254-256 BELSIZE ROAD

Flood Risk Assessment and Conceptual Drainage

HLEF03959
254-256 Belsize Road
1
July 2023

rpsgroup.com

Quality Management

Version	Status	Authored by	Reviewed by	Approved by	Review date
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Approval for issue

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Contents

Tables

Figures

Appendices

1 INTRODUCTION

1.1 RPS was commissioned to prepare a Flood Risk Assessment (FRA) of a site located at 254-256 Belsize Road, NW6 4AA in relation to the proposed redevelopment including "*alterations and extensions to an existing residential apartment building to add two floors and the erection of a part 2 and part 1 storey extension to create an additional 8 no. apartments, including 5no. by conversion/extension and 3 no. new build*";

1.2 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the impacts of the proposed development on flooding in the vicinity of the site, and the proposed measures which could be incorporated into the development to mitigate the identified risk. The report has been prepared in accordance with the guidance detailed in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG). Reference has also been made to the CIRIA SuDS manual (C753), BRE Digest 365 Soakaway Design, Camden Local Plan and the Camden Strategic Flood Risk Assessment (SFRA).

1.3 This report has been prepared in consultation with the Lead Local Flood Authority (LLFA). The site is not located within an Internal Drainage Board (IDB) District.

1.4 This report is not intended to provide formal details of the final drainage design for the development. However, it provides information regarding the capabilities of the conceptual surface water drainage strategy to meet the requirements of the NPPF.

1.5 The desk study was undertaken by reference to information provided / published by the following bodies:

- Environment Agency (EA);
- Centre for Ecology and Hydrology;
- British Geological Survey (BGS);
- Ordnance Survey (OS);
- Thames Water (TW); and
- London Borough of Camden.

2 PLANNING POLICY CONTEXT

National Planning Policy

2.1 The National Planning Policy Framework (NPPF) was released in March 2012 and was updated in July 2021. The document advises of the requirements for a site-specific Flood Risk Assessment (FRA) for any of the following cases (Planning and Flood Risk paragraph 167 (footnote 55)):

- All proposals (including minor development and change of use) located within the EA designated floodplain, recognised as either Flood Zone 2 (medium probability) or Flood Zone 3 (high probability);
- All proposals of 1 hectare (ha) or greater in an area located in Flood Zone 1 (low probability);
- All proposals within an area which has critical drainage problems (as notified to the Local Planning Authority by the EA);
- Land identified in a strategic flood risk assessment as being at increased flood risk in future; and
- Where proposed development may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

2.2 Paragraph 169 of the updated NPPF identifies that major developments (developments of 10 homes or more and to major commercial development) should incorporate Sustainable Drainage Systems unless there is clear evidence that this would be inappropriate. The systems used should:

a. Take account of advice from the Lead Local Flood Authority;

b. Have appropriate proposed minimum operational standards;

c. Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and

d. Where possible, provide multifunctional benefits.

2.3 Defra published their 'Non-statutory technical standards for sustainable drainage systems' in March 2015. These are supported by the revised NPPF.

Regional Planning Policy

2.4 The development site is within the London Borough of Camden which is covered by the London Plan 2021, published in March 2021. The London Plan contains various policies pertaining to flood risk and drainage, the relevant aspects of which are reproduced below.

Policy G1 Green Infrastructure

A. London's network of green and open spaces, and green features in the built environment, should be protected and enhanced. Green infrastructure should be planned, designed and managed in an integrated way to achieve multiple benefits.

B. Boroughs should prepare green infrastructure strategies that identify opportunities for cross-borough collaboration, ensure green infrastructure is optimised and consider green infrastructure in an integrated way as part of a network consistent with Part A.

C. Development Plans and area-based strategies should use evidence, including green infrastructure strategies, to:

1. Identify key green infrastructure assets, their function and their potential function

2. *Identify opportunities for addressing environmental and social challenges through strategic green infrastructure interventions.*

D. *Development proposals should incorporate appropriate elements of green infrastructure that are integrated into London's wider green infrastructure network.*

Policy G5 Urban Greening

A. *Major development proposals should contribute to the greening of London by including urban greening as a fundamental element of site and building design, and by incorporating measures such as high-quality landscaping (including trees), green roofs, green walls and nature-based sustainable drainage.*

B. *Boroughs should develop an Urban Greening Factor (UGF) to identify the appropriate amount of urban greening required in new developments. The UGF should be based on the factors set out in Table 8.2, but tailored to local circumstances. In the interim, the Mayor recommends a target score of 0.4 for developments that are predominately residential, and a target score of 0.3 for predominately commercial development (excluding B2 and B8 uses).*

C. *Existing green cover retained on site should count towards developments meeting the interim target scores set out in (B) based on the factors set out in Table 8.2.*

Policy SI12 Flood Risk Management

A. *Current and expected flood risk from all sources (as defined in paragraph 9.2.12) across London should be managed in a sustainable and cost-effective way in collaboration with the Environment Agency, the Lead Local Flood Authorities, developers and infrastructure providers.*

B. *Development Plans should use the Mayor's Regional Flood Risk Appraisal and their Strategic Flood Risk Assessment as well as Local Flood Risk Management Strategies, where necessary, to identify areas where particular and cumulative flood risk issues exist and develop actions and policy approaches aimed at reducing these risks. Boroughs should co-operate and jointly address cross-boundary flood risk issues including with authorities outside London.*

C. *Development proposals should ensure that flood risk is minimised and mitigated, and that residual risk is addressed. This should include, where possible, making space for water and aiming for development to be set back from the banks of watercourses.*

D. *Developments Plans and development proposals should contribute to the delivery of the measures set out in Thames Estuary 2100 Plan. The Mayor will work with the Environment Agency and relevant local planning authorities, including authorities outside London, to safeguard an appropriate location for a new Thames Barrier.*

E. *Development proposals for utility services should be designed to remain operational under flood conditions and buildings should be designed for quick recovery following a flood.*

F. *Development proposals adjacent to flood defences will be required to protect the integrity of flood defences and allow access for future maintenance and upgrading. Unless exceptional circumstances are demonstrated for not doing so, development proposals should be set back from flood defences to allow for any foreseeable future maintenance and upgrades in a sustainable and cost-effective way.*

G. *Natural flood management methods should be employed in development proposals due to their multiple benefits including increasing flood storage and creating recreational areas and habitat.*

Policy SI13 Sustainable Drainage

A. *Lead Local Flood Authorities should identify – through their Local Flood Risk Management Strategies and Surface Water Management Plans – areas where there are particular surface*

water management issues and aim to reduce these risks. Increases in surface water runoff outside these areas also need to be identified and addressed.

B. Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. There should also be a preference for green over grey features, in line with the following drainage hierarchy:

1) rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)

2) rainwater infiltration to ground at or close to source

3) rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)

4) rainwater discharge direct to a watercourse (unless not appropriate)

5) controlled rainwater discharge to a surface water sewer or drain

6) controlled rainwater discharge to a combined sewer.

C. Development proposals for impermeable surfacing should normally be resisted unless they can be shown to be unavoidable, including on small surfaces such as front gardens and driveways.

D. Drainage should be designed and implemented in ways that promote multiple benefits including increased water use efficiency, improve water quality, and enhance biodiversity, urban greening, amenity and recreation.

Local Planning Policy

2.5 The Camden Local Plan (2016 – 2031) contains the following Policies relating to flood risk and drainage:

Policy CC3 Water and Flooding

The Council will seek to ensure that development does not increase flood risk and reduces the risk of flooding where possible. They will require development to:

A. incorporate water efficiency measures;

B. avoid harm to the water environment and improve water quality;

C. consider the impact of development in areas at risk of flooding (including drainage);

D. incorporate flood resilient measures in areas prone to flooding;

E. utilise Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy to achieve a greenfield run-off rate where feasible; and

F. not locate vulnerable development in flood-prone areas.

Where an assessment of flood risk is required, developments should consider surface water flooding in detail and groundwater flooding where applicable. The Council will protect the borough's existing drinking water and foul water infrastructure, including the reservoirs at Barrow Hill, Hampstead Heath, Highgate and Kidderpore.

2.6 The Camden SFRA identifies and maps flood risk from all sources at a borough-wide scale as well as providing guidance on producing site specific FRAs. Relevant information from the SFRA has been referenced throughout this FRA report.

3 CONSULTATION

Environment Agency

3.1 The site lies within Flood Zone 1, the EA has therefore not been consulted in this instance.

Thames Water

3.2 The public sewer network within the vicinity of the site is operated by Thames Water.

3.3 A sewer history enquiry has been submitted to the local water company. A response was received in July 2023 and is included as Appendix A.

3.4 The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

Lead Local Flood Authority

3.5 The site is within the administrative boundary of London Borough of Camden. Consultation has been undertaken with the planning department. With regards to surface water management, they have advised that this development is in area of flood risk. Belsize Road has previously flooded in 1975, 2002 & 2021, the risk of surface water flooding is also indicated extending around the whole frontage of the property on Environment Agency Surface water flood maps and Camden's SFRA.

3.6 Currently no information has been submitted to meet the requirements of Local Plan Policy CC3 on Water and Flooding, especially in relation to points C, D & E.

3.7 They encouraged to fill out the Camden flood & SuDs proforma in order to better understand the requirements for the site.

Mitigating flood risk

3.8 Developments must not increase the risk of flooding and are required to put in place mitigation measures where there is known to be a risk of flooding. Development located within such areas should not place additional pressure on the existing drainage infrastructure. Within areas at risk of flooding (see Local Plan Policies Map, Camden's SFRA incl. appendices, and SFRA updated figure 6), they will expect water infrastructure to be designed to cope with a 1 in 100 year 6-hour storm event plus 40% climate change in order to limit the flooding of, and damage to, property. They will expect buildings, landscaping and features to be designed to cope with events exceeding this magnitude.

Sustainable Drainage Systems

3.9 All developments will be required to manage drainage and surface water on-site or as close to the site as possible, using Sustainable Drainage Systems (SUDS) selected in accordance with the drainage hierarchy. We would like developments to achieve greenfield run-off rates unless demonstrated this is not feasible.

3.10 As roof extension is proposed this presents an great opportunity for the incorporation of a Blue/Green roof in order to attenuate run-off to as close to greenfield run-off rates as practically possible.

