# Confidential

# Hexagon Housing Association

**Board of Management**

**Report from the Development & Regeneration Director**

**27th September 2016**

**Agenda Item 11**

**Brickfield Cottages, Plumstead – Ground Collapse**

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#### 1.0 Summary

1.1 Following the ground collapse on 2nd May, there have been ongoing investigations and stabilisation works to the front and rear of Nos. 32 and 34, overseen by expert ground engineers – Peter Brett Associates (PBA). This was reported to Board at the previous two meetings.

1.2 We are now in receipt of PBA’s Background Deskstudy, Subsidence Ground Investigation, and Risk Assessment reports and have considered the content.

1.3 In summary, PBA have reported that based on their investigations there is evidence to suggest a mining legacy on the site. As a result of this, PBA have made a series of recommendations on how to reduce future hazards and mitigate risks.

1.4 In their risk assessment, PBA have reported a moderate to high risk of further ground collapse to roads / gardens in two locations (covering only five of 40 homes) on the estate where there is **evidence** to suggest historic mine workings / mining activity. The evidence being the ground collapse to 32 and 34 (South of the site), and the two voids discovered during the works affecting nos. 35,37,39,(North of the site). Nos. 28-36 remain unoccupied, and it is clear that Nos. 33-39 will need to be decanted for safety reasons, and to facilitate the further intrusive investigation required.

1.5 As there has *not yet* been any intrusive investigations undertaken to the rest of the estate, PBA are unable to provide a risk assessment of the likelihood of a further ground collapse in these areas (i.e. the majority of the estate).

Added to this, the (surface water) drainage strategy adopted on the estate (i.e. soakaways), is a feature of the risk profile for the potential of further ground collapse.

1.6 Following a lengthy meeting with PBA, and then further considerations at the next DG meeting, the Directors have decided that the best action to take is to decant the whole estate, as we cannot assess the risk of a further ground collapse, and therefore cannot assure residents of their safety as regards moving around the estate roads and gardens.

1.7 The logistics around how we will do this are still being worked through. We recognise this will not be easy due to the lack of properties Hexagon has access to so we will need to consider hotels (in the immediate short term), temporary housing and the private rented sector.

1.8 Residents have not yet been informed of this course of action (hence the confidentiality), we plan to do this at a residents’ meeting later this month.

1.9 There are significant cost implications as a result of the likely level of investigations and stabilisation works. This is likely to run into millions of pounds, only a small portion of which will be covered by insurance. We have assessed that if expenditure was greater than £6.4m (the NPV of the rental income plus grant), it would not be worth ‘fixing’ the problem, unless we could recover this from third parties. The potential for recovery from the original Ground Investigation consultants / Main Contractor etc. is currently being assessed by our lawyers at Devonshires. The insurer’s solicitors are also reviewing their chances of recovery.

1.10 At this stage, the timescales for decanting and carrying out the full extent of investigations and remedial works are unknown. However PBA have advised that we should assume 12 months.

1.11 The board will be kept fully informed of progress with regular reports.

Further details are provided within the report.

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#### 2.0 Recommendation

That the Board **note** this report.

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**3 PBA’s findings**

As noted in the summary above, PBA have thus far produced three reports; A summary of the reports is set out below;

**3.1 Background Desk Study (July 2016)**

3.1.1 Historical maps dating from 1842 indicate the presence of mining activity within the vicinity of the site relating to old brickworks and surface pits used for sand and gravel or chalk extraction. No maps have been found to show mining activity on the site itself.

3.1.2 Based on the available historic information, PBA consider it likely that it was between 1864 and 1895 when the surface excavations for clay and mining at depth for chalk would have been undertaken around Brickfield Cottages (4.12)

From the early 1900’s through to the late 1980’s a series of collapses, subsidence, and stabilisation works have taken place to surrounding areas.

3.1.2 The estate lies 4-6m below Rockliffe Gardens (to the south). Known mining took place on this adjoining site and there were two ground collapse incidents at Rockliffe Gardens (1938 and 1939) one of which resulted in a fatality. Surface depressions on the land are visible (6.2.2)

**3.2 Subsidence Ground Investigation Report (August 2016)**

3.2.1 PBA has concerns that the extent of survey undertaken by RSK (who carried out the original site investigation), was insufficient (i.e. not deep enough) considering the known mining history and mining depths of adjoining sites. Therefore, despite RSK confirming the absence of mining voids, PBA state “..confidence levels are low in terms of using the results to confirm the absence of mine workings.” (6.1)

3.2.2 The two voids which were encountered during the installation of piles for the foundations, were filled with concrete and was reported to the NHBC[[1]](#footnote-1). In PBA’s view, RSK should have been asked for their geotechnical advice and were not. Consequently, PBA consider that the various parties involved may not have fully understood the potential significance of finding voids in an rea known for past chalk mining.

