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Tustin Estate Low Rise Repairs

Executive Summary, Manor Grove

200535/J Ham

Approved By: N Nicholls

Date: 08 Jun 2021

Status: For Information

Version: 1.1

Conisbee has been appointed by Southwark Council to investigate subsidence at 81 Manor Grove and to propose remedial works to stabilise the structure. The defects are to be considered in the context of the broader Manor Grove development (part of Tustin Estate) which comprises 49 properties, of which 18 remain in the ownership of Southwark Council.

The structure comprises load bearing brickwork walls, a ground bearing concrete slab, an internal load bearing timber stud wall, and suspended timber first floor and roof joists. There is a non load-bearing lightweight blockwork wall at first floor level, built off the timber joists, as well as other non-load bearing partitions. A previous report on the defects, by engineers Calford Seadon, discusses potential influencing factors, but remains inconclusive in the absence of intrusive investigations. Findings of the previous report may be superseded by the contents of this document.

Intrusive investigations at Manor Grove indicate that the flank walls and party walls comprise the main structural elements, between which the suspended structures span, and which bear on deep foundations. The front and rear elevations and ground bearing slab have shallow footings and bear on made up ground. The movement has occurred as a result of the shallow foundations subsiding relative to the party and flank walls.

This is considered structurally significant only at 81 Manor Grove. 81 Manor Grove has been previously underpinned at the front and rear elevations. It appears that the ground floor slab and internal load bearing wall remain inadequately supported and should be remedied by stabilisation works or internal re-construction.

At the other properties showing minor cracking, periodic re-pointed should be carried out to manage water ingress and weathering that could lead to further deterioration. There is some cracking to garden boundary walls, but this is not considered structurally significant and brickwork repairs should be carried out for durability.

According to the sequencing of investigations our reporting comprises the following documents as contained within this final report:

- Structural Appraisal Report.
Written following initial inspections.
Includes Appendix A, Approximate Cost Estimates.
- Structural Addendum Report.
Written to discuss the findings of the initial intrusive investigations by others.
- Second Structural Addendum Report.
Written following the completion of intrusive investigations of sub structure via trial holes.

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Tustin Estate Low Rise Repairs

Structural Appraisal Report – Manor Grove

Ref: 200535/J Ham

Approved By: N Nicholls

Date: 08 Jun 2021

Status: For Comment

Version: 1.3

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1.0 INTRODUCTION

- 1.1 Conisbee has been appointed by Sophie Hall-Thompson of Southwark Council, which was organised by Robert Forrest of Hunters. Our brief is to investigate the cracking to external brickwork walls at Manor Grove and propose remedial structural works, as well as commenting on the general structural condition of the buildings. Our scope is limited to the eighteen houses which remain in the ownership of Southwark Council.
- 1.2 We were asked to report on the structural condition of 81 Manor Grove in particular – a property which has been void for a number of years due to its structural condition. Investigations at 81 Manor Grove, internal inspections of a representative sample of rented properties and a general external visual inspection of Manor Grove houses from public areas form the basis of our report.
- 1.3 James Ham of Conisbee attended site to carry out an initial external visual inspection on 31st July 2020. A follow up inspection with internal access was carried out on 14th August 2020. Finishes had been removed in a void property, 81 Manor Grove, prior to our inspection. At the other properties visited the inspections were visual only.
- 1.4 This report is intended for the use of our client, Hunters, and their client, Southwark Council, and no liability can be accepted for use by any third party. Furthermore whilst this investigation has been taken far enough to satisfy the requirements of the brief, it has, of necessity, not been exhaustive. The findings cannot therefore be warranted to apply to areas of the building not inspected or investigated.

2.0 PROPERTY TYPE, CONSTRUCTION & CONTEXT

- 2.1 Manor Grove comprises nine rows of terraced houses on the Tustin Estate, Peckham. The houses are two storeys high, with some rows linked by suspended first floors bridging over the ground level footpaths. Manor Grove is divided into two clusters of houses by a central area for car parking and garages.
- 2.2 Construction comprises load bearing brickwork external and party walls. Stretcher bond brickwork indicates the external walls are cavity wall construction. There is an internal load bearing timber stud wall at ground floor level. At first floor level there are non-load bearing blockwork partitions. Floors and flat roofs are suspended timber joists. The suspended first floor bridges are of concrete slab construction. Reinforced concrete beams and lintels feature an exposed aggregate external surface.

- 2.3 There appear to be three archetypes among the properties on Manor Grove. The most numerous type is the terraced house which is the focus of this report. This archetype is generally found facing onto the north-south walkways, as well as numbers 79 and 81 at the west end of the estate. The other two types are north facing and located along the east-west walkways. These feature more exposed concrete elements and recessed front doors.
- 2.3.1 The properties of the most numerous archetype are in handed pairs (see Photograph 1). At the front elevation there are two doors at ground floor level, including the larger front door and a smaller door to an external cupboard, and there are two window openings at first floor level. Flank walls are generally plain brickwork with a single first floor window. The rear elevation comprises a reinforced concrete beam spanning from flank wall to party wall and supporting first floor brickwork and windows (see Photograph 2).
- 2.4 A significant proportion of the property freeholds have been sold by Southwark Council. Those properties where freeholds remain the property of Southwark Council include 1, 3, 9, 19, 21, 27, 31, 33, 35, 61, 73, 79, 81, 83, 89, 93, 95 and 97 Manor Grove; only these properties are within the scope of this report. The distribution of the Southwark Council owned properties is shown in Figure 1 below:



Figure 1 – Distribution of properties under the ownership of Southwark Council.

- 2.5 We were provided with archive reports by Calford Seaden investigating the defects at 81 Manor Grove. The observations and photos provided insight into the nature of the defect prior to the site visit, however the reports did not seem to conclusively identify the underlying causes of the defect. No investigations were carried out into the extent of foundations and ground conditions.
- 2.6 The Martech Test Report, ref 19130 and dated 8th January 2020, provides useful site and laboratory testing data on cover, carbonation and chloride characteristics of the concrete. The details will inform the specification of concrete repair details.