Internal Drainage Board

3.11 The site is not located within an IDB District.

4 SITE DESCRIPTION

Site Description

4.1 The site is located at National Grid Reference TQ 25503 83672, is irregular in shape and occupies an area of approximately 0.17 hectares (ha). The site location is presented in Figure 1.

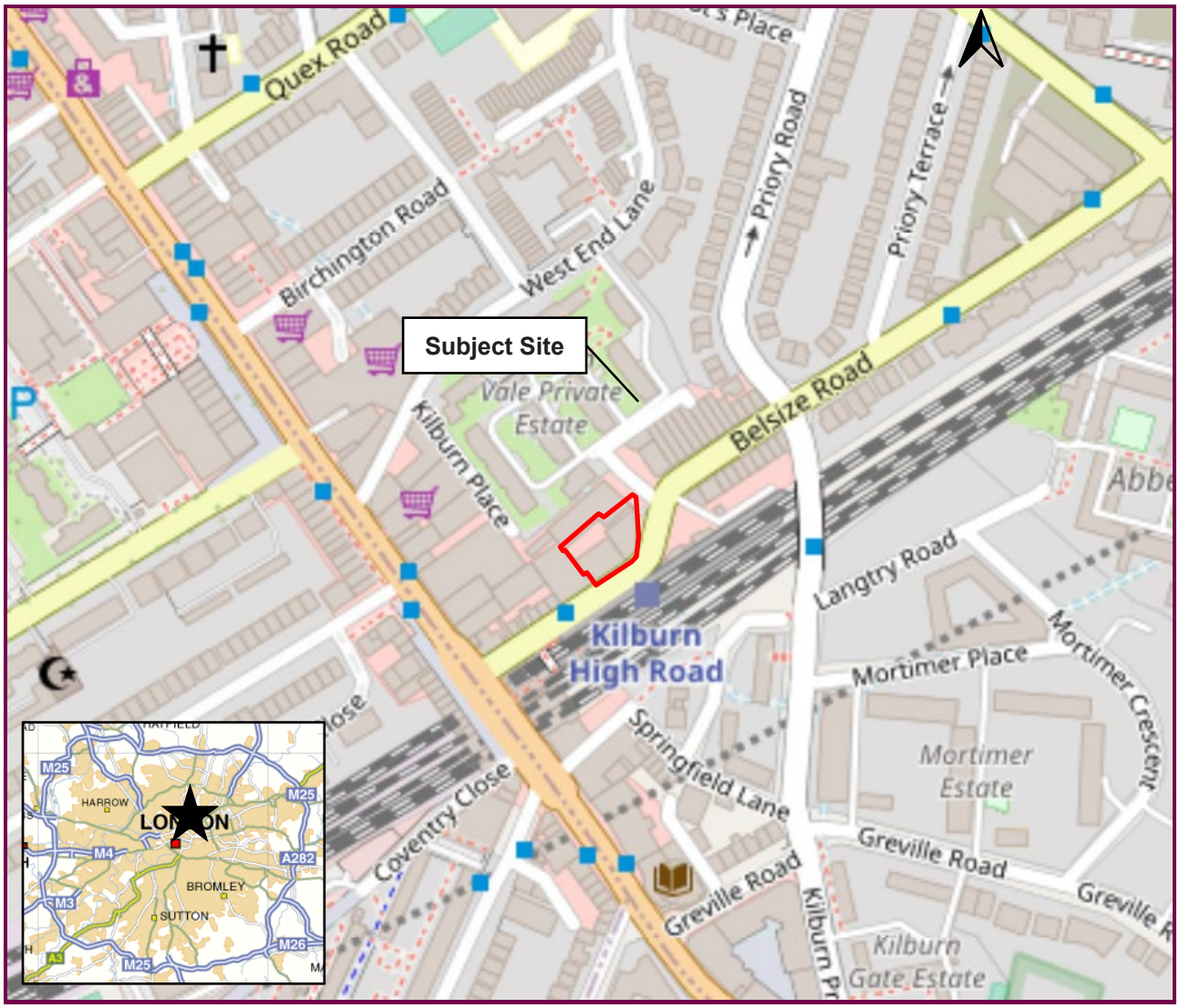


Figure 1. Site Location

4.2 The site is currently occupied by buildings of no. 254 and 256 Belsize Road, although the works subject to the application are confined to no. 256 only.

4.3 The site is currently 100% hardstanding.

Surrounding Land Uses

4.4 Kilburn High Road lies approximately 40 metres to the west, which is part of the A5 major road and from here there are main bus routes. There is a bus stop directly outside the front of no.264 Belsize Road and Kilburn High Road Overground Station lies around 91 metres to the south-west of the site. There are also many key services and facilities within short walking distance of the site.

4.5 The surrounding area has a mixture of architectural styles and building heights. To the south of the site is the Kilburn High Road Overground line and beyond this are several blocks of high-rise apartments, of around five and six storeys, situated along Springfield Lane and Walk. To the west is no. 258 Belsize Road. This is an early 1990s office building of five storeys, which has been converted into flats. To the north, immediately adjacent to number 254, is 252 Belsize Road (Omni House). Omni House is a late-Victorian brick building which has a similar height to no. 254 Belsize Road in its current form. Beyond this, to the north, is a large public housing estate (Kilburn Vale Estate), dating from the 1970s which comprises individual blocks of flats of around four storeys high.

4.6 There are no designated sensitive areas (e.g. Special Area of Conservation (SAC), Special Protection Area (SPA) or Site of Special Scientific Interest (SSSI)) within close proximity to the site.

Topography

4.7 A topographic survey was completed by Cloud 10 Ltd in 2021, reference 0707-T and indicates that Belsize Road at the eastern access of the site is located at 32.28m AOD. Ground levels increase to the west along Belsize Road and within the internal yard to 33.80mAOD approximately. The topographic survey is located in Appendix B.

5 PROPOSED DEVELOPMENT

5.1 The proposed description of development is as follows: *"alterations and extensions to an existing residential apartment building to add two floors and the erection of a part 2 and part 1 storey extension to create an additional 8no. apartments, including 5no. by conversion/extension and 3no. new build".* Development plans are shown in Appendix C.

5.2 The proposed works include the creation of 8 no. additional residential apartments. This includes 3 new builds, and 5 to be converted/extended from existing fabric. The new apartments created via new build extensions to No.256 Belsize Road are on the 3rd and 4th floor of the building. The new apartments created via alteration / conversion of the existing units are proposed on the 3rd floor of 254 Belsize Road and 4th floor of 256 Belsize Road.

5.3 In addition to the above, the below works are proposed:

- 2 new floors atop No. 256 Belsize Road (3rd and 4th floors). The fourth floor is to be set back to minimise the impact on the appearance of the building and includes a lightweight, seamless glass curtain wall with flat slender roof. The third-floor extension replicates the original design;
- Removal of internal staircases between the existing duplex flats and separation of the 3rd floor of No. 256 from the 2nd floor;
- 4no. PV panels atop No. 254 Belsize Road.

5.4 Floor levels will remain as existing.

5.5 The proposal will not impact on the impermeable area at the site.

5.6 The proposed use of the site is classified as 'more vulnerable' within the PPG.

5.7 Surface water runoff is anticipated to pass to the existing drainage network serving the site. The discharge rate to the existing mains sewer will not increase due to the proposed development.

5.8 The potential to provide surface water attenuation, including the use of Sustainable Drainage Systems (SuDS), has been considered as part of the preliminary design process (see Section 10 – Surface Water Management).

6 HYDROLOGICAL SETTING

Nearby Watercourses

6.1 OS Mapping indicates that there are no surface water features located within 1km of the site.

6.2 An arm of the Grand Union Canal is located approximately 1.7km south of the site.

6.3 The nearest EA Main River is a reach of the Mitchell Brook located approximately 4.6km north west of the site.

Fluvial / Tidal Flood Risk Classification

6.4 The EA Flood Map for Planning, which is available online, indicates that the site is located within Flood Zone 1, whereby the annual probability of flooding from fluvial or tidal sources is classified as less than 0.1%. The EA Flood Map for Planning is provided in Figure 2.

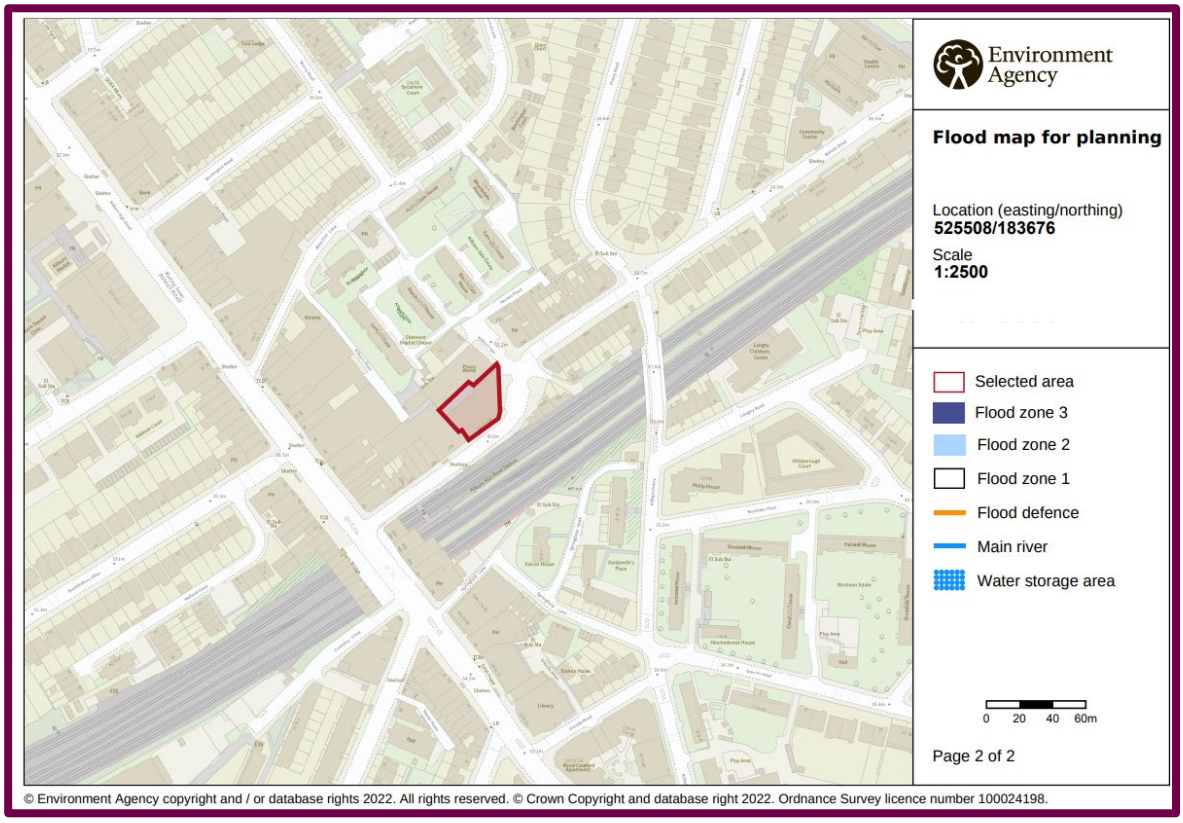


Figure 2. EA Flood Map for Planning

EA Flood Warning Area

6.5 The EA defines a Flood Warning Area as "*geographical areas where we expect flooding to occur and where we provide a Flood Warning Service. They generally contain properties that are expected to flood from rivers or the sea and in some areas, from groundwater*."

