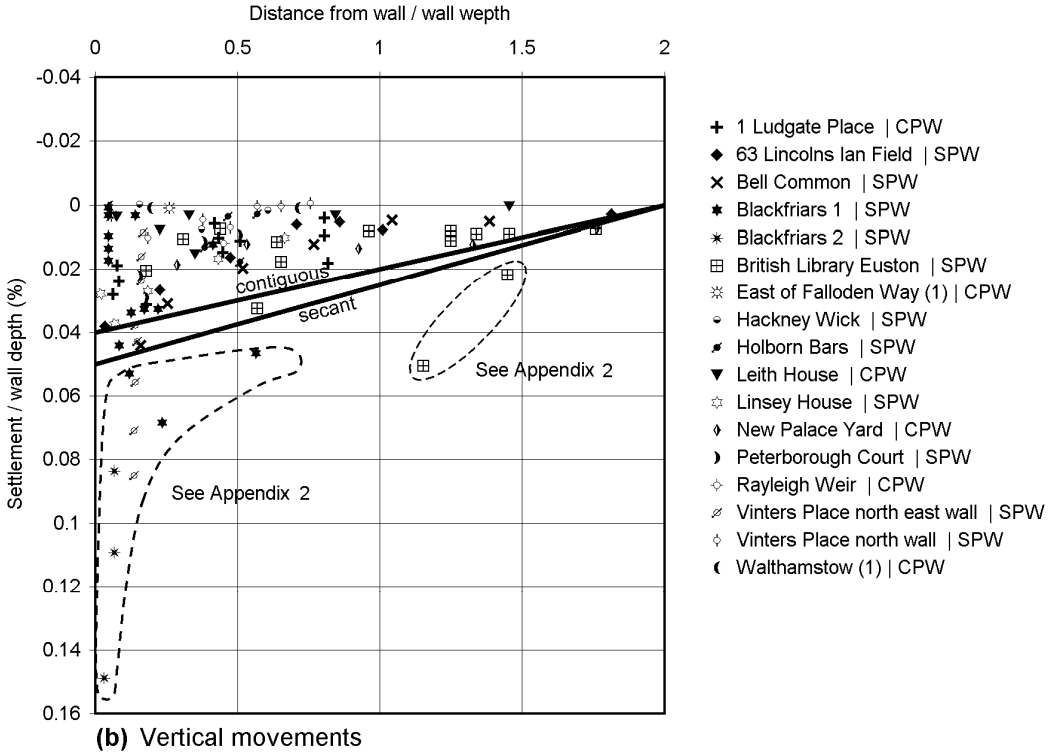


Figure 2.8 *Ground surface movements due to bored pile wall installation in stiff clay*

Reproduced from CIRIA C580 (Figure 2.8)

The piled wall depth is 6m and therefore 0.04% of this gives 2.4mm of maximum settlement immediately behind the wall and decaying to 0mm at 6m distance.

The basement excavation work itself gives rise to ground movements that can be considered to derive from both the immediate upward heave of the Clay in response to its undrained unloading and also from the inward deflection of the walls that itself gives rise to local surface settlement behind the wall. These movements occur naturally at the same time and historic observations of movements behind piled walls as part of similar basement excavations include for both of these effects.

Measurements relating to the excavation of two central London deep basement excavations were reviewed and reported on in CIRIA C580 and back-analysis using FREW[4] gave rise to the proposed relationship between analysed wall deflections and ground surface settlements in the Report's figure 2.16 which is reproduced below. This shows settlement behind the retaining wall with the

[4] FREW by OASYS software: http://www.oasys-software.com/products/geotechnical/retaining_walls/frew/

maximum settlement being half of the maximum horizontal deflection and this method is used here. Some preliminary FREW analysis has therefore been undertaken using the available Ground Investigation information and the assumptions listed above in Section 2. Note that this process does not address movements within the footprint of the excavation itself and the ground movements presented here are only for the ground outside of this footprint.

