



Apex Tower, Manchester Flood Risk Assessment

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1.0 INTRODUCTION

1.1 Purpose of this report

This Site-Specific Flood Risk Assessment (FRA) has been prepared for the proposed development at Albion Street, Manchester. The assessment investigates the potential flood risk impacts of the proposed development in accordance with the National Planning Policy Framework (NPPF) and supporting Planning Practice Guidance.

This FRA is considered proportionate to the degree of flood risk and to the scale, nature, and location of the development. This FRA has been prepared in accordance with non-statutory technical standards for sustainable drainage and NPPF climate change allowances.

2.0 THE SITE

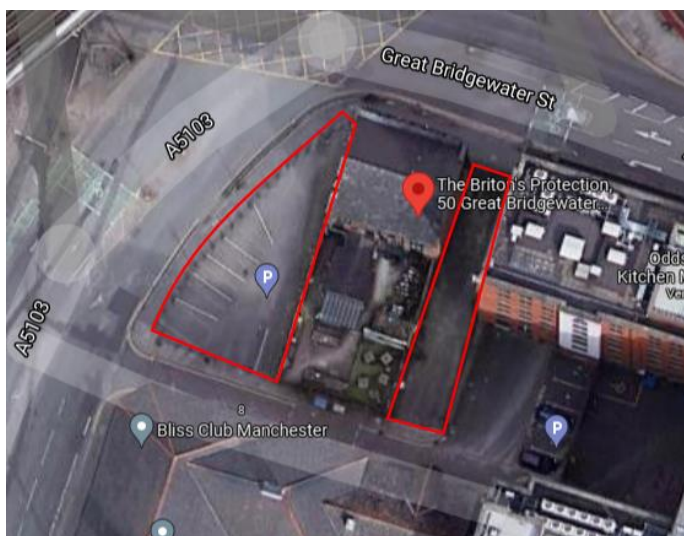
2.1 Site Location

The proposed development site is located off Albion Street and Great Bridgewater Street, Manchester. When considered cumulatively, the site is bound to the west by Albion Street, the northeast by Great Bridgewater Street, and the south by Trumpet Street.

The site location is described below:

- Post Code M1 5LE
- OS X (Easting) 383686
- OS Y (Northing) 397608
- Nat. Grid SJ836976

The site location is illustrated in Figure 2.1 below.



Map data ©2021 Google

Figure 2.1: Site Location

2.1 Site Description

The development site is circa 0.04 hectares and comprises two distinct parcels. The main component of the site is currently a private car park and is located at the west of the site, along Albion Street. The second is smaller rectangular plot of land also used as a car park. The sites lie adjacent to Trumpet Street, to the south, and Great Bridgewater Street to the north. The two parcels are separated by the Briton's Protection Pub. The site is mostly flat as can be seen from the topographical survey in Appendix A.

The main access to the site can be gained via Trumpet Street to the south.

2.2 Existing Site Drainage

The existing site is currently 100% impermeable. Based on an assessment of the development site and the topographical survey (Appendix A) there is no existing foul or surface water network on the site and inherently no existing connection to the public sewer. It is therefore assumed that the site currently drains by discharging into the highway.

Refer to Appendix B to United Utilities Sewer Records.

2.3 Geology

Published geological mapping does not indicate the site to be underlain by Made Ground however based on the historical mapping and the development that has taken place, made ground deposits are highly likely to be present. A large area of made ground is indicated to be present approximately 50m to the west, south and further afield to the east of the site according to BGS mapping.

The western area (Site A) is indicated to be predominantly underlain by glaciofluvial sheet deposits, typically comprising sand and gravel. Glacial till, typically clay with minor silt, sand and gravel, is indicated to encroach into the northern end of Site A.

In contrast, the eastern area (Site B) is indicated to be predominantly underlain by glacial till (clays), with glaciofluvial deposits (sand and gravel) indicated to encroach into the southern area.

The deeper solid geology is indicated to be part of the Chester Pebble Beds Formation which typically comprises sandstone.

No faults are shown on or within an influencing distance of the site.

There are two relevant BGS borehole records within 50m which show broadly similar ground conditions. The closest is located immediately north of the site within the road intersection between Lower Mosley Street and Great Bridgewater Street. At this location the ground conditions comprised bituminous surfacing over reinforced concrete and hardcore to 0.70m bgl, underlain by natural strata comprising very stiff brown silty and sandy clay with grey fissures, stone inclusions and bands of silty laminated clay. Bedrock comprising very dense red fine/medium grained sandstone was encountered from 5.10m bgl.

The second borehole is located circa 40m north-east where concrete over ashy made ground was encountered to 1.00m bgl, underlain by natural strata comprising very stiff red brown sandy silty clay with grey stained fissures. Highly weathered brown medium to coarse grained sandstone was encountered at 5.50m bgl.

Rotary coring within both boreholes indicates solid core recovery typically exceeded 80% and rock quality designation often exceeded 50% below 7.50m bgl.

2.4 Hydrology

The nearest surface water feature is the Rochdale Canal which lies 36m south of the site, whereas the nearest natural watercourse is the River Medlock located 169m south and the flow direction is indicated to be from east to west.

The site is indicated to lie 22m east of a Source Protection Zone, Zone III, Total Catchment (the area needed to support the discharge from the protected groundwater source) for a groundwater abstraction well.

There are no active surface water abstractions within 2000m of the site. The nearest historical surface water abstraction licence was located 1797m south for process water and general cooling at Hydes Brewery.

The closest licenced discharge consent is an historical discharge of sewage final/treated effluent to the River Tib culvert located 48m south-east, revoked in 1993. The closest active licenced discharge consent is for sewer storm overflow into the River Medlock, located 175m south-east.

With regard to the hydrogeology, information accessed on DEFRA's, "Magic Map Application" (DEFRA, 2019) indicates that the Glaciofluvial Deposits and Glacial Till are classified as a Secondary Aquifer (A) Aquifer. The 'Secondary A' aquifer is defined as permeable layers capable of supporting water at a local scale and in some instances providing an important source of baseflow to rivers. The Chester Pebble Beds Formation is classified as a Principal Aquifer.

Information obtained from the Environment Agency (EA) Risk of Flooding from Rivers and the Sea (RoFRaS) database indicates that the risk of flooding across the site is negligible as the site is not indicated to be within either an EA designated Zone 2 or Zone 3 flood plain.

The British Geological Survey indicate there is a potential for groundwater flooding at the subject site, with a moderate risk rating. Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

2.5 Proposed Development

The proposed development is for combined residential and commercial units, split over two sub-sites separated by the Britons Protection public house, which is to be retained. The development of Site A in the west will involve the construction of a 27-storey residential apartment building with ground floor amenities, substation, visitor parking and cycle stores. The development of Site B in the east will involve the construction of a 7-storey office building.

Refer to Appendix D for the proposed development plans.

3.0 SUITABILITY OF DEVELOPMENT PROPOSALS

3.1 National Planning Policy

The National Planning Policy Framework (NPPF) and the accompanying Planning Practice Guidance (PPG) aim to ensure that flood risk is taken into consideration at all stages of the planning process and advocates the use of a risk-based 'Sequential Test' to preferentially locate development in areas with a low risk of flooding. Where development is necessary in high-risk areas, the NPPF aims to ensure that the development is safe without increasing flood risk through the application of the Exception Test.