6.6 The site is not located in a Flood Warning Area.

Surface Water Flood Risk Classification

6.7 The EA's Flood Map for Surface Water, which is available online, indicates that the majority of the site is at 'Very Low' risk from Surface Water Flooding. This corresponds with an annual probability of flooding that is less than 0.1%. The site is bounded by areas of 'Low' Surface Water Flooding, this corresponds with an annual probability of flooding between 0.1% and 1%, which encroach upon

the site at the northern and southern boundaries. The updated Flood Map for Surface Water is presented in Figure 3.

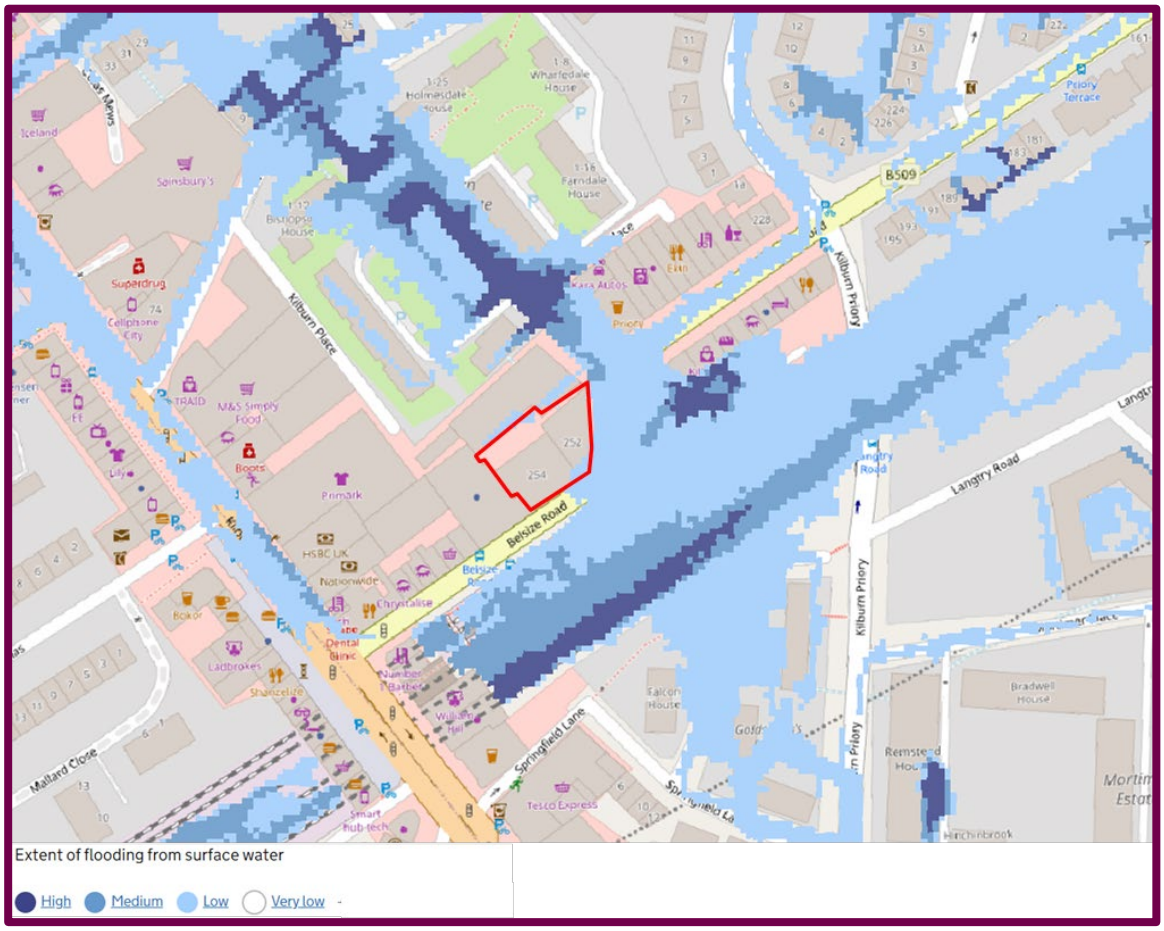


Figure 3. Flood Map for Surface Water

6.8 Surface water depth mapping indicates that the extents encroaching upon the site may reach depths of 300 to 900mm for the low risk scenario. However, a high-level topographic analysis indicates that flood depths are more likely to be around 300mm given that the flooding in the north east corner seems to be confined to the road and the entrance to the site and the curb do not seem to be affected, which have a difference in elevation compared to the road of approximately 300mm.

6.9 Surface water velocity mapping indicates that the extents in the vicinity of the site flow south, adjacent to the eastern boundary of the site and join the flow path which flows westerly along Belsize Road.

Reservoir Flood Risk Classification

6.10 EA mapping also indicates that the site is not located within an area potentially at risk from reservoir flooding.

Local Authority Flood Risk Assessment

6.11 The Camden SFRA was published in 2014. It provides an overview of flood risk from various sources within the borough. Information relevant to this assessment is summarised below:

- All main rivers within the Council's administrative area are culverted and incorporated into the sewer network.
- SFRA mapping indicates that Belsize Road experienced flooding during the 2002 event.

- SFRA mapping indicates that the site is primarily categorised as a ‘Low’ flood hazard (Caution), with some small areas at the northern boundary categorised as ‘Moderate’ (Danger for some) to ‘ Significant’ (Danger for most) flood hazard.
- The site postcode ‘NW6 4’ is indicated to have experienced 4 exterior sewer flooding occurrences and 2 internal sewer flooding occurrences, however specific locations are not provided.
- SFRA mapping indicates that Camden Council do not hold any groundwater flooding records for the vicinity of the site, however it is indicated that a two Environment Agency groundwater flood incidents are recorded in the site vicinity; located 100m south east and 170m north east of the site.

7 HYDROGEOLOGICAL SETTING

7.1 British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the site is underlain by the London Clay Formation, comprising clay, silt and sand. There are no records of superficial deposits at the site.

7.2 No BGS boreholes are located within the vicinity of the site.

7.3 A Ground Investigation was undertaken at the site by Ground & Water in 2014. A borehole was drilled onsite to a depth of 15.45m bgl. It was observed that the site is situated on Made Ground, to a depth of 0.40m below ground level (bgl), underlain by the London Clay Formation, to a depth of 15.45m bgl. Groundwater was not encountered during the site investigation,

7.4 The soils are described as ‘Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils’ by the National Soils Research Institute.

7.5 According to the MAGIC Aquifer Designation Mapping, the underlying London Clay Formation is classified as an ‘Unproductive Aquifer. These formations have a low permeability and have negligible significance for water supply or base flow.

7.6 MAGIC online groundwater Source Protection Zone (SPZ) mapping indicates that the site is not located within a groundwater SPZ.

8 EXISTING DRAINAGE / WATER MAINS

8.1 The existing drainage survey of the site is included as Appendix D. It indicates that the drainage at the site discharges into the existing Thames Water sewer network on Kilburn Vale through manhole MH1.

9 FLOOD RISK AND MITIGATION

9.1 The key sources of flooding that could potentially impact the site are discussed below:

Fluvial / Tidal Flooding

9.2 The EA Flood Map for Planning, which is available online, indicates that the site is located within Flood Zone 1, whereby the annual probability of flooding from fluvial or tidal sources is classified as less than 0.1%.

9.3 There are no EA main rivers or other surface water bodies located within 1km of the site.

9.4 The SFRA indicates that all main rivers within the Council's administrative area are culverted and incorporated into the sewer network.

9.5 The PPG details the suitability of different land uses within each flood zone. The proposed land use is classified as 'more vulnerable' and such uses are generally considered appropriate within Flood Zone 1.

Flooding from Sewers

9.6 Sewer flooding can occur during periods of heavy rainfall when a sewer becomes blocked or is of inadequate capacity. The site is currently served by Thames Water (detailed in Section 8).

9.7 As previously mentioned, main rivers within the Council's administrative area are culverted and incorporated into the sewer network. The SFRA indicates that the site postcode 'NW6 4' is indicated to have experienced 4 exterior sewer flooding occurrences and 2 internal sewer flooding occurrences, however specific locations are not provided.

9.8 The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

Surface Water Flooding (Overland Flow)

9.9 This can occur during intense rainfall events, when water cannot soak into the ground or enter drainage systems. The EA's Flood Map for Surface Water, indicates that the majority of the site is at 'Very Low' risk from Surface Water Flooding. The site is bounded by areas of 'Low' Surface Water Flooding, this corresponds with an annual probability of flooding between 0.1% and 1%, which encroach upon the site at the northern and southern boundaries.

9.10 Surface water depth mapping indicates that the extents encroaching upon the site may reach depths of 300 to 900mm for the low risk scenario. However, a high-level topographic analysis indicates that flood depths are more likely to be around 300mm given that the flooding in the north east corner seems to be confined to the road and the entrance to the site and the curb do not seem to be affected, which have a difference in elevation compared to the road of approximately 300mm.

9.11 Surface water velocity mapping indicates that the extents in the vicinity of the site flow south, adjacent to the eastern boundary of the site and join the flow path which flows westerly along Belsize Road.

9.12 The LLFA have indicated that Belsize Road has previously flooded in 1975, 2002 & 2021, the risk of surface water flooding is also indicated extending around the whole frontage of the property.

