

BASEMENT IMPACT ASSESSMENT
10 ELLINGTON ROAD
LONDON
N10 3DG

Basement Impact Assessment

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1:0 INTRODUCTION

Rose & Associates have been commissioned to prepare a Basement Impact Assessment report to accompany a Planning application for the proposed demolition of existing buildings on the site and their replacement with a modest terrace of flats and town houses.

This Basement Impact Assessment is based on the criteria which involves an initial scoping appraisal to identify when additional investigations are required. This basement impact report therefore satisfied Haringey's Development Management BDP, policy DM18 residential basements and lightwells.

The site basically lies on the South side of Ellington Road where the rear overlooks the gardens to domestic houses in Cranley Gardens.

The site is set on a relatively steep slope where the road and pavement represent the uphill side of the site.

Currently the site is occupied by a two-storey structure across the site frontage with a Porte- Cochere providing access to a rear courtyard where single storey buildings are huddled around the perimeter of the courtyard.

Also, at the rear the ground level has been artificially raised, almost by a single storey height and the courtyard and buildings are supported by a series of concrete gravity retaining walls.

2:0 METHODOLOGY

Haringey's Council's planning department require a Basement Impact Assessment to be undertaken for this project.

This document follows the same procedure adopted by Camden Council and other inner London Boroughs. Therefore following Haringey's published information this Basement Impact assessment set out 5 stages which must be satisfied. These are: -

Stage 1: Screening

Stage 2: Scoping

Stage 3: Site investigation and study

Stage 4: Impact Assessment

Stage 5: Review and decision making

SITE DESCRIPTION AND PROPOSED REDEVELOPMENT

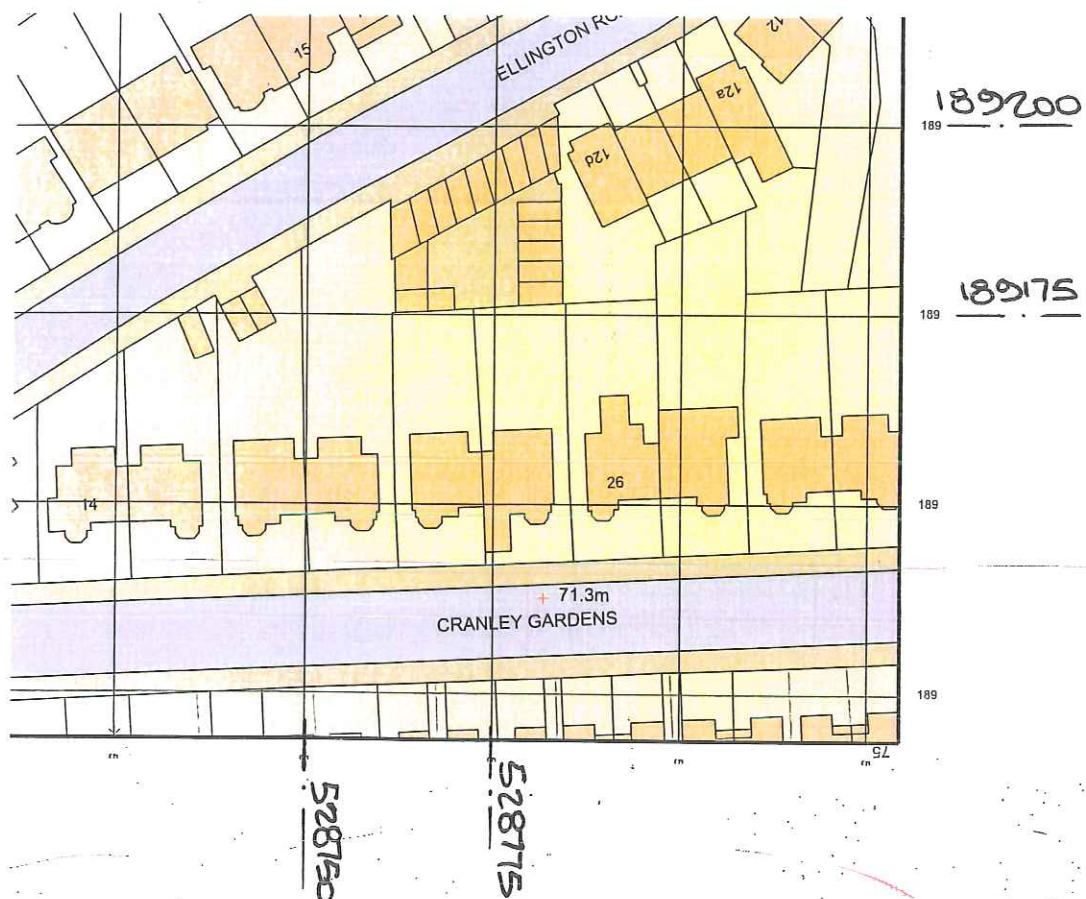
As we stated above the site can be found on the south side of Ellington Road set between the rear garden to No 20 Cranley Gardens and a recent new development of two and three storey properties with off street parking to the left as viewed from the road, being 12a to 12d Ellington Road