The PPG, defines the levels of flood risk within England as follows:

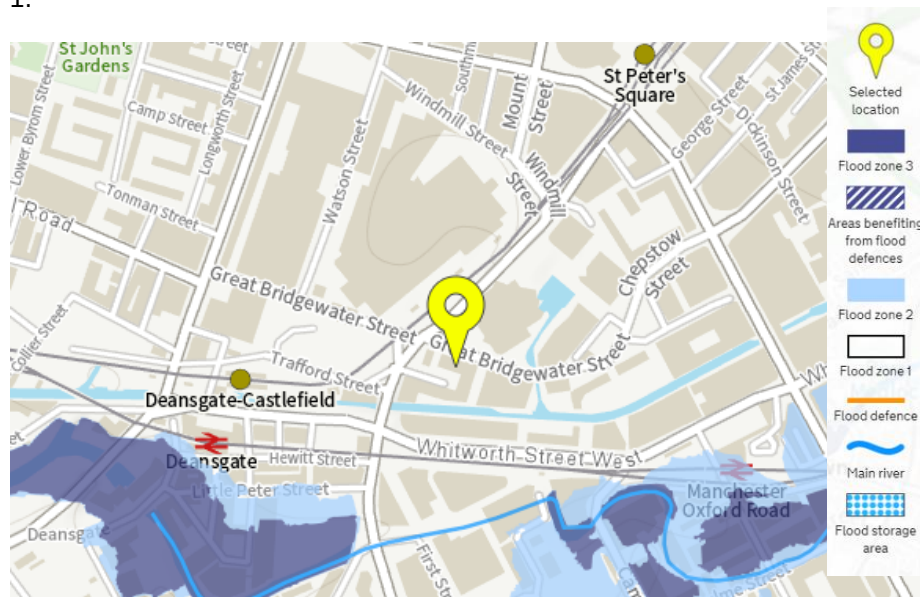
- Flood Zone 1 - Low Probability - Land having less than a 1 in 1,000 annual probability of river or sea flooding.
- Flood Zone 2 - Medium Probability - Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
- Flood Zone 3a - High Probability - Land having a 1 in 100 or greater annual probability of river flooding; or having a 1 in 200 or greater annual probability of sea flooding.
- Flood Zone 3b - Functional Floodplain - Land where water has to flow or be stored in times of flood.

The PPG states that a site-specific FRA is required for all new development proposals located in Flood Zones 2 and 3, and for any proposal of 1 hectare or greater regardless of its flood zone classification. The flood zones as described above are shown on the Environment Agency's Flood Map for Planning, available online.

Table 2 of the PPG classifies development types based on their vulnerability to flooding, ranging from 'Essential Infrastructure' which has to be operational in times of flood, through 'Highly Vulnerable' (e.g., emergency service stations), 'More Vulnerable' (e.g. residential dwellings and establishments), 'Less Vulnerable' (e.g. offices/retail), to 'Water Compatible' development (e.g. open space, docks, marinas and wharves).

Table 3 of the PPG indicates which 'vulnerability classes' are acceptable in each of the Flood Zones, and when the Exception Test should be applied. This is reproduced as Table 3.1 below.

The Environment Agency flood map (see Figure 3.1) defines the Site as falling within Flood Zone 1.



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Figure 3.1: Environment Agency Flood Map for Planning (Rivers and Sea)

3.2 Flood Risk Vulnerability

The Flood Risk Vulnerability Classification has been determined in accordance with Planning Practice Guidance, Flood Risk and Coastal Change. For multi-occupancy sites, the Flood Risk Vulnerability should be based upon the most vulnerable part of the site. The Flood Risk Vulnerability Classification is 'More Vulnerable', which includes 'Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels'.

3.3 Flood Zone Compatibility

The Flood Zone Compatibility has been reviewed in accordance with Planning Practice Guidance, Flood Risk and Coastal Change, paragraph 067.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a	Exception Test Required	✗	Exception Test Required	✓	✓
Zone 3b	Exception Test Required*	✗	✗	✗	✓*

Table 3.1: Flood Risk Vulnerability and Flood Zone Compatibility Key

Key:

✓ Development is appropriate

✗ Development should not be permitted

According to Environment Agency flood maps, the site is located entirely in Flood Zone 1. The vulnerability classification is 'More vulnerable'. The proposal is therefore considered appropriate in accordance with Planning Practice Guidance.

3.4 Application of Sequential and Exception Test

The above Table 3.1 indicates which 'vulnerability classes' are acceptable in each of the Flood Zones, and when the Exception Test should be applied.

The site is shown on the Environment Agency's Flood Map for Planning to be located within Flood Zone 1. (Refer to Figure 3.1 for map).

The Sequential Test, as set out in the NPPF, aims to steer developments to areas with the lowest risk of flooding (i.e. to steer developments to Flood Zone 1 areas where possible). Since the proposed development area is located wholly within Flood Zone 1, based on the guidance presented in Table 3.1 above, the Sequential Test is deemed to have been passed.

The Exception Test, as detailed in paragraph 159 of the NPPF, is applied after the Sequential Test has been undertaken and, in the circumstances, when 'More Vulnerable' development and 'Essential Infrastructure' cannot be located within Flood Zones 1 or 2, or 'Highly Vulnerable' development cannot be located within Flood Zone 1. The proposed residential land use at as 'More Vulnerable' development in accordance with Table 2 of the NPPF. Table 3.1, shows that a 'More Vulnerable' development is appropriate within Flood Zone 1 and it is not necessary to apply the Exception Test.

4.0 SOURCES OF FLOODING

4.1 Flood Map for Planning (Rivers and Seas)

Fluvial flooding occurs when high flows exceed the capacity of the river channel and spill out onto the floodplain, usually after a period of prolonged or heavy rainfall.

The EA Flood Map for planning (rivers and sea) has been reviewed (Figure 4.1). The site falls wholly within Flood Zone 1. The risk of flooding from Rivers and Sea across the site is very low. It means that each year the land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).



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Figure 4.1: Risk of flooding from Rivers and Sea

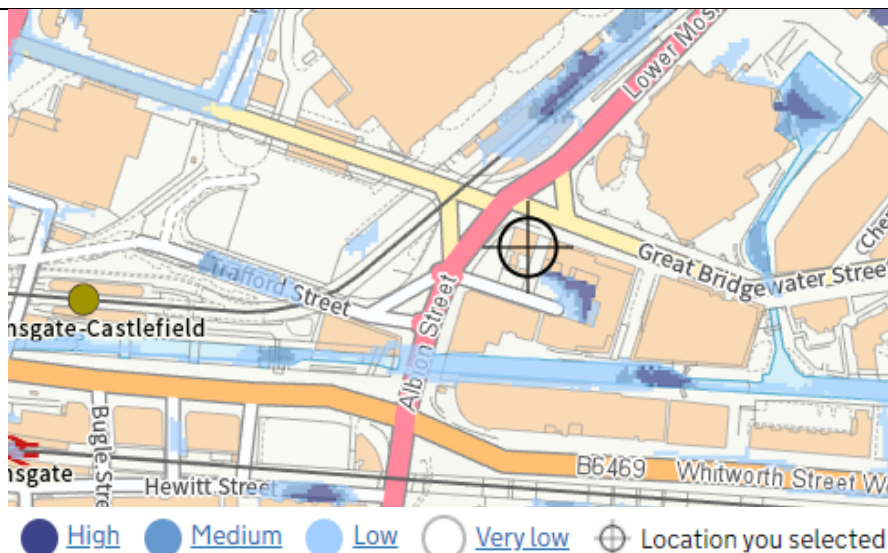
4.2 Flooding from Land (Pluvial Flooding)

The Environment Agency Map showing risk of flooding from surface water is presented in Figure 4.2. This type of flooding can be difficult to predict, much more so than river or sea flooding as it is hard to forecast exactly where or how much rain will fall in any storm.

As illustrated in figure 4.2, the site is typically at a very low risk of surface water flooding; however, a low to high risk exists on Jurys Inn site which borders the east side of the site.

This map is not definitive and is based on the best information available to the Environment Agency, such as ground levels and drainage.