9.13 SFRA mapping indicates that Belsize Road experienced surface water flooding during the 2002 event.

9.14 SFRA mapping indicates that the site is primarily categorised as a 'Low' flood hazard (Caution), with some small areas at the northern boundary categorised as 'Moderate' (Danger for some) to ' Significant' (Danger for most) flood hazard.

9.15 Surface water flooding from on-site sources is considered in Section 10 of this report.

Groundwater Flooding

9.16 This can occur in low-lying areas when groundwater levels rise above surface levels, or within underground structures. BGS mapping indicates that the site is underlain by the London Clay Formation, comprising clay, silt and sand, which is classified as an 'Unproductive' Aquifer. There are no records of superficial deposits at the site. Groundwater was not encountered during the site investigation.

9.17 SFRA mapping indicates that Camden Council do not hold any groundwater flooding records for the vicinity of the site, however it is indicated that an Environment Agency groundwater flood incident is recorded in the site vicinity.

9.18 Development plans indicate that a basement level is present at the site, however as no groundwater was encountered during the site investigation and no sleeping accommodation is proposed at basement level, it can be considered to be at low risk from groundwater.

Other Sources

9.19 There is a limited risk of flooding occurring as a result of a break in a water main. The risk of flooding associated with reservoirs, canals and other artificial structures is considered to be low given the absence of any such structures in the site vicinity.

Proposed Mitigation

9.20 As the site is indicated to be at 'Low' to 'Medium' risk from surface water flooding only, and the proposal is for alterations to an existing building on upper floors, it is not deemed appropriate to recommend any mitigation measures.

10 SURFACE WATER MANAGEMENT

Introduction

10.1 The proposed description of development comprises ‘alterations and extensions to an existing residential apartment building to add two floors and the erection of a part 2 and part 1 storey extension to create an additional 8no. apartments, including 5no. by conversion/extension and 3no. new build’.

10.2 As the proposal will not impact on the impermeable area at the site and surface water runoff is anticipated to pass to the existing drainage network serving the site, the discharge rate to the existing mains sewer will not increase due to the proposed development.

10.3 The buildings footprint at the site occupies the majority of the site area and therefore the implementation of infiltration measures such as soakaways is not deemed to be feasible in this instance. It is physically not feasible to achieve greenfield runoff rates at this site. However, with the aim of providing betterment on the current situation and reducing the runoff rates, it is proposed to implement a green roof on top of the single ply membrane flat roof extension and two rainwater harvesting butts at ground floor level. The location of these measures is indicated in the Conceptual Drainage Strategy included as Appendix E.

Site Specific SuDS Benefits

Green Roof

10.4 Green roofs are areas of living vegetation, installed on the top of buildings, for a range of reasons including visual benefit, ecological value, enhanced building performance and the reduction of surface water runoff. Types of green roof can be divided into two main categories;

- Extensive roofs, have low substrate depths (and therefore low loadings on the building structure), simple planting and low maintenance requirements; they tend not to be accessible.
- Intensive roofs (or roof gardens) have deeper substrates (and therefore higher loadings on the building structure) that can support a wide variety of planting but which tend to require more intensive maintenance; they are usually accessible.

Rainwater Harvesting

10.5 Rainwater harvesting (RWH) is the collection of rainwater runoff for use. Runoff can be collected from roofs and other impermeable areas, stored, treated (where required) and then used as a supply of water for domestic, commercial, industrial and/or institutional properties. RWH systems have a number of key benefits:

- They can meet some of the building’s water demand, delivering sustainability and climate resilience benefits.
- They can help reduce the volume of run off from a site.
- They can help reduce the volume of attenuation storage required on the site.

10.6 The maintenance and adoption of the SuDS features are described in Section 10.7.

SuDS Proforma

10.7 Further details are given in the Camden Drainage Assessment form, included in full as Appendix F.

Maintenance and Adoption

10.8 A specialist management company will be identified at the detailed design stage and appointed to maintain the SuDS features for the lifetime of the development.

10.9 Tables 1 to 2, below, indicate the envisaged maintenance activities associated with the proposed green roof and rainwater harvesting, along with the approximate frequency within which they should be completed.

Table 1. Green Roof Maintenance Requirements

Maintenance schedule	Require Action	Typical Frequency
Regular Inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside or roof for evidence of leakage	Annually and after severe storms
Regular Maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (ie year one), replace dead plants as required	Monthly (but usually responsibility if manufacturer)
	Post establishment, replace dead plants as required (where > 5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required

Remedial Actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settle, cracked or moved, investigate and repair as appropriate	As required

Table 2. Rainwater Harvesting Maintenance Requirements

Maintenance schedule	Require Action	Typical Frequency
Regular Maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps, filters	Annually (and following poor performance)
	Cleaning of tank, inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris	Annually (and following poor performance)
Occasional Maintenance	Cleaning and/or replacement of any filters	Three monthly (or as required)
Remedial Actions	Repair of overflow erosion damage or damage to tank	As required
	Pump repairs	As required

11 SEQUENTIAL TEST AND EXCEPTION TEST

Sequential Test

11.1 The NPPF requires the Local Authority to apply the Sequential Test in consideration of new development. The aim of the Test is to steer new development to areas at the lowest probability of flooding. Given that the subject site has not been allocated as one of the Council's proposed future development sites, it has not been specifically assessed within the SFRA. Therefore, the Sequential Test is based on the EA Flood Zones and information contained within the SFRA.

11.2 According to the EA online Flood Map for Planning, the site is shown to be located within Flood Zone 1. As the development comprises alterations and extensions to an existing residential apartment building and the site is considered to have an overall low risk of flooding, application of the Sequential Test is not required.

11.3 As the proposals will make use of existing buildings, the development site should be considered a suitable location.

The Exception Test

11.4 According to Table 3 of the PPG to the NPPF, 'More Vulnerable' developments are considered appropriate within Flood Zone 1 without the requirement to apply the Exception Test.

12 SUMMARY AND CONCLUSIONS

12.1 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the potential impacts of the development on flooding both onsite and in the vicinity, and the proposed measures which can be incorporated into the development to mitigate the identified risks. The report has been prepared in accordance with the guidance detailed in the NPPF. Reference has also been made to the CIRIA SuDS manual (C753), the SFRA and the SWMP and following consultation with the LLFA.

12.2 The potential flood risks to the site, and the measures proposed to mitigate the identified risks, are summarised in Table 3.

Table 3. Proposed mitigation

Source of Flooding	Identified Risk			Mitigation Proposed
	L	M	H	
Fluvial	✓			None required.
Tidal	✓			None required.
Sewers	✓			None required.
Surface Water		✓		None required, as development is proposed on upper floors only
Groundwater	✓			None required.
Other Sources (e.g. reservoirs, water mains)	✓			None required.

12.3 The site is classified as being at very low risk from fluvial/tidal sources. The frontage of the existing building can be considered at low to medium risk from surface water flooding. However, given that the development is proposed on upper floors, no mitigation measures are considered to be required in this instance.

12.4 The site is not at significant risk from any other source of flooding.

12.5 It has been demonstrated that no Sequential and Exception Tests are required for the proposed development.

12.6 Overall, it has been demonstrated that the development would be safe, without increasing flood risk elsewhere, and that a positive reduction in flood risk would be achieved through the implementation of a green roof and rainwater harvesting butts.

APPENDICES

Appendix A

Thames Water Sewer Flooding History

Sewer Flooding
History Enquiry

Property Searches

RPS Consulting

Search address supplied	254-256 Belsize Road London NW6 4BT
Your reference	HLEF03959
Our reference	SFH/SFH Standard/2023_4856332
Received date	**11 July 2023**
Search date	**11 July 2023**

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

Sewer Flooding
History Enquiry

Property Searches

Search address supplied: 254-256,Belsize Road,London,NW6 4BT

This search is recommended to check for any sewer flooding in a specific address or area

TWUL, trading as Property Searches, are responsible in respect of the following:-

(i) any negligent or incorrect entry in the records searched;

(ii) any negligent or incorrect interpretation of the records searched;

(iii) and any negligent or incorrect recording of that interpretation in the search report

(iv) compensation payments

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

Sewer Flooding
History Enquiry

Thames Water Property Searches

History of Sewer Flooding

Is the requested address or area at risk of flooding due to overloaded public sewers?

The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

For your guidance:

- A sewer is "overloaded" when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- "Internal flooding" from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- "At Risk" properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company's reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water on Tel: 0800 316 9800 or website www.thameswater.co.uk

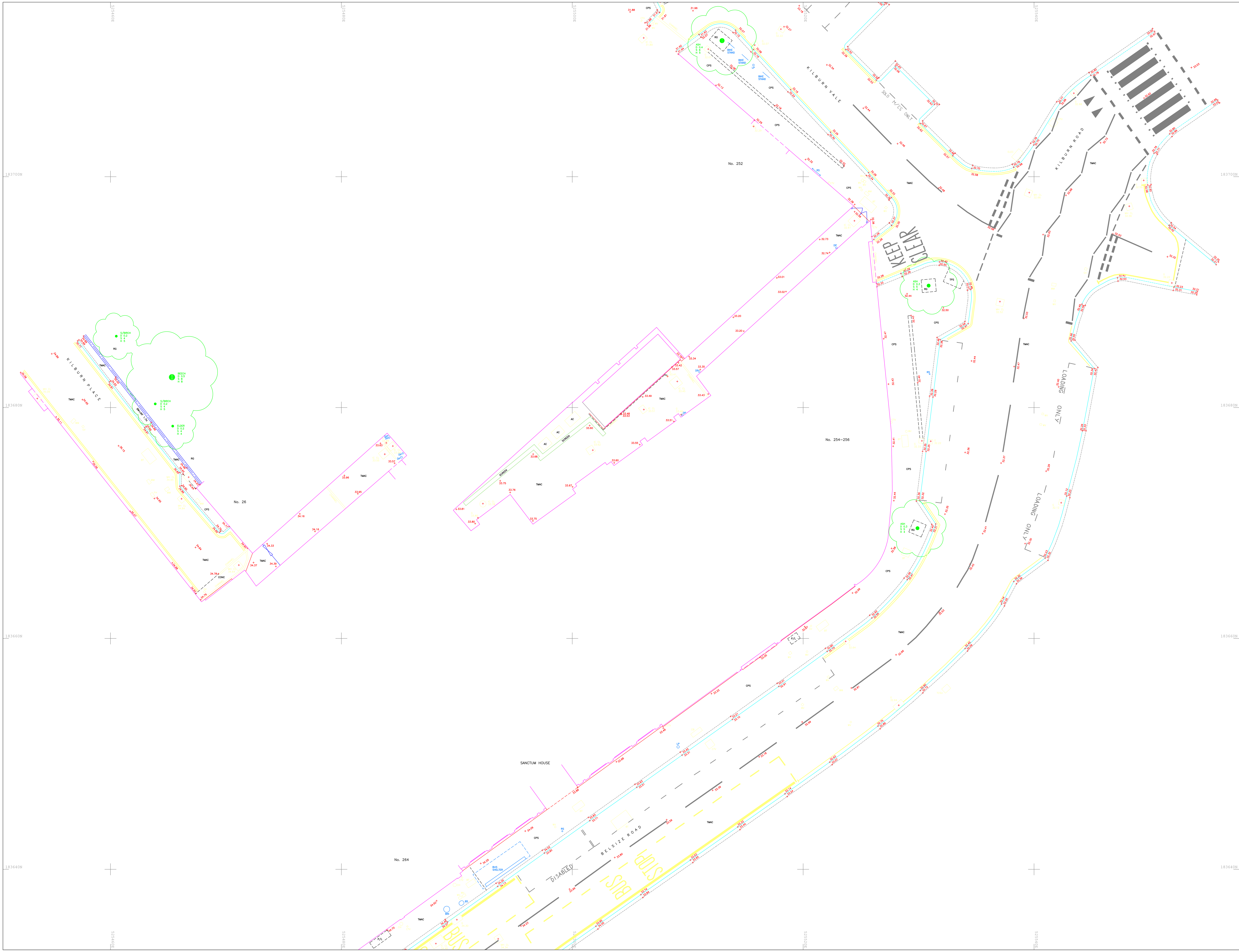
Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