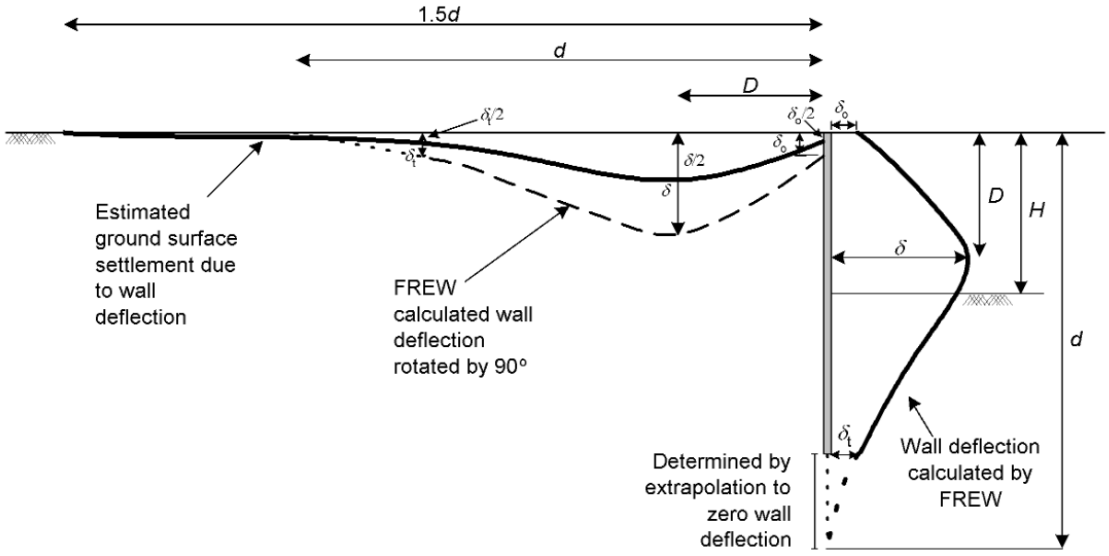


Figure 2.16 *Relationship between analysed lateral (propped) wall deflections and predicted ground surface settlements in stiff soil*

Reproduced from CIRIA C580 (Figure 2.16)

3.4 Assessment of Damage Category

Once the building movements have been determined a Damage Category assessment is made following the method of Burland[5]. This requires consideration of the height (H), length (L) of the structure undergoing distortion as well as the vertical movements and horizontal strains in the structure. A view needs to be taken of the horizontal strains imposed on the structure and typically where this is driven by wall deflection, as may be the case for piled walls, then the horizontal strain is often assumed equal to the change in vertical displacement divided by the separating length (L). In the case of underpinning installation the horizontal movements are likely to be much smaller than implied by this as the vertical movements originate substantially from the change to the new load carrying mechanism rather than through bulk distortion of the soil mass. For this reason in this assessment for underpinning the horizontal strains are given only through consideration of the effects of the bulk excavation rather than combined with installation.

Once the building distortions have been fully evaluated the results then lead directly to a Damage Category prediction. The various Damage Categories and their descriptions are reproduced for reference in the figure below, from the BRE Report 251 and taken from CIRIA C580 as Table 2.5.

[5] J B Burland (1997) "Assessment of risk of damage to buildings due to tunnelling and excavation" Proc. Conf. Earthquake Geotech. Engng, Balkema.

Table 2.5 *Classification of visible damage to walls (after Burland* et al*, 1977, Boscardin and Cording, 1989; and Burland, 2001)*

Category of damage	Description of typical damage (ease of repair is underlined)	Approximate crack width (mm)	Limiting tensile strain ε_{lim} (per cent)
0 Negligible	Hairline cracks of less than about 0.1 mm are classed as negligible.	< 0.1	0.0–0.05
1 Very slight	Fine cracks that can easily be treated during normal decoration. Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection.	< 1	0.05–0.075
2 Slight	Cracks easily filled. Redecoration probably required. Several slight fractures showing inside of building. Cracks are visible externally and some repointing may be required externally to ensure weathertightness. Doors and windows may stick slightly.	< 5	0.075–0.15
3 Moderate	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable linings. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weathertightness often impaired.	5–15 or a number of cracks > 3	0.15–0.3
4 Severe	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Windows and frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted.	15–25 but also depends on number of cracks	> 0.3
5 Very severe	This requires a major repair involving partial or complete rebuilding. Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion. Danger of instability.	usually > 25 but depends on number of cracks.	

Notes

1. In assessing the degree of damage, account must be taken of its location in the building or structure.
2. Crack width is only one aspect of damage and should not be used on its own as a direct measure of it.

Reproduced from CIRIA C580 (Table 2.5)

4 Results of Ground Movement Assessment

4.1 Basement Excavation

Results for the FREW wall analyses for the shallow and deep underpinned walls and for the piled wall section are shown in Figures 1, 2, 3 below.

These horizontal deflections show the shallow underpinning moving approximately 0.5mm; the deep underpinning moving approximately 2.8mm; and the piled wall moving a maximum of 3.5mm.

A special case occurs for the excavation against number 6 Pilgrim's Lane in which the adjacent footing is not underpinned but excavation occurs laterally beneath the level of the footing. The situation has been examined in which the new formation level at 400mm below footing level occurs to a point no closer than 400mm to the side of the nearest edge of the footing, i.e. with a 1:1 batter. The footing is on the Clay of the Claygate member, as found. For current estimates of line loading and an 800mm wide footing width the resulting footing settlement due to this excavation to one side is very small as determined using PLAXIS Finite Elements and a linear-elastic plastic undrained Clay soil. A value of 1mm of settlement has conservatively been taken following this analysis.

These results have all been combined with the described methodology to provide the contour map for 'greenfield' vertical ground settlements outside of the excavated areas and arising cumulatively and after excavation. This is shown in figure 4 and note that contour lines exactly on and along the line of the party/boundary walls are not shown but are 5.25mm along the line of the shallow underpinning; 6.4mm along the line of the deep underpinning; and 3.4mm along the line of the piled wall section.

