Chelmer
Consultancy Services
'Groundbreaking Services'

Damage Category Assessment

Site	67 Goldhurst Terrace London NW6 3HB
Client	Etch Design Ltd
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This report must be read in its entirety in order to obtain a full understanding of our recommendations and conclusions.

3.0 DAMAGE CATEGORY ASSESSMENT

3.1 When underpinning it is inevitable that the ground will be un-supported or only partially supported for a short period during excavation of each pin, even when support is installed sequentially as the excavation progresses. This means that the behaviour of the ground will depend on the quality of workmanship and suitability of the methods used, so calculations of predicted ground movements can never be rigorous. However, provided that the temporary support follows best practice as outlined in Section 10.4 of the BIA report, then extensive past experience has shown that the bulk movements of the ground alongside the basement caused by underpinning for a single storey basement (typical depth 3.5m) should not exceed 5mm in either horizontal or vertical directions.

3.2 In order to relate these typical ground movements to possible damage which adjoining properties might suffer, it is necessary to consider the strains and the angular distortion (as a deflection ratio) which they might generate using the method proposed by Burland (2001, in CIRIA Special Publication 200, which developed earlier work by himself and others).

3.3 The adjoining No.65 is approximately 0.35m higher than No.67. The proposed depths of excavation for the underpins to the 65/67 party wall, which formed part of No.65's basement, were 3.75-3.85m below internal floor levels (ground-bearing and suspended respectively) so the 3.4m proposed depth of excavation for No.67's basement will place the underpins at approximately the same level as those to No.65. Thus, no damage category assessment is warranted for No.65 and the adjoining terrace.

3.4 Trial pit TP1 at No.67 showed that its flank wall, to the rear of the cellar, was founded at a depth of 1.0m below ground level. No.69's flank wall is approximately 1.5m from No.67's flank wall (scaled from Etch Design's Drg No.ED/67GT/1003a) and the ground level is about 0.5m lower. No.69 has a cellar (which was flooded and being bailed out at the time of our inspection) which is assumed to have a similar geometry to No.67's cellar, located beneath the flank wall but not extending below the front porch or the rear projection. Both houses are assumed to have 1.0m deep footings to the flank walls of the porch, although it is possible that a deeper footing was used when the front corner of No.67 was re-built (see paragraph 2.4 in the BIA).

3.5 The PDISP analyses have predicted long-term displacements beneath the underpins to No.67's flank wall which ranged from about 2.5mm heave at the rear end to 4mm settlement alongside the existing cellar. The model doesn't allow for the stiffness of the underpins and their bases, so the range of displacements actually experienced is expected to be somewhat less. While there are internal transverse walls at/close to the centre of the main part of No.69, adjacent to the maximum anticipated settlement, the presence of the cellars at that location will reduce the depth of excavation to the extent that the 1.5m separation between the buildings should result in minimal impact of the proposed basement on No.69. Thus, the critical location for potential impact of the proposed basement on No.69 will be on the line of the front wall, so a damage category assessment has been made for that location.

No.69 Front Wall:

3.6 Ground movements associated with the construction of retaining walls in clay soils have been shown to extend to a distance up to 4 times the depth of the excavation. The relevant geometries are as follows:

Depth of excavation below No.69's footing (assumed) = 3.4 – 1.0 – 0.5m
(= excavation depth – footing depth – GL difference) = 1.9m

Width (L) = 1.9 x 4 = 7.6m, so the ground movements are only likely to extend part way beneath No.71.

Height (H) = 8.7m to eaves level + 1.0 footing = 9.7m

Hence L/H = 0.78 = approx. 1.0

Thus, for an anticipated 3.5mm maximum horizontal displacement (reduced pro-rata to the limited depth of excavation), the strain beneath No's 69 & 71 would, theoretically, be in the order of $\varepsilon_h = 4.6 \times 10^{-4}$ (0.046%).

3.7 The settlement predicted by the PDISP analysis at the front end of No.67's flank wall, allowing for the stiffness of the underpin base, is expected to be about 3mm; this must be added to the typical settlement caused by relaxation of the ground alongside the basement in response to excavation of the underpins, giving approximately 6.5mm total predicted settlement of the ground at the level of No.69's footings. The settlement profile is expected to be convex with a worst case (low stiffness) deflection, Δ = 17% of the predicted combined settlement profile. Hence, Δ = 1.1mm, which represents a deflection ratio, $\Delta/L = 1.45 \times 10^{-4}$ (0.015%).

3.8 Using the graphs for L/H = 1.0, which is slightly conservative, these deformations represent a damage category of 'very slight' (Burland Category 1, ε_{lim} =0.05-0.075%), as given in CIRIA SP200, Table 3.1, and illustrated in Figure 8 below.