Appendix B

Topographic Survey



ABBREVIATIONS

AB	Air Brick	DP	Down Pipe	PWF	Post & Wire Fence
B	Bollard	ECB	Electricity Control Box	R	Render
BB	Belisha Beacon	ELEC	Electricity	RAD	Radiator
BD	Back Drop	EP	Electricity Pole	RE	Rodding Eye
BH	Borehole or Beam Height	FB	Flower Bed	RG	Rough Ground
BL	Bed Level	FH	Fire Hydrant	RS	Road Sign
BP	Brick Paviors	FL	Floor Level	RSJ	Rolled Steel Joist
BRW	Brick Retaining Wall	FS	Floor to Sill	RWP	Rain Water Pipe
BS	Bus Stop	G	Gully	S	Spread or Stone
BT	British Telecom	GV	Gas Valve	SC	Stop Cock
BTCB	BT Control Box	H	Height in Metres	SH	Sill to Head
BW	Brick Wall	H	Window Head Height	SL	Soffit Level or Skylight
BWF	Barbed Wire Fence	IC	Inspection Cover	SP	Arch Springer Height
CB	Control Box	IL	Invert Level	SPS	Stone Paving Slabs
CBF	Close Boarded Fence	IRF	Iron Railing Fence	SW	Stone Wall
CBW	Concrete Block Wall	IWF	Interwoven Fence	TCSU	Traffic Control
CCB	Cable TV Control Box	KO	Kerb Outlet	T	Top Heights
CIF	Corrugated Iron Fence	L	Light	TL	Traffic Light
CL	Cover Level	LP	Lamp Post	TP	Telephone Pole
CLF	Chain Link Fence	MH	Manhole	TPS	Tactile Paving Slabs
CLSF	Chain Link Security Fence	MKR	Marker	UTL	Unable To Lift
CPF	Concrete Panel Fence	OV	Over Flow Pipe	V	Vent
CPS	Concrete Paving Slabs	O/H	Overhead	VP	Vent Pipe
CR	Arch Crown Height	P	Post	W	Window
CRW	Concrete Retaining Wall	PALF	Palisade Fence	WL	Water Level
CSU	Ceiling Slopes Up	PF	Picket Fence	WM	Water Meter
CTV	Cable Television	PIT	Trial Pit	WMF	Wire Mesh Fence
CW	Concrete Wall	PL	Pavement Light	WPF	Wooden Panel Fence
D	Diameter or Doors	PM	Parking Meter	WV	Water Valve
DH	Duct Height	PRF	Post & Rail Fence	ø	Diameter

Top
Banks
Bottom

Drop Kerbs
Overhead Detail
Change in Elevation
Fences
Overhead Cables
Change in Surface
Edge of Vegetation

3.28 Floor to Ceiling Height
3.28 F False Ceiling Height
Gate
Survey Station
Foul Water Sewer
Surface Water Sewer
Combined Sewer

GRID & DATUM

Coordinates - related to OS grid via GPS observations
Levels - related to OS datum via GPS observations
Units - metres

N

NOTES

Rev	Amendment	Date
A	Updated	04-01-2022

THE SURVEY ASSOCIATION

Cloud 10 Ltd, 27 Old Gloucester Street, London, WC1N 3AX
T: 020 4537 5522 E: admin@cloud10ltd.co.uk
www.cloud10ltd.com

Title
Topographical Survey

Project
256-264 Belsize Road
London
NW6

Client
Castle Trading Ltd
1 Greville Road
London
NW6 5HA

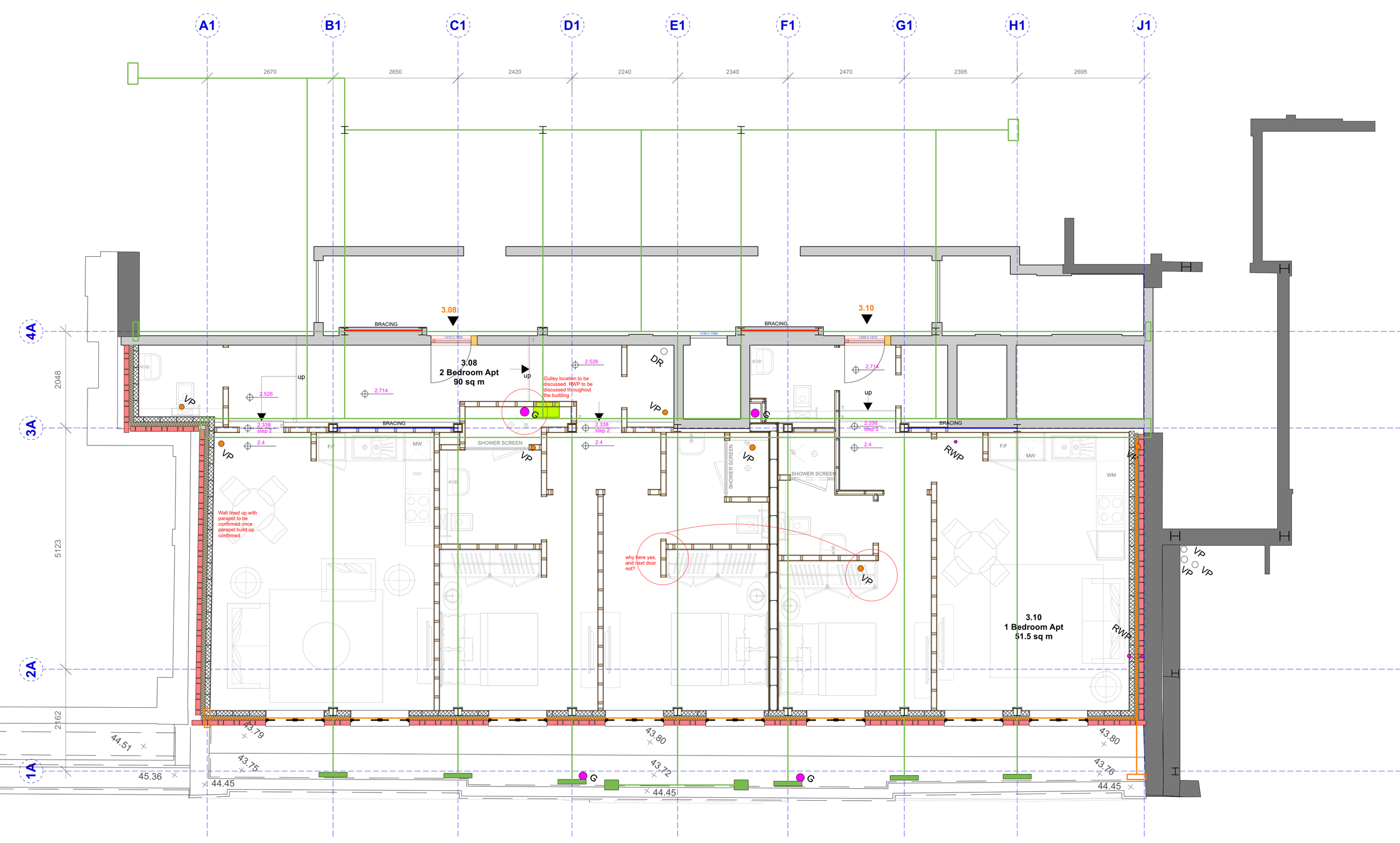
Scale
1:100 @ A0

Surveyor	FN	Measured	Nov 2021	Revision
Checked	ET	Issued	Dec 2021	A

Drawing Name
0707 - T

Appendix C

Development Plans



Key

- Walls as existing
- Walls survey feb 2023 (MS)
- Existing steel structure
- Proposed steel structure

NOTE:
Layout based on survey information.
Survey to be confirmed on site after opening up.

0m 5m

SCALE BAR

N

Rev A 09.03.23 Amended structure to be confirmed by Struct. Eng.

