

BASEMENT IMPACT ASSESSMENT
for
108 CLEVELAND STREET
LONDON W1T 6NY

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Document Control

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1. INTRODUCTION

This Basement Impact Assessment, BIA, has been prepared in support of the planning application for a mixed residential and commercial development of 108 Cleveland Street. This BIA, has been prepared in accordance with LB of Camden CPG4, Basements and Lightwells and the Camden Geological, Hydrogeological and Hydrological Study, CGHHS.

CPG4 screening questions are presented in Appendix 1 and Site Photographs are included in Appendix 2. A Site Location Plan and drawings of the Proposed Development are presented in Appendix 3.

1.1 BIA Stages

A Stage 1 Screening has been completed, utilising the questions in CPG4, and these are presented in Appendix 1

The screening has been used to define the Stage 2 Scope of the Assessment.

As background to the assessment, the environmental setting and the proposed scheme is presented in section 2. This includes published geology, aquifer classification and flood data.

As part of the Stage 3 site investigations and study, a site walk over was completed on 22 June. The desk top research included:

- i. Site investigations in our library for sites that are nearby
- ii. Obtaining details of the Victoria Line alignment from London Underground.

These are presented in Section 3.

The Stage 4 Impact Assessment is presented in Section 4 following the 'principal impacts' tabulated in CPG4. report.

1.2 Scope of Assessment

As set out in Appendix 1, the key areas that need further consideration are:

- The site is found on River Terrace Alluvial Deposits anticipated to be 3m thick as a minor aquifer
- The basement will increase the differential depth of the adjoining foundations

Possible Areas that need further investigation are:

- Whether the basement is within 5m of a highway
- Confirmation whether the proportions of impermeable areas have changed
- Whether the site is situated over London Underground deep tunnels

2. ENVIRONMENTAL SETTING AND PROPOSED SCHEME

For the purposes of this assessment, Cleveland Street is taken to the west with Warren Mews to the east. This means that Nos 110 and 106 Cleveland Street are to the north and south respectively. Photo 1.

2.1 Existing Site

108 Cleveland Street is a terrace house comprising basement, ground and three storeys over. Photo 1. To the rear is a basement lightwell with access to the southern end of Warren Mews. Photo 2. This lightwell is 2/3 of the basement depth and has been covered over so it forms part of the accommodation; there are metal steps leading from the lightwell to the mews door. Photo 4. There are also steps leading up to the half landing on the main stairs within the terrace. Photo 5.

Warren Mews stops at No 108. No 106 extends a further 2m to the east, blocking off part of Warren Mews and No 10 Warren Mews extends across the remainder of the Mews. Photos 2 & 3.

The rear lightwell has a manhole with its outlet running beneath the main terrace to Cleveland Street to the west. The manhole has drainage tails from the rear boundary with Warren Street. Photo 6.

To the front, the lightwell has been filled in with a solid slab over the access to the pavement vaults. No 110 has an open front lightwell. Photo 1.

Scoping Clarifications

- Since the rear yard has been covered over, the site is 100% impervious.
- The rear boundary is along Warren Mews; there is no pavement. Photo 2. Access to Warren Mews is from Warren Street as a passageway of limited width and headroom which will limit the size of vehicles using the Mews to Vans and small lorries.

2.2 Topography and Levels

The site is effectively level; there is a slight gradient down to the south towards the River Thames. From CGHHS Figure 10 the gradient can be estimated as 5m in 1.5km or 0.3%.

Cleveland Street is at +19.9m and Warren Mews at +19.4m. The existing basement is at +17.5 and the rear lightwell is 0.4m higher at +17.9m; this means the lightwell is 1.5m below Warren Mews.

The invert to the manhole in the rear lightwell is 0.8m. Allowing for a concrete bed beneath the channels in the manhole, the depth of the existing drainage is $+17.9 - 0.9 = +17.0\text{m}$.

Both Nos 106 and 110 have basements beneath the main terrace and both have basement lightwells to the rear at a comparable level to No 108's. Photos 2 to 3.

2.3 Geology and Hydrogeology

Geology

The 1:10,000 scale geological map shows that the site is founded on River Terrace Deposits. Fig 6 of the CGHHS shows these are some 3m thick.

Hydrogeology

The River Terrace Deposits are a minor or Secondary A Class aquifer.

2.4 Water Courses and Flooding

Water Courses and Features

There are no water courses or water features in the immediate vicinity of the site.

Flooding

The site is too high to be subjected to any fluvial flooding. There have been instances of local surface water flooding within LB Camden, but Cleveland Street is not listed as a street at risk of surface water flooding Floods in Camden 2003, Appendix 4.

2.5 Land Stability

There are no problems of land stability in the vicinity of the site.

2.6 Proposed Development

It is proposed to refurbish the main terrace with a retail unit at ground and residential units on the upper floors. The existing basement is to be separated from the main terrace, becoming part of a new residential unit constructed on the rear with access from Warren Mews. The floor levels to this new unit will be set by the ground level on Warren Mews which means that the new basement will have to be lowered with the finished floor at +17.0m. This new basement will step back up to the existing basement beneath the terrace. The new basement will form the main bedroom and there is no drainage required beneath this floor. See drawings in Appendix 3.

The infill to the existing front lightwell is to be recast with pavement lights. Given that the staircase is to be removed from the basement in the main terrace, the front lightwell will have a fire escape hatch.