3.0 OBSERVATIONS

3.1 General:

3.1.1 There is a repeated pattern of diagonal and horizontal cracking through mortar joints. This occurs between the two door openings in the front elevation. Diagonal cracking extends upwards through mortar joints from each of the two door openings, meeting in the centre of the brickwork panel (see Photograph 3). At some properties the mortar joints which have opened have been re-pointed. At some properties the cracks have reopened. The following properties are affected:

- 39 Manor Grove (privately owned)
- 79 Manor Grove (property of Southwark Council)
- 81 Manor Grove (property of Southwark Council)
- 83 Manor Grove (property of Southwark Council)
- 85 Manor Grove (privately owned)
- 87 Manor Grove (privately owned)
- 89 Manor Grove (property of Southwark Council)
- 91 Manor Grove (privately owned)
- 95 Manor Grove (property of Southwark Council)

3.1.2 We note that some of the properties are no longer in the ownership of Southwark Council and are therefore beyond the scope of this report. We include them in this list for completeness and to give a reflection of the condition of the buildings across the estate.

3.1.3 At some properties there is localised damage to the low level brickwork at door openings (see Photograph 4).

3.1.4 Brickwork at the base of load bearing walls can be seen to continue below the paving finishes. At the non-load bearing front elevations, the blockwork appears to be built off the grounds floor slab which is visible above the paving finishes (see Photograph 1). At party walls there is a crack to each side of the 9 inch brickwork party wall, indicating the interface between the brickwork and concrete floor slab (see Photograph 5).

3.1.5 The externally accessed cupboards appear to be located under the stairs (see Photograph 6). The enclosure of the cupboard appears to be formed with concrete walls and sloped top. It is not understood how this relates to the internal staircase which appears to be a timber structure. When viewed from the outside there is some cracking at the interface between the concrete and the inside face of the brickwork.

3.2 81 Manor Grove:

- 3.2.1 The floor and roof structures were exposed by complete removal of ceiling finishes. The roof comprises 240mm deep joists spanning from party wall to flank wall with no intermediate support. The joist ends are supported by a steel angle fixed into the brickwork walls (see Photograph 7). There are mid-span timber herringbone noggins, but no noggins at the supports.
- 3.2.2 The first floor structure comprises 165mm timber joists spanning from brickwork walls and supported by a load bearing timber stud wall between living room and kitchen (see Photograph 8). The joists are spaced according to the span and loading. The spacing is wider over the narrower kitchen and joists are closed up below the water tank.
- 3.2.3 Non-load bearing partition walls at first floor level comprise 75mm blockwork built off the first floor floor boards. The blockwork walls are not located over the walls at ground floor.
- 3.2.4 The first floor appears to slope down towards the internal load bearing wall.
- 3.2.5 In the kitchen the tiled floor seems to slope down away from the flank wall.
- 3.2.6 There is significant horizontal cracking to the inner face of the external wall across the stairway (see Photograph 9). In the cupboard below the stair there is diagonal cracking from ground level, corresponding to the external cracks (see Photograph 10).
- 3.2.7 There is staining to the roof joists around the rainwater gulley on the roof, indicating historic leakage. The roof build-up appears to comprise “wood wool” or Stramit boarding which may have been weakened by the water ingress.
- 3.3 79 Manor Grove:
- 3.3.1 The pattern of cracking observed in 81 is repeated in 79, but to a lesser extent. The cracks appear to have been progressively filled over time, but have not significantly reopened. Doors on the first floor landing are out of square but have been adjusted to fit, reflecting a fall in the floor towards the internal load bearing wall.
- 3.4 Other properties:
- 3.4.1 Three further properties were inspected internally and externally. The form of construction is identical to the observed at 79 and 81 Manor Grove. There were no visible defects of a similar pattern to that observed at 79 and 81 Manor Grove.

4.0 OTHER OBSERVATIONS

- 4.1 There is widespread spalling of concrete at the lower edges of the first floor concrete slabs bridging over the access walkways (see Photograph 11). Similar cracking is visible at the edges of isolated lintel elements. Corroding bars indicate inadequate concrete cover.
- 4.2 There is vertical cracking in the brickwork below the bearing of first floor bridging concrete slabs (see Photograph 12) and at joints between concrete elements.
- 4.3 At flank walls there is a brickwork projection which extends beyond the first floor concrete beam. At some properties this is in poor condition (see Photograph 13).
- 4.4 Alterations have been carried out at some window openings, where they have been closed up with infill brickwork. The brickwork is generally poor quality and is not toothed into the surrounding reveals. (see Photograph 14)
- 4.5 Boundary walls were found to be in poor condition. There is vertical cracking for the full height of the wall which has been repointed. There is a damp proof course just above ground level above which there is some lateral displacement in places, (see Photographs 15 and 16)

5.0 DISCUSSION

- 5.1 The front elevation and internal load bearing wall appear to be built off the ground floor slab. The top of the slab can be seen above the paving finishes and cracks indicate the interface between slab and load bearing walls. The ground floor slab seems to have dropped relative to the load bearing walls, along with the front elevation and inner load bearing wall. As support was reduced to the front elevation the central brick pier (between the two door openings) has dropped whilst the remainder of the elevation has corbelled out from flank and party walls. The corbelling from both sides appears to have joined above the central pier, forming an arch in the upper elevation.
- 5.2 This defect mechanism is also illustrated by the tiled kitchen floor in No. 81 which appears to fall from the flank wall, where it is hooked up on the foundation, to the centre where ground floor slab is lower. Where the brickwork is damaged at door openings, it seems to be a similar pattern of reduced support to the brickwork and corbelling in the courses above.
- 5.3 The brickwork continuing below the paving finishes indicates that the party and flank walls are built off deeper foundations, thought to comprise mass concrete strips. These walls support the first floor rear elevations, the roof and the outer ends of first floor joists. There is no evidence that these elements have been affected by structural movement.