For interpretation of the corner or 3D effects, the settlements in the section are taken as reducing to 2/3 of the plane strain values as the plain strain section reaches the corner and in accordance with the assumption of Burland[6]. Note that contour interpretation has necessarily involved careful consideration of the boundaries of the different retention systems and the length of each required to attain plain strain conditions and this has necessarily involved informed judgement.

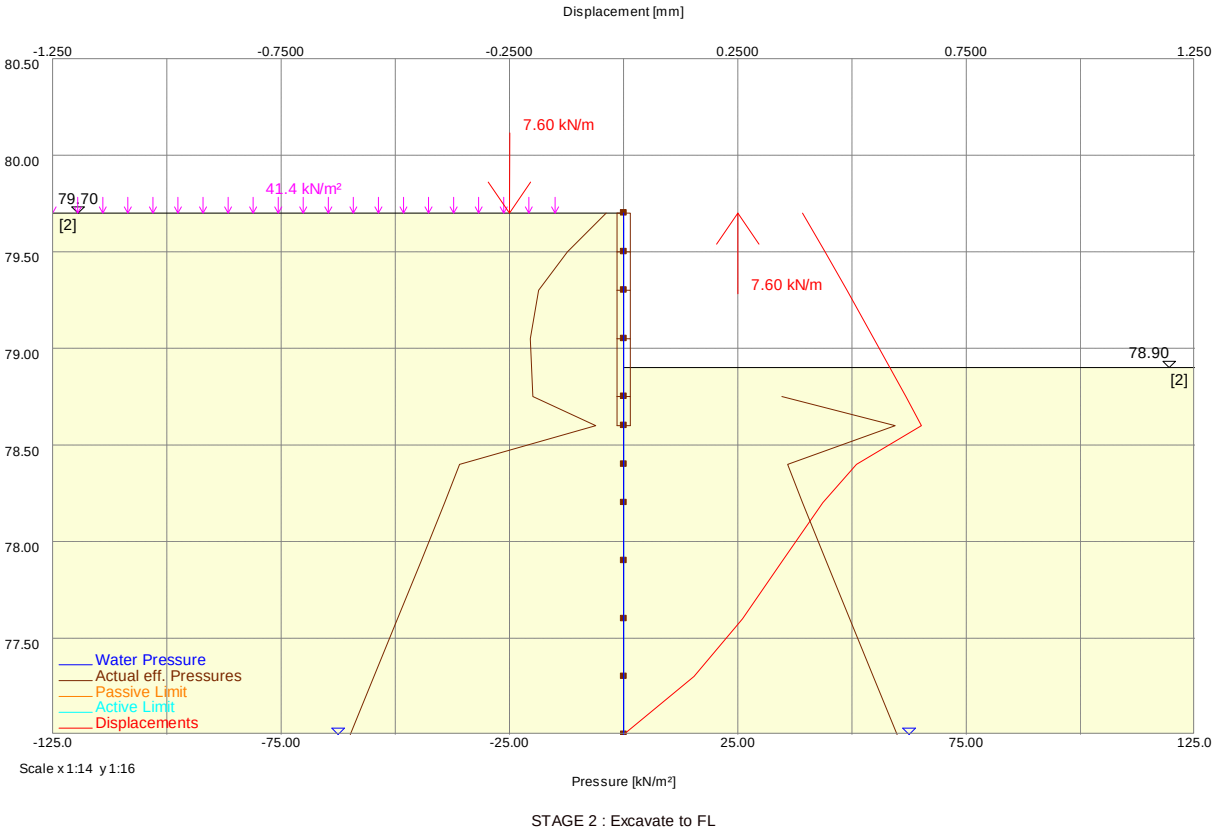
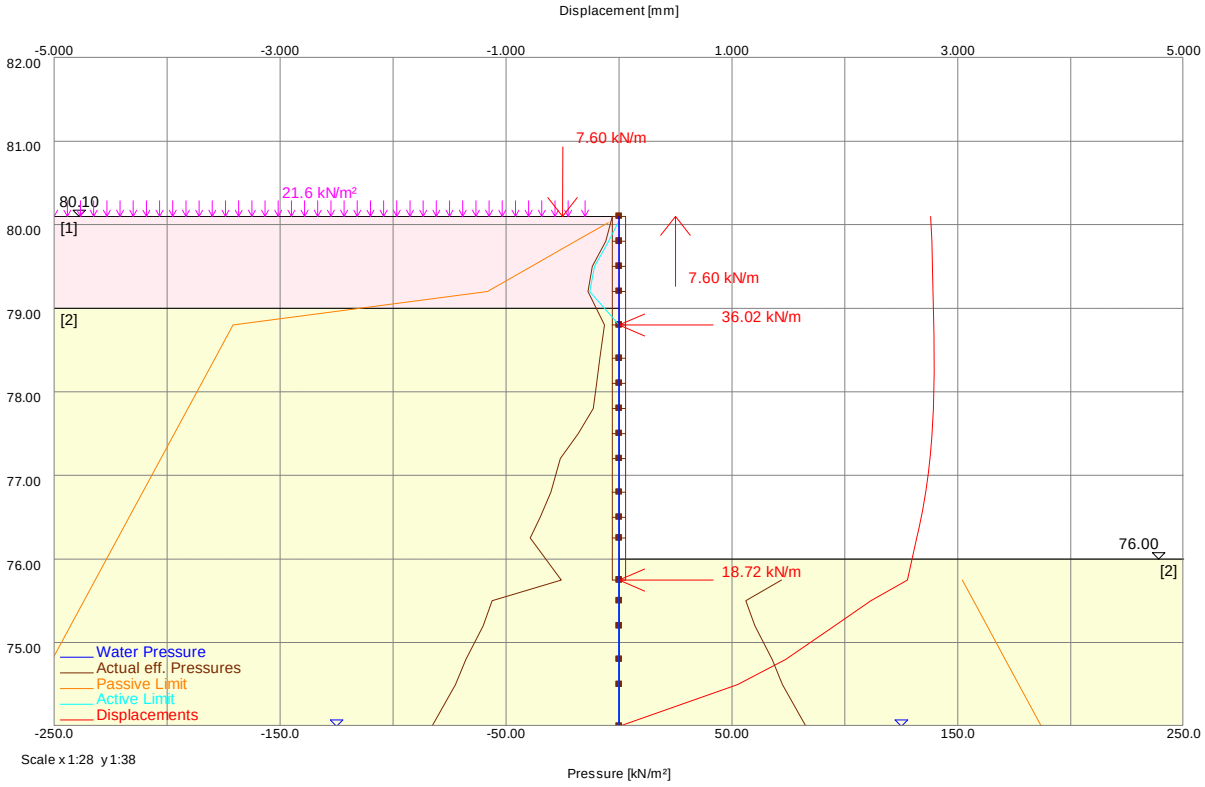