To mitigate any risk associates with surface water flooding overland flood flow routing will be considered throughout the design process. This will be achieved by maintaining the set back of the building from the highway with appropriate falls to mitigate any issues.



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Figure 4.1: Risk of flooding from Surface Water

4.3 Flooding from Groundwater

Groundwater flooding tends to occur sporadically in both location and time. When groundwater flooding does occur, it tends to mostly affect low-lying areas, below surface infrastructure and buildings (for example, tunnels, basements, and car parks) underlain by permeable rocks (aquifers).

The Strategic Flood Risk Map for Salford City Council indicates that there is no visible evidence or site history of groundwater issues on the site.

The British Geological Survey indicate there is a potential for groundwater flooding at the subject site, with a moderate risk rating. Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

4.4 Flooding from Sewers

Sewer flooding occurs when urban drainage networks become overwhelmed and maximum capacity is reached. This can occur if there is a blockage in the network causing water to back up behind it or if the sheer volume of water draining into the system is too great to be handled. This type of flooding tends to occur sporadically in both location and time. The majority of sewers are built to the guidelines within Sewers for Adoption. These sewers have a design standard to the 1 in 30-year flood event and therefore it is likely that most sewer systems will surcharge during rainstorm events with a return period greater than 30 years.

United Utilities sewer records, included in Appendix B, indicate that the site is bound by public combined sewers to south within Trumpet Street, to the west and to the north by Great Bridgewater Street. As previously noted, 100% of the site currently consists of impermeable hard standing. The current site would appear to discharge indirectly to the public combined sewers to the perimeter of the site by flowing into the highway.

United Utilities is responsible for the disposal of wastewater within the local area. They have a statutory obligation to maintain a register of properties/areas that are at risk of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. This includes records of flooding incidents from public foul sewers, combined sewers and surface water sewers that are maintained by water Company. When an incident is reported, a decision chart is used to assess whether the properties/areas are 'at risk' and then the record is added to the appropriate register.

The Level 2 Hybrid SFRA, Manchester City, Salford City and Trafford Councils indicates the site to be within the Conurbation Core Critical Drainage Area (CDA). Therefore, new developments are required to provide a minimum 50% reduction in surface water discharge rates from the site.

The development proposals intend to reduce the rate of discharge from the site and accommodate the balance of flows up to and including the 1 in 100-year critical event plus climate change

allowance. This restriction and attenuation of flows will have a positive impact on the surrounding existing drainage and hence work to mitigate the long-term risk of flooding from sewers.

Based on the above the site is considered to have a medium risk of flooding from sewers.

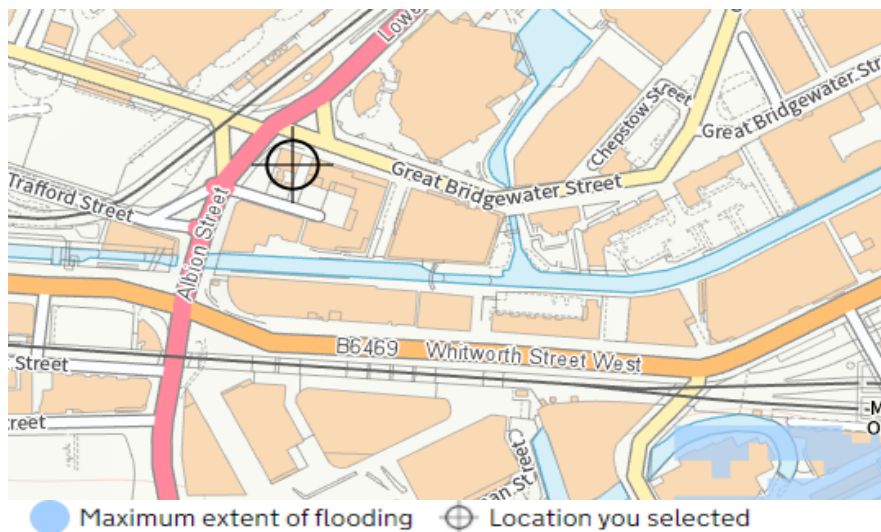
4.5 Flooding from Reservoirs

The Environment Agency Reservoir flood risk map indicates that the site to be outside of the maximum flood extent of a breach to any local reservoir.

As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency ensure that reservoirs are inspected regularly, and essential safety work is carried out.

Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers.

Taking the above into account the risk of flooding from reservoirs is therefore considered to be low to moderate.



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Figure 4.3: Risk of flooding from Reservoirs

4.6 Summary of Flooding Risks

The site is within a Critical Drainage Area (CDA) as defined in the Manchester, Salford, and Trafford SFRA. CDA's, as described in the SFRA, are those identified from historical flood events and/or modelled data as having a significant risk from surface water flooding and include drainage catchments for the sewer network. The Development should aim for a minimum reduction in surface water runoff rates of 50% for Brownfield sites, with an aim of reducing runoff to Greenfield rates up to a 1 in 100 year storm event, considering climate change. This will be achieved by providing onsite attenuation through the adoption of SuDS features on site.

Based on the above review the risk of flooding from pluvial, sewers, and reservoirs are all considered to be very low. Fluvial and groundwater risks of flooding are considered low.

5.0 DRAINAGE STRATEGY

For detailed Drainage Strategy refer to renaissance Outline Drainage Strategy document. A brief summary of the principles to be adopted is included below.

5.1 Drainage Hierarchy

In accordance with NPPF, the following hierarchy of surface water drainage options will be considered:

- Discharge into the ground (infiltration);
- Discharge to a surface water body;
- Discharge to a surface water sewer, highway drain, or another drainage system;
- Discharge to a combined sewer.

5.2 Climate change

The drainage strategy will include an increase in the storm intensity of 40%, which is consistent with the effects of climate change for this development with a design life of 100 years, as outlined in NPPF.

6.0 CONCLUSION

The proposed development is for combined residential and commercial units, split over two sub-sites separated by the Britons Protection public house, which is to be retained. The development of Site A in the west will involve the construction of a 27-storey residential apartment building with ground floor amenities, substation, visitor parking and cycle stores. The development of Site B in the east will involve the construction of a 7-storey office building.

The site is located within flood zone 1 and the probability of flooding is very low.

The site is considered to have a low risk of flooding from surface water.

The site is not considered to be at risk of flooding from reservoirs.

The site is not considered to be at risk of groundwater flooding.

The site is considered appropriate under Planning Practice Guidance.

7.0 REFERENCES

National Planning Policy Framework, Ministry of Housing Communities & Local Government (February 2019)

Planning practice guidance – Ministry of Housing Communities & Local Government <https://www.gov.uk/government/collections/planning-practice-guidance> (22 Nov 2018)

Ministry of Housing, Communities and Local Government <https://www.gov.uk/guidance/flood-risk-and-coastal-change> (6 March 2014)

Flood risk assessments: climate change allowances – Environment Agency <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> (31 July 2019)

Manchester City, Salford City and Trafford Councils Level 2 SFRA (March 2011)