This development also makes good use of the sloping site and therefore has a lower ground floor one storey below Ellington Road street level., backing directly onto the rear gardens of 26 and 28 and 30 Cranley Gardens.

The new works involve the demolition of the existing building fronting Ellington Road and the range of single storey out buildings at the rear.

Thereafter the courtyard fill and perimeter retaining walls will be carefully removed reverting to natural ground levels.

A terraced building is to be erected containing a mix of town houses and flats, all as shown on Jane Duncan Architects and Interiors drawings CER- 209-PL 230,231 & 232 and upon which this Basement Impact Assessment is based.



4:0 GEOLOGY AND FLOOD RISK

Formal site investigations were undertaken by Messrs AVZ Geo Eng Ltd for this site. These confirm extensive fill material beneath the rear courtyard with natural ground being London Clay of high shrinkage potential proven to the end of one of the boreholes at 20 metres below courtyard level. No ground water was struck during these site investigation works.

We have referred to the Local Government flood risk maps for planning purposes.

An extract showing surface water flood risk is attached to this report. This shows that the risk of surface water flooding is very low.

Reference to the flood risk from rivers and seas is also very low. The site is therefore confirmed as lying in flood Zone 1.

Whilst the flood risk from surface water during extreme weather conditions is historically noted as low, the foul and more importantly the storm water drainage will be designed to satisfy current SuDS requirements including a 40% growth factor for potential climate change.

The SuDS compliant storm water drainage will ensure no overland flow from the storm water drainage installation for this site.

Hence it is our considered opinion that the proposed works will not have an adverse effect on the existing underground drainage, nor will it affect established ground water flows.

Select the type of flood risk information you're interested in. The map will then update.

Flood risk

Extent of flooding

Location

Enter a place or postcode

The map shows a residential area with several streets. A red line, representing the extent of flooding, runs from the top left towards the center, following the A504. Other streets shown include Muswell Hill Road, Leinster Road, Linden Road, Rookfield Avenue, and Springfield Avenue. Landmarks such as St James's Church of England Primary School and Tetherdown Primary School are marked. A compass rose is located in the center of the map. A scale bar at the bottom right indicates 500 m. The map also shows various parks and gardens, including Hillfield Park and Grove Lodge Garden.

Extent of flooding from surface water

4:2 LONDON UNDERGROUND

There are no London Underground running tunnels in the general vicinity of the site.

5:0 SCREENING

To summarise this Basement Impact Assessment has been prepared to ensure that the new lower ground floor excavations do not:-

- I Cause harm to the built and natural environment and local amenity.
- II Result in flooding or
- III Lead to ground instability

CPG4 guidance also requires any proposed development must assess the impact of the proposed works on: -

- Surface flow and flooding
- Subterranean (groundwater) flow
- Slope stability

CHHS provides 3 flow charts which are replicated below with respective answers and a narrative as to the response and proposals to mitigate any risks identified.