2.7 Basement and Foundations

The new basement floor will be +17.0m and the floor thickness will be 0.3m giving an excavation depth of +16.7m. At this depth the boundary wall with Nos 106 and 108 will need to be underpinned; this will be achieved using traditional methods. It is possible that the excavation depth of +16.7m may be below the foundations to the main terrace rear wall and that these may also need to be underpinned.

The rear wall to Warren Mews will be 2.5m deep and will be a new reinforced concrete wall utilising the basement slab as its foundation. This wall will be designed to withstand surcharge loads from traffic on Warren Mews.

The boundary wall foundations to the rear lightwell will extend some 0.3m below the existing lightwell and consequently the new basement will require the excavation of a box some 5m long by 5m wide by 1.0m deep.

3. SITE INVESTIGATIONS AND STUDY

3.1. Survey of Buildings

Structural Integrity

No 108 is a traditionally constructed terrace house with solid brick walls and timber suspended floors. The basement floor and the rear lightwell are both concrete. At the time of the survey a soft strip was being completed.

There are no signs of significant movement, cracks or defects within No 108. The front and rear elevations to Nos 106 and 110 are also free from distortion and cracks.

There is no evidence of any movement or structural defects within the building or adjacent units that could effect the proposed redevelopment or excavation of the rear basement.

Damp in Basement

There is no evidence of damp in either the basement or rear yard area. The front vaults beneath the pavement are musty but this is due to lack of ventilation rather than damp from the ground.

3.2. Victoria Line Tunnels

London Underground has confirmed that the Victoria Line Tunnels pass beneath Nos 90 and 92 Cleveland Street, some 50m to the south of the site.

There are no tunnels beneath the site.

3.3. Site Investigation Reports

We have two site investigation reports in our library for sites within 0.5km of the site. A summary of the ground conditions is tabulated below.

Address	Portland Place		Duchess Street	
Distance from site	400m west		500m south west	
Soil Profile	BH1	BH2	BH1	BH2
Made Ground	0.0m to 2.8m	0.0m to 4.0m	0.0m to 1.5m	0.0m to 5.0m
River Terrace Deposits	2.8m to 7.4m	4.0m to 8.5m	1.5m to 9.7m	5.0m to 9.2m
London Clay	From 7.4m	From 8.5m	From 9.7m	From 9.2m
Water Table	6.8m	6.9m	8.4m	8.7m
River Terrace Deposits Description	Medium dense sandy gravel with pockets of sandy clay		Dense sand and gravel with thin bands of sandy clay	
N Values	11 to 46		60 to 114	
Sieve Analysis	D ₁₀	7mm	4mm	3.5mm
	D ₅	4mm	3.5mm	2mm

In addition to these reports in our library, Site Analytical Services completed a survey for 6 & 7 Warren Mews and this found made ground to 2.8m, a 0.2m coarse sand layer with London Clay below 3.0m. The water table was monitored and stabilised at 3.6m below ground level; this is at a datum level of +15.8m.

4. IMPACT ASSESSMENTS

4.1 Structural Stability of Building and Neighbouring Properties

The basement excavation depth of +16.7m will be 1.2m below the existing rear yard area. This will be of the order of 0.9m below the foundations to Nos 106 and 110 rear yard boundary walls. The excavation depth will probably be slightly deeper than the rear wall of the terrace. Such depths are achievable using traditional underpinning techniques.

The rear boundary wall will be a reinforced retaining wall which will be designed for a surcharge loading for vans and small lorries extending to the back of the wall.

4.2 Groundwater Flow

The site is founded on River Terrace Deposits as a Secondary A Class aquifer, this would have previously been classified as a 'minor aquifer'. The River Terrace Deposits are found on top of the London Clay as an unproductive stratum. This means it is a perched unconfined aquifer which will fluctuate in depth depending on the prevailing weather conditions.

Capillary action means that rising damp can occur up to 0.8m above a water source. The lack of damp in the existing basement at +17.5m demonstrates that the water table is at or below +16.7m. The Site Analytical Services investigation measured the water table at +15.8m, as the best assessment of the actual water table in the area. At this depth the basement excavation will not affect the groundwater flow.

The direction of flow of the groundwater will tend to follow the topography; i.e. in a southerly direction. This means the drainage run and manhole beneath the rear yard at a depth of +17.0m already forms a potential barrier against any southerly flow. Lowering the floor slab by a further 0.3m will have minimal effect on the groundwater flow.

The excavation of the basement can affect adjacent properties with displacement of groundwater flows. This is dependant on the depth of the excavation, the permeability of the ground and the hydraulic gradient.

The permeability of granular materials is dependant on the particle size and the inter-granular permeability. For the River Terrace Deposits this can be estimated from the D_{10} and D_5 grading results giving an estimate for the range of Hydraulic Conductivity, k , as between 10^{-3} and 10^{-4} m/s. [Shepherd 1989] Given the flatness of the site, the ground level gradient is of the order of 0.3% and this is a reasonable approximation for the hydraulic gradient. The quantities disrupted by a 5m long x 1.2m deep basement will be negligible and will not have any effect on the adjoining properties

4.3 Land Stability

There are no land slippage or ground stability problems with the site.

4.4 Surface Flow and Flooding

There are no surface water flow or flooding issues with the site.

4.5 Impact on Neighbours

The proposal will have limited impact on Nos 106 and 110 Cleveland Street. Underpinning of the rear yard boundary walls will have to be agreed as part of the party wall awards. .

