

22011 69 Cromwell Avenue, N6 5HS
January 2024 Structural Monitoring Strategy & Specification

22011-MHA-ZZ-ZZ-SP-S-010

Rev	Description	Date
P01	For comment	25 January 2024
P02	For Issue	30 January 2024

Prepared Ryan Saw *MEng (Hons)*

Checked Robert Dean *BEng (Hons) CEng MStructE*

Issued Ryan Saw *MEng (Hons)*

London
+44 (0) 20 7375 6340

Cambridge
+44 (0) 1223 776340

mhastructuraldesign.com

Registered in England & Wales
Company No. 04718155

Contents

	Summary	
1.0	Introduction	3
2.0	The Site and Structure	4
3.0	Nearby Structures	4
4.0	Preliminary Zone of Influence	5
5.0	Building Monitoring	5
6.0	Monitoring Responsibilities & Contract	6
7.0	Reporting & Trigger Levels	7

Appendix A – Site Plan

Appendix B – Site Photographs

Appendix C – Preliminary Zone of Influence

Appendix D – Proposed Monitoring Locations

1.0 Introduction

MHA Structural Design has been appointed by Andreas Weiskam to prepare a structural monitoring strategy and specification for the proposed refurbishments and Ground Floor (GF) & Lower Ground Floor (LGF) extension of his house on the site of 69 Cromwell Avenue, N6 5HS.

MHA visited the property on 8/2/2022, 17/8/2022, 21/9/2022, 23/8/2023; the neighbouring property #67 on 10/11/2023 and #71 on 27/11/2023.

The existing building is a three storeys Victorian semi-detached house with a small lower ground floor. There is an existing single-storey rear extension that was constructed in more recent times. The building was previously used as 4 flats.

The refurbishment work consists of forming openings into existing walls to turn the building into a single dwelling house. The existing rear extension will be replaced with a smaller partially glazed single storey extension. The existing LGF is expanded to match most of the proposed ground floor footprint.

Haringey's Planning permission (application number HGY/2022/4004) is dated 31/7/2023.

Part of Condition 4 of the approval states:

“
...
The condition of nearby buildings shall be monitored throughout the construction process and works shall cease immediately if Burland Scale 1 damage is recorded.

Reason: To ensure that the proposed development would have no undue impact on the structural integrity of adjoining and neighbouring buildings, in accordance with Policy DM18 of the Haringey Development Management DPD 2017.”

This document sets out an appropriate strategy for monitoring works and forms a specification to enable monitoring quotations to be obtained from experienced specialist contractors.

The proposed areas to be monitored are within or nearby the likely zone of influence of ground movement associated with the proposed construction.

The specialist monitoring contractor will be responsible for the installation and implementation of the monitoring and the provision of regular factual reports containing monitoring results. This information will enable the movement of relevant nearby structures to be regularly monitored and assessed.

The monitoring is to be undertaken strictly during the specified periods and monitoring results are to be appropriately presented, numerically and graphically within 24 hours, via a web-based password protected portal to enable all appropriate parties to gain easy access.

The monitoring is to commence one month before the commencement of basement excavations, to provide data on typical background movement fluctuations. The monitoring is to continue for the duration of the structural works, but at more regular intervals of 1 week during the basement works, including excavation.

Condition surveys of #67 and #71 have been conducted by a Party Wall Surveyor. A soil investigation and subsequent monitoring have not found groundwater in the deep trial pits or the boreholes.

2.0 The Site and Structure

The site is generally level, but it is located near the top of Highgate Hill. Topographic survey shows that the spot level in the road of Cromwell Avenue to be around 105.1m. London Underground's Property Asset Register website shows the level of Hornsey Lane, to the south backing onto the site, is 99.6m. A large retaining wall forms the rear boundary to the site (this is to remain untouched).

The structure to the original main house is traditional with a timber roof, load-bearing masonry external walls, load-bearing stud internal walls, some steel transfer beams, timber joisted floors and spread footings with brick corbels.

The property is unoccupied, and a soft strip has taken place to clearly reveal the structure.

The existing structure is not exhibiting any visual signs of distress.

An Ordnance Survey (OS) site plan is provided in Appendix A and site photographs are provided in Appendix B.

3.0 Nearby Structures

The below two buildings are near the property site and are within or near the potential zone of influence. These are:

#67 Cromwell Avenue – A semi-detached to the north of #69 and appears to be of the same construction. A small basement is located at the rear of the house.

#71 Cromwell Avenue – Appears to be of the same construction as #69, to the south of #69 separated by an access alleyway. A basement (presumably an old coal cellar) is located at front of the house.