5:1 **TABLE 1 – SURFACE WATER AND FLOOD SCREENING FLOW CHART:**

No.	Question	Y/N
1	Is the site within the catchment of the pond chains on Hampstead Heath?	N
2	As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run off) be materially changed from the existing route?	N
3	Will the proposed basement development result in a change in the proportion of hard surfaced/paved external areas?	N
4	Will the proposed basement result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?	N
5	Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	N
6	Is the site in an area known to be at risk from surface water flooding, such as South Hampstead, West Hampstead, Gospel Oak and Kings Cross, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature.	N

Narrative

Q1, by reference to Ordnance Survey maps the site lies North East of Hampstead Heath and the ponds.

Q2, part of the existing rear courtyard will become gardens. Hence there will be a diminution in surface water runoff. The new storm water drainage is to be designed to satisfy SUDS criteria.

Q3, To ensure there is no increase in the storm water discharge from the site a variety of options are available to ensure the design meets SuDS criteria. This can include the use of rain gardens, green roofs, attenuation tanks with hydro brakes.

Q4, The works will not affect the profile of water inflows, instantaneously or long term.

Q5. No changes envisaged.

Q6 Reference to CHHS Streets at risk of surface water flooding do not indicate Ellington Road having suffered from any localised flooding.

5:2 **TABLE 2 – SUBTERRANEAN (GROUNDWATER) FLOW SCREENING FLOWCHART**

No.	Question	Y/N
1a	Is the site located directly above an aquifer?	N
1b	Will the proposed basement extend beneath the water table surface?	N
2	Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	N
3	Is the site within the catchment of the pond chains on Hampstead Heath?	N
4	Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?	N
5	As part of the site drainage, will more surface water (e.g. rainfall and run off) than at present be discharged into the ground (not just the pond chains on Hampstead) or Spring line?	N
6	Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or Spring line?	N

Narrative

Q1a. The site is situated on London Clay which would be classified as a non-aquifer.

Q1b. The water table was not struck during the boreholes site investigation works to 20 metres depth therefore the lower ground floor works will not extend below the water table.

Q2: The Hampstead Ponds lie due South West from the site

Q3: Site lies North East of Hampstead Heath.

Q4: The site is currently all hard landscaped, either by buildings or a concrete covered yard. The new development will include gardens hence there will be less hard surfaces to drain.

5:3 TABLE 3 SLOPE STABILITY SCREENING FLOWCHART

No	Question	Y/N
1	Does the existing site include slopes; natural or man-made, greater than 7 degrees (approximately 1 in 8)?	Y
2	Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7 degrees?	N
3	Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees?	Y
4	Is the site within hillside setting in which the general slope is greater than 7 degrees?	Y
5	Is the London clay the shallowest strata at the site	Y
6	Will any trees be felled as part of the proposed development and/or any works proposed within any tree protection zones where trees are to be retained?	Y
7	Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at site?	Y
8	Is the site within 100m of a watercourse or a potential spring line?	N
9	Is the site within an area of previously worked ground?	Y
10	Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?	N
11	Is the site within 50 meters of Hampstead Heath Ponds?	N
12	Is the site within 5m of a highway or pedestrian right of way?	Y
13	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	N
14	Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	N

Narrative

- Q1 The existing man made courtyard at the rear of the site is currently retained by vertical retaining walls with slopes greater than 7 degrees.
- Q2. The proposed development will entail cutting into and re-grading the fill material to create a stepped profile where the lowered ground will be maintained by appropriate retaining walls. The slope within the proposed rear gardens is less than 7 degrees.
- Q3. The proposed development will reduce current site levels to those more closely matching neighbouring land by the removal of a considerable amount of fill material and associated retaining walls.
- Q5. Formal site investigation works confirm fill supporting the courtyard, overlying London clay.
- Q6. There are a number of trees in the rear garden of properties in Cranley Gardens. Foundation design for the proposed development will take account of these trees.
- Q9. Reference to British Geological maps do not indicate previously worked ground.
- Q10. Development will not extend below the water table, hence no de-watering required during construction.
- Q12 The property fronts onto Ellington Road where the front elevation is shown as approximately 2.5m from the back of pavement.
- Q13. As previously stated, the proposed development seeks to better follow natural ground level hence the new foundations will not create a significant differential depth in foundations.
- Q14. No tunnels have been located passing beneath or close to the site. British Rail's former asset, the line which ran from Finsbury Park up to Alexandra Palace has been decommissioned, now used as the Parkland Walk (North). The Northern Line Barnet branch runs some distance away to the east of the site.