4.6 Sustainable Construction

The proposal is for the refurbishment of the existing terrace house. Demolition will be minimised, maintaining the existing structure and materials as far as possible. The basement excavation is limited to the rear lightwell, will be contained within the site boundary and all neighbouring boundary walls will be retained.

Waste material will be minimised and recycled as much as possible.

4.7 Amenity and Landscape

As an individual terrace house, the existing property currently has no amenity space and the proposals do not include amenity and landscape provision.

4.8 Lightwells

The previous lightwell to the front has been infilled with a solid slab over. Pavement lights will be introduced to this.

4.9 Cumulative Impacts

The environmental setting is such that the impacts of the proposed scheme are minimal and as such there is no cumulative impact.

5. CONCLUSION

The site is founded on River Terrace Deposits as a stable layer and the gradient of the ground is such that there are no problems of ground stability or surface water flooding. The site is not found above the Victoria Line tunnels. This means that there are no concerns with the environmental setting of the site.

The River Terrace Deposits are a Secondary A Class aquifer, however the water table is below the proposed basement excavation and as such the excavation will have no effect on the groundwater flow.

The construction of the new basement is limited to the rear lightwell and will use established techniques so ensure that the stability of the neighbouring properties is maintained. The rear wall to the basement is on Warren Mews and will need to be designed to accommodate highway loadings.

The site is already 100% impermeable.

There is nothing in this BIA to suggest that the lowering of the rear yard to form a basement to the rear of No. 108 Cleveland Street will have any detrimental impact.

Reference

Shepherd, R. G. (1989), **Correlations of Permeability and Grain Size**. Ground Water, 27: 633–638..

Appendix 1: CPG4 Stage 1 Screening

Basement Impact Assessment to CPG4

Stage 1 Screening

Screen	Response	Amplification	Reference
Subterranean (ground water) flow			
1 Is the site founded on an aquifer	Yes	River Terrace Deposits 3m thick	CGHSS Fig 6
1A Will the basement extend beneath the water table	Unlikely	Basement extension 1.0 below existing basement and remote from River Thames	
2 Is the site within 100m of a watercourse	No	The Tyburn is to west of Baker Street and a tributary of the Fleet shown to east of Tottenham Court Road	CGHSS Fig 11
3 Is the site within Hampstead Ponds catchment	No		
4 Will proportions of impermeable areas change	Unlikely	Existing section shows semi basement but site visit required to confirm extent.	
5 Will more surface water discharge to ground	No		
6 Is the lowest excavation lower than any nearby water feature.	No		
Material changes in groundwater flows	Possibly	Site Visit needed to establish extent of surrounding basements to rear of Cleveland Street and on Warren Mews	
Ground stability			
1 Are existing slopes > 1 in 8	No		
2 Will remodelled slopes be > 1 in 8	No		
3 Does neighbouring land slope > 1 in 8	No		
4 Is site on hillside with slope > 1 in 8	No		
5 Is the site founded on London Clay	No		
6 Will any trees be felled	No		
7 Is there a history of seasonal movement	No		
8 Is the site within 100m of watercourse or spring	No	The Tyburn is to west of Baker Street and a tributary of the Fleet shown to east of Tottenham Court Road	CGHSS Fig 11
9 Is the site on worked ground	No		
10A Is the site on an aquifer	Yes	River Terrace Deposits 3m thick	CGHSS Fig 6
10B If so will excavation be below water table	No		
11 Is the site within 50m of Hampstead Ponds	No		
12 Is site within 5m of highway	Possibly	Need to understand relationship between basement extension and Warren Mews	
13 Will basement increase the differential depth of adjoining foundations	Yes		
14 Is the site over tunnels	Possibly	Need to contact London Underground on alignment of Victoria Line tunnels	
Surface Water and Flooding			
1 Is site within Hampstead Ponds Catchment	No		

108 Cleveland Street

Basement Impact Assessment

<u>Screen</u>	<u>Response</u>	<u>Amplification</u>	<u>Reference</u>
2 Material changes in surface water flows	Unlikely	Site Visit needed to establish extent of permeable ground to rear of Cleveland Street and on Warren Mews	
3 Changes in impervious area	Possibly	[See Groundwater Flow No.4]	
4 Changes in flow rate onto neighbouring land	No		
5 Changes in quality of water discharge	No		
6 Is site in area of risk from surface water flooding	No	Cleveland Street is not listed as flooding in either 1975 or 2002	Floods in Camden 2003 App 4

Appendix 2: Site Photographs

108 Cleveland Street



Photo 1 Cleveland Street elevation with No.110 to left and No.106 to right

- Note 1 Basement extends beneath pavement as vault
2 Railings to No 110 front lightwell visible beyond its front door

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Photo 2 Warren Mews Elevation with black door to No.108 rear yard

- Note 1 No.106 outrigger extends 2m across the end of Mews to abut No 10 Warren Mews

108 Cleveland Street



Photo 3 Rear of No.106 Cleveland Road and No.10 Warren Mews
Note 1 Green door to No 106 basement is 1.5m below Mews level

Basement Impact Assessment



Photo 4 No.108 covered rear yard with rear door to Warren Mews
Note 1 Rear yard is 1.5m below Mews level