4.0 Preliminary Zone of Influence

The monitoring needs to be in place, including the 'background' reading period, prior to the commencement of basement excavation and underpinning.

The ground investigations undertaken in 2022, including two ~5.5m deep window sample boreholes (BH), established on the property site the presence of made ground to a depth of between 1.60m and 1.80m below ground level, over Bagshot Formation (Sand) found to the full depth in one BH and to 3.40m in the other. The Bagshot Formation is underlain by Claygate Member. Groundwater was not encountered during drilling and during a subsequent monitoring visit of the standpipe.

Soil investigations show that the basement will be founded in the Bagshot Formation layer, a mostly granular material.

Based on case data (reference to figure 6.16 & 6.17 of Ciria C760), vertical settlement associated with retaining wall construction is conservatively expected to be zero at a distance of twice the excavation depth (~5.6m). This approximate zone of influence is represented on the drawing in Appendix C.

5.0 Building Monitoring

The buildings to be monitored are specified and detailed in Appendix D. The monitoring is to be undertaken using reflective retro monitoring targets securely fixed to the buildings and Electronic Distance Measurement (EDM) readings be undertaken using a Total Station.

Permission for the fixing of the targets to the neighbour buildings should be obtained from the building owners. This permission should be forthcoming, as it will be in their interest for any movement to be quantified.

Reflective survey targets will be used to measure the horizontal and vertical displacement of the specified buildings. These targets should be securely attached and adequately protected from damage, displacement, or vandalism.

Movement readings should be relative to stable datum points to maintain the specified monitoring accuracy. The datum points should be located at least 10m from the site, cleared of the site boundary, in an area unaffected by seasonal effects, construction activity, or any other factors.

The specialist monitoring contractor should translate the movements into the appropriate local grids relative to the monitored building. The graphical presentation of the movements should include vertical movement, movement in the plane of the façade, and movement perpendicular to the building (tilt), plus horizontal movements in the plane of the façade. The monitoring data should be imported into the monitoring database, web-

based accessible to all relevant parties via password protection, with 24 hours of the completion of the survey.

Trigger alarms (see section 7.0) should be issued immediately if any trigger thresholds are exceeded.

The supply, installation, and monitoring of all instrumentation will be the responsibility of the specialist monitoring contractor, as well as the reporting of data.

The accuracy of all building monitoring should be to $\pm 1\text{mm}$.

The frequency of monitoring should be as the below table:

Stage of Works	Monitoring Frequency	Monitoring Period
Pre-basement commencement.	Weekly	4 weeks
Commencement of basement ground works	Weekly	Duration of ground works
Superstructure commencement	Bi-weekly	Completion of superstructure works
To Practical Completion	Every four weeks	To PC

6.0 Monitoring Responsibilities & Contract

The specialist monitoring contractor shall be responsible and provide the below:

- A responsible and experienced person or persons, familiar with the instrumentation and monitoring techniques, to carry out the works.
- The attendance of their responsible person at a site meeting prior to the commencement of the monitoring installation.
- All relevant method statements, risk assessments and installation details as required.
- The installation of the monitoring targets, taking the readings of targets at the specified times, verification works to check the accuracy of readings.
- Robust equipment that is adequately protected against potential interference and environmental conditions typically encountered on a construction site and public areas.

- Ensuring Quality Assurance of the instrumentation and monitoring activities. The specialist monitoring Contractor shall thoroughly review all data for errors before submission. In the event of erroneous readings, the specialist monitoring contractor shall identify the cause, notify the Contract Administrator, re-monitor the target or instrument in question, and, if necessary, replace damaged instruments with additional monitoring equipment.
- Issuing reports via a web-based interface containing numeric and graphical data in both PDF and Excel spreadsheet formats, as directed, and circulating them to relevant parties.
- Safely storing all data, including appropriate robust back-ups, for the duration of the building contract and one year afterwards.
- Rectifying any faults or damage to the instrumentation system throughout the contract period.
- Clear rates for all monitoring equipment and monitoring works.
- Upon satisfactory completion, the removal of all monitoring equipment.

The Contractor Administrator shall be responsible for obtaining all necessary permissions for the installation of all monitoring points.

The monitoring contract shall be the client's preferred form. The proposed contract is to be provided to the specialist monitoring contractor at the time of tender.