6:0 SCOPING

6:1 RESULTS OF SCREENING PROCESS.

The above screening assessment has been undertaken in accordance with the three flow charts detailed in Appendix E of the Basements and Light wells Policy CPG4.

The purpose of this initial assessment was to identify factors which require further investigation to complete the Basement Impact Assessment. To aid simple identification we have set out below a summary of additional considerations and the potential impact these may have. This is basically where answers to the flow charts have primarily been answered as "Yes". Risks can be mitigated so a narrative of further investigative works or design proposals to mitigate the risks are set out below.

6:2 TABLE 1. SURFACE WATER AND FLOOD SCREENING

No risks identified warranting further investigations. Storm water discharge to be designed to satisfy current SuDS criteria.

6:3 TABLE 2 SUBTERRANEAN (GROUNDWATER) FLOW SCREENING FLOW CHART.

No risks identified. Site lies over made ground, all of which will be removed. Development to be founded on the natural clay sub-soil.

6:4 TABLE 3. SLOPE STABILITY SCREENING FLOW CHARTS

The screening flow charts returned a predominantly Yes response. This is because the ground has been previously artificially raised where the ground is retained on three sides. Hence the current site sits much higher than the surrounding area.

The new works seek to remove the fill material creating a stepped profile cross section through the development which will greatly reduce the impact the new works have on the surrounding properties. The stepped profile will utilize retaining walls where necessary, hence the slopes are still defined as greater than 7 degrees.

No risks identified that warrant anything other than traditional structural design works to satisfy Building Regulations and all appropriate Codes of Practice. Hence no further investigations required to supplement this Basement Impact Assessment.

7:0 STAGE 3 INVESTIGATIONS AND STUDY

Based on information provided by the site investigation company natural ground compromises London Clay. This provides a relatively stable material for excavation works provided temporary works are employed as excavated vertical surfaces are stable due to the phenomenon of negative pore pressures.

To mitigate the risk of damage it is commonly accepted that movement must be restricted to "slight" as defined in Ciria publication C580. Slight is defined as movements causing cracks less than 5mm in width and is based on work undertaken by Burland et.al. A copy of crack classifications is shown at the rear of this report as table 1.

The proposed development entails excavations into the existing embankment, involving the removal of a considerable amount of fill material.

It is a well understood phenomena that clay subsoils will expand when clay is removed by way of excavations. This expansion is termed heave and represents an elastic recovery in the clay which is time dependent and not instantaneous.

The development proposes a new lower ground floor which extends across the whole width of the site meaning in the order of 2.7 metres of fill and clay will be removed together with the existing buildings of lightweight construction.

8:0 STAGE 4

BASEMENT IMPACT ASSESSMENT

We have undertaken a detailed analysis of the risks associated with the proposed development at the above mentioned site. Please see attached calculations.

We believe this desk top appraisal, using the screening and scoping procedures laid down in CPG4 have identified the direct and indirect implications of the proposed development on the environment and properties in the immediate vicinity of the proposed works.

It is clear the development will reduce the area of hard landscaping so there will be no increase in storm water run-off. A formal design for the storm water drainage will be undertaken to satisfy current SuDS criteria to produce a zero-groundwater inflow.

Reference to various sources and by formal Site investigations show the underlying geology is London Clay. Stable ground in excavation works can be achieved by following good construction practices using traditional planking and strutting or other such temporary works.