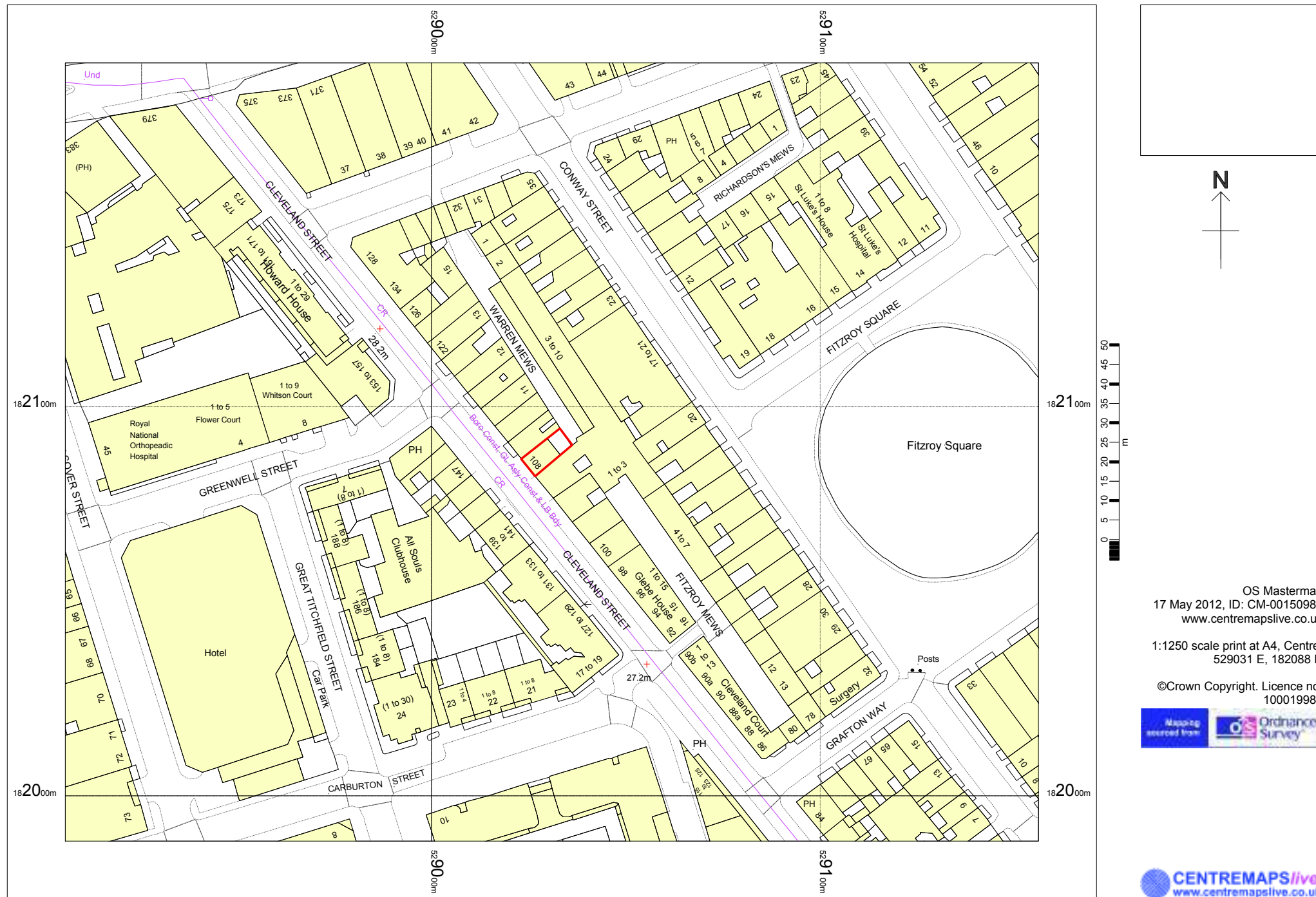


Photo 5 No 108 Rear yard with steps to Warren Mews and half landing above basement in main terrace



Photo 6 Detail of manhole in rear yard 0.8m deep with outlet draining to front of Cleveland Street

Appendix 3: Site Location Plan and Proposed Development Drawings



Site Location Plan

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Tender	<input type="checkbox"/>
Construction	<input type="checkbox"/>