7.0 Reporting & Trigger Levels

The specialist monitoring contractor on their internet-based system shall report the results in the below format:

- Clear project details and locations of monitoring.
- Tabular monitoring data in pdf and Excel format, showing the time and date of readings. Interpretations of the tabular data, to provide movement results in plane of façades, perpendicular to façades and vertically.
- Graphical monitoring data in pdf and Excel format, showing the time and date of readings. Interpretations of the graphical data, to provide movement results in plane of façades, perpendicular to façades and vertically.
- The tilt of building where high and low monitoring readings have been undertaken.

- A description of the construction activities taking place at the time of monitoring. These are to be broad and include approximate levels, e.g. basement dig is at 2m below ground level; or works at 1st floor level etc.
- Presentation of both sets of readings if erroneous data is recorded and additional monitoring is undertaken, along with details of remedial works and data correction process.
- All data available in PDF and Excel format.

A traffic light system will be used to classify the building movements. The below table shows the set of trigger levels for the relevant monitoring points.

Trigger levels	Movement in any three individual axes, measured to an accuracy of $\pm 1\text{mm}$	
	On #67	On #71
Amber:	4mm	3mm
Red:	6mm	5mm

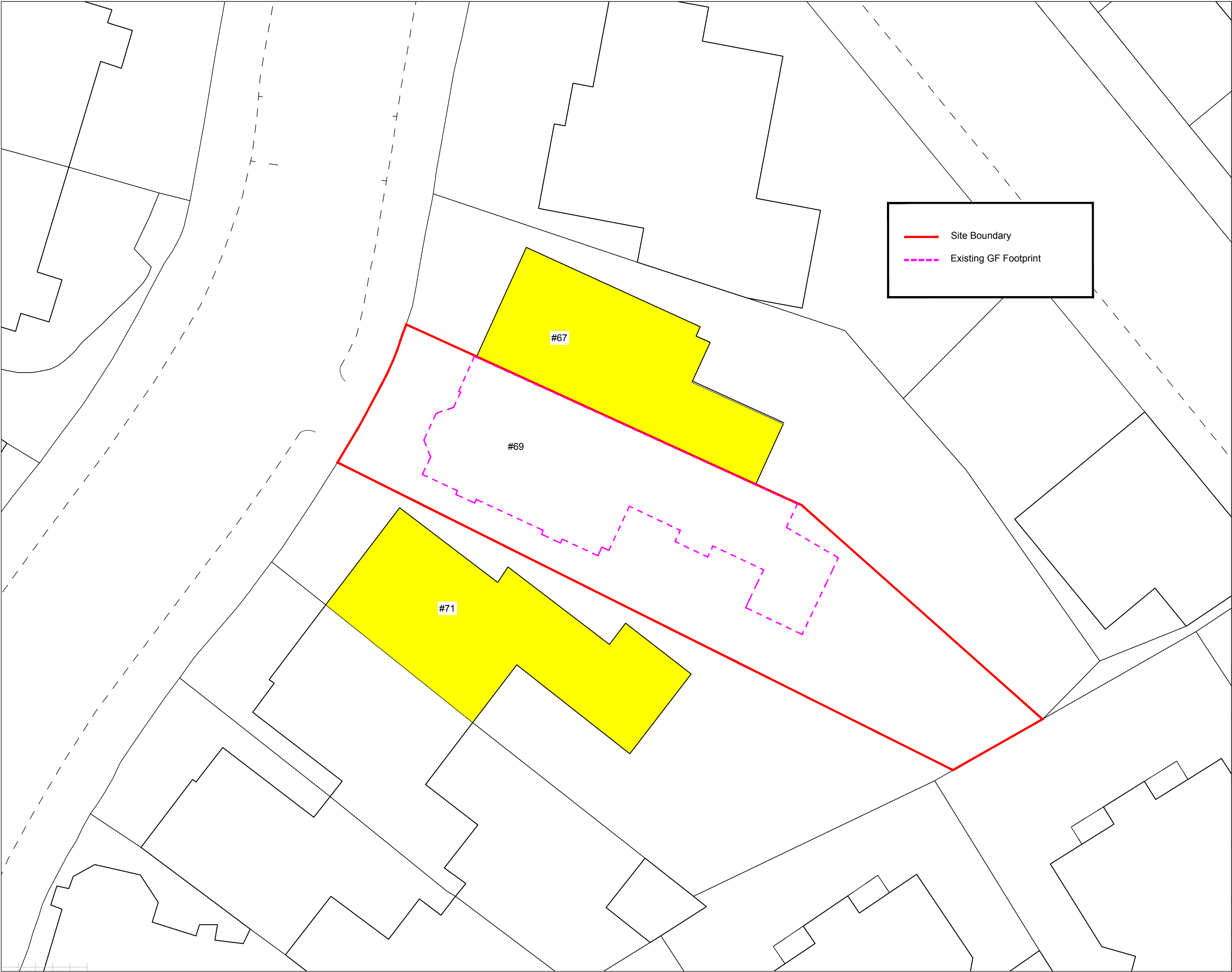
If an amber movement is reached, all relevant parties are to be alerted and work ceased temporarily to determine the cause of the excessive movement. Monitoring frequency is to be increased and an immediate verification of the movement measurements is to be undertaken, by re-surveying. Building Damage Classification checks are to be reassessed, to estimate the horizontal strain and angular distortion along the length of building; if the strains are low then damage may not occur. Additional condition surveys may be undertaken to establish if the movements have resulted in any impact to the building.

