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Flood Risk Assessment for No. 5, 6 and 7 Beaconsfield, Manchester, M14 6UP



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1.0 Introduction

1.1 Background

Peak Associates Environmental Consultants Limited (Peak Associates) was commissioned by Paul Reeves at This Space Ltd to conduct a Flood Risk Assessment (FRA) to support the planning application for 5, 6 and 7 Beaconsfield, Manchester, M14 6UP.

This report is based upon observations made on site during a walkover undertaken on the 29th of September 2023 and upon data driven research. This FRA includes the analysis of historical maps, geological, hydrogeological, and hydrological data, and other relevant Third-Party environmental information, including Environment Agency's (EA) Product 4 Data. Product 4 data includes detailed FRA maps which show: flood zones, defences and storage areas, areas benefiting from defences, statutory main river designations, historic flood event outlines and more detailed information from the EA's river models. Product 4 data is freely available and can be requested from GOV.UK.

Peak Associates can accept no liability for any inaccuracies contained within the Third-Party information referenced. It should be noted that where screenshots of online mapping tools have been used, these contain public sector information licensed under the Open Government Licence v3.0.

1.2 Existing Site and Proposed Development

No. 5, 6 & 7 Beaconsfield are currently in residential use with 5 apartments in each of the 3 properties. Each property is accessed from the front, by a set of 6 steps to the raised ground floor front doors at 37.97AOD. There are 2 apartments to each ground floor, 2 apartments to each first floor and a single apartment in the existing loft. (see Plan 1). The basement is isolated and does not have any windows. . The rear outriggers are at split levels between ground and first floor and first and second floor, but these have no cellars nor loft space. The existing cellars are currently accessed from the rear by a lower ground level door, with 3 external steps, down from outside ground level. The cellars are currently used for storage, with electric and gas meters located on the front walls. There were windows to the front of all 3 properties when originally built, but these have been bricked up over time, as have 2 side windows to No. 5 & 6. The total site area is 662m². Many of the adjacent properties' cellars have been converted in to habitable accommodation with front windows visible along the front elevation. Photographs of the properties in their current condition are in Appendix 1.

The property resides between 35.63 mAOD in the 'lower ground' basement, with the ground level varying from 36.18 mAOD to 37+ mAOD (see Appendix 2), with. However, the proposed development is occurring on the ground level of 36.38mAOD. The flood risk data for the 3D model's node points are over 100m away from the site and therefore this report has focused on the 2D levels.

The property is accessed via Beaconsfield off Derby Road, Manchester. Cringle Brook is located approximately 145m north of the properties, but is culverted for a significant length, with the inlet over 400m from the site and the outfall approximately 1.2km. Mauldeth Road train station is located approximately 800m southeast of the site.

The proposal for the development is the conversion of three basements into 1 bed flats, including amendments from existing staircases above, with some internal remoddeling, three rear loft conversion to create three 2 bed flats, alongside the construction of a 3.5 storey rear extension to create 5 two bed flats and 1 one bed flats, including associated external works. The existing cellars which currently have external access via full height doors will be remodelled to provide internal access, with the existing doors bricked up at 36.65 mAOD. Alongside all 3 existing cellars being fully tanked, using a proprietary insurance backed system.

1.3 Geology

The geology of the area was investigated using the Geology of Britain Viewer from the British Geological Survey (Ref 1). The bedrock geology of the site is composed of Chester Formation Sandstone. This sedimentary bedrock formed between 250 and 247.1 million years ago during the Triassic period.

In terms of superficial geology, the site is underlain by Till. Till is a form of glacial drift, which is rock material transported by a glacier and then deposited. These superficial glacial deposits of till formed between 116 and 11.8 thousand years ago during the Quaternary period.

1.4 River Catchment and Climate Change Allowances

Cringle Brook, which is located approximately 145m north of the site is a small watercourse that flows through the highly urbanised area of south Manchester, with the majority of the watercourse being culverted in the area nearest to the site. The inlet to the culverted section of Cringle Brook is located approximately 400m northeast of the site. Between 1962 to 2000 six severe flood events occurred at Cringle Brook which caused properties adjoining the brook to flood. Since then, the EA has created a flood alleviation scheme for Cringle Brook. Works associated with the alleviation scheme include widening of the channel's capacity, regularly removing debris and blockages, and repairing and maintaining culverts (Ref 2).

Cringle Brook is part of the Upper Mersey catchment area and the Bollin Dean Mersey Upper Operational Catchment (Ref 3). As such, the peak river flow allowances for the Mersey Upper Management Catchment broadly apply to Cringle Brook. The climate change allowances (CCA) for the Mersey Upper are presented in Table 1. Given the residential flats reside partly in Flood Zone 3, the central and higher central allowances are to be used in this strategic flood risk assessment (Ref 4).

Because the brook is so urbanised in terms of its catchment and culverting, consideration of how to adequately manage flood risk and/or prepare for increased incidents and severity of flooding due to climate change is a matter local residents and the Lead Local Flood Authority

(LLFA) need to pay some attention to. Indeed, Manchester City Council's Level 1 SFRA has assigned Cringle Brook, Fallowfield, the Flood Warning 'Code GM13', which denotes a 'Severe' type of warning where there is an extreme danger to life and property (Ref 5).

Table 1: Mersey Upper Management Catchment peak rainfall