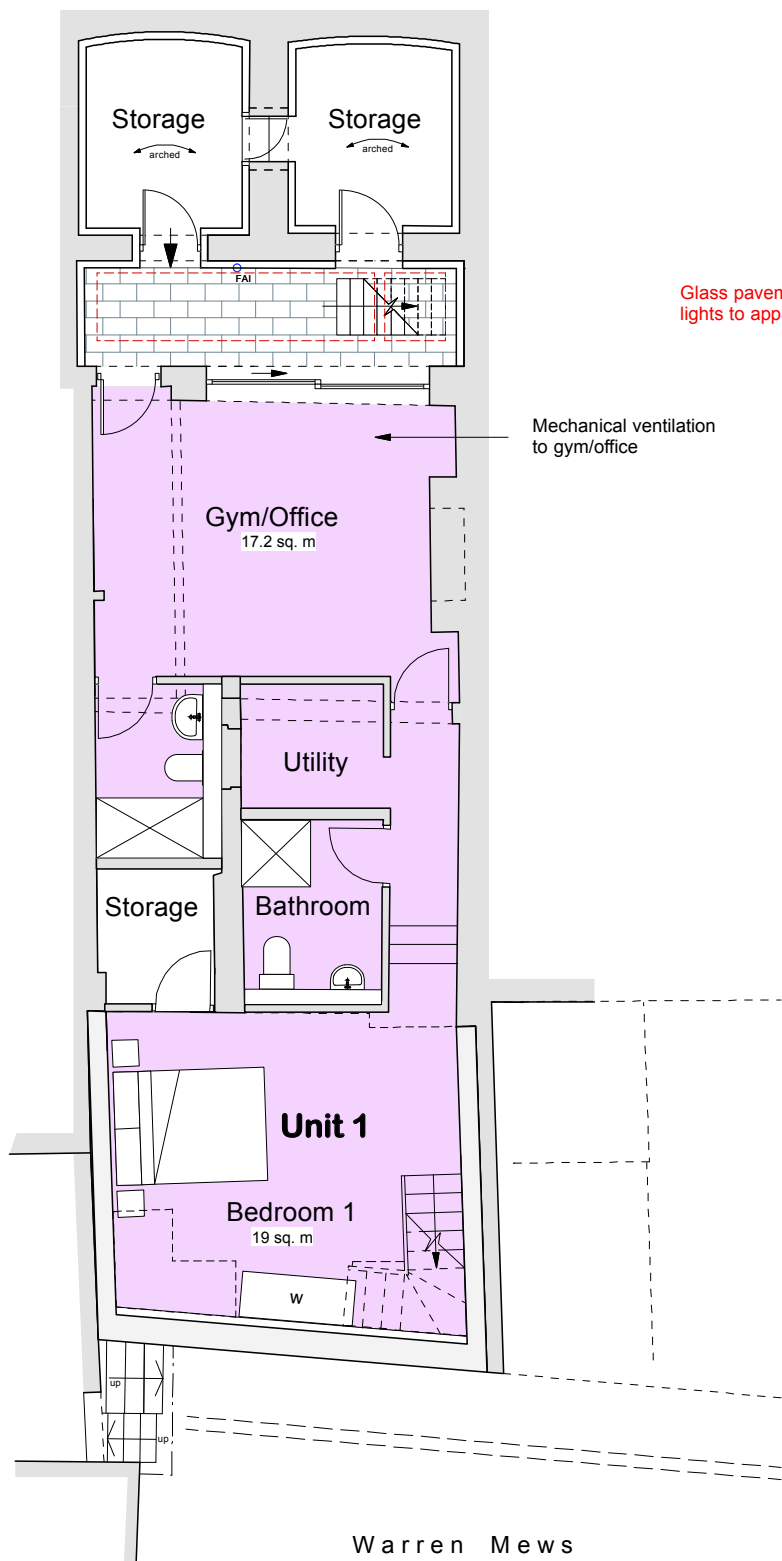
239-001
Rev:
Date: 17.05.12
Scale: 1:1250 @ A3

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108 Cleveland Street, London, W1T
Site Location Plan