Work to proceed once action has been taken to satisfy all parties that the cause of the movement has been understood and appropriate measures are taken to limit further movement.

If a red trigger level of movement is reached, work is to be halted immediately and significant measures taken to stabilise the building and prevent any further movement. Necessary surveys and investigations are to be undertaken to determine the cause and solution. If building damage is found to be negligible and the cause of movement has been addressed, reset red trigger levels following discussions with all relevant parties.

Appendix A – Site Plan

SK07



Site Boundary

Existing GF Footprint

P01	24/6/2024	RS	RD	For Information
Rev	Date	Drawn	Checked	Amendments
Status For Information				
MHA STRUCTURAL DESIGN MHA Structural Design LTD 14-16 Oak Street London, EC1V 9BH +44 (0)207 375 6340 Cambridge +44 (0)1223 776340 mhastructuraldesign.com				
Project Title 69 Cromwell Avenue, N6 5HS				
Drawing Title Site Plan				
Drawing No. SK07				
Scale 1:200 @ A3	Drawn RS		Checked RD	
Project No. 22011	Drawing No. -		Revision P01	

Appendix B – Site Photographs



Front of #69 site - taken on 8/8/22



Rear of #69 site - taken on 17/8/22



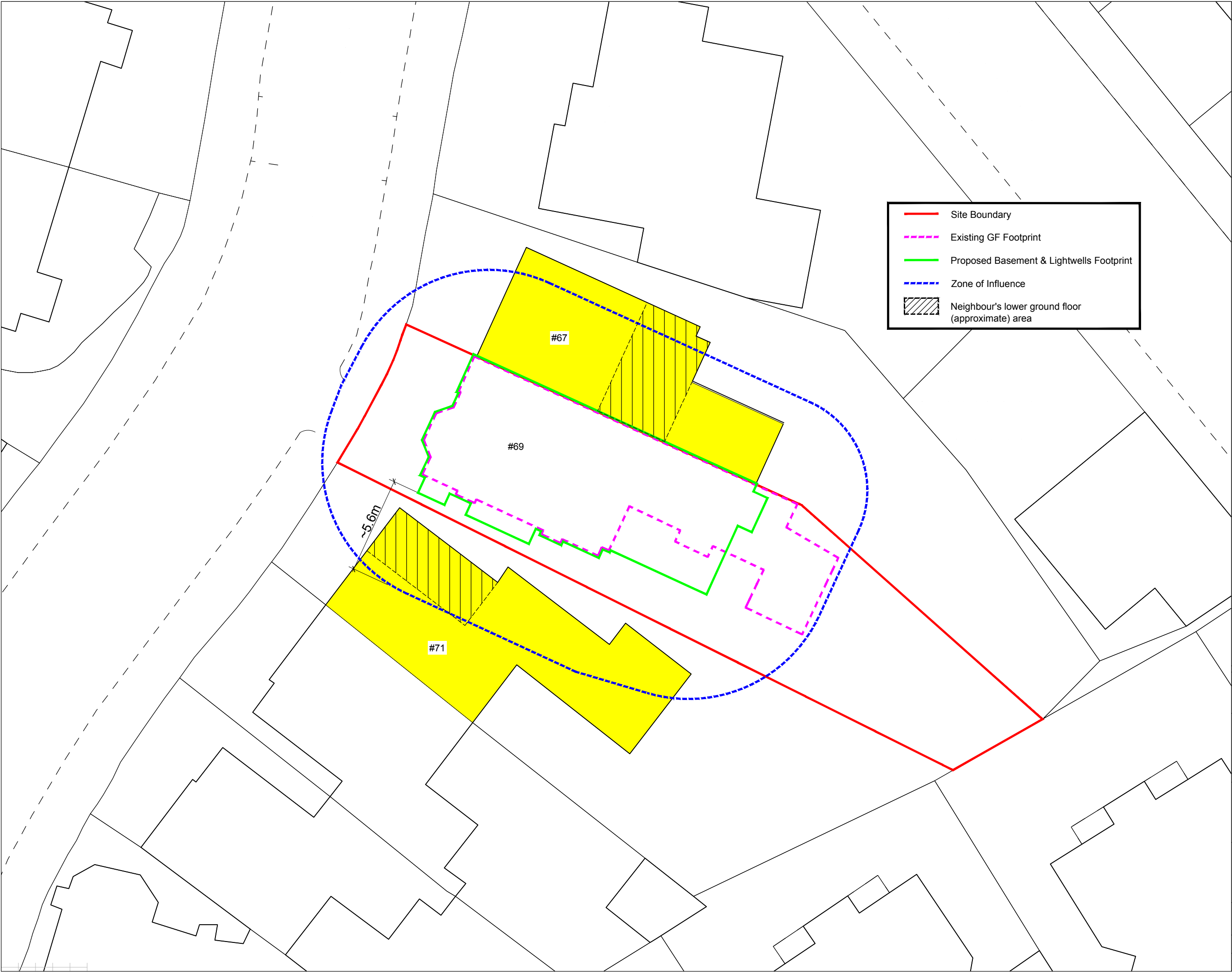
Rear of #69 site (Looking from 1F) - taken on 17/8/22