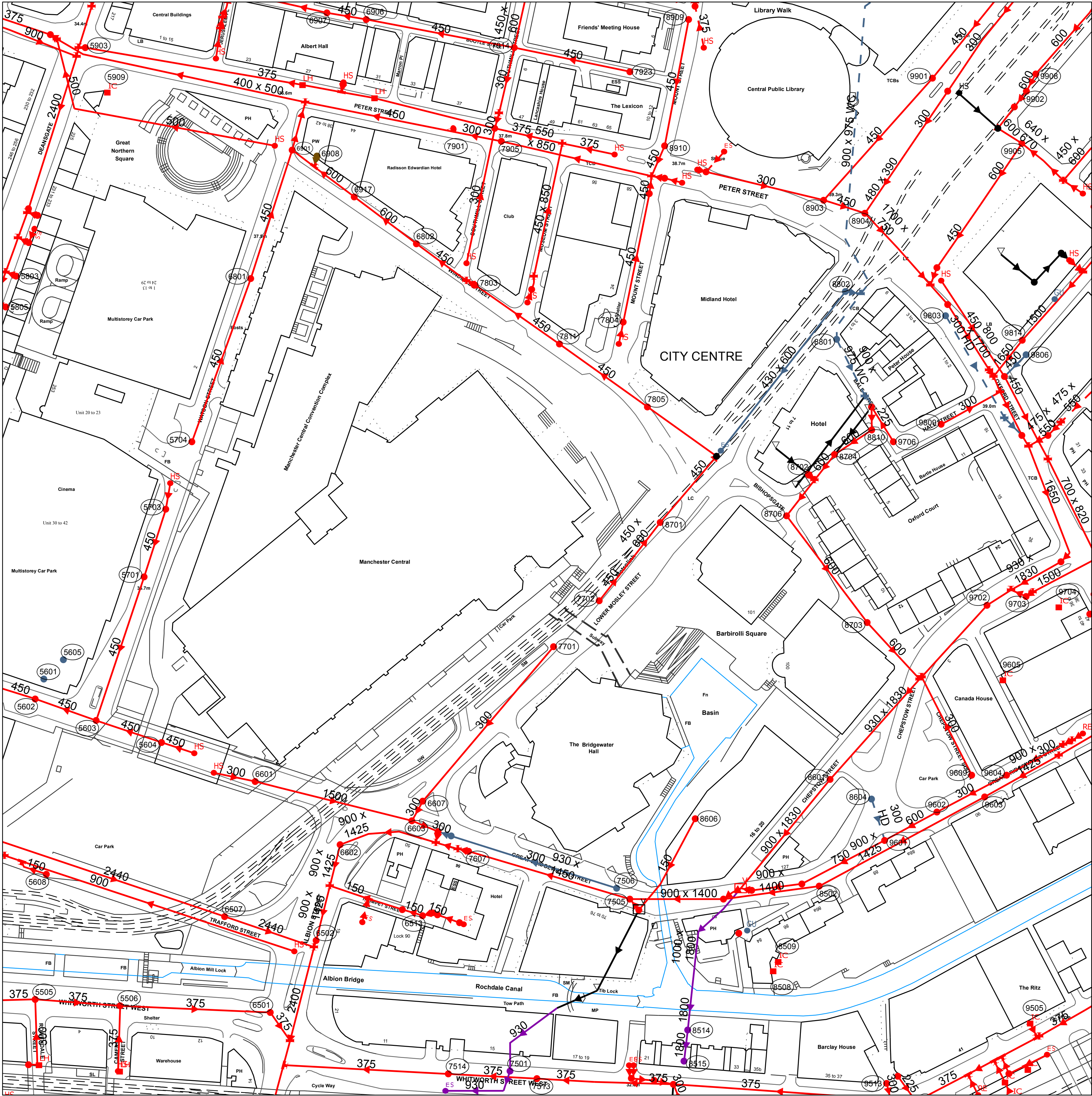
British Geological Survey – Geology of British Viewer
<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

Long term flood risk information <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>

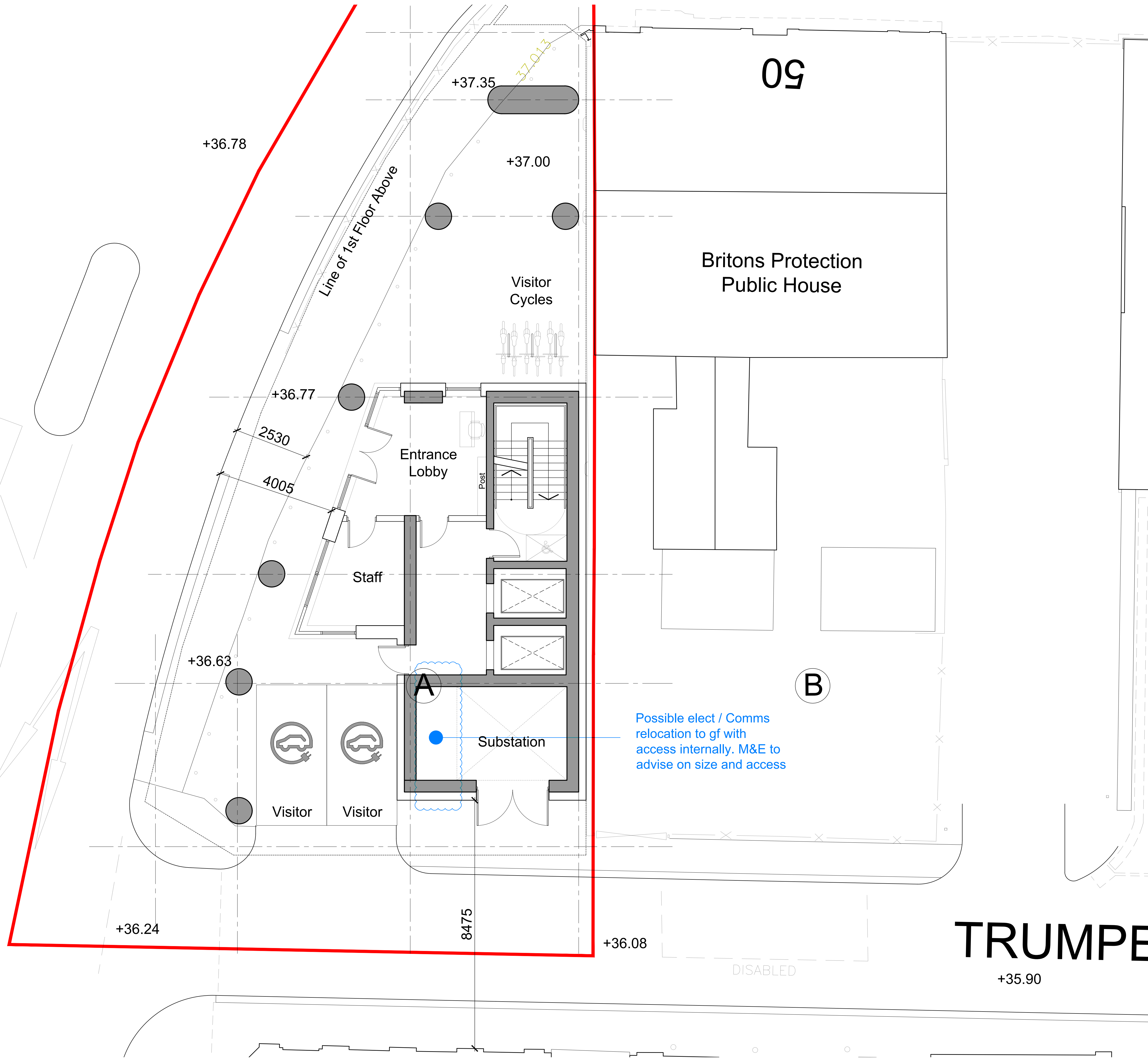
Improving the Flood Performance of New Buildings, Flood Resilient Construction, Department for Communities and Local Government, (May 2007)