Cleveland Street

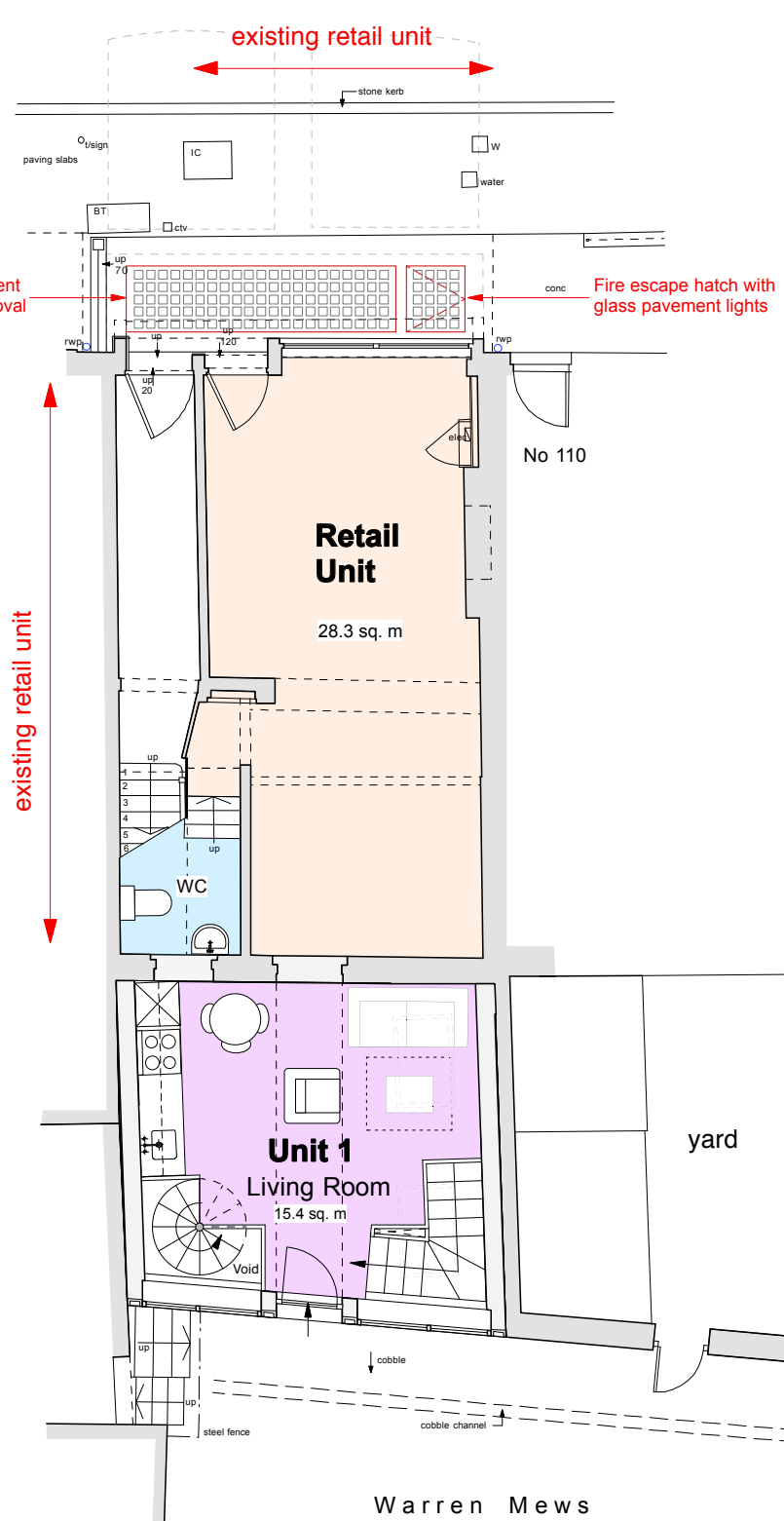
Cleveland Street

Cleveland Street



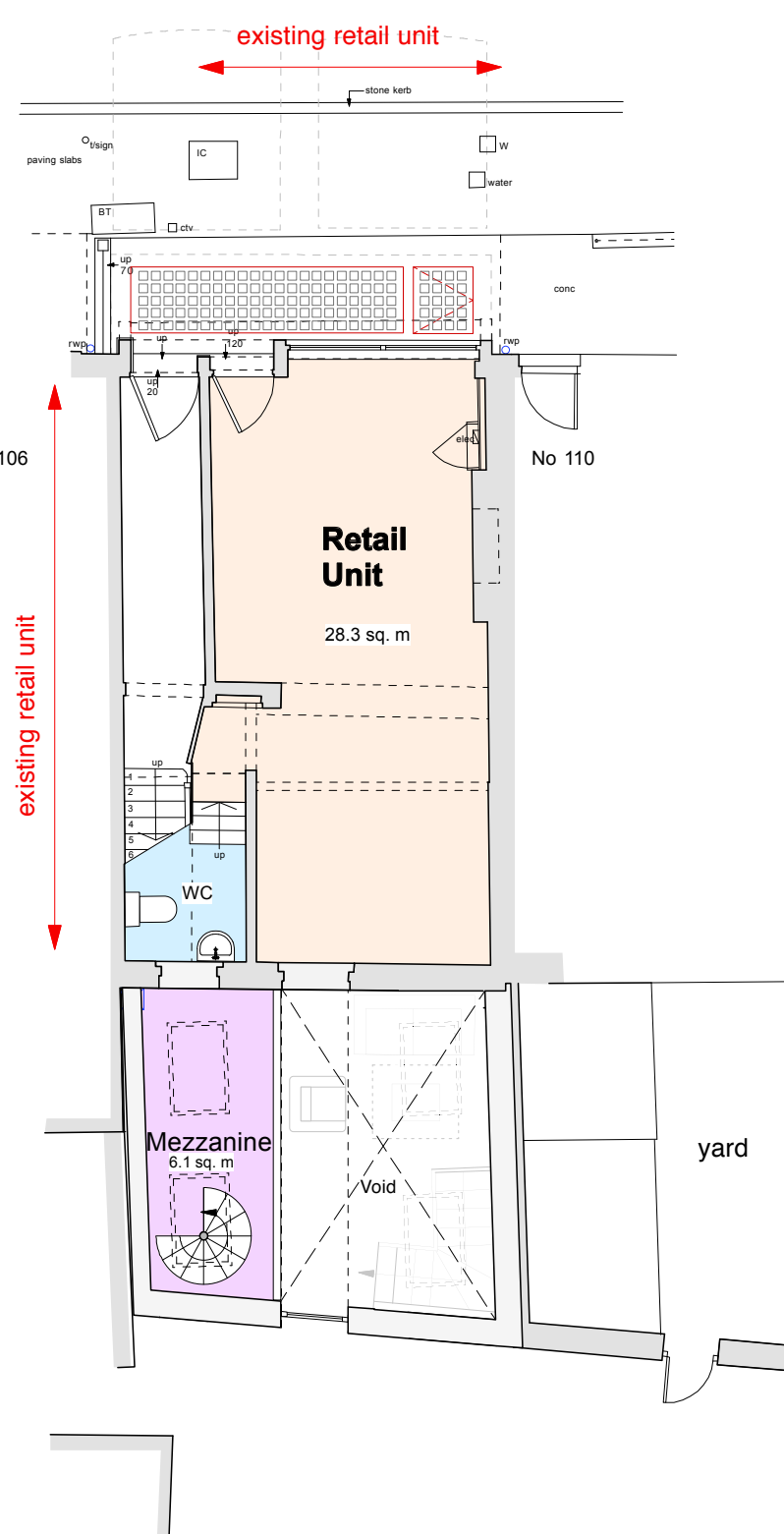
Basement Plan

Approx. Gross Internal Area - 52.6 sq. m (567 sq. ft)