The regrading works associated with excavations cut into the existing fill can be undertaken relatively easily as in most cases the excavations involve reducing the ground back down to the natural lie of the land. A formal temporary works scheme will be needed when forming the new retaining wall behind the public pavement. As this wall is over 2 metres behind the pavement, this could safely be excavated behind battered surfaces.

We have already discussed the known phenomenon of ground heave when excavating basements in a clay subsoil and the attached calculations demonstrate any movement will be less than category 3

As a Chartered Civil and Chartered Structural engineer I have considered all of the matters discussed above and believe the risks associated with the proposed development to be no more significant than any normal redevelopment. Hence, I do not believe any further investigations than those already undertaken are necessary to satisfy Haringey Councils Basement Impact Assessment criteria for Planning purposes.



Signed

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Date...9th March 2023

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PROPOSALS.

It is proposed to demolish a two storey building across the front of the site together with lightweight steel type single storey units at the rear.

Once cleared the existing fill material which has been used to artificially raise the ground to street level on a steeply sloping site will also be removed to allow a new four storey building to be erected.

This building is for a mix of town houses and flats and will occupy a larger footprint than the existing building. Initially the underlying clay will experience an elastic recovery as load is removed which will relatively quickly be suppressed by the load from the new four storey building.

The following calculations have been prepared to evaluate likely elastic recovery and to check that the values fall into Burdett's classification "Slight" i.e. less than 5mm movement.

Work undertaken by Terzaghi recommends that the calculated thickness H for London clay should not exceed 4B.

It should also be noted that with ground heave the value of Young's modulus E_u for unloading is generally

greater than the value E_u for loading.

Site parameters

Width of site approximately 22.6m average

Length of site approximately 20.0m average

Bulk density of the underlying clay 1900 kg/m^3 .

Approximate height of clay to be removed together
with the fill material to the rear open courtyard

Take as 2.7m average height.

BUILDING LOADS

Existing 2 storey building across site.

Since two storey building only occurs across the
front of the site with what can best be described as
timber sheds at the rear, conservatively take surcharge
load on whole site as say 10 kN/m^2 (generators)

Hence initially heave will occur as excavations proceed
after site clearance

Total predicted heave load:-

Buildings	10 kN/m^2	$= 10 \text{ kN/m}^2$
Soil removal	2.7×19	$= 51.3 \text{ kN/m}^2$
Total		61.3 kN/m^2

SME

WIDTH APPROXIMATELY 24m = L

LENGTH APPROXIMATELY 22m average = B.

Hence calculated thickness for the London clay, max
@ 4B = $4 \times 22 = 88m = H$.

$$\frac{H}{B} = \frac{88}{22} = 4.0$$

$$\therefore \mu_1 = 0.7$$

} See charts
over.

$$\frac{L}{B} = \frac{24}{22} = 1.09$$

$$\therefore \mu_0 = 1.0$$

$$\frac{D}{B} = \frac{2.7}{24} = 0.11$$

Hence predicted heave given by.

$$S_{\text{heave}} = \frac{61.3 \times 0.7 \times 10 \times 22}{50} = 18.9 \text{ mm}$$

where short term Young's modulus for overconsolidated
London clay taken as 50 MPa.

This elastic recovery is time dependant so an
evaluation of how long before the new structure
suppresses the heave recovery needs to be considered.

See figure 5.3 over.

