Ross & Partners
Consulting Civil and Structural Engineers
1 Bastwick Street
Clerkenwell
London EC1V 3NU
Tel: 020 7553 6050
Fax: 020 7253 6720
Email: mail@ross-partners.co.uk

Movement Monitoring of 26 and 30 Redington Road

In connection with
New Residential Development
at
28 Redington Road
Hampstead
London NW3

Revision	Description	By	Checked	Date
00	Issued for Planning	ad	mor	11 August 2017

Executive Summary

This report has been prepared to provide supplementary information in support of a planning application to redevelop the site at 28 Redington Road, London NW3. The application is for the construction of a new to provide eight new residential apartments.

The construction involves the construction of a new basement.

It is fully intended that a system of monitoring is deployed prior to any works starting on site and continued throughout the construction process. It is intended the monitoring shall follow the recommendations of CIRIA 760.

At this stage it is proposed that fixed 3d targets are fixed to the front, rear and side elevations to the properties at 26 and 30 Redington Road. The targets shall be fixed at two levels; one at each end and two mid way along the wall. That targets shall bbe monitored for movements in the x,y and z directions.

It is also recommended that inclinometers are provided at two locations along the site boundaries. These will be used to monitor lateral secant pile displacements and compared with those predicted within the GMA.

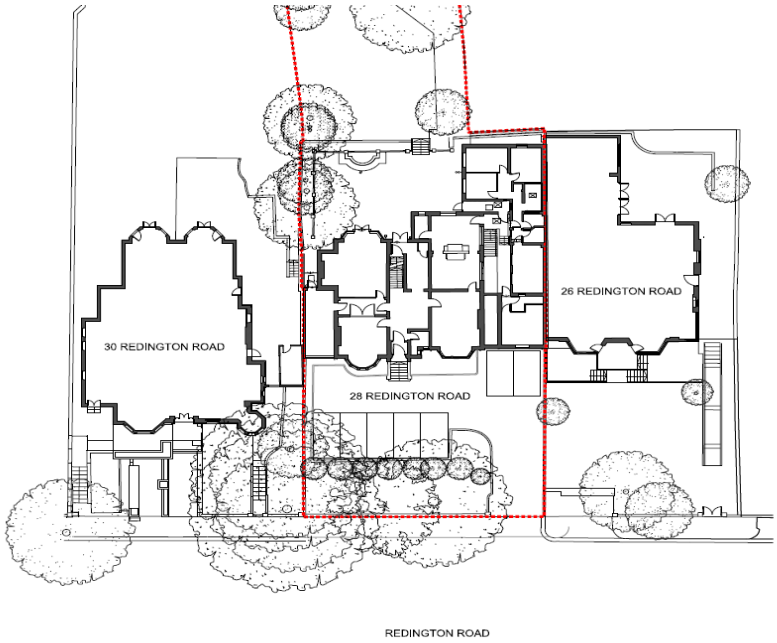
Using the FE GMA Model, horizontal and vertical displacements will be evaluated for each stage of construction and any consequential damage, arising from tensile strain has been determined in accordance with the Burland Damage Assessment Methodology.

A regime of movement monitoring of surrounding buildings is proposed and discussed within this report. The monitoring will be carried out by an independent company at regular intervals throughout the construction phase of the project.

The Site

The site, as shown below is a long, narrow strip measuring approximately 100m from front to rear and 21m from side to side.

Most of the site comprises of soft landscaping. The site survey gives surface levels at the rear of the site at 105m OD with a gentle 1.8° slope towards the rear terrace at 103m OD.



Site Geology

A specific geotechnical site investigation and desk study has been carried out by Soil Consultants and is presented in their report 9911A/AW/KOG dated February 2016. The reader is invited to refer to this report for further and more specific matters relating to the site geology.

The investigations reveal the following general ground condition

Made Ground, over
Bagshot Formation, over
Claygate Member, over
London Clay.

Ground Movement Assessment

A detailed ground movement assessment is being carried out by Geotechnical Consulting Group GCG and will consider:

- Initial phase
- Erosion
- Historic construction
- Demolition
- Re-grading of site for piling
- Installation of piling
- Capping beam and lateral propping
- Excavation to formation
- Complete substructure
- Complete superstructure
- End of construction
- Long term condition for dissipation of pore water pressures.