APPENDIX A
Existing Topographical Survey

APPENDIX B
United Utilities Sewer Records



APPENDIX C
Proposed Development Layouts

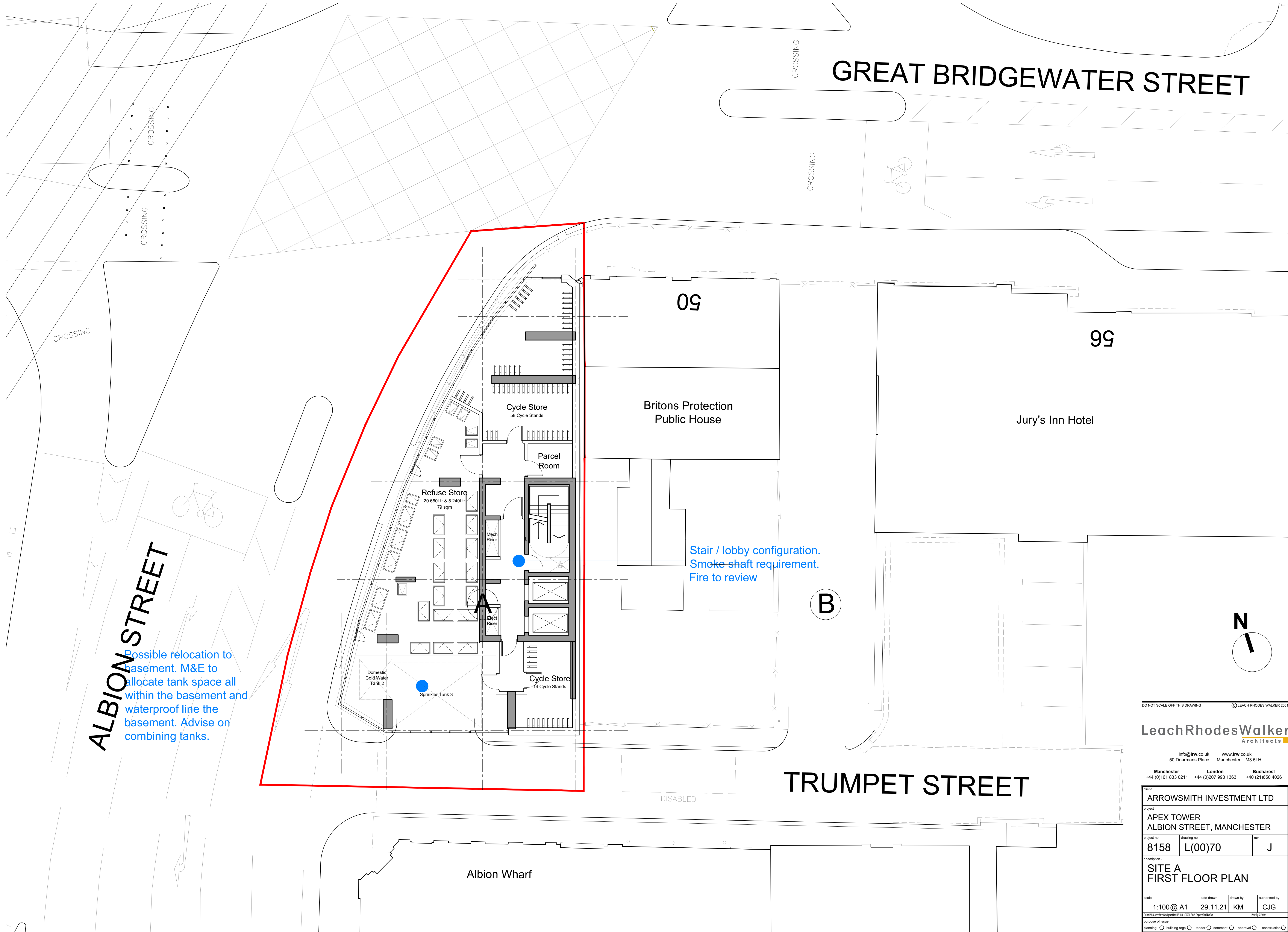


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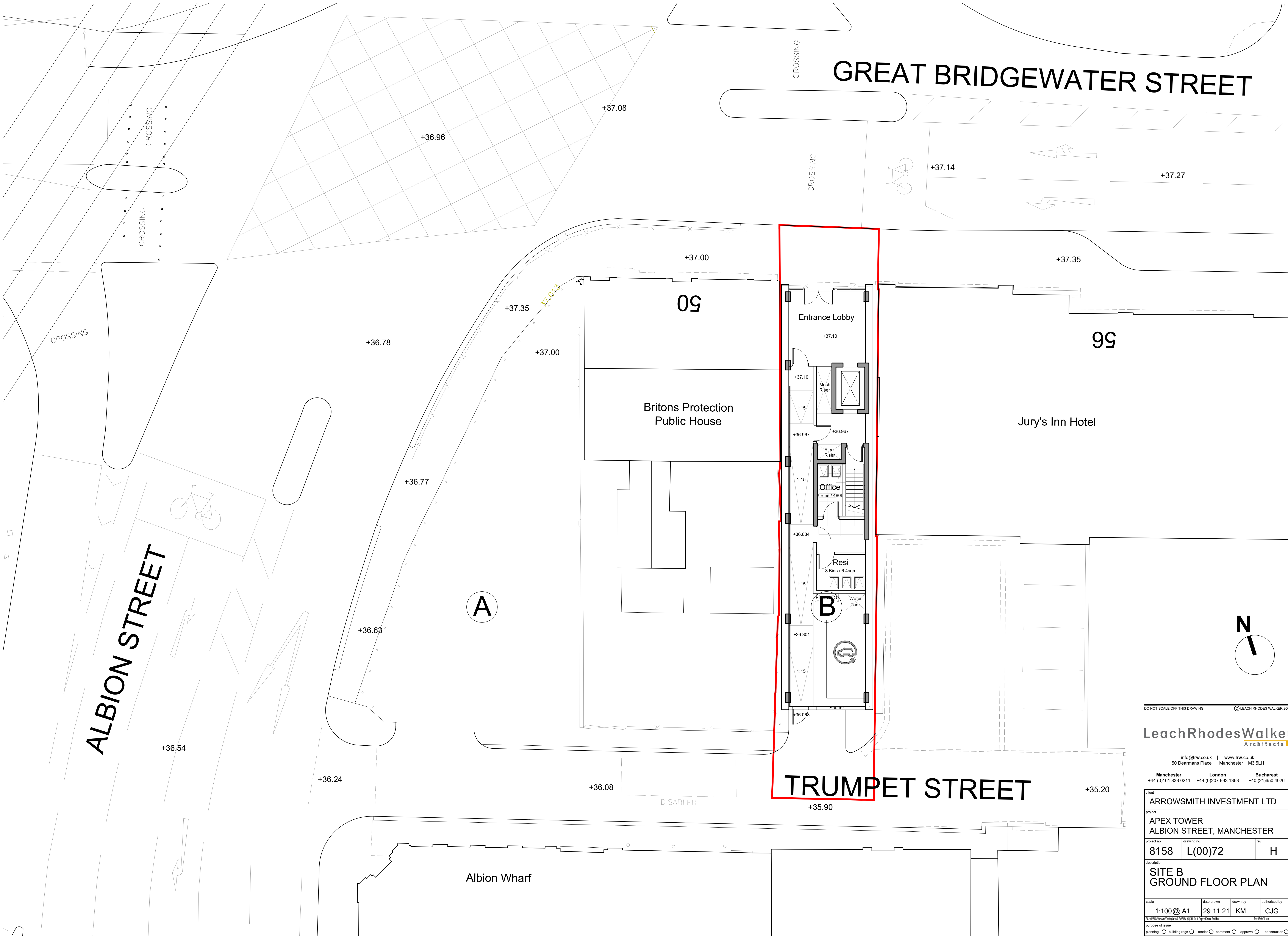