$$\Delta P_t = \text{heave recovery} = 18.9 \text{ mm long term}$$

$$\Delta P_b = \text{zero c 88m depth}$$

$$\text{Hence } \frac{\Delta P_t}{\Delta P_b} = \frac{18.9}{0} = 0$$

Heave recovery likely to be at least 2 years for an

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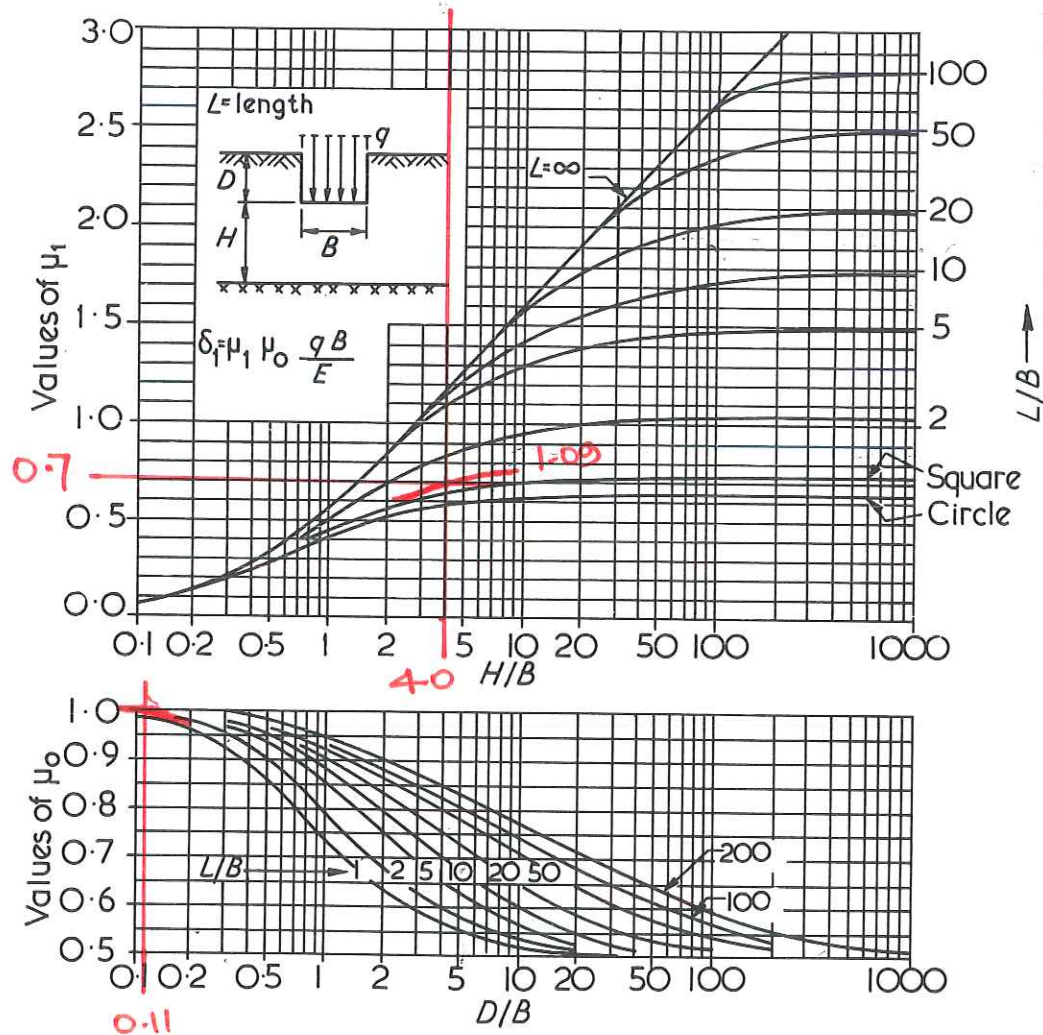


Fig.3.6 Diagrams for the factors μ_0 and μ_1 used in the calculation of the immediate average settlement of uniformly loaded flexible areas on homogeneous isotropic saturated clay, after Janbu, Bjerrum and Kjaernsli (1956)

over consolidated clay.