- 5.4 The ground floor slab is thought to be on a shallower foundation than the load bearing walls, making it more susceptible to movement. This appears to be a consistent construction detail which applies to all properties, though it is not clear why it has occurred at some and not others. Findings from further investigations may help to clarify this.
- 5.5 The progressive repairs visible at 79 Manor Grove indicate that the movement may have taken place gradually over a longer period of time, possibly a consequence of long-term settlement, rather than subsidence due to local factors.
- 5.6 The underlying causes cannot be discerned from visual inspection alone and require further investigations to expose relevant structural details. It was reported by a representative of Southwark Council present on the internal inspection that there may have been a large accumulation of books at first floor level in No. 81, potentially exacerbating the defects.
- 5.7 Local drainage should be surveyed in case there are any defects affecting the ground conditions. There are no nearby trees which could be significant.
- 5.8 According to Building Research Establishment guidelines, the widest cracking observed is classified as Class 2 – up to 5mm wide. For Class 2 BRE states:
- Cracks easily filled. Recurrent cracks can be masked by suitable linings. Cracks not necessarily visible externally; some external repointing may be required to ensure weather-tightness.*
- 5.9 The movement is not considered to make the structures unsafe, but defects should be repaired to mitigate water ingress that could lead to additional defects.
- 5.10 The other defects observed at Manor Grove include brickwork cracking and deterioration of reinforced concrete. These generally result from poor detailing and durability defects and do not represent structurally significant problems. Repairs may be carried out with normal building repair techniques.
- 5.11 A common defect in buildings of this type and age is inadequate or damaged wall ties between inner and outer skins of the cavity wall construction. There were no visible defects indicating that this is a problem, but if the client requires assurance of the longer term condition of the buildings, wall cavity investigations could be undertaken.
- 5.12 The cracking to boundary walls appears to be a combination of inadequate movement joints and differential settlement. In the case of the former, long term thermal expansion and contraction has cracked long brickwork panels and in the case of the latter, shallow footings are likely to have settled differently over the length of long brickwork panels.

6.0 CONCLUSIONS AND RECOMMENDATIONS

- 6.1 The widespread pattern of cracking appears to reflect downward movement of the ground floor slab in each house relative to the load bearing brickwork walls. Structural elements supported by the ground floor slab have consequently dropped relative to those supported by load bearing brickwork walls, resulting in sloping floors, cracked masonry walls and out of square door openings. The cracking is not considered to be structurally significant, but repairs should be carried out to prevent water ingress and sustain the useful life of the buildings.
- 6.2 Remedial proposals are subject to the findings of further investigations into the underlying causes of the ground floor slab movement. Trial pits are required to provide the relevant information, including the depth of foundations and bearing stratum to the load bearing walls and ground floor slab. Trial pits should be undertaken at several locations around No. 81, and well as in various locations across the site to identify any discrepancy in ground conditions which make certain properties more susceptible to the movement. Defective drainage may be a factor.
- 6.3 As part of the next stage Conisbee will provide a sketch detailing the trial pits required. A CCTV survey of all drainage networks at Manor Grove should be carried out to identify and repair any damage which may be affecting the ground conditions.
- 6.4 As the cracking is minor at most properties it is likely it can be managed as a maintenance issue, with periodic re-pointing. There may be continued movement at some properties, however the reopening of existing repairs indicates that this is unlikely to be structurally significant.
- 6.5 Depending on findings of investigations, this maintenance strategy may also be applicable to No. 81. Alternatively, more intrusive remedial measures may be appropriate to manage progressive movement, such as localised underpinning of the front elevation and internal load bearing wall.
- 6.6 Damage to concrete elements results from durability defects and does not currently represent significant structural weakening. These defects may be repaired using normal concrete repair techniques. Standard repair materials tend to be of a monotone dark grey appearance. Should the client wish to match the existing appearance, the exposed aggregate appearance will be more difficult to replicate, but can be achieved with dyes and exposed aggregate finishes if required.

- 6.7 As the cover will remain low there is a residual risk of the defects reoccurring. This may be mitigated with protective coatings which can be coloured or clear, according to the client's requirements. Application of such coatings to all concrete elements across Manor Grove will mitigate the advancement of concrete durability defects, however the client should anticipate re-application of these finishes as well as some degree of concrete repairs on a cyclical basis.
- 6.8 Investigations undertaken by Martech detected chlorides in the concrete elements, but the concentrations are generally low, with an occasional reading in higher levels. Migrating corrosion inhibitors should be allowed for in the repairs to manage residual chloride content.
- 6.9 Should repairs expose any excessive corrosion of reinforcement bars, replacement bars are to be installed.
- 6.10 It is not structurally advisable to carry out concrete repairs to only one half of the overhead first floor concrete slabs. Each be treated holistically, rather than repairing only the half corresponding with the council owned property. In these instances the client may wish to consider shared costs with neighbouring freeholders which may have party wall implications.
- 6.11 The brickwork at Manor Grove houses is generally in good structural condition except for localised defects. These should be repaired with a combination of localised rebuilding and stainless steel helical bars to reinforce as necessary. An allowance for re-pointing should be included in the repair specification to cover making good to cracking and isolated weathering of mortar joints.
- 6.12 The projecting brickwork corners should be stabilised with stainless steel reinforcement to tie the coping bricks into the wall.
- 6.13 Where the vertical crack has occurred at the first floor concrete slabs damaged bricks should be cut out and replaced to match existing. Stainless steel bars should be installed every three courses, forming an L-shaped bar at a corner and a U-shaped bar at piers.
- 6.14 The cracking to boundary walls is not considered to be severe and may be managed as part of estate maintenance. Should the client require a more long term and durable solution more significant repairs are likely to be required, such as localised rebuilding, creation of movement joints and replacement panels in the most severe cases. Should replacement panels be required it is unlikely that the existing design will meet modern design standards and a new design may be necessary, including deeper foundation, piers and movement joints. For more significant repairs, trial pits should be investigated with trial pits to expose the depth of footings and bearing stratum.

6.15 Some timber repairs may be required where there has been historic water ingress. Structural roof timbers should be inspected for decay around the defective valley gutter, and the “wood wool”/Stramit should be checked for deterioration due to water ingress.

6.16 Cost Estimates

6.16.1 We have prepared cost estimates for undertaking the recommended repairs to blocks, based on their current condition. These are detailed in a separate document titled *Approximate Estimate for Concrete Repairs, Surface Treatments and Brickwork Repairs*, by David Parker dated January 2021. It should be noted that these estimates are for costing purposes only and are not prepared for tender.

6.16.2 Martech technical reports and cost plans were used to inform our cost estimates, appended to this report. It should be noted that our estimates supersede those by Martech following a more detailed assessment by our quantity surveyor as well as taking in structural works beyond concrete maintenance and repair contained within the Martech cost plan.

6.16.3 Due to the inconclusive nature of the CS (Calford Seadon) report, there may be some discrepancies between earlier cost estimates, based upon the CS report, and those based upon Conisbee investigations. The latter will be more accurate.