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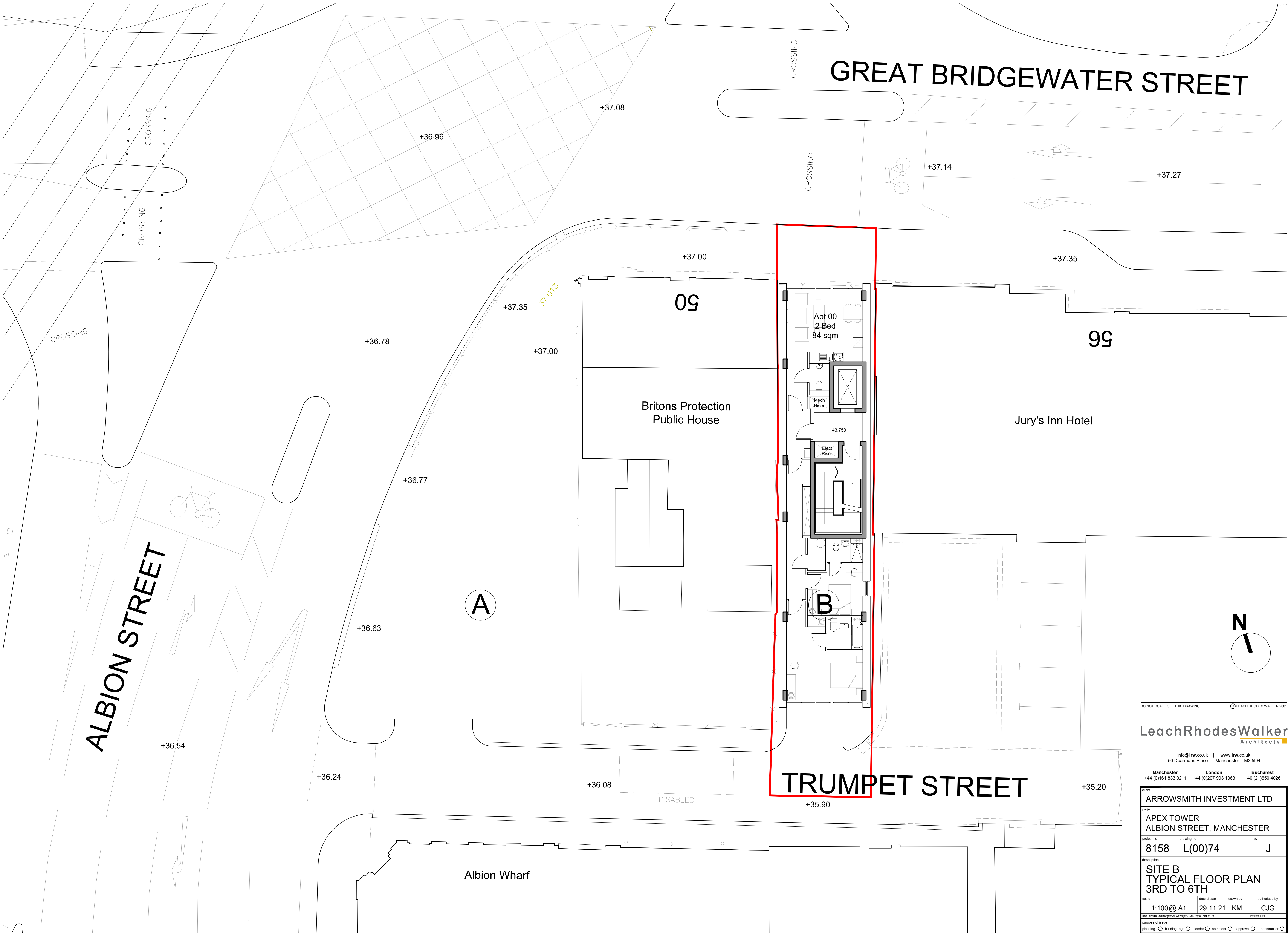


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client			
ARROWSMITH INVESTMENT LTD			
project			
APEX TOWER ALBION STREET, MANCHESTER			
project no	drawing no	rev	
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client			
ARROWSMITH INVESTMENT LTD			
project			
APEX TOWER ALBION STREET, MANCHESTER			
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purpose of issue			
planning ☐ building regs ☐ tender ☐ comment ☐ approval ☐ construction ☐			

GREAT BRIDGEWATER STREET

ALBION STREET

TRUMPET STREET

Albion Wharf

rev	description	drawn	auth	date
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client
ARROWSMITH INVESTMENT LTD

project

APEX TOWER
ALBION STREET, MANCHESTER

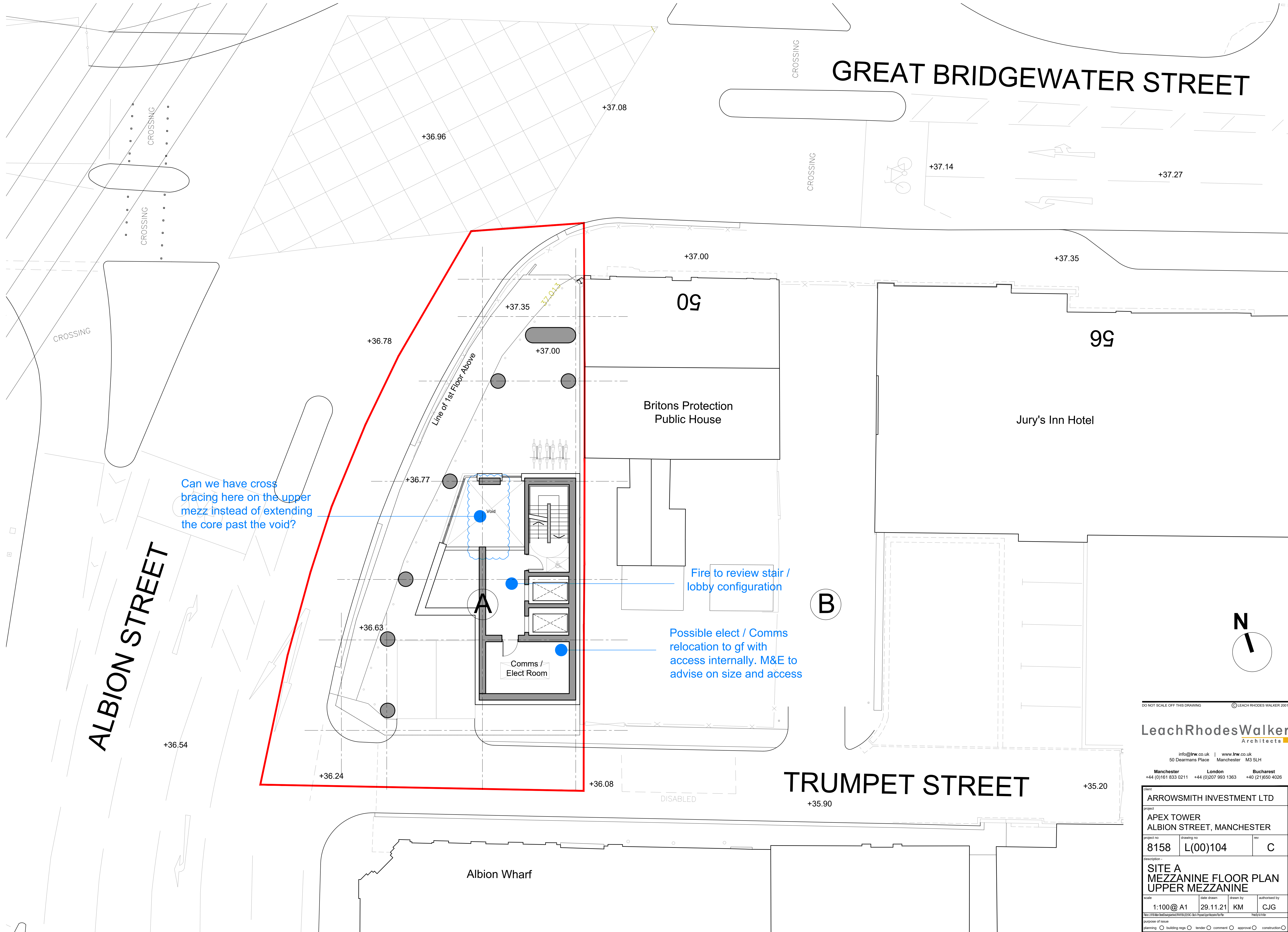
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description -

SITE A
MEZZANINE FLOOR PLAN
LOWER MEZZANINE

scale	date drawn	drawn by	authorised by
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purpose of issue
 planning ☐ building regs ☐ tender ☐ comment ☐ approval ☐ construction ☐



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project			
APEX TOWER ALBION STREET, MANCHESTER			
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description			
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scale	date drawn	drawn by	authorised by
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file: \\fs1\drawings\project\04\01\001\			

A diagram showing a road crossing a railway track. The road is on the left, and the railway track is on the right. A car is shown crossing the track. The word "CROSSING" is written vertically on the track.