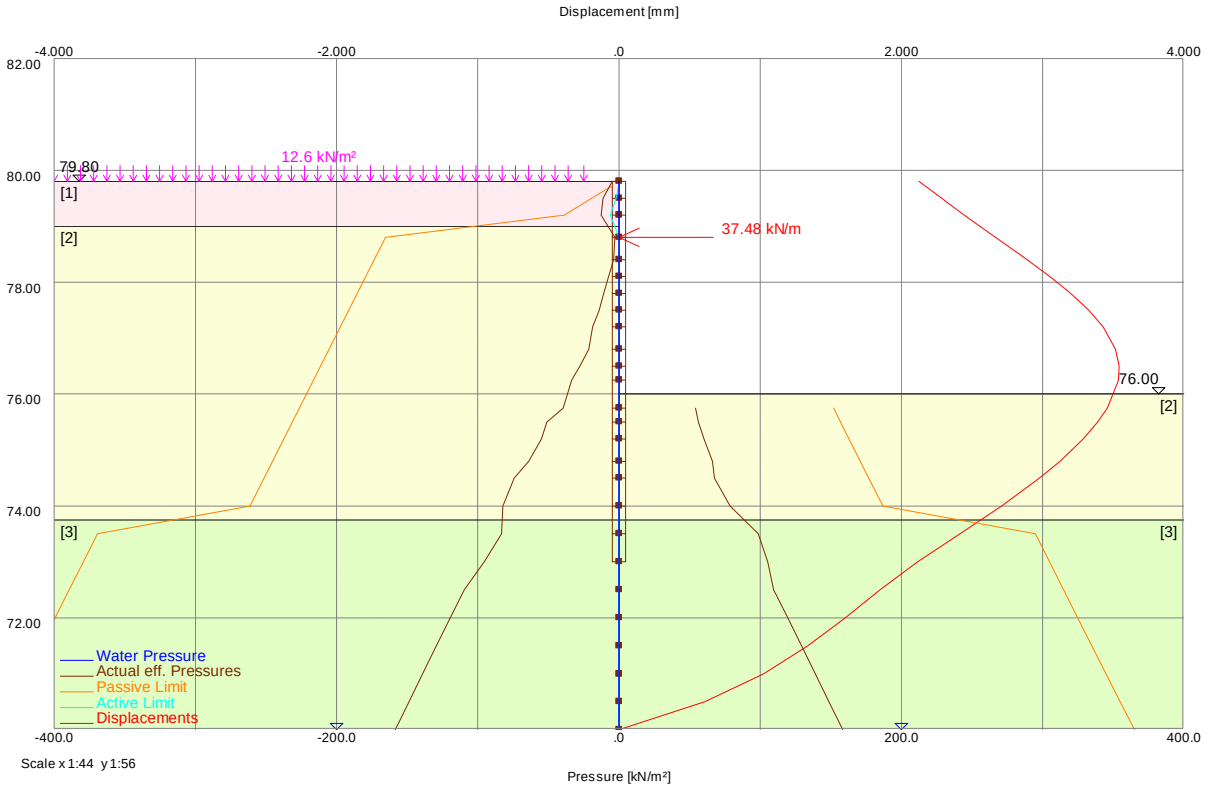
Figure 1: Shallow Underpinning: Horizontal Displacement on Excavation

[6] J B Burland (1977) "Underground Car Park at the House of Commons, London: Geotechnical Aspects" The Structural Engineer, 55(2) pp87-100.