3.2.3 RSK recommended piled foundations ending in chalk as a result of the ground conditions, expecting that chalk to be found 15-17m below ground. If chalk levels had been checked during piling the loss of shallow chalk would have been evident when the piles were installed below Nos. 32 and 34. RSK were mistaken in thinking that old chalk mine workings were not present under this site. In PBA’s opinion there was insufficient data to make that assumption and the ground investigation strategy and resultant interpretation was flawed. (6.1.6/6.1.7)

3.2.4 The intrusive investigations coordinated by PBA reveal weak/disturbed soils extending to considerable depth at 32/34. Without treatment to stabilise this soil the piles could fail leading to building damage, settlement movement or ground collapse. (6.1.8)

3.2.5 The results of the work undertaken are interpreted to show collapsed chalk mine workings. It is clear that the mine working extends further southwards,”.. left undetected and untreated the mine workings pose a significant health and safety threat to the stability of the adjacent parts of the development”*.* (6.1.9)

3.2.6 PBA consider there to be enough evidence to suggest a mining legacy on the site considering the location of the collapse and the voids found during work, and the historical shafts in Rockliffe Gardens.

3.2.7 PBA note that the presence of water could be a trigger for the collapse; Extended heavy rainfall, adoption of deep bored soakaway drainage, inundation from water main leakage are cited as potential triggers. (5.1)

3.2.7 PBA’s recommendations are

* Remedial ground stabilisation works (using grouting techniques) should be undertaken to Nos. 32 and 34.
* Data arising from the stabilisation works is used to supplement the developing ground model i.e. the known ground conditions
* Further ground investigations should be undertaken to establish the full extent of mined ground to check the stability of adjacent areas southwards and beyond 32/34.

**3.3 Risk Assessment (19th August 2016)**

3.3.1 PBA’s risk Assessment was issued to assist us with decision making about what we should do, based on the findings reported in the previous two reports.

3.3.2 In summary, the risk assessment considered the development in three parts;

**(1) Ground below and immediately adjacent to 32 and 34 (Location of ground collapse).**

1. A Moderate Risk of further ground collapse below north side of 32/34
2. A Moderate to High Risk of further ground collapse below south side of 32/34 and / or gardens
3. A Moderate to High Risk of further ground collapse below structures or gardens to the east or west of 32/34

PBA advise the above risks can be reduced to **Low**, if the following actions are undertaken.

1. Regular monitoring programme to check for damage and / or changes in levels
2. Extension of ground investigations into rear gardens, frontages and below adjoining properties as necessary
3. Carry out remedial ground stabilisation as necessary based on investigation results
4. Investigate soakaway positions and take action to either dispose via mains drainage or to relocate deep bored soakaways away from area of the mine workings

**All actions identified above are either completed or underway.**

*Estimated* costs: £700k

**(2) Ground below and immediately adjacent to 35-39 9 (North side where voids were found during works)**

1. A Moderate Risk of further ground collapse below 35,37,39

PBA advise the Risks can be reduced to **Low**, if the following actions are undertaken;

1. Regular monitoring programme to check for damage and / or changes in levels
2. Carry out ground investigation around and below affected houses to check stability and potential for mine workings at depth.
3. Follow-on remedial ground stabilisation as necessary depending on investigation results
4. Investigate soakaway positions and take action to either dispose via mains drainage or to relocate deep bored soakaways away from area of the mine workings as necessary depending upon above results

Actions I-III cannot start until properties 33-39 are decanted. Action IV – investigate soakaways has started.

*Estimated* costs (investigation element): £150k

**(3) Ground below the wider footprint of the remainder of the Development**

PBA do not *yet* have enough information to assess with confidence the risks relating to the presence of historical chalk mine workings below the wider development.

They cite the types of investigations which would need to be carried out to establish the situation on the rest of the estate;

PBA have given very approximate guidance on costings;

Hundreds of boreholes up to 30m depth @ 1.5m centres – Circa £3m+

Perimeter boreholes around terraces / roads - Circa £2m

Close centred exploratory holes along site margins where there are known mine workings – Circa £250k

In addition, PBA cite different methods of monitoring ground levels and buildings on a daily basis that can be used to address the risk (£10-15k p.a)

**4 Actions arising from PBA’s reports**

4.1 All of PBA’s advice / recommendations are being followed as regards areas (1) and (2).

4.2 However, the Board will note the risk related to the provision of soakaways to provide the surface water drainage. It has finally been clarified by the original drainage consultant, that soakaways were used in order to meet the LA’s planning requirement for drainage solutions which reduce the risk of flooding, as well as meeting the requirements of Code For Sustainable Homes. The drainage consultant and the contractor maintain that RSK were consulted and agreed to the use of deep-bore soakaways. An alternative solution utilising existing drains was not explored, but may be technically possible. This will be looked into as a matter of urgency.