CROSSING

ALBION STREET

TRUMPET STREET

Albion Wharf

50

Britons Protection
Public House

99

Jury's Inn Hotel

- Stair / lobby configuration.
- Smoke shaft requirement.
- Fire to review

Apt 01
2 Bed
71 sqm

Apt 02
2 Bed
72 sqm

Apt 03
2 Bed
70 sqm

N

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APEX TOWER
ALBION STREET, MANCHESTER

project no	drawing no	rev
8158	L(00)116	B

description -

**SITE A
TYPICAL FLOOR PLAN
(2-5, 10-13, 18-21)**

scale	date drawn	drawn by	authorised by
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purpose of issue
 planning ☐ building regs ☐ tender ☐ comment ☐ approval ☐ construction ☐

ALBION STREET

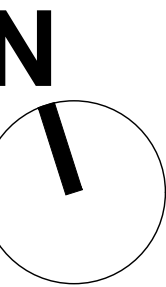
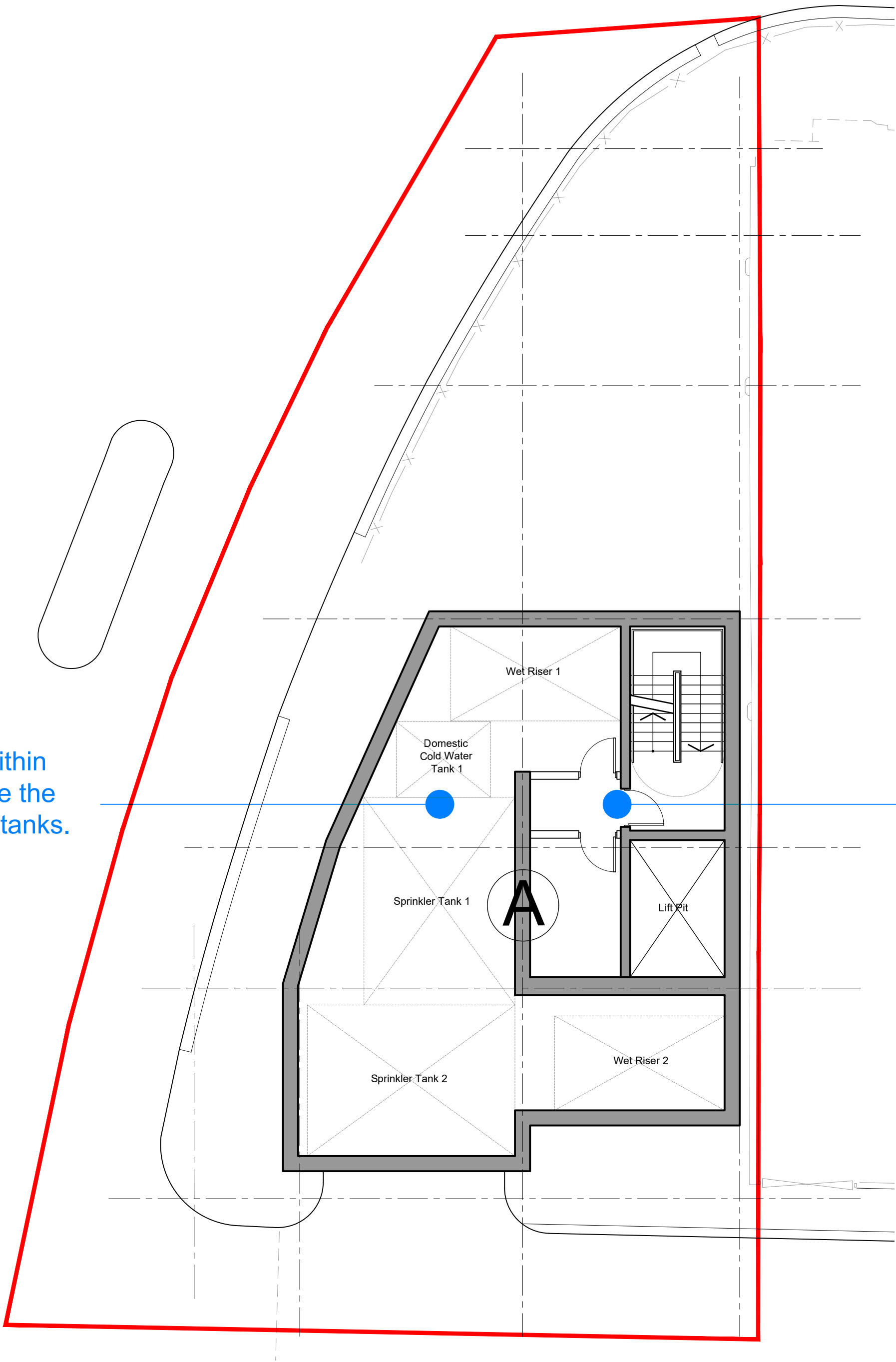
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project			
APEX TOWER ALBION STREET, MANCHESTER			
project no	drawing no	rev	
8158	L(00)117	B	
description -			
SITE A TYPICAL FLOOR PLAN (6-9,14-17,22-25)			
scale	date drawn	drawn by	authorised by
1:100@ A1	29.11.21	KM	CJG
http://www.bimbaengineering.co.uk/staff/cjg/cjg%20for%20A1.pdf			sheet 3 of 16
purpose of issue			
planning	or building regs	tender	or comment
approval	or construction	or approval	or construction

M&E to allocate tank space all within the basement and waterproof line the basement. Advise on combining tanks.