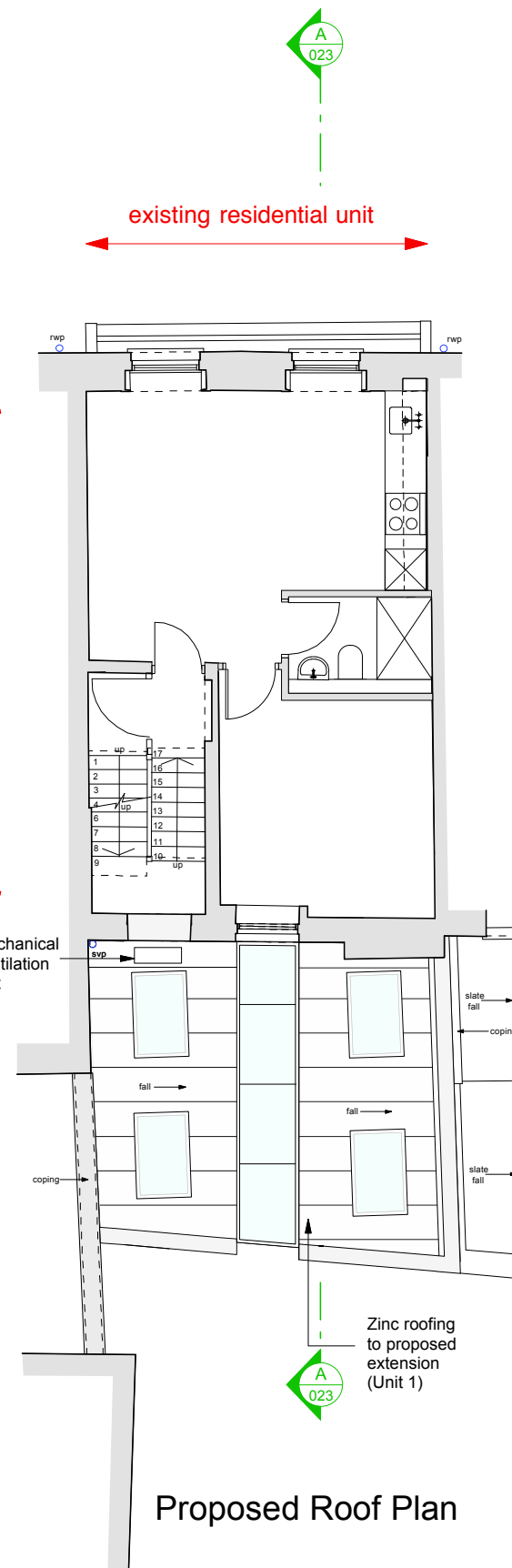
Ground Floor Plan

Approx. Gross Internal Area - 15.4 sq. m (165 sq. ft)



Mezzanine Floor Plan

Approx. Gross Internal Area - 6.1 sq. m (66 sq. ft)



Proposed Roof Plan



Scale 0 1m 2m 5m 8m

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Proposed Residential Unit 1 Basement, Ground & Mezzanine Floor Plans

PURPOSE OF ISSUE
Preliminary ☐
Planning ☒
Tender ☐
Construction ☐

239-020
Rev: A
Date: 23.01.12
Scale: 1:100 @ A3

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108 Cleveland Street, London, W1T