4.3 Due to the level of uncertainty as regards area (3), and the moderate to high risk of further collapse, relating to the other parts of the estate Directors’ view is that the safest thing for the residents is to move them off the estate to allow further investigations and remedial works to take place. This decision was not taken lightly, and the following was taken into account;

4.3.1 There is a moderate to high risk of further collapse on parts of the estate, and due to uncertainty, a limit to the level of assurance of safety that we can give to the residents. This is a fundamental concern.

4.3.2 We considered the option for people remaining on the estate. However, from a PR perspective, our inability to assure people of their safety would be challenging. Residents are likely to be very concerned as well as local councillors etc. and this could result in very negative press coverage.

4.3.3 We considered an incremental approach to decanting as the investigations / works progressed, however, this would provide less control over when to stop due to the level of expenditure. Whereas, if the estate is fully decanted we can carry out the full range investigative works and establish from the findings the likely level of works required and therefore the costs, and make a decision about whether to continue. In addition, the costs of this approach will be lower as larger equipment can be used with less constraints etc. this will reduce the time spent on site, compared to the approach needed when working around people still living on the estate.

4.4 The board are reminded that there are already five families living in alternative accommodation, so homes for 35 households will need to be identified.

4.5 DG’s latest thoughts around our broad approach are;

4.5.1 Homes 35,37,39 need to be decanted asap due to the level of risk of collapse around their property. They will be found hotel accommodation in the short term.

4.5.2 The residents across the rest of the estate will be advised of the need to move from their homes at a residents’ meeting, likely to take place w/c 26th September.

4.5.3 Investigative works will commence to 35-39 within the next couple of weeks, and then across the wider estate once decanting has happened.

**5 Public Relations**

5.1 Since the incident, and the resident’s meeting on 12th May June, we have been keeping residents informed of what we are doing as regards stabilisation works to 32/34.

5.2 In line with our commitment to report back once we had received and considered PBA’s report, we are planning another resident’s meeting for the end of this month, where we will advise them of PBA’s findings and our decision to decant the estate. We expect this meeting to raise a number of legitimate concerns by residents, and we will do our best to be prepared for the questions they will have for us.

5.3 We have engaged the services of a PR consultant who has been assisting us in recent weeks in our communications with residents, as well as planning our approach to the resident’s meeting, liaising with interested parties in terms of being pro-active in explaining our ‘plan of action’ (E.g. LA, local press, GLA etc.)

5.4 The PR challenge presented by archaeology / mining enthusiast Dominic Clinton, has reduced and the last posting on his website was 11th August,

where he showed a “drilling update photograph”.

**6 Insurer’s Position**

6.1 The Insurer has confirmed that costs involved in the stabilisation to the front of 32/34 are covered as damage to the buildings was evident by cracks to the front of the properties (Estimated at £360k)

6.2 Costs of further investigative and stabilisation works, i.e. to the rear of 32/34 and any further areas, are not covered as no damage to buildings has been identified.

6.3 The rest of the development is not covered for subsidence. This is due to the timing of our new policy (2 days after the incident) which gives the insurer’s the right to review terms.

6.4 The costs associated with loss of rent , decanting and rehousing the five households are covered.

6.5 The insurer’s solicitors are reviewing the position with regard to recovering their costs.

**7 Legal Position**

8.1 Despite the insurer’s offer to pursue recovery of our uninsured losses (if they decide to take action), we have taken independent legal advice from Devonshires.

8.2 Mark London (Partner – Construction) has reviewed all of the available information, and considers that we have a good chance of recovery from RSK / the contractor. Protocol means that we would work with the insurer’s solicitor to recover our uninsured losses.

8.2 Devonshires are also advising on our insurer’s position re: extent of cover for the investigative and stabilisation works, as well as the loss of cover on the rest of the estate.

**8 Financial Risk**

8.1 The development cost us circa £8.5m to acquire and build-out, however, in assessing the point at which it would not be worth carrying out remedial works, we need to take account of the revenue income produced by the scheme over 30years. This is £4.8m, in addition the £1.6m grant. Therefore, in broad terms if we had to spend anything close to this, to make the estate ‘safe’ by reducing the risk of any further ground collapse, it would not be worth doing.

8.2 As noted above, we would make any decision in the context of the likelihood of being able to recover our costs via the liabilities which may be proven against third parties.

8.3 The risk associated with this event are now the highest scoring on our risk map.

1. National House Builders Council [↑](#footnote-ref-1)