TENDER

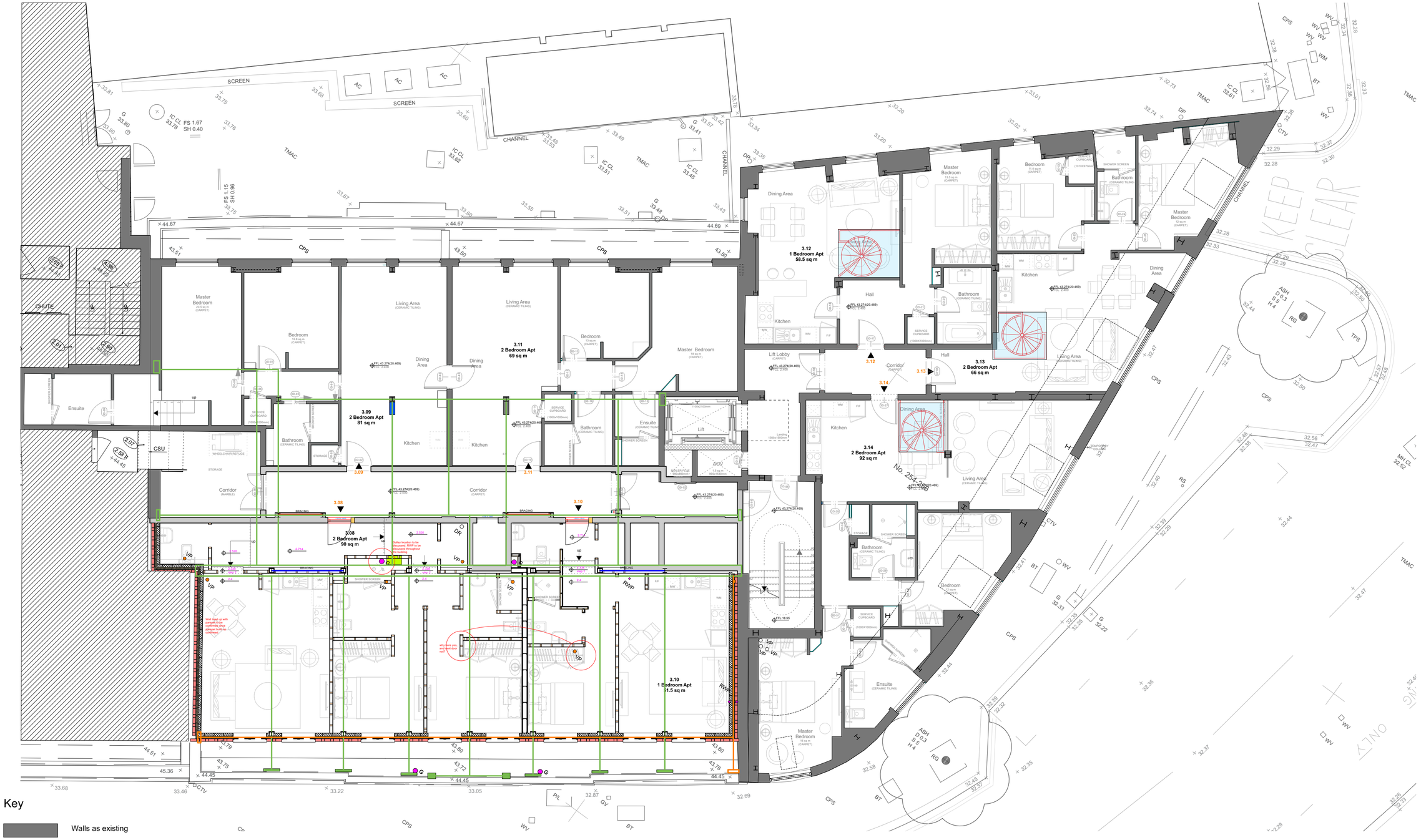
A2 1:50 @ A2 1:100 @ A4

AP (a.) alan power (ARCHITECTS.)

Alan Power Architects Ltd
13 Needham Road London, W11 2RP
Tel. 020 7229 9375 Fax. 020 7221 4172

DRAWING: Third Floor plan stage 4	DRWG. Nº.: 625 - 105
PROJECT: 254-256 BELSIZE RD LONDON NW6 4BT	Rev.: A
	Scale: 1:50 @ A2, 1:100 @ A4
CLIENT: EMPIRE COMMUNICATIONS LTD	Date: February 2023
	Drawn:

NOTE:
Layout based on survey information.
Survey to be confirmed on site after opening up.



Key

- Walls as existing
- Walls survey feb 2023 (MS)
- Filled floor
- To be demolished
- Existing steel structure
- Proposed steel structure

SCALE BAR 0m 5m

Rev A 09.03.23 Amended structure to be confirmed by Struct. Eng.

TENDER

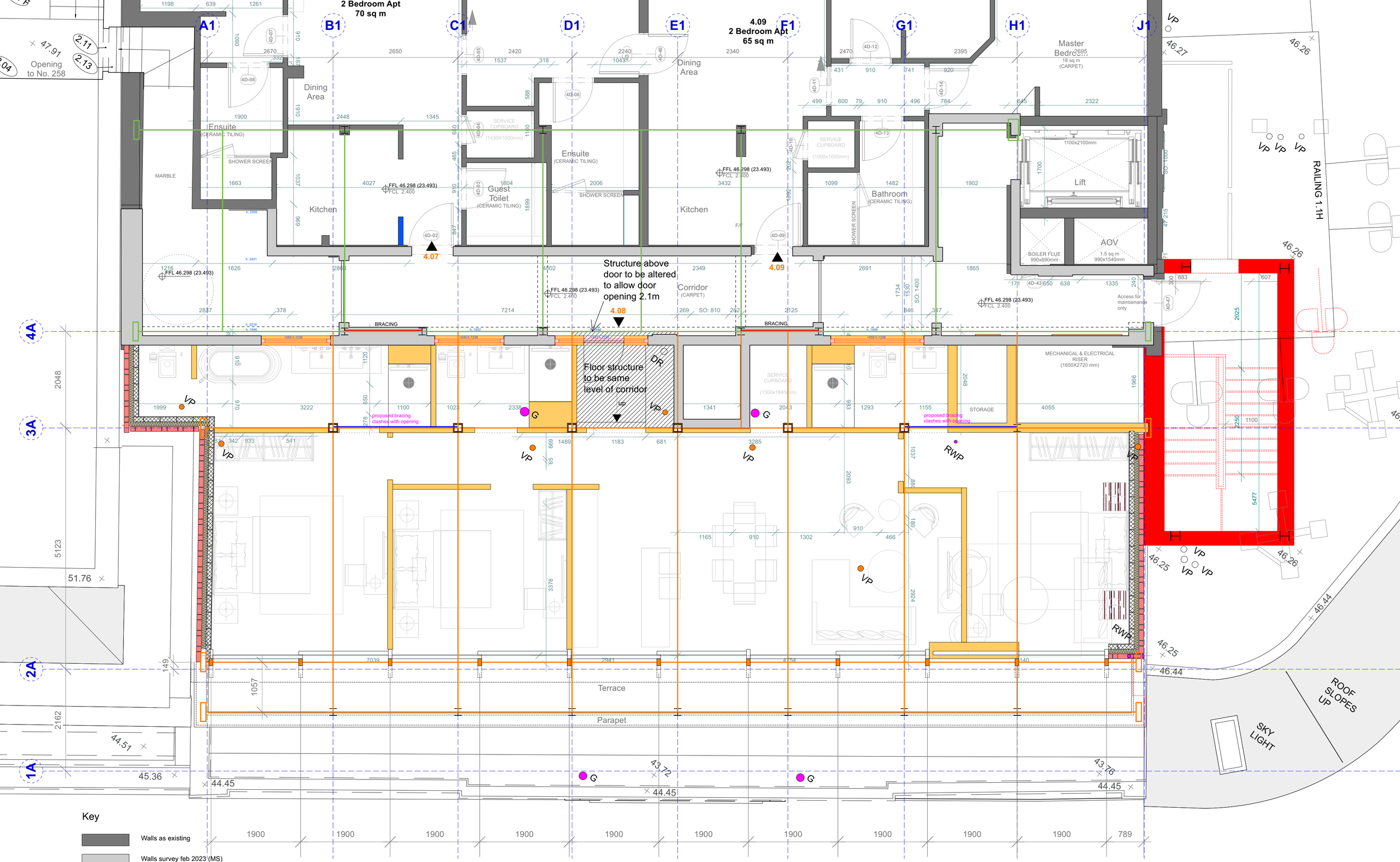
A2 1:100 @ A2
1:200 @ A4

AP (a.) alan power (ARCHITECTS.)

Alan Power Architects Ltd
13 Needham Road London, W11 2RP
Tel. 020 7229 9375 Fax. 020 7221 4172

DRAWING: Third Floor as proposed stage 4	DRWG. Nº. 625 - 105
PROJECT: 254-256 BELSIZE RD LONDON NW6 4BT	Rev. A
	Scale 1:100 @ A2, 1:200 @ A4
CLIENT: EMPIRE COMMUNICATIONS LTD	Date Feb 2023
	Drawn

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE CHECKED ON SITE AND DISCREPANCIES REPORTED TO ARCHITECT



Key

- Walls as existing
- Walls survey feb 2023 (MS)
- Walls to be demolished
- To be demolished
- Walls proposed
- Existing steel structure
- Proposed steel structure

NOTE:
Layout based on survey information.
Survey to be confirmed on site after opening up.

0m — 5m
SCALE BAR

Rev A 09.03.23 Amended structure to be confirmed by Struct. Eng.