6.16.4 Cyclical maintenance will be required to sustain the protection provided to the concrete structures by the remedial systems used. Failure to do so will result in the protective coatings breaking down and the possibly resumption of concrete durability defects.

6.16.5 A typical outline maintenance regime may include visual inspection at year five to assess the condition of concrete structures. Providing products are performing as expected a further visual inspection at year ten (following the completion of repairs) along with redecoration with specialist concrete protective coatings. A similar cycle can then be anticipated, with a visual inspection at year fifteen, followed by a further visual inspection and a further round of redecorations. With a further five year period before the next round of visual inspections, the client may expect a design life of twenty-five years providing the maintenance plan of protective coating is observed.

7.0 PHOTOGRAPHS



Photograph 1 – No. 1 represents a typical terraced house at Manor Grove, forming a handed pair with No. 3 beyond.



Photograph 2 – Typical rear elevation.



Photograph 3 – Typical pattern of cracking at Nos. 79 (near) and 81 (far).



Photograph 4 – Low level brickwork cracking at No. 81.



Photograph 5 – Cracking at ground level indicates junction between load bearing party wall and ground floor slabs. Note diagonal cracking to brickwork on both sides.



Photograph 6 – Concrete lining to under-stair cupboard. Vertical crack indicates junction with brickwork.



Photograph 7 – Roof structure spans between load bearing flank and party walls at No. 81. Non-load bearing blockwork partition visible.



Photograph 8 – First floor joists span from load bearing walls to central supporting wall. Note spacing of joists reflects intensity of loading.



Photograph 9 – Horizontal crack across stair reflects horizontal cracks in external brickwork.



Photograph 10 – Internal cracking at understair cupboard reflects that viewed externally.



Photograph 11 – Spalling reinforced concrete slab edge.



Photograph 12 – Vertical cracking through brickwork at supports to concrete elements.



Photograph 13 – Projecting brickwork wall at supports to first floor rear beams.



Photograph 14 – Poor quality infill brickwork to window openings. Comparable window openings elsewhere appear to be full height, as this was assumed to have been.



Photograph 15 – Typical cracking to boundary walls.



Photograph 16 – Boundary wall with movement joint. Note repair and lateral displacement at damp proof course.

APPENDIX A – APPROXIMATE COST ESTIMATES

REVISED APPROXIMATE ESTIMATE

FOR

**CONCRETE REPAIRS, SURFACE TREATMENTS AND
BRICKWORK REPAIRS**

TO

EXTERNAL ELEVATIONS

AT

MANOR GROVE, TUSTIN ESTATE, LONDON, SE15 1EJ

FOR

LONDON BOROUGH OF SOUTHWARK

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JANAURY 2021

TUSTIN ESTATE, LONDON, SE15 1EJ

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1.00 INTRODUCTION

This report has been produced in order to provide an Approximate Estimate of Costs for carrying out essential concrete and brick repairs, sealant and treatment works to external elevations to Manor Grove on the Tustin Estate, London, SE15 1EJ for The London Borough of Southwark.

2.00 INFORMATION USED

The following information prepared by Conisbee has been used in formulating the estimate:

- Manor Grove structural report dated 24/08/2020.
- Manor Grove properties owned by Southwark Council.

3.00 BASIS OF ESTIMATING

The estimate has been set out on an elemental basis using quantities measured on site using allowances stated by Conisbee and priced upon current competitive tender return levels.

It has been assumed that the works will be carried out as one contract with an anticipated overall contract period of 4-6 months.

The location and vicinity of the other buildings has been considered in the preparation of this estimate.

Where concrete and brickwork repairs occur the repairs would be carried out to match existing including replicating existing profiles, drip details, existing textured and exposed aggregate finishes to all surfaces.

4.00	APPROXIMATE ESTIMATE OF COSTS		
4.00	MANOR GROVE (Units 1, 3, 9, 19, 21, 27, 31, 33, 35, 61, 73, 79, 81, 83, 89, 93, 95, 97 only)		
1.	<u>Inspection and testing</u>		
-	Surface preparation of concrete by means of high pressure water jet.		
-	- Concrete soffits to links (120m ²).	600	
-	- Concrete banding including lintel over door (436m ²).	2,200	
-	- Sides of soffits to links (36m ²).	200	
-	- Brickwork – Assumed not required.	-	
-	Visual and hammertap defects.		
-	- Concrete soffits to links (120m ²).	500	
-	- Concrete banding including lintel over door (436m ²).	1,200	
-	- Sides of soffits to links (36m ²).	300	
-	Visual inspection of brickwork and report including garden walls.	3,000	
		Subtotal 1	8,000
2.	<u>Concrete treatments/repairs</u>		
-	Cut out and repair defective concrete in small areas including reinforcement, reinstate to match existing.		
-	- Concrete soffits to links 120m ² x 5% = 6m ² .	2,400	
-	- Concrete banding including lintel over door 436m ² x 2% = 9m ² .	3,600	
-	- Sides of soffits to links 36 x 5% = 2m ² .	800	
-	Application of pore fillers/fairing coats, corrosion inhibitors, anti carbonation protective coatings.		
-	- Concrete soffits 120m ²	3,600	
-	- Concrete banding including lintel over door 436m ² .	13,100	
-	- Sides of soffits to links 36m ² .	1,100	
		Subtotal 2	24,600
3.	<u>Brickwork repairs to houses</u>		
-	Brick stitching/repointing to elevations of properties using helical bars to reinforce as necessary. Allow £2,000/property x 18nr.	36,000	
-	Sundry repointing works and repairs to elevations. Allow £700/property x 18nr.	12,600	
-	Repairs to projecting brickwork corners using stainless steel reinforcement.	10,000	
		Subtotal 3	58,600
		C/F £	