Proposed Residential Unit 1
Basement, Ground & Mezzanine Floor Plans



Scale 0 1m 2m 5m 8m

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Existing Section AA

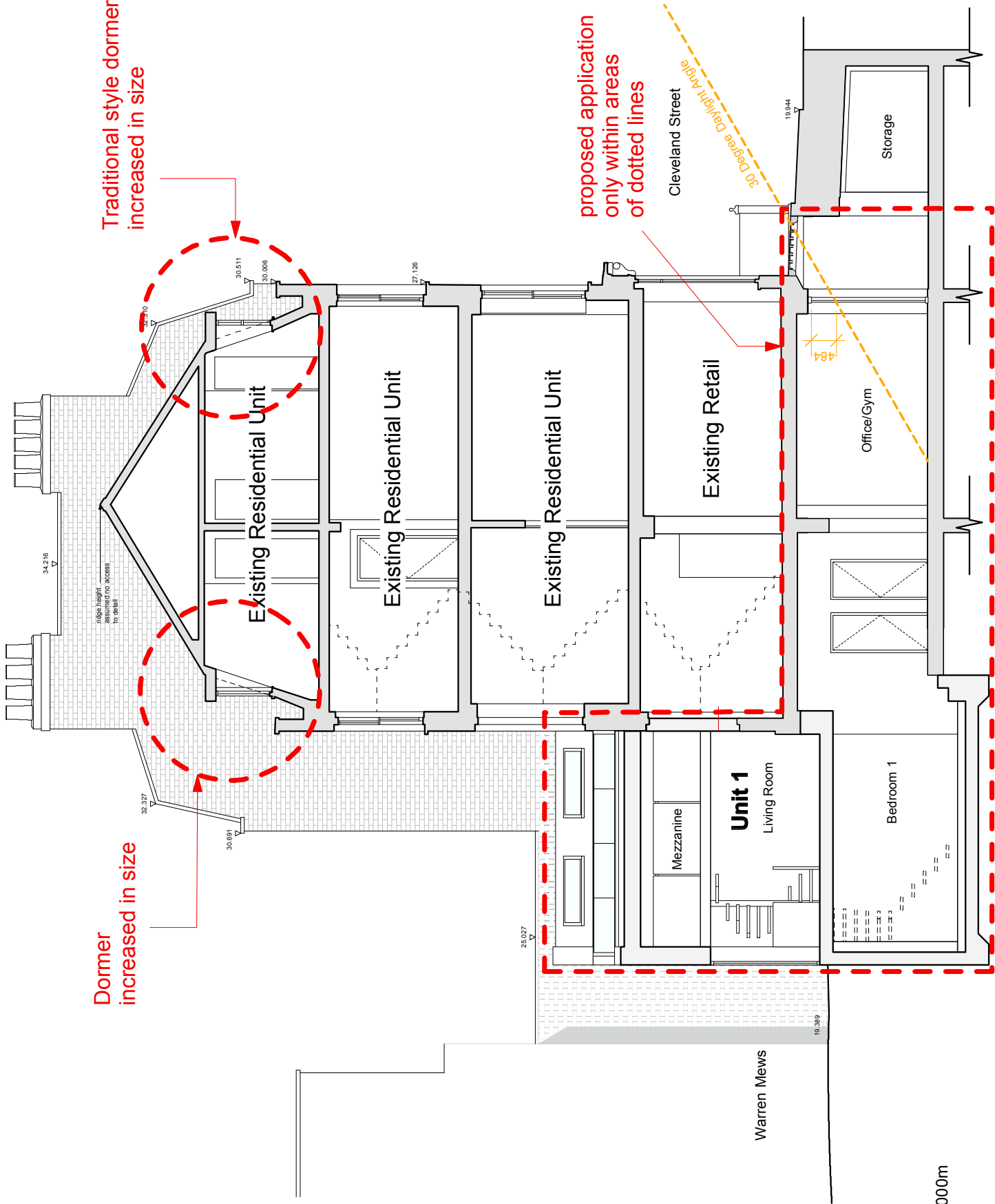
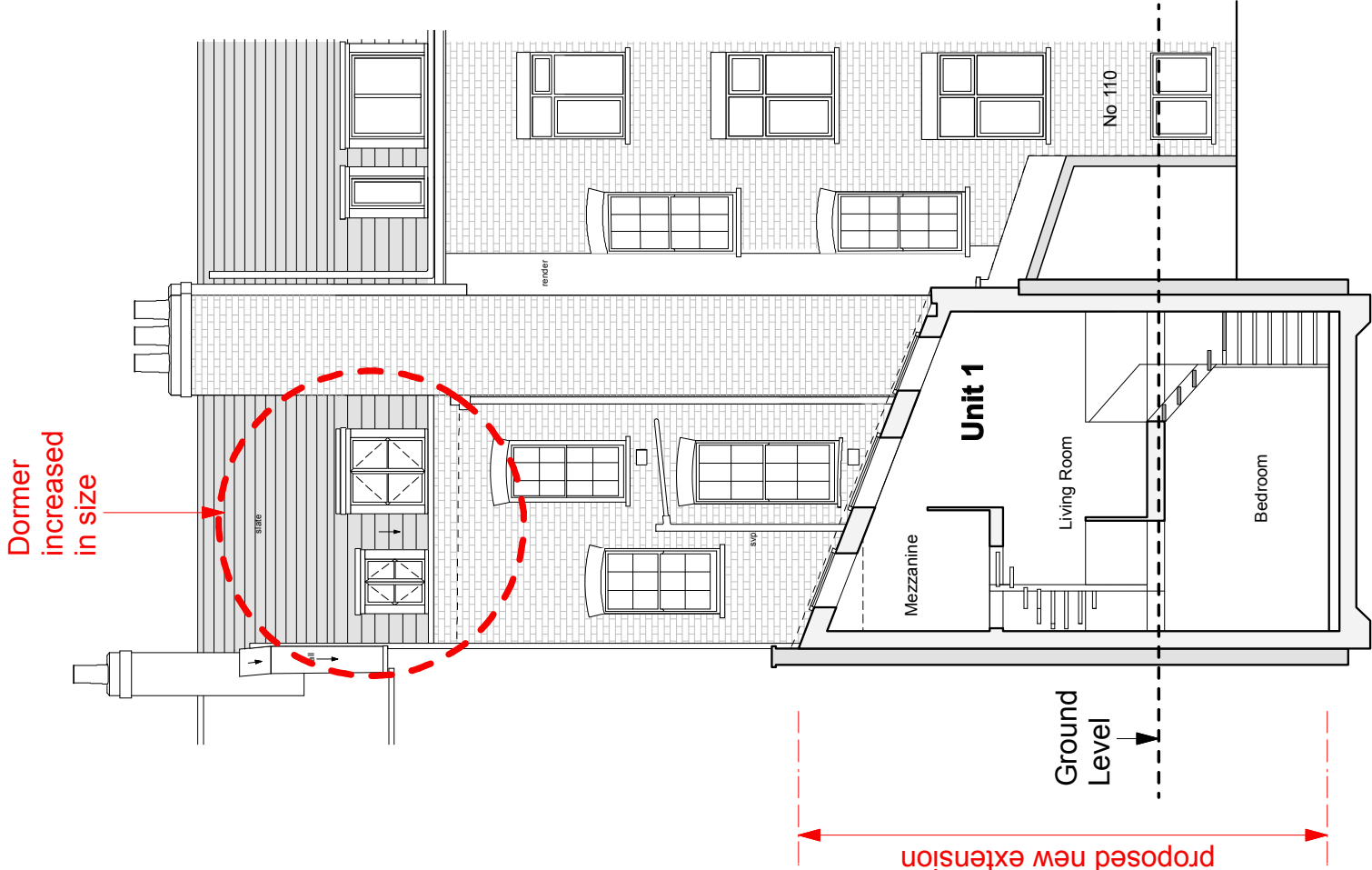
PURPOSE OF ISSUE
Preliminary ☒
Planning ☐
Tender ☐
Construction ☐

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Existing Section AA



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Proposed Typical Cross Sections

PURPOSE OF ISSUE
Preliminary ☐
Planning ☒
Tender ☐
Construction ☐

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Proposed Typical Cross Sections