STAGE 6 : Excavate to FL at +76

Figure 2: Deep Underpinning: Horizontal Displacement on Excavation



STAGE 4 : Excavate to FL at +76

Figure 3: Piled Wall: Horizontal Displacement on Excavation

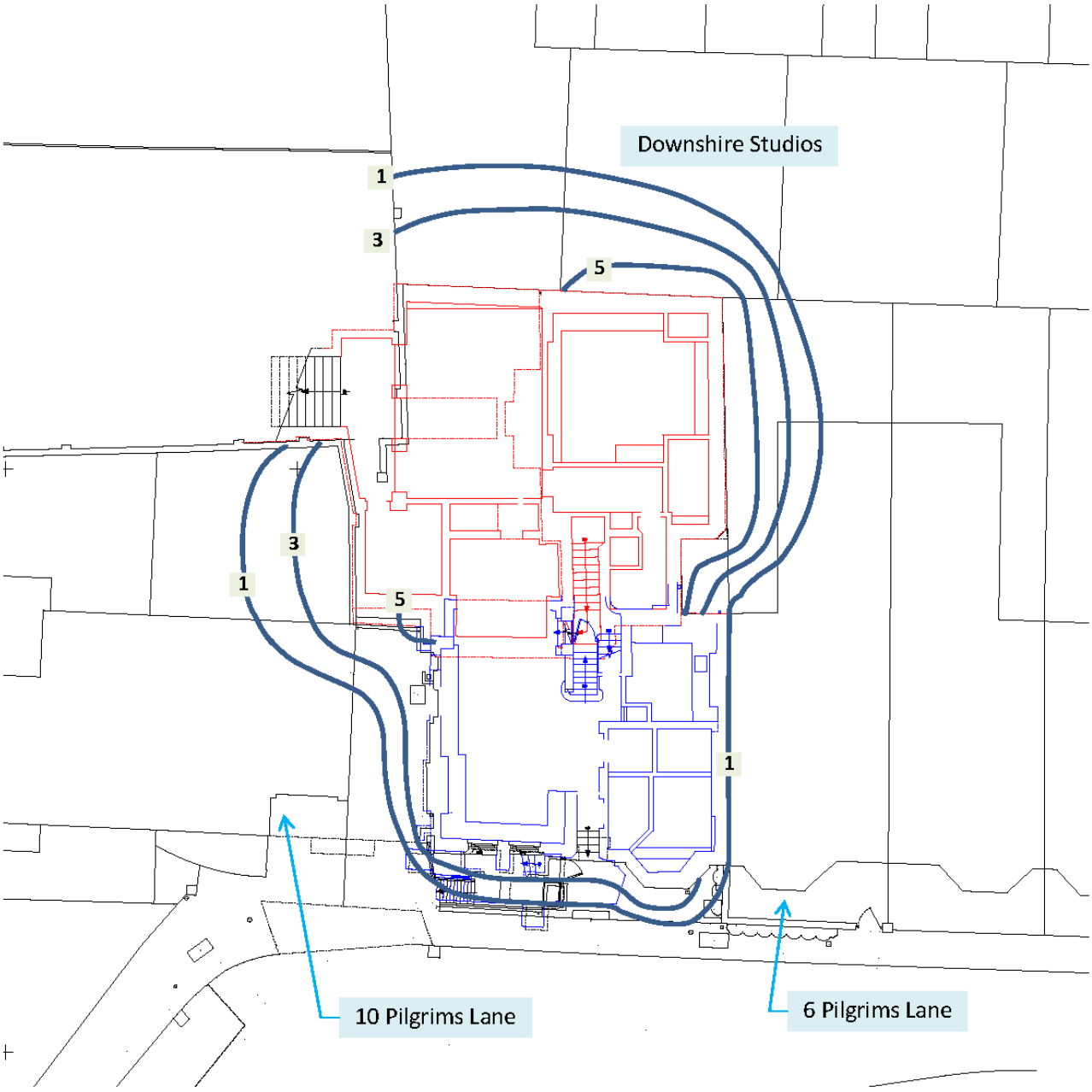


Figure 4: Contours of ground settlement after basement excavation (in mm)

4.2 Associated Damage Category

4.2.1 6 Pilgrims Lane

With respect to the deeper excavation at the rear of 8 Pilgrims Lane, the largest shown contour (5mm) passes through the patio area of number 6 Pilgrims Lane. The structure in this area sees settlements of the order of 3mm and decaying to 1mm across half the length of the back wall (L) where critical distortions occur. This leads to hogging distortion of the back wall and the maximum relative deflection (Δ) is taken as 2.0mm over this distance. The building geometry in this orientation is taken as L = 3.9m, H = 6.5m (to eaves). L represents a single structural unit of the traditional masonry.