4.00	APPROXIMATE ESTIMATE OF COSTS (CONT)		
4.00	MANOR GROVE (CONT)		
		B/F £	
4.	<u>Brick repairs to garden walls</u>		
-	Take down and rebuild defective brick walls to houses 9, 19, 73, 79, 97, 95. Allow 28m ² in total.	9,000	
-	Allow brick stitching to houses, 33, 93.	1,000	
-	Allow to repoint walls generally. Allow 200m ² .	8,000	
-	Extra cutting out and replacing defective bricks (say 150nr).	4,000	
-	Take down and replace fence to Nr 81.	2,000	
	Subtotal 4		24,000
5.	<u>Underpinning external walls</u>		
-	Underpinning external walls excluded as awaiting trial pits results and design from Conisbee.		-
			115,200
	MAIN CONTRACTORS PRELIMINARIES		17,300
			132,500
	MAIN CONTRACTORS OVERHEAD AND PROFIT 10%		13,300
	CONTINGENCY 10%		13,300
	TOTAL MANOR GROVE COSTS		£159,100
5.00	EXCLUSIONS		
-	VAT @ 20%.		
-	Professional fees.		
-	Creation of movement joints in garden walls.		
-	Extensive repairs and repointing garden walls. Only essential repairs allowed.		
6.00	COSTS FOR THIRTY YEAR DESIGN LIFE		
	The below costs reflect current costs but over a 30 year period.		
6.01	<u>Manor Grove costs</u>		
a.	Visual inspection after 5 years from accessible areas.		1,500
b.	Carry out repairs and inspection after year 10 as section 4 costs above (excludes concrete repairs).		152,200
c.	Visual inspection after 15 years from accessible areas.		1,500
d.	Carry out repairs and inspection after year 20 as section 4 costs above (excludes concrete repairs).		152,200

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Tustin Estate Low Rise Repairs

Structural Addendum Report – Manor Grove

Ref: 200535/J Ham

Approved By: N Nicholls

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Status: For Information

Version: 1.1

1.0 INTRODUCTION

- 1.1 Conisbee has been appointed by Sophie Hall-Thompson of Southwark Council (organised by Robert Forrest of Hunters). Our brief is to investigate the cracking to external brickwork walls at Manor Grove, in particular at number 81, and propose remedial structural works. This report follows investigations and should be read in conjunction with our earlier report Structural Appraisal Report ref 200535/J Ham, version 1.2 dated 8th January 2021.
- 1.2 James Ham of Conisbee visited the site on two occasions: 25th January and 3rd February 2021. Trial pits were undertaken in accordance with Conisbee sketch 200535-SK-S-001, Manor Grove Trial Pits. Due to the depth of some foundations the second visit was required to return when the contractor had access to a mechanical excavator.
- 1.3 This report is intended for the use of our client, Hunters, and their client, Southwark Council, and no liability can be accepted for use by any third party. Furthermore whilst this investigation has been taken far enough to satisfy the requirements of the brief, it has, of necessity, not been exhaustive. The findings cannot therefore be warranted to apply to areas of the building not inspected or investigated.

2.0 PROPERTY TYPE, CONSTRUCTION & CONTEXT

- 2.1 Manor Grove comprises nine rows of terraced houses on the Tustin Estate, Peckham. The houses are two storeys high, with some rows linked by suspended first floors bridging over the ground level footpaths. Manor Grove is divided into two clusters of houses by a central area for car parking and garages.
- 2.2 Construction comprises load bearing brickwork external and party walls. Stretcher bond brickwork indicates the external walls are cavity wall construction. There is an internal load bearing timber stud wall at ground floor level. At first floor level there are non-load bearing blockwork partitions. Floors and flat roofs are suspended timber joists. The suspended first floor bridges are of concrete slab construction. Reinforced concrete beams and lintels feature an exposed aggregate external surface.
- 2.3 There has been a record of subsidence at some properties. We were provided with archive reports by Calford Seaden investigating the defects at 81 Manor Grove. The observations and photos provided insight into the nature of the defect prior to the site visit, however the reports did not seem to conclusively identify the underlying causes of the defect.

3.0 TRIAL PITS

- 3.1 Trial pits were specified by Conisbee on drawing *Manor Grove Trial Pits*, 200535-SK-S-001 (provided in appendix A). Additional briefing notes were provided in document *Trial Pit Briefing Notes*.
- 3.2 The scope includes eight trial pits. There are four trial pits focused on 81 Manor Grove. This property is the most critical case of movement on the estate and therefore has been targeted for detailed investigation of the three external elevations and internal floor slab. Two further trial pits are targeted at similar properties with a similar pattern of cracking to determine whether the defects are consistent among the archetype.
- 3.3 Two trial pits are required to investigate the garden boundary walls. The construction of these is likely to differ to the houses. The extent to which the walls are worth repairing will be influenced by the adequacy of the foundations, the bottom of which is to be exposed.

4.0 FINDINGS

- 4.1 Historic underpinning was revealed at 81 Manor Grove. It was not possible to confirm the depth to the front of the property due to obstructions in the ground. At the rear of the property the excavation hit a flat concrete surface at 1.65m below ground level. It is not clear what the concrete is, but it could be some overspill from the underpinning formwork. The depth to the bottom of the rear underpinning was unconfirmed.



Underpinning to the rear of 81 Manor Grove

- 4.2 No further underpinning was exposed at the other properties. The ground floor slab thickness was generally found to be 360mm to 380mm thick where exposed at the front of the two sample properties: Nos 83 and 93. At 93 Manor Grove the bearing stratum was inconclusive due to obstructions, but at 83 it was bearing on made up ground.



Ground slab bearing on made-up ground at 83 Manor Grove

- 4.3 The foundations to the flank wall at 81 Manor Grove are deep. And despite excavating to 2.0m the bottom of the flank wall brickwork was not found.



Deep foundations to the flank wall of 81 Manor Grove.

- 4.4 The foundations to the boundary walls were exposed in two locations. The locations were adjusted from those shown on the Conisbee drawing in order to avoid obstructions from buried services encountered during CAT scanning.
- 4.5 At the north side of the site the top of the mass concrete foundation was found at 1.64m below pavement level, but the depth of the concrete is unknown. At the south side of the site the mass concrete was 250mm deep with a bearing at 700mm below ground level. The top of the concrete was 40mm beyond the brickwork, suggesting a metre wide strip. The bearing stratum did not appear to be natural ground. In the vicinity of the south trial pit there is a significant vertical crack in the wall.