Rear of #69 site - taken on 17/8/22

Appendix C – Preliminary Zone of Influence

SK08



Site Boundary

Existing GF Footprint

Proposed Basement & Lightwells Footprint

Zone of Influence

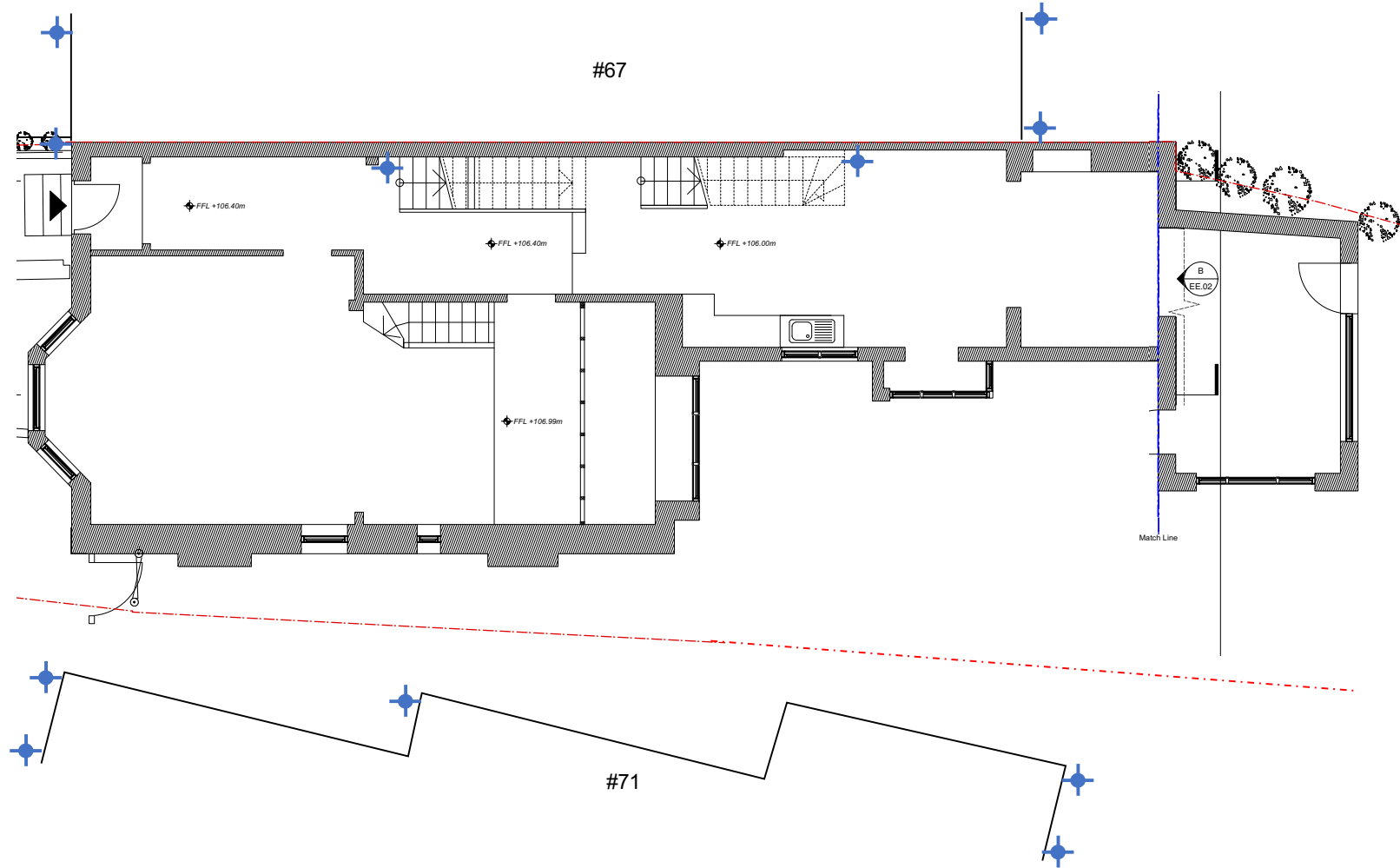
Neighbour's lower ground floor
(approximate) area