3.9 Use of best practice construction methods, as outlined in the BIA report, will be essential to ensure that the ground movements are kept in line with the above predictions.

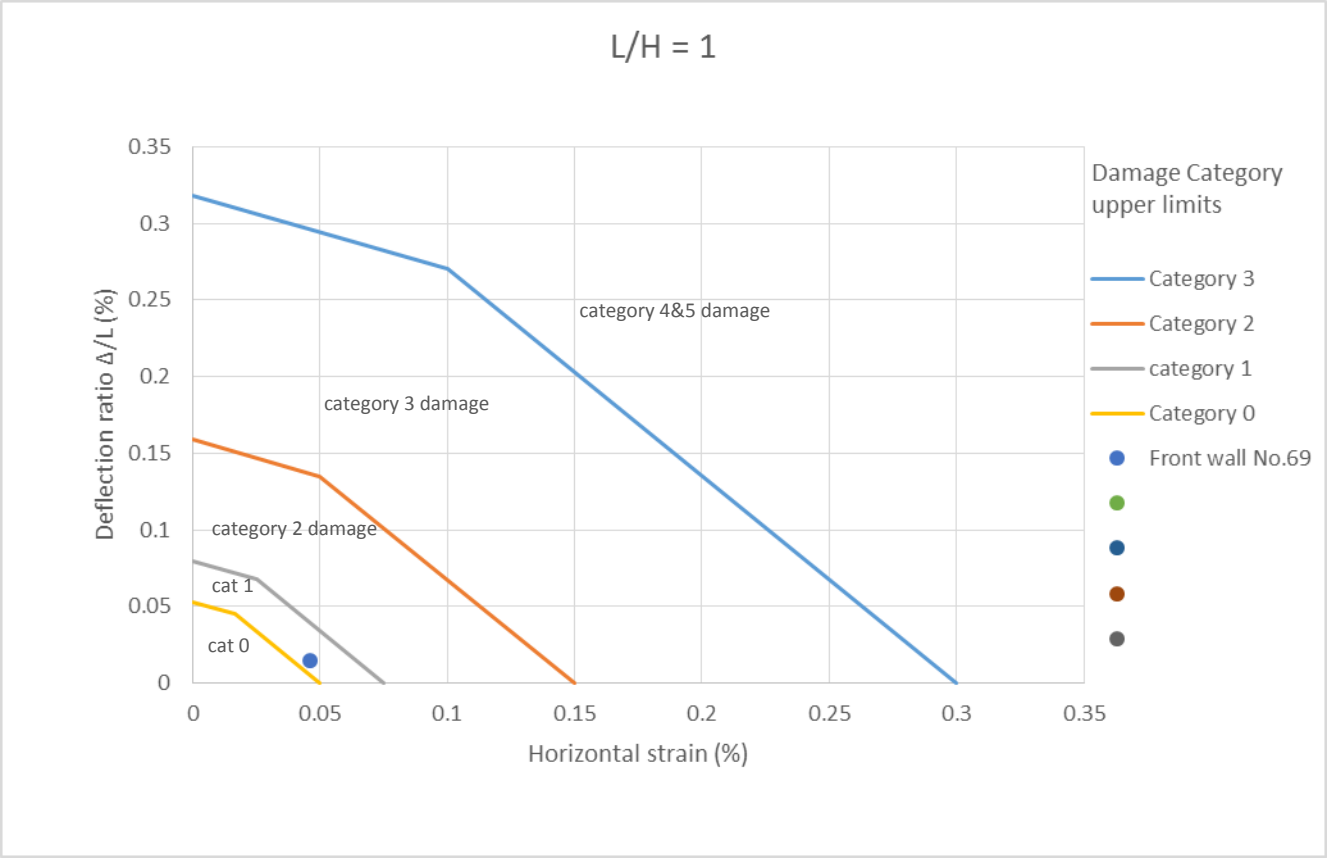

Figure 8: Damage category assessment for front wall of No.69 (and part of No.71).

3.10 3mm of settlement was also predicted just behind the cellar, on the line of the rear wall of the main part of the house. However, the area concerned was tiny so 2mm to 2.5mm of settlement is considered more likely in that area (see figure 7), giving a less critical situation for the rear wall of the main part of the house than has been analysed above for the front wall.

3.11 Similarly, no separate analysis was considered warranted for the rear wall of No.69's rear projection because the heave predicted by the PDISP analyses beneath/alongside No.67's rear projection will largely be offset by the settlements caused by slight relaxation of the ground alongside the basement excavations.

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