Shallow footing to the garden wall at the south side of Manor Grove, on the boundary with Kentmere House.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 81 Manor Grove:

- 5.1.1 The front and rear of 81 Manor Grove have been previously underpinned, apparently in response to the pattern of subsidence observed across Manor Grove, of which No. 81 is the most severe.
- 5.1.2 Contrasting mortar colours indicate previous re-pointing. The timing of the re-pointing is not known; it may have been carried out at the time of the underpinning or subsequently. In any event it has not significantly reopened.
- 5.1.3 At the rear elevation the windows to the right hand side of the timber beam end (indicating the end of the internal load bearing wall) appear to have dropped, superficially suggesting recent movement. Exposing the top of the windows to the left-hand side, the windows are tighter to the beam soffit over, and there is no evidence of cracking to the underpin that would suggest differential movement between the two. It therefore appears the windows to the right are poorly fitted, rather than showing evidence of further subsidence.

- 5.1.4 It seems that there is currently no evidence that there is an active problem and the front and rear elevations. It would be costly and difficult to carry out further underpinning as a precautionary measure. Informal monitoring should be carried out along with periodic pointing repairs as recommended for the other similar properties.
- 5.1.5 The brickwork of the flank walls indicates a deep footing, although the precise depth could not be confirmed. As there are no defects to the flank walls it is not necessary to investigate this further. It is possible that the underpinning to the front and rear matched the depth of the flank wall foundation. This is consistent with the understanding that the party walls and the flank walls are the main load bearing elements supporting the floors and roof (in addition to the internal loading wall).
- 5.1.6 Without carrying out the internal trial pit we cannot comment on subsidence within the building, potentially affecting the ground floor slab and the internal load bearing wall. It could be that although the perimeter may have been addressed, the ground bearing slab has not. The internal load bearing timber stud wall and the ground floor slab may bear on made-up ground and may have subsided further following underpinning.
- 5.1.7 We recommend that the internal trial pit is carried out. Until this is done we have insufficient information to comment on the stability of the internal structure or specify repairs.
- 5.2 Boundary Walls:
- 5.2.1 The garden perimeter wall findings were varied with one foundation of significant depth and one of shallower bearing on made-up ground. The deeper foundation is likely to be bearing on firmer clay and therefore be more resistant to seasonal changes in the ground conditions. Conventional brickwork repairs are more viable in this instance. The shallow footing is more susceptible to continued movement. It is structurally acceptable to carry out conventional brickwork repairs, but further movement is very likely, requiring periodic brickwork repairs. The risk of further movement may be mitigated by checks and maintenance of the local drainage and preventing any large trees becoming established in rear gardens.
- 5.2.2 If a new boundary wall were considered to reduce maintenance liabilities this would require a substantial footing, and in order to meet modern design requirements a wall of the same height as the existing would be of much more substantial construction than the current nine-inch brickwork wall. The client should consider the costs and benefits of regular simple maintenance work compared with the construction of a new wall. This should also be viewed in the context of other plans for the site. The shallow footing was at the boundary with Kentmere House, the redevelopment of which could present an opportunity to address the boundary walls.

5.3 Other Manor Grove Properties:

5.3.1 In the Conisbee *Structural Appraisal Report* we draw the following conclusion regarding the other Manor Grove properties (in addition to No. 81):

As the cracking is minor at most properties it is likely it can be managed as a maintenance issue, with periodic re-pointing. There may be continued movement at some properties, however the reopening of existing repairs indicates that this is unlikely to be structurally significant.