This then leads to a deflection ratio of 2.0/3900 = 0.051%. The horizontal strain is calculated from the excavation phase only for the underpinned sections and so the deep section gives a value of 1.4/3900 = 0.036%.

The shallow excavation section has a more controlled movement due to the footing being left in-situ without underpinning, albeit with some alteration to the side support as previously discussed. This leads to smaller distortions as shown in figure 4. This not critical with respect to the Damage Category evaluation for the structure of number 6 Pilgrim's Lane.

The results for the worst case as described above are plotted in figure 5 below and this indicates that the local Damage Category is classified within (1) or 'Very Slight'.

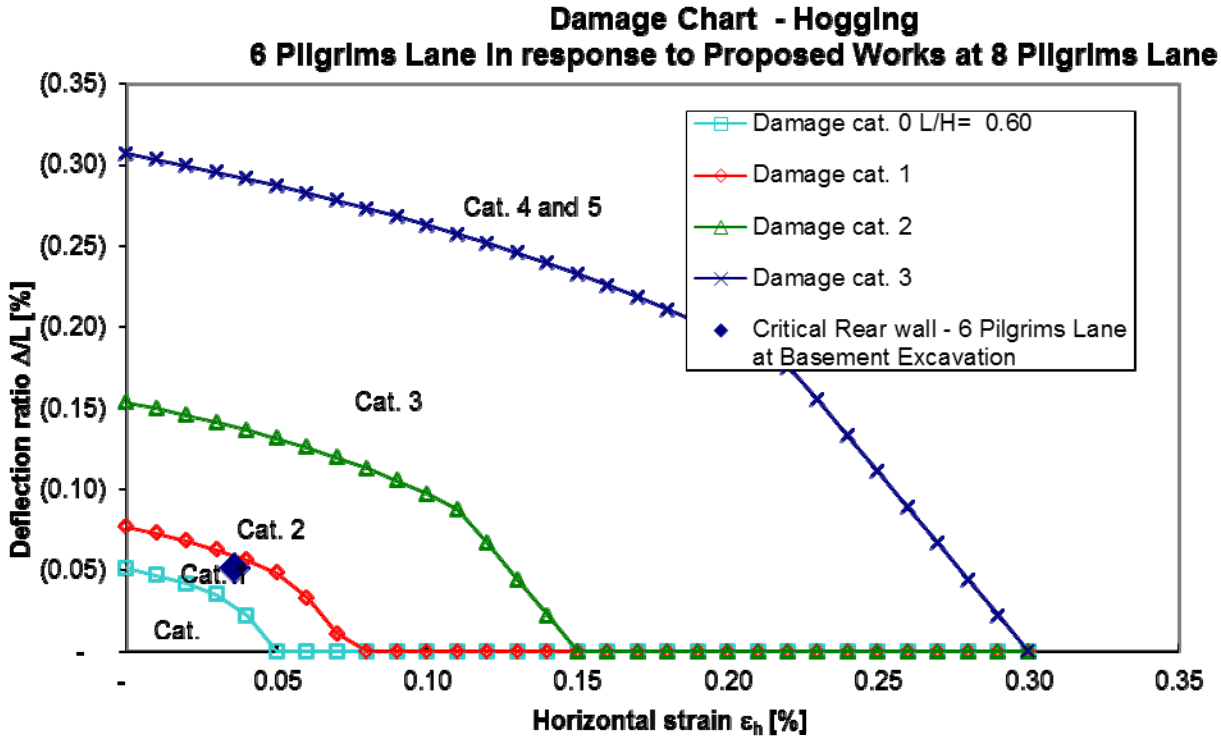


Figure 5: Damage Category Assessment for (critical) rear wall of number 6 Pilgrim's Lane

4.2.2 10 Pilgrims Lane

The structure of 10 Pilgrim's Lane is not a traditional old masonry structure and may be a frame structure in steel or concrete which may provide the structure with more resilience. The length L of the structural unit for that part of the structure adjacent to number 8 Pilgrim's Lane is assessed here as that half of the Site with the same sloping roof configuration, i.e. ignoring the arched roof section. From this the values L = 9.6m and H = 6.5m are adopted.

The Party Wall along the shallow section underpinning experiences a total settlement of 5.25mm as a direct result of the underpinning action and excavation and as already described. The settlement at the other end of the structure (distance L) is negligible. The relative deflection (Δ) is given by some value less than 5.25mm but is conservatively taken here as 5.25mm. This then gives, for the front façade, a deflection ratio of 5.25/9600 = 0.055%. The horizontal strain is calculated from the excavation phase only for the underpinned sections and so the shallow section gives a small value

of 0.25/9600 = 0.0026%. These results give a Damage Category of (1) or 'Very Slight' and as shown in Figure 6 below.