TENDER

A2 1:50 @ A2
1:100 @ A4

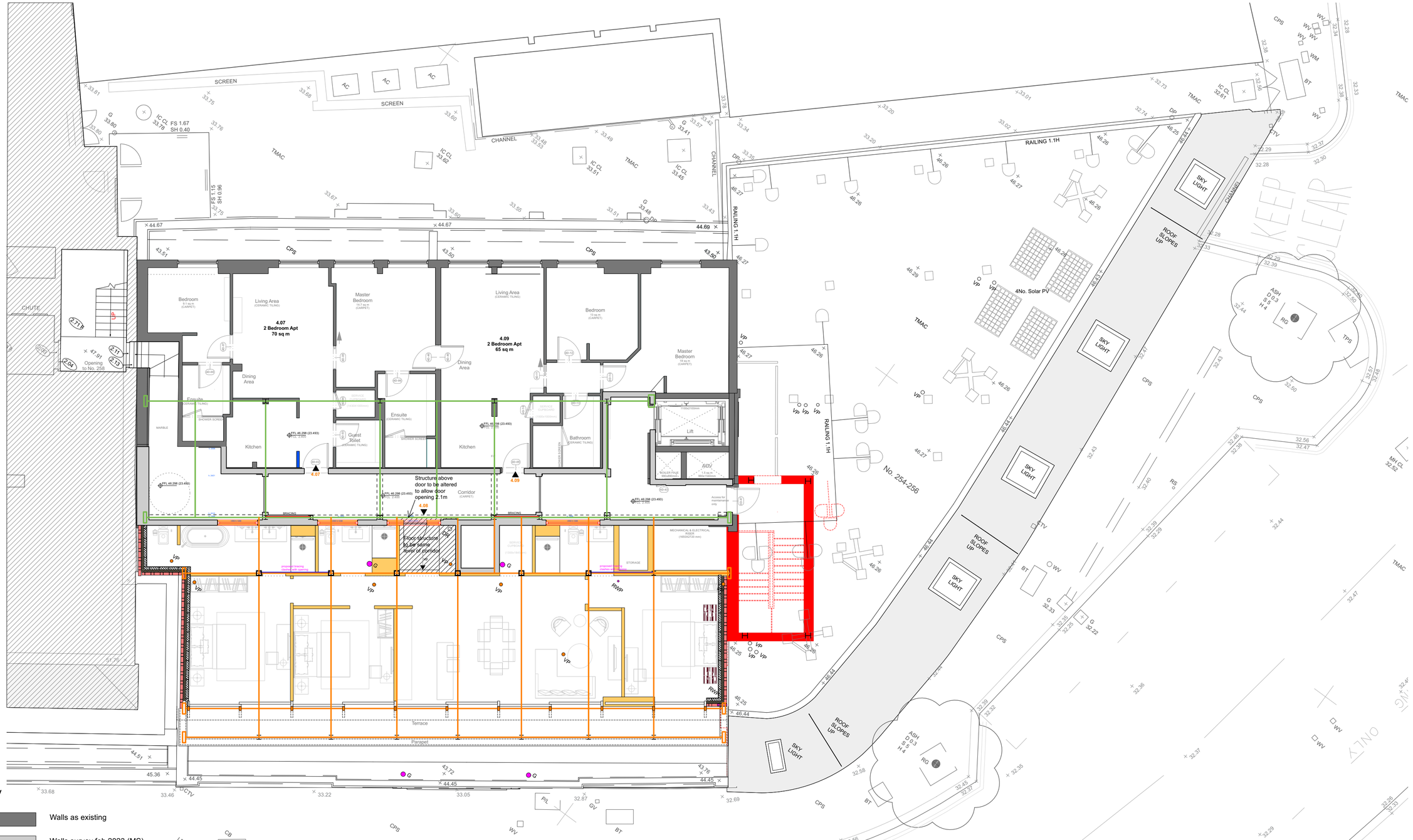
AP (a.) alan power (ARCHITECTS.)

Alan Power Architects Ltd
13 Needham Road London, W11 2RP
Tel. 020 7229 9375 Fax. 020 7221 4172

DRAWING: Fourth Floor plan stage 4	DRWG. Nº. 625 - 106
PROJECT: 254-256 BELSIZE RD LONDON NW6 4BT	Rev. A
	Scale 1:50 @ A2, 1:100 @ A4
CLIENT: EMPIRE COMMUNICATIONS LTD	Date February 2023
	Drawn

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE CHECKED ON SITE AND DISCREPANCIES REPORTED TO ARCHITECT

NOTE:
Layout based on survey information.
Survey to be confirmed on site after opening up.



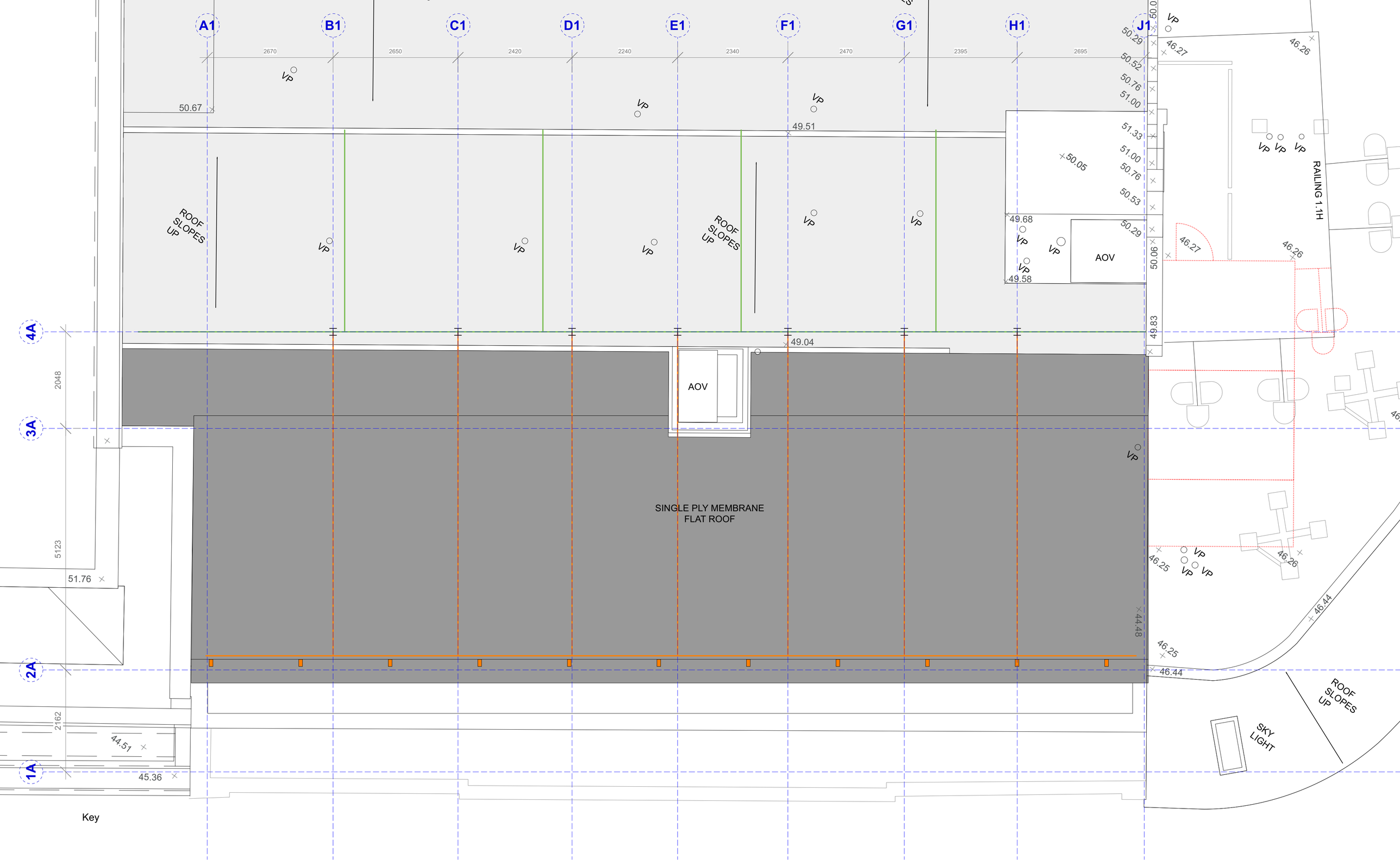
Rev A 09.03.23 Amended structure to be confirmed by Struct. Eng.

TENDER

A2 1:100 @ A2
1:200 @ A4

AP (a.) alan power (ARCHITECTS.)
Alan Power Architects Ltd
13 Needham Road London, W11 2RP
Tel. 020 7229 9375 Fax. 020 7221 4172

DRAWING Fourth Floor as proposed stage 4	**DRWG. N°.** 625 - 106
PROJECT 254-256 BELSIZE RD LONDON NW6 4BT	**Rev.** A
	Scale 1:100 @ A2 1:200 @ A4
CLIENT EMPIRE COMMUNICATIONS LTD	**Date** Feb 2023
	Drawn



Key

- Walls to be demolished
- To be demolished
- Walls proposed
- Existing steel structure
- Proposed steel structure

NOTE:
Layout based on survey information.
Survey to be confirmed on site after opening up.

0m — 5m

SCALE BAR

N

TENDER

A2 1:50 @ A2
1:100 @ A4

AP (a.) alan power (ARCHITECTS.)

Alan Power Architects Ltd
13 Needham Road London, W11 2RP
Tel. 020 7229 9375 Fax. 020 7221 4172

DRAWING: Roof level stage 4	DRWG. Nº.: 625 - 107
PROJECT: 254-256 BELSIZE RD LONDON NW6 4BT	Rev.: -
	Scale: 1:50 @ A2, 1:100 @ A4
CLIENT: EMPIRE COMMUNICATIONS LTD	Date: March 2023
	Drawn:

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE CHECKED ON SITE AND DISCREPANCIES REPORTED TO ARCHITECT

Appendix D

Existing Sewer / Drainage Survey

General Notes.

All concrete to have o minimum cube crushing strength of:
Mass Concrete = 25 N/mm2. at 28 days.
Reinforced Concrete = 35 N/mm2. at 28 days.
Nominal Aggregate size is to be 20mm.

All dimensions to be checked on site by the Contractor prior to construction and the Engineer to be informed of any descrepancies.

All new steelwork is to comply with B.S.449. 1969 and later amendments, or B.S.5950 2000 and later amendments as directed.