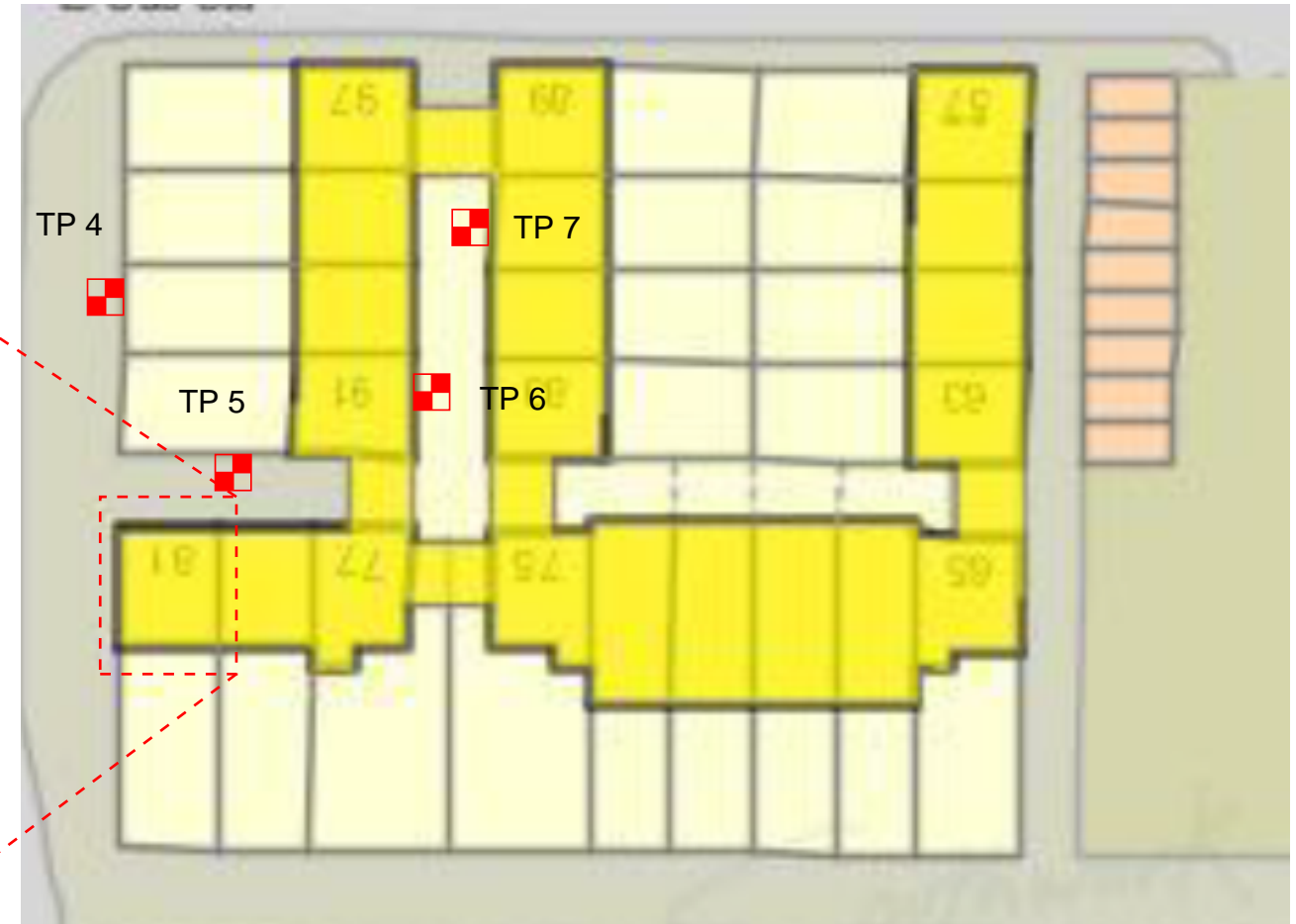
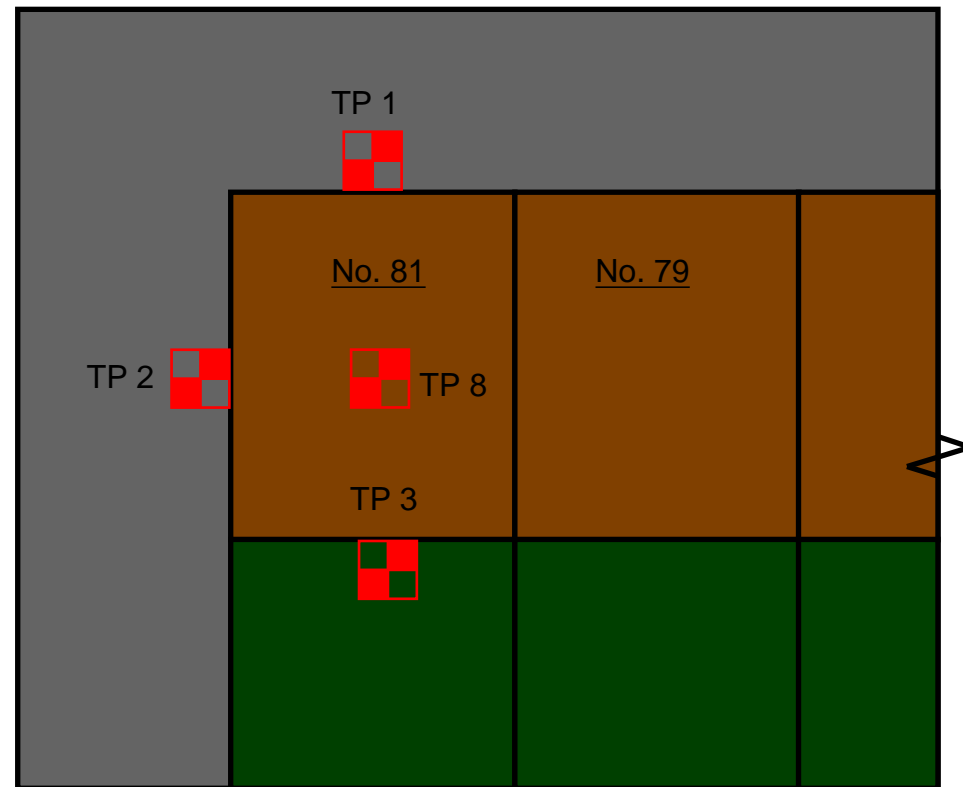
5.3.2 The internal inspections and the two trial pits to corroborate the findings at 81 Manor Grove support this conclusion. For a number of possible factors the movement is most significant at No. 81. These could be any or a combination of: it's relatively outlying location on the estate; local variation in ground conditions; and historic usage of the building (we were informed there was previously an excessive accumulation of the previous resident's possessions, particularly books, leading to very high loading). This appears to be an isolated case, and it does not appear that the other properties are likely to be similarly affected. There is, however, a residual risk as the form of construction is consistent. Some movement may be expected to continue, but it is not expected to be structurally significant and can be managed with periodic repointing to maintain durability.

5.3.3 The elements of the buildings with shallow foundations bear on made up ground comprising a mixture of granular waste materials from and clay from the time the estate was built. Consequently future movement could be affected by defective drainage, tree root action and extreme weather events. To mitigate these risks vegetation must be managed and drainage regularly surveyed and repaired as part of routine maintenance.

APPENDIX A – TRIAL PIT LOCATIONS

NOTES:

- CONTRACTOR TO CHECK FOR PRESENCE OF ASBESTOS CONTAINING MATERIALS PRIOR TO CARRYING OUT WORK.
- CONTRACTOR TO CHECK FOR PRESENCE OF SERVICES PRIOR TO EXCAVATING. CONISBEE ATTENDANCE TO COINCIDE WITH CONTRACTOR PRESENCE ON SITE TO DIRECT AND ADJUST TRIAL PITS AS REQUIRED.
- CONTRACTOR TO BRING APPROPRIATE TOOLS FOR BREAKING OUT CONCRETE/ASPHALT IF REQUIRED, SUCH AS ELECTRIC DRILLS AND BREAKER.
- CONTRACTOR TO ALLOW FOR REINSTATEMENT OF FINISHES AND FOR PROTECTION OF EXCAVATIONS SHOULD WORKS EXCEED ONE DAY ON SITE.



MANOR GROVE, WEST

TRIAL PITS:

TP1, TP3, TP6 AND TP7 - TRIAL PITS TO EXPOSE BOTTOM EDGE OF CONCRETE GROUND SLAB AND BEARING STRATUM.

TP2, TP4 AND TP5 - TRIAL PITS TO EXPOSE BOTTOM OF FOUNDATIONS AND BEARING STRATUM.

TP8 - TRIAL PIT TO BREAK THROUGH GROUND FLOOR SLAB IN CENTRE OF PROPERTY TO CONFIRM SLAB THICKNESS AND BEARING STRATUM. FOUNDATIONS NOT TO BE UNDERMINED.

TRIAL PITS IN REPRESENTATIVE LOCATIONS FOR PRICING PURPOSES - EXACT LOCATIONS TO BE CONFIRMED.