Means of escape via stairs or hatch tbc. Fire to review

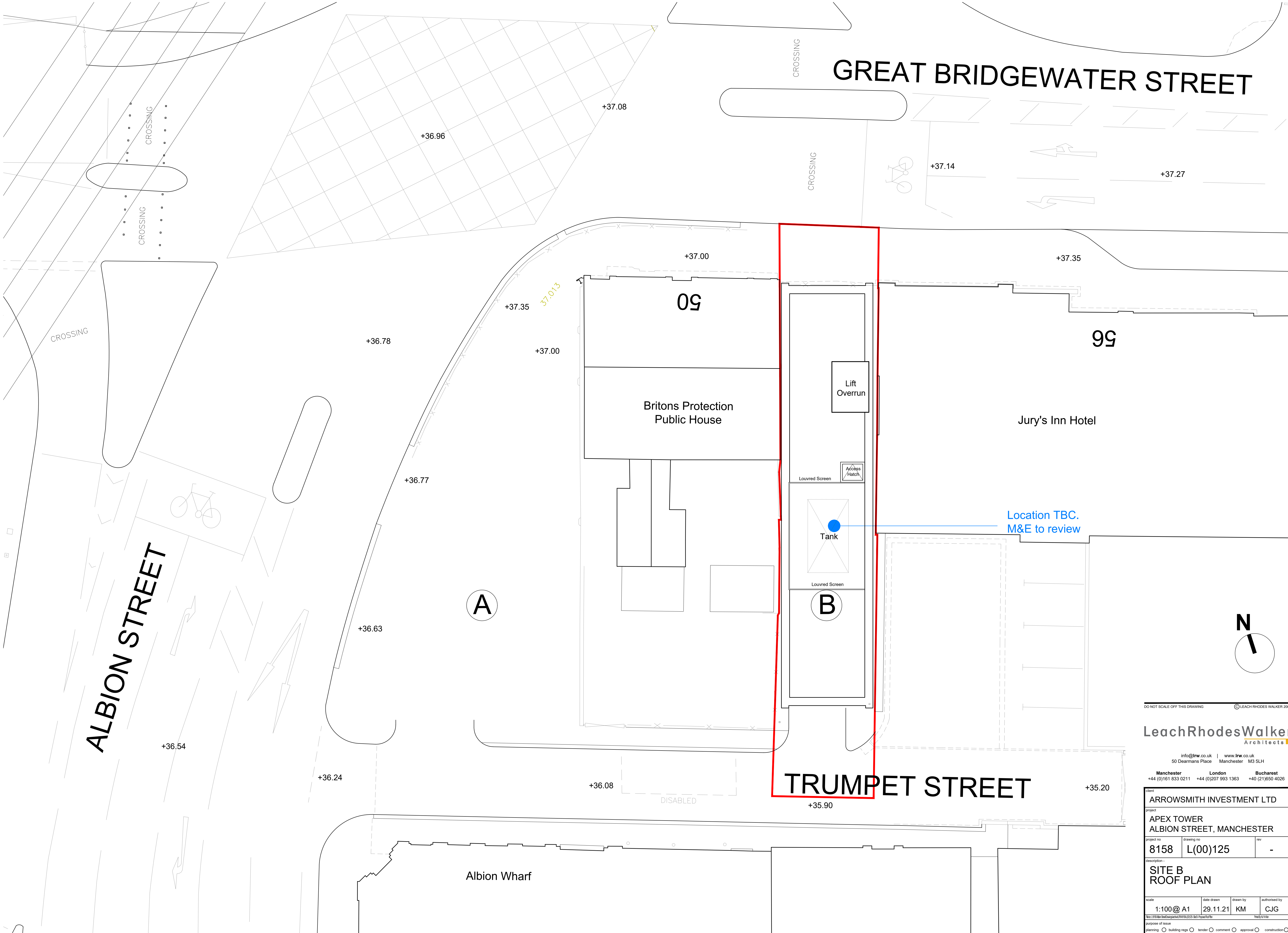


rev	description	drawn	auth	date
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client ARROWSMITH INVESTMENT LTD			
project APEX TOWER ALBION STREET, MANCHESTER			
project no 8158	drawing no L(00)124	rev -	
description - SITE A BASEMENT FLOOR PLAN			
scale 1:100 @ A1	date drawn 29.11.21	drawn by KM	authorised by CJG
Notes: B10 to be amended and C10 to be added to the purpose of issue planning ☐ building regs ☐ tender ☐ comment ☐ approval ☐ construction ☐			

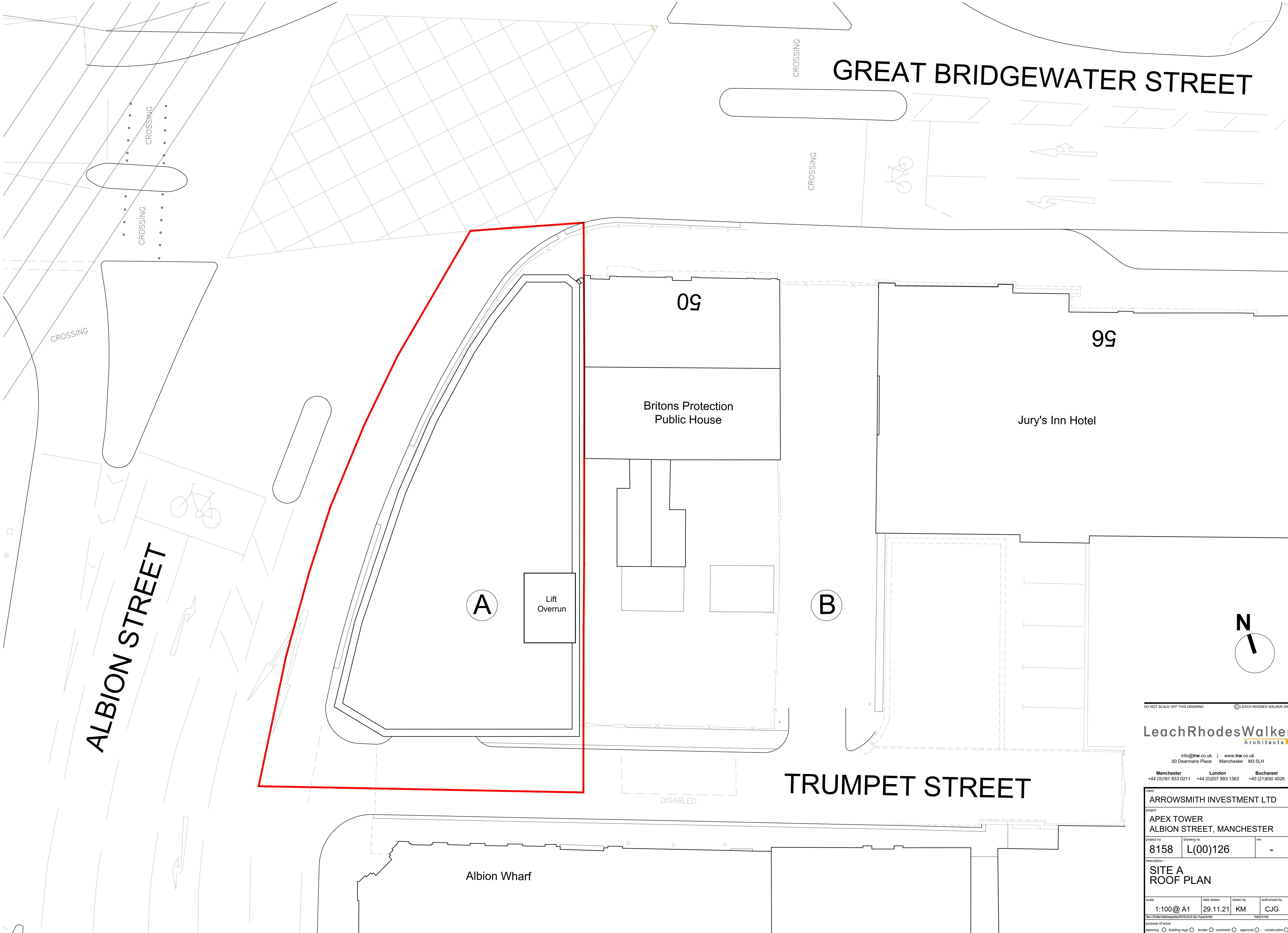


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project			
APEX TOWER ALBION STREET, MANCHESTER			
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SITE B ROOF PLAN			
scale	date drawn	drawn by	authorised by
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https://www.leachrhodeswalker.co.uk/sitemap.html		https://www.leachrhodeswalker.co.uk/sitemap.html	
purpose of issue			
planning ☐ building regs ☐ tender ☐ comment ☐ approval ☐ construction ☐			



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client ARROWSMITH INVESTMENT LTD			
project APEX TOWER ALBION STREET, MANCHESTER			
project no 8158	drawing no L(00)126	rev -	
description - SITE A ROOF PLAN			
scale 1:100@ A1	date drawn 29.11.21	drawn by KM	authorised by CJG
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purpose of issue planning ☐ building regs ☐ tender ☐ comment ☐ approval ☐ construction ☐			