P01	24/6/2024	RS	RD	For Information
Rev	Date	Drawn	Checked	Amendments
Status				
For Information				
MHA STRUCTURAL DESIGN MHA Structural Design LTD 14-16 Oak Street London, EC1V 9BH +44 (0)207 375 6340 Cambridge +44 (0)1223 776340 mhastructuraldesign.com				
Project Title				
69 Cromwell Avenue, N6 5HS				
Drawing Title				
Zone of Influence				
Drawing No.				
SK08				
Scale	Drawn		Checked	
1:200 @ A3	RS		RD	
Project No.	Drawing No.		Revision	
22011	-		P01	

Appendix D – Proposed Monitoring Locations

SK09 – SK10

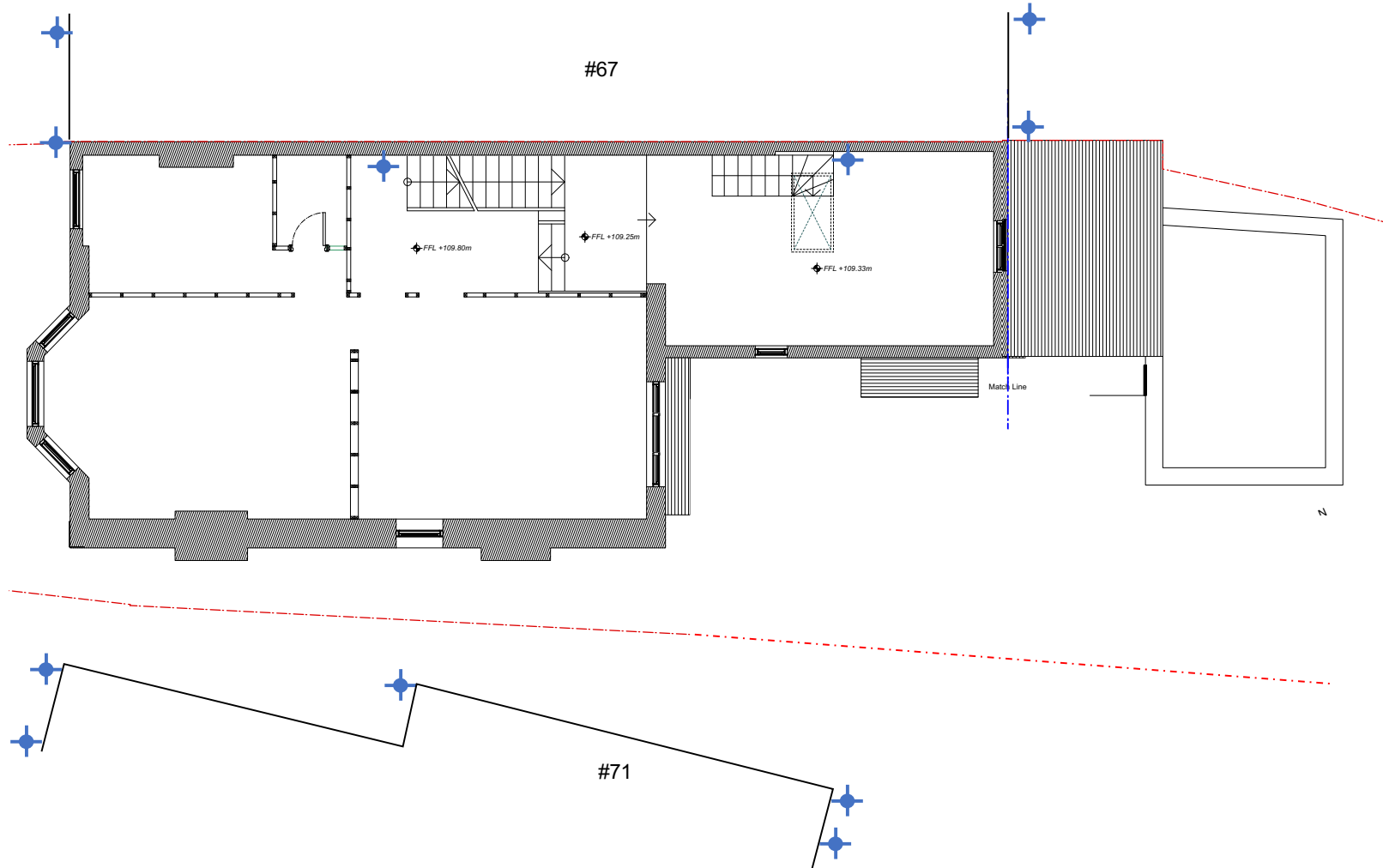
Ground Floor



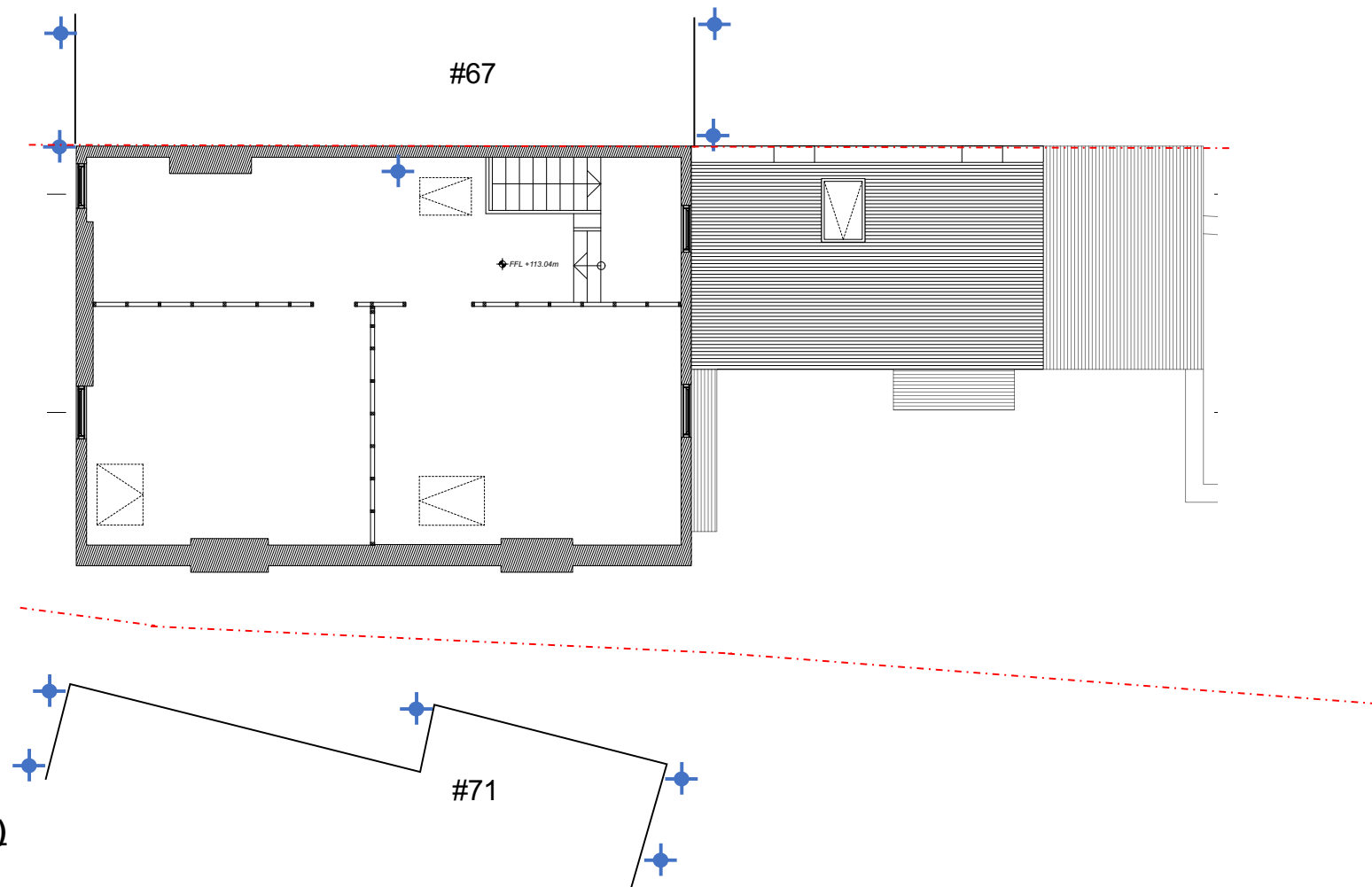
Retro Target at 1m above floor level

Note:
Location for targets on front and rear elevation are shown indicatively on plan. Refer to front and rear elevation on SK10 for 'precise' location.