NOT FOR CONSTRUCTION

Rev	Date	Description	Drawn	Check
P1	02.09.20	Preliminary	JWH	NN
Drawing Status			Project No	
PRELIMINARY			200535	
Date	Drawn	Drawing No		
SEP 2020	JWH	200535-SK-S-001		
Scale	Engineer	Revision		
NTS	JWH	P1		

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Project

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Title

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Tustin Estate Low Rise Repairs

Second Structural Addendum Report – Manor Grove

Ref: 200535/J Ham

Approved By: N Nicholls

Date: 08 June 2021

Status: For Information

Version: 1.1

1.0 INTRODUCTION

- 1.1 Conisbee has been appointed by Sophie Hall-Thompson of Southwark Council (organised by Robert Forrest of Hunters). Our brief is to investigate the cracking to external brickwork walls at Manor Grove, in particular at number 81, and propose remedial structural works. This report follows investigations and should be read in conjunction with our earlier reports Structural Appraisal Report ref 200535/J Ham, version 1.2 dated 8th January 2021, and Structural Addendum Report ref 200535/J Ham, version 1.0 dated 19th February 2021.
- 1.2 James Ham of Conisbee visited the site on 13th April 2021. The internal trial pit was undertaken in accordance with Conisbee sketch 200535-SK-S-001, Manor Grove Trial Pits.
- 1.3 This report is intended for the use of our client, Hunters, and their client, Southwark Council, and no liability can be accepted for use by any third party. Furthermore whilst this investigation has been taken far enough to satisfy the requirements of the brief, it has, of necessity, not been exhaustive. The findings cannot therefore be warranted to apply to areas of the building not inspected or investigated.

2.0 PROPERTY TYPE, CONSTRUCTION & CONTEXT

- 2.1 Manor Grove comprises nine rows of terraced houses on the Tustin Estate, Peckham. The houses are two storeys high, with some rows linked by suspended first floors bridging over the ground level footpaths. Manor Grove is divided into two clusters of houses by a central area for car parking and garages.
- 2.2 Construction comprises load bearing brickwork external and party walls. Stretcher bond brickwork indicates the external walls are cavity wall construction. There is an internal load bearing timber stud wall at ground floor level. At first floor level there are non-load bearing blockwork partitions. Floors and flat roofs are suspended timber joists. The suspended first floor bridges are of concrete slab construction. Reinforced concrete beams and lintels feature an exposed aggregate external surface.
- 2.3 There has been a record of subsidence at some properties. We were provided with archive reports by Calford Seaden investigating the defects at 81 Manor Grove. The observations and photos provided insight into the nature of the defect prior to the site visit, however the reports did not seem to conclusively identify the underlying causes of the defect.

3.0 FINDINGS

- 3.1 The trial pit was excavated against the internal load bearing wall to investigate the slab composition, the bearing stratum and any thickening or strip foundation below the wall.
- 3.2 The slab thickness was variable and was found to be approximately 250mm thick, increasing to 350mm thick below the wall. This appears to be associated with construction tolerances rather than a thickening below the wall by design. The slab is bearing on made-up ground of variable composition, including clay and brick rubble.
- 3.3 The operatives reported that the concrete was harder to break through close to the wall, but this appeared to be coincidental. There were minor reinforcement bars in the slab, but nothing to indicate a ground beam or significant structure.



Internal trial pit carried out at 81 Manor Grove

4.0 CONCLUSIONS AND RECOMMENDATIONS

- 4.1 We have previously found that the main load bearing walls, including the party walls and the flank walls, are on a deep foundation. These walls do not exhibit evidence of movement and it appears they bear on adequate ground.
- 4.2 At 81 Manor Grove underpinning was undertaken at some time in the past, though it is not known when, at the front and rear elevations, apparently in response to cracking in the brickwork walls.

- 4.3 The fall in the first floor joists and the cracking in the ground floor slab indicate that although the front and rear elevations were underpinned, the load bearing wall in the centre of the dwelling, and the ground floor slab which supports it, were inadequately supported. This final stage of investigations appear to confirm this.
- 4.4 There is no evidence of significant continued movement in the front and rear elevations following the underpinning. Any hairline cracking in mortar joints is likely to be due to minor settlement following underpinning or shrinkage cracks in the mortar. There is a significant crack in the stairway reflecting the historic movement in the front elevation. It is thought that this crack has not been repaired since the underpinning was carried out.
- 4.5 There are two broad approaches to remedial works at 81 Manor Grove. One would aim to maintain and stabilise the existing fabric. This could potentially be achieved by resin injection into the made up ground to form supports to the ground floor slab. Such work is usually designed and undertaken by specialist subcontractors. More detailed information, such as gained by an intrusive site investigation and lab testing, may be required for the design process. Carrying out intrusive site investigations would represent additional delay and costs. This method may be expensive and some rebuilding is likely to be required in any event, such as replacing the wall between the kitchen and living room with something more substantial, levelling the first floor joists and replacing the diving wall between the two bedrooms with a timber stud partition. There may be more risk in advanced techniques such as this, and the variability of the ground conditions may make successful stabilisation more difficult.
- 4.6 Alternatively more conventional building techniques could be used as part of a substantial rebuild. A new line of support could be formed along the line of the existing load bearing wall, using either a beam spanning between existing walls or a line of mini screw piles, subject to detailed design. A suspended floor would span onto the new line of support to overcome the poor quality ground, potentially comprising timber joists or a block and beam system. The first floor would be supported by a new load bearing wall. The entire ground bearing slab would require removal, most likely requiring the removal of all stairs and first floor structure. This method would present the client with the opportunity to internally improve the house and potentially alter the layout. This method relies on more established building techniques, is likely to be quicker to procure and is considered likely to provide better value to the client as a preferred option. A budget estimate has been prepared by Hunters for this work.
- 4.7 The client should bear in mind that despite these remedial works, there is some residual risk of further movement in the front elevation. Whilst it is unlikely, we have not been able to verify the depth of the underpinning nor its design.

- 4.8 In both proposed scenarios some basic fabric repairs are required, such as external brickwork repairs and re-pointing. The open crack in the stairway should be repaired by dry-packing to close the gap. Apparent drainage defects from the flat roof should be investigated and repaired and affected timber checked for decay.
- 4.9 The repair strategy is proposed for number 81 only as the most severely affected dwelling inspected. In accordance with our earlier Structural Appraisal Report, the movement of a similar pattern observed at other houses on Manor Grove is not considered structurally significant at this stage. Periodic re-pointing should be carried out to maintain the durability of the buildings. Drainage should be kept in good order and vegetation managed to mitigate future subsidence issues.