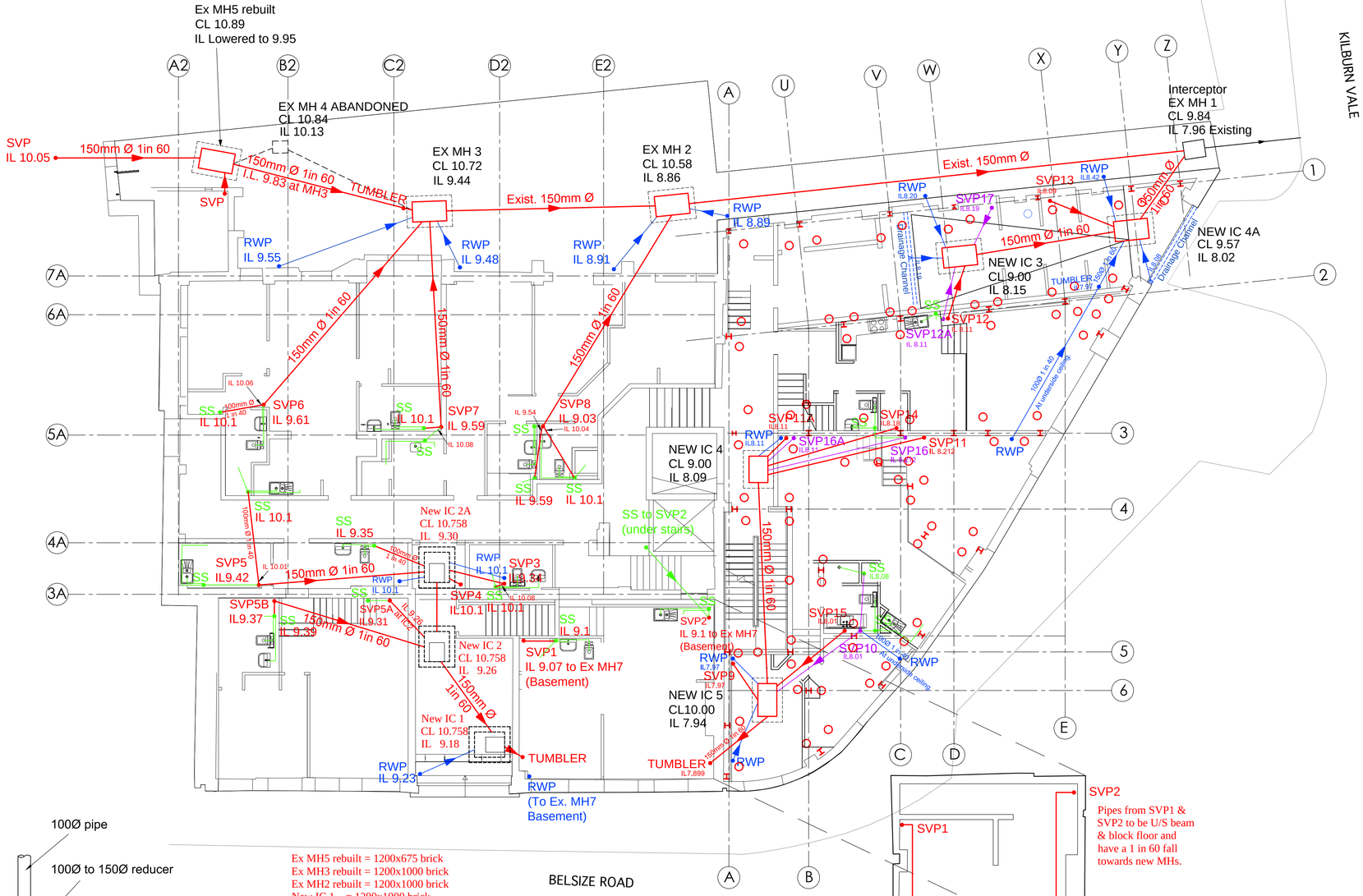
All new timber is to comply with B.S.5268, 2002, Grade C24 and be treated.

All dimensions are in millimetres unless otherwise stated.

Fire casing to steelwork is to be two layers of 12.5mm Gypsum fireline board with joints taped & staggered. Finished with skim coat of gypsum plaster on Gypsum steel encasement system to achieve 1 hour fire resistance.

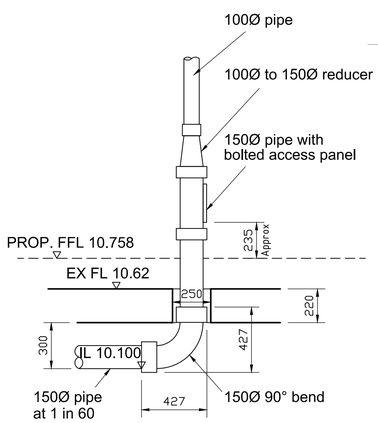
All welds are to be continuous 6mm fillet welds unless otherwise stated

This drawing is to be read in conjunction with all relevant Architects and other specialists drawings.
All work to be carried out to the approval of the local Authority District Surveyor or Building Inspector.

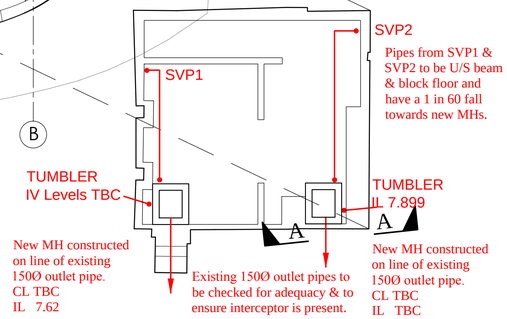


Ex MH5 rebuilt = 1200x675 brick
Ex MH3 rebuilt = 1200x1000 brick
Ex MH2 rebuilt = 1200x1000 brick
New IC 1 = 1200x1000 brick
New IC 2 = 1200x1000 brick
New IC 2A = 1200x1000 brick

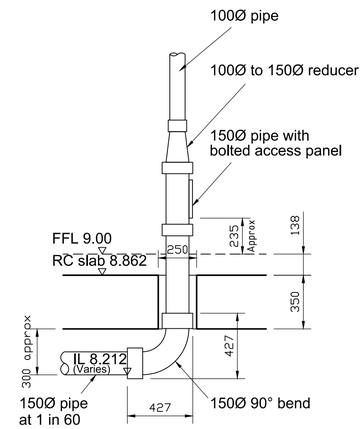
GROUND FLOOR



TYPICAL SECTION SHOWING PIPE PASSSING THROUGH SLAB BLOCK B



BASEMENT



TYPICAL SECTION SHOWING PIPE PASSSING THROUGH SLAB BLOCK C

0 2m 6m 10m

REV	DATE	
K	26:02:16	Blocks A, B & C drainage updated.
J	01:02:16	Block C drainage updated.
H	22:01:16	Blocks A & B updated. Block C in Abeyance.
G	15:01:16	Drainage updated. Block B section added
F	13:01:16	Drainage updated. Curved wall columns relocated.
E	23:12:15	Drainage along alley renewed.
D	10:11:15	Updated to suit latest Arch's layouts
C	28:10:15	?
B	22:10:15	Updated to suit latest Arch's layouts

Drawing

GROUND FLOOR & BASEMENT DRAINAGE PLAN

Project

254-256 BELSIZE ROAD
LONDON NW^ 4BT

Client

CASTLE TRADING

Architect

Michael Blacker Partnership
Michael S. Blacker C.Eng. F.I.Struct.E. Andrew Blacker B.Sc.(Hons) C.Eng. M.I.C.E.
CONSULTING STRUCTURAL & CIVIL ENGINEERS
1, MARK STREET, REIGATE, SURREY RH2 0BL
TELEPHONE 01737 244886 FACSIMILE 01737 224556
e-mail : engs@blacker.co.uk

Scale	Drawn	Checked
1:100 @ A1	GRC	

Date	Job No.	Drg. No.	Rev
JULY 15	4173	DR01	K

p:\4173\drawings\a_working drawings\4173-dr01-k.dwg

Appendix E

Conceptual Surface Water Drainage Layout

Notes

1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.
2. If received electronically it is the recipients responsibility to print to correct scale. Only written dimensions should be used.
3. This drawing should be read in conjunction with all other relevant drawings and specifications.

PRELIMINARY
SUBJECT TO DETAILED DESIGN

This drawing illustrates a sketch proposal only and as such is subject to detailed site investigation including ground conditions/contaminants, drainage, design and planning/density negotiations. The layout maybe based upon an enlargement of an OS sheet or other small scale drawing and accuracy will need to be verified by Survey. Full risk analysis under the CDM Regulations has not been undertaken.

KEY

Proposed Water Butt Location

Green Roof

NOTE:
Layout based o

Two proposed water butts for rainwater harvesting

Proposed green roof at roof level - Area ~ 77 m²

Key

To be demolished

Sedum roof

SCALE BAR 0m 5m

Rev	Description	By	Ckd	Date
A	First Draft	LS		23.7.23

23.02.27 Railing removed
23.01.13 Amended roof plan
22.07.25 Planning application issue
22.06.23 Draft Planning application
Rev B 22.05.12 Amended plan following Pre-App meeting with Camden Pl
Rev A 22.02.18 Amended plan as per survey

PLANNING APPLICATION

AP (a.) alan power (ARCHITECTS.)

Alan Power Architects Ltd
13 Needham Road London, W11 2RP
Tel. 020 7229 9375 Fax. 020 7221 4172

DRAWING
Roof Plan as proposed

PROJECT
254-256 BELSIZE RD LONDON NV

CLIENT
EMPIRE COMMUNICATIONS LTD

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE CHECKED ON SITE AND DISCREPANCIES REPORTE

A TETRA TECH COMPANY
20 Farringdon Street, London, EC4A 4AB
T: +44 20 3691 0500 E: rpshydrologyservices@rpsgroup.com

Client: Castle Trading Ltd.

Project: 254-256 Belsize Road

Title: Conceptual Surface Water Drainage Strategy

Status	Scale	Date Created
Preliminary	1:75 @A0	23.07.2023

Task Team Manager	Information Author	Task Information Manager
FC	LS	FC

Document Number: HLEF03959/D01

RPS Project Number: HLEF03959

Revision: A

rpsgroup.com

Notes

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2. If received electronically it is the recipients responsibility to print to correct scale. Only written dimensions should be used.
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PRELIMINARY
SUBJECT TO DETAILED DESIGN

This drawing illustrates a sketch proposal only and as such is subject to detailed site investigation including ground conditions/contaminants, drainage, design and planning/density negotiations. The layout maybe based upon an enlargement of an OS sheet or other small scale drawing and as necessary will need to be verified by Survey. Full risk analysis under the CDM Regulations has not been undertaken.

KEY

Proposed Water Butt Location

Green Roof

Two proposed water butts for rainwater harvesting

Proposed green roof at roof level - Area ~ 77 m²

Rev	Description	By	Chd	Date
A	First Draft	LS		23.7.23

A TETRA TECH COMPANY
20 Farringdon Street, London, EC4A 4AB
T: +44 20 3691 0500 E: rpshydrologyservices@rpsgroup.com

Client: Castle Trading Ltd.

Project: 254-256 Belsize Road

Title: Conceptual Surface Water Drainage Strategy

Status	Scale	Date Created
Preliminary	1:75 @A0	23.07.2023

Task Team Manager	Information Author	Task Information Manager
FC	LS	FC

Document Number: HLEF03959/D01

RPS Project Number: HLEF03959

Revision: A

rpsgroup.com

0m 5m
SCALE BAR

Appendix F

Camden SuDS Proforma

SUMBITTED AS A SEPARATE FILE (HLEF03959 FRA Appendix F - Camden SuDS Proforma.XLSX)