First Floor



P01	24/01/2024	RS	RD	For Information
Rev	Date	Drawn	Checked	Amendments
Status				
For Information				
MHA STRUCTURAL DESIGN				
MHA Structural Design LTD 14-16 Sals Street London, EC1V 9BH +44 (0)207 375 6340 Cambridge +44 (0)1223 776340 mhastructuraldesign.com				
Project Title				
22011 / 69 Cromwell Avenue, N6 5HS				
Drawing Title				
Monitoring Targets at GF & 1F				
Drawing No.				
SK 09				
Scale	Drawn	Checked		
1:60 @ A3	RS	RD		
Project No.	Drawing No.	Revision		
22011	-	P01		



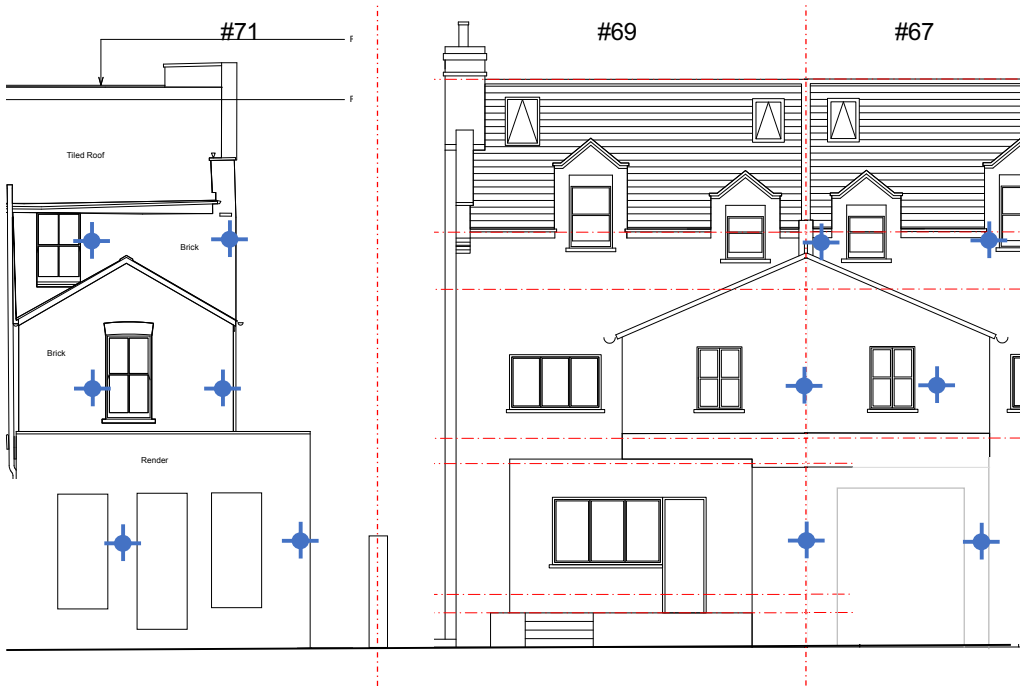
Second Floor (1:60 @ A3)

Retro Target at 1m above floor level

Note:
Location for targets on front and rear elevation are shown indicatively on plan. Refer to front and rear elevation on SK10 for 'precise' location.



Front Elevation (1:80 @ A3)



Rear Elevation (1:80 @ A3)

P01	24/01/2024	RS	RD	For Information
Rev	Date	Drawn	Checked	Amendments
Status				
For Information				
MHA Structural Design LTD 14-16 Old Street London, EC1Y 9BH +44 (0)207 375 6340 Cambridge +44 (0)1223 776340 mhastructuraldesign.com				
Project Title				
22011 / 69 Cromwell Avenue, N6 5HS				
Drawing Title				
Monitoring Targets at 2F & Elevations				
Drawing No.				
SK 10				
Scale	Drawn	Checked		
As shown	RS	RD		
Project No.	Drawing No.	Revision		
22011	-	P01		