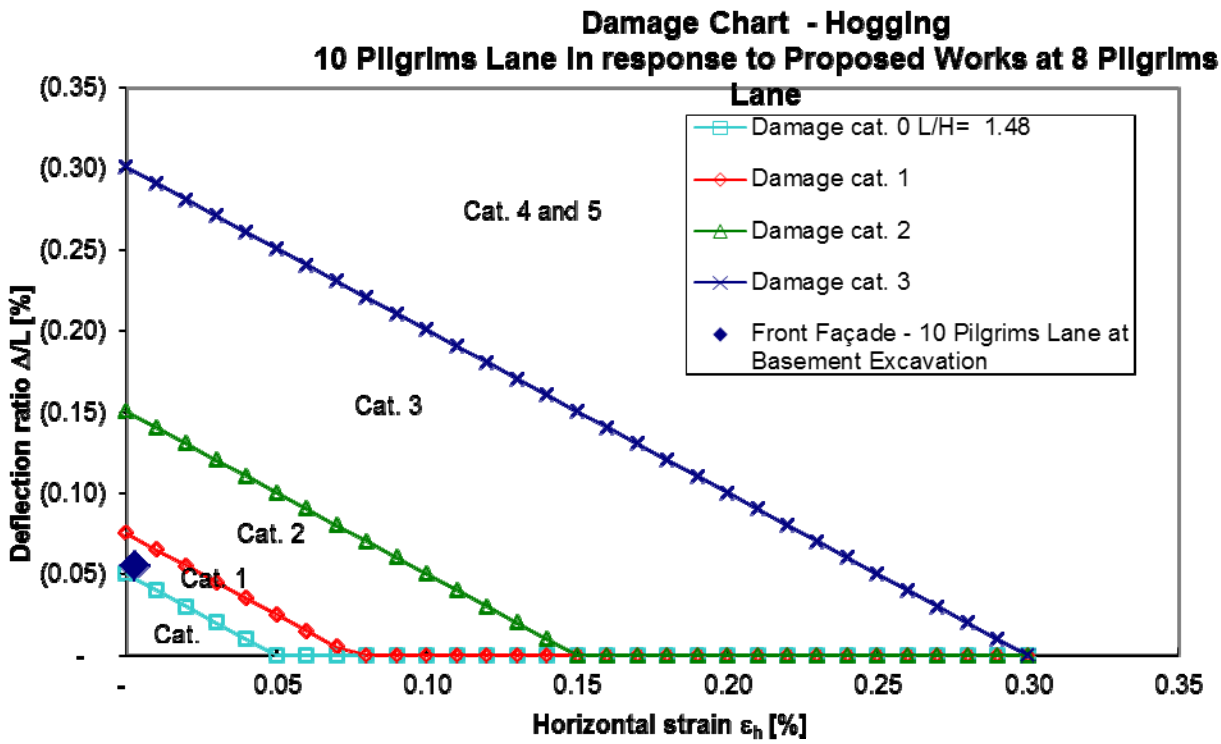


Figure 6: Damage Category Assessment for (critical) front façade of number 10 Pilgrim's Lane

The rear façade of 10 Pilgrim's Lane is potentially affected by the 6.4mm of settlement of the footing underpinning, being marginally more than that for the shallow underpins. However the nature of the movements are more spread throughout the structure near this location and also the footing occurs at a corner of the number 10 structure which reduces both movements and their effects on the structure. For this reason the Damage Category Assessment for the structure is considered to be given by the result for the front façade as described. The garden walls are also subject to the effects of ground movements and with total movements of 3.5mm for the adjacent piling work these too are likely to fall within the bounds of the assessed Damage Category though it should be noted that the ease of repair, i.e. re-pointing, of these walls is much greater than for the structure and the wall may benefit from this after the works if the existing mortar is loose at present. The Damage Category Assessment for number 10 Pilgrim's lane is (1) or 'Very Slight'.

4.2.3 Downshire Studios

The Downshire Studios wall is located immediately behind the deep underpinning section and this area of the structure is most at risk of applied ground movements. The underpinning section moves a predicted 6.4mm. The Greig-Ling drawing shows that the Studios wall is separate from the underpinned wall and so the expected movements beneath its footing will be smaller. The precise geometry of the footing is not known but a settlement of 5mm and as shown by the contour is considered representative.

The building geometry in this orientation is taken as L = 8.4m, H = 5.0m (to eaves). L is measured perpendicularly away from the Site. The settlement at the other end of the structure (distance L) is negligible. The maximum relative deflection (Δ) is taken from the worst section contour curvature at the corner and as 4mm (worst case). This gives a deflection ratio of 4/8400 = 0.048%. The horizontal strain is calculated from the excavation phase only for the underpinned sections and so the deep section gives a value of 1.4/8400 = 0.017%.