Allowance for time from full excavation until basement structure begins to load excavated area, take as 10 weeks

$$\text{Hence time period} = \frac{10}{2 \times 52} = 0.096$$

Hence likely degree of heave given by 2% long term

$$\text{heave} = 0.2 \times 18.9 = 3.8 \text{ mm} < 5 \text{ mm. Heave OK}$$

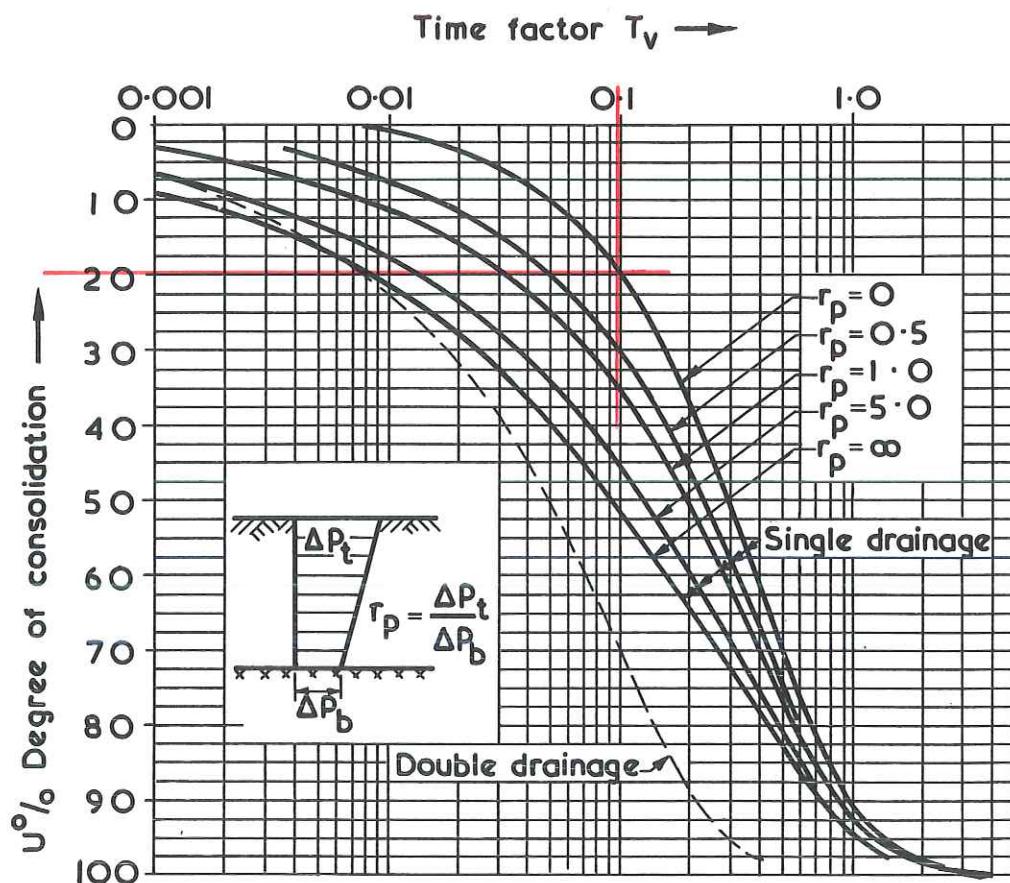


Fig. 5.3 Relationship between degree of consolidation and time factor, after Janbu, Bjerrum and Kjaernsli (1956)

CONSIDER LONG TERM HEAVE

Long term to consider surcharge load, soil + buildings removed followed by new build.

From previous work assumed load removed @ 61.3 kN/m^2

New loadings.

	kN/m^2
<u>Flats</u> - Basement slab + r.c walls.	= 20
Ground floor	= 9
1st floor	= 9
2nd floor	= 9
Roof + ceiling	= 2.5
Allowance for external + internal walls	= 20
	<u>60.5 kN/m^2</u>

Houses

Basement slab + r.c walls	= 20
Ground floor	= 9
1st floor	= 2
2nd floor	= 2
Roof + ceiling	= 2.5
Allowance for external + internal walls	= 20
	<u>55.5 kN/m^2</u>

By reference to the site plan, the only buildings that can be affected by the potential heave recovery is the recent new development 12a-12d Ellington Road which lies adjacent to the proposed flats + houses