Damage Assessment

The assessment of any building damage as a consequence of the works is to be carried out by Geotechnical Consulting Group. The assessment will be based on the method proposed by Burland, which has become a commonly adopted industry standard for this type of analysis

The table in Appendix A summarises the range of tensile strain applied to a masonry structure and its associated damage classification.

The total tensile strain for a particular façade element is determined based on the combination of horizontal ground strain (along the main axis of the wall or façade element) and the bending or distortional strain, which is developed due to differential vertical settlement of the ground.

It is anticipated the damage category will be less than 2.0 although every effort will be made to keep this even lower. This may require fine tuning of pile size/spacing and temporary works.

Movement Monitoring

The purpose of movement monitoring is to check the actual movements are within the predicted movements determined from the Ground Movement Analyses calculated by GCG. The Contractor will appoint an independent surveyor to undertake movement monitoring at regular intervals throughout the construction phase of the project.

Scope

Prior to commencement of any new works, a series of targets will be installed on the facades of adjoining buildings. A "real time" Total Station, accurate to 1" will be set up for laser measurement of targets.

The three dimensional co-ordinates of each target are to be established. The co-ordinates will be recorded at regular intervals to check if a wall has moved vertically and/or horizontally.

The monitoring station (s) will need to be protected throughout the construction period. Ideally two independent stations should be provided for continuity in the event of damage.

If it becomes necessary for a station to be relocated, the new station should be set up and target co-ordinates established for an agreed period (min two weeks) prior to the decommissioning of the existing station.

Accuracy

The survey equipment shall achieve the following tolerances:

Target co-ordinates +/- 2.0mm

Frequency of Monitoring and Reports

Target monitoring is to take place automatically every 15 minutes and to include recalibration from backsights. All data is to be transferred wirelessly to the monitoring surveyor and contractor.

Monitoring Reports

The independent monitoring surveyor will produce a summary report that includes, for each building and each façade the following:

- Executive Summary
- Target Location diagrams/photos
- Tables showing base readings and tabulated differences (if any) in mm
- Deflection Graphs.

The reports are to be used to monitor actual building movements against those predicted from the ground movement analyses.

Action levels

Building façade movements have been calculated as part of the ground movement analyses. The movements consider all stages of construction such as:

- Demolition of home
- Installation of piling
- Capping beam and lateral propping
- Excavation to formation
- Complete substructure
- Complete superstructure
- End of construction
- Long term condition for dissipation of pore water pressures.

During construction, target movement thresholds are set for each of the buildings. The target values are based upon those predicted by GCG. The monitoring systems will automatically, and in real time, notify the independent surveyor and main contractor of any movements at or exceeding target values.

The target values are listed on the following pages.

26 / 30 New End Action Levels

Action Level	Vertical Movement	Lateral Movement		Action to be Taken
		E-W	N-S	
Green	tbc	tbc	tbc	No action required; works progressing as planned.
Amber	tbc	tbc	tbc	Notify all interested Parties. Increase frequency of monitoring reporting
Red	tbc	tbc	tbc	Contractor to suspend all works (with the notable exception of those works already underway that might affect stability). Notify all interested parties Review options for limiting any further movement.

Appendix A

The risk of damage is described using the Burland Scale which is used by the Building Research Establishment and the Institution of Structural Engineers. Damage is considered in three broad categories:

(i) Visual appearance or aesthetics
(ii) Serviceability and function
(iii) Stability

Burland Scale Categories 0, 1 and 2 refer to (i) aesthetic damage
Burland Scale Categories 3 and 4 refer to (ii) serviceability and function
Burland Scale Category 5 relates to (iii) stability

Category of Damage	Description of typical damage	Approximate crack width (mm)	Limiting tensile strain ε_{lim} (per cent)
0 Negligible	Hairline cracks of less than about 0.1 mm are classed as negligible	< 0.1	0.0-0.05
1 Very Slight	Fine cracks that can easily be treated during normal decoration. Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection	< 1	0.005-0.075
2 Slight	Cracks easily filled. Redecoration probably required. Several slight fractures showing inside of building. Cracks are visible externally and some repointing may be required externally to ensure weather tightness. Doors and windows may stick slightly.	< 5	0.075-0.15
3 Moderate	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable lining. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weathertightness often impaired.	5-15 or a number of cracks > 3	0.15-0.3
4 Severe	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Windows and frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted.	15-25 but also depends on number of cracks	>0.3
5 Very Severe	This requires a major repair involving partial or complete rebuilding. Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion, Danger of instability.	Usually > 25 but depends on number of cracks	