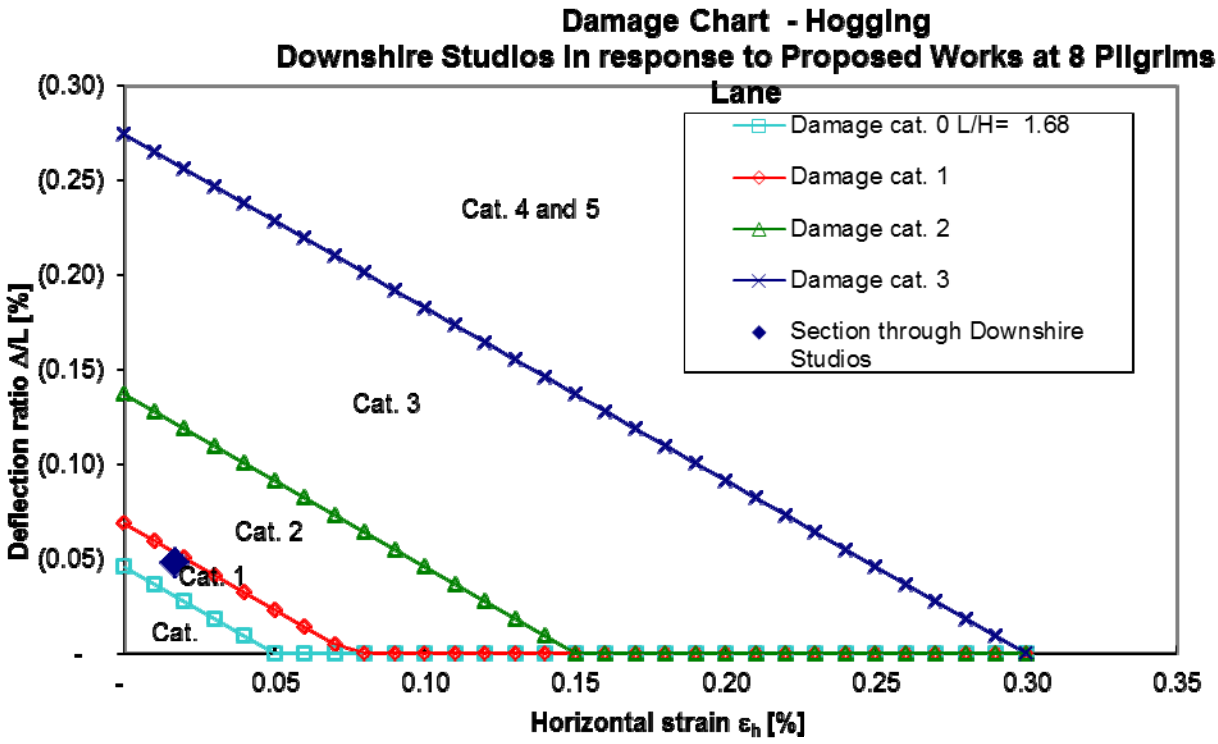


Figure 7: Damage Category Assessment for (critical) section through Downshire Studios taken away from the Site

The result for the Damage Category Assessment of Downshire Studios is given in figure 7 and this shows Damage Category (1) or 'Very Slight'.

5 Summary

This report has described theoretical estimates of ground movements and those that may be experienced by structures outside of the new basement excavation for number 8 Pilgrim's Lane. With respect to neighbouring structures beyond the Site boundary, these estimates are likely to be conservative and they ignore soil-structure interaction that is likely to be beneficial. The following has been determined:

- Variability in ground movements due to such basement works occurs in relation to the quality of workmanship in addition to the analytical and predictable assumptions that are offered as part of the assessment offered here. The results should be read in the context of known achievable levels of accuracy and as described. The assessment necessarily assumes a competent Contractor providing an acceptably good level of workmanship for all the processes involved in basement construction at this Site of known and investigated ground

conditions. Some particular associated assumptions and construction requirements are described in this report;

- The combined greenfield ground movements accumulating after basement excavation have been derived and then traced and plotted. These are all ground settlements outside of the basement excavation area. The maximum derived cumulative settlement at any location was approximately 6.4mm and the maximum derived settlement beneath an adjacent structure is given by the Party Wall structure where this is underpinned and is 5.25mm;

- The adjacent structure of number 6 Pilgrim's Lane experiences Damage Category (1) or 'Very Slight' in response to the proposed new basement works;

- The adjacent structure of number 10 Pilgrim's Lane experiences Damage Category (1) or 'Very Slight' in response to the proposed new basement works;

- The adjacent structure of the Downshire Studios experiences borderline Damage Category (1) or 'Very Slight' in response to the proposed new basement works;

- Other neighbouring structures would remain in Damage Category (0) or 'negligible'.

RKD Consultant Limited 1st November 2012