Combined long term load from houses + flats:-

Houses, $55.5 \times 13.1 \text{ m} \times 11.2 \text{ m} = 8143 \text{ kN}$

Flats $60.5 \times 10.7 \text{ m} \times 9.6 \text{ m} = 7139 \text{ kN}$

Site Frontage.

$$\begin{array}{l} \text{Road build up } 0.2 \times 24 = 4.8 \\ \text{Live load } \quad \quad \quad 2.5 \\ \hline 7.3 \text{ kN/m}^2 \end{array}$$

Area in front of houses $27.6 \text{ m long} \times 1.8 \text{ m wide}$

$$\text{Hence total load} = 363 \text{ kN}$$

Total new loads to be applied post excavations:-

$$8143 + 7139 + 363 = 15,645 \text{ kN}$$

Equivalent leave recovery load

$$61.3 \times 24 \text{ m} \times 13.6 \text{ m} = 20,008 \text{ kN}$$

Nett difference; leave potential

$$\text{Nett lift} = 20,008 - 15,645 = 4363 \text{ kN}$$

$$\text{OR } 4363 / (24 \times 13.6) = 13.4 \text{ kN/m}^2$$

Hence predicted long term leave recovery:-

$$\Delta = \frac{13.4 \times 0.7 \times 1.0 \times (24 + 13.6)}{2} = 5 \text{ mm}$$

35

Work undertaken by Burland considers the effect of anisotropic distortions as the cause of potential structural damage. That is to say if all the adjacent properties were to rise by 5 mm there would be no structural damage. In reality this is not the case as the influence of removing the clay diminishes with distance the further you move away from the excavated area.



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The clay will also leave where it experiences the line of least resistance, ie the open ground between the neighbouring properties and the rear gardens.

Hence the neighbouring property will experience less than 5mm of leave recovery, Satisfying Burland's criteria.

TABLE 1. CLASSIFICATION OF CRACKS.

Where cracks are noted within the body of this report they relate to the standard classification given in the Building Research Establishment digest No: 251 entitled: 'Assessment of Damage in low-rise buildings.' Table 1 has been reproduced by permission of the controller of H.M. Stationery Office.

TABLE 1 CLASSIFICATION OF VISIBLE DAMAGE TO WALLS WITH PARTICULAR REFERENCE TO EASE OF REPAIR OF PLASTER AND BRICKWORK OR MASONRY.

CATEGORY OF DAMAGE	DESCRIPTION OF TYPICAL DAMAGE	APPROXIMATE CRACK WIDTH
0	Hairline cracks of less than about 0.1mm are classed as negligible.	up to 0.1 ⁽¹⁾
1	Fine (also noted as very slight) cracks which can easily be treated during normal decorations. Perhaps isolated light fracturing in building. Cracks rarely visible in external brickwork.	up to 1 ⁽¹⁾
2	Cracks easily filled. Redecoration probably required. Recurrent cracks can be masked by suitable linings. Cracks not necessarily visible externally. Some external repointing may be required to ensure weather tightness. Doors and windows may stick slightly.	up to 5 ⁽¹⁾
3	The cracks require some opening up and can be patched by a mason. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weather tightness often impaired.	5 to 15 ⁽¹⁾ (or a number of cracks, each up to 3)
4	Extensive repair work involving breaking out and replacing sections of walls, especially over doors and windows. Windows and door frames distorted, floor sloping noticeably, walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted.	15 to 25 ⁽¹⁾ but also depends on the number of cracks.
5	This requires a major repair job involving partial or complete rebuilding. Beams lose bearing, walls lean badly and require shoring. Windows broken with distortion. Danger of instability.	usually greater than 25 ⁽¹⁾ but depends on number of cracks.

- Notes: 1. Crack width is one factor in assessing category of damage and should not be used on it's own as direct measure of it.
2. Local deviation of slope, from the horizontal or vertical, of more than 1/100 will normally be clearly visible. Overall deviations in excess of 1/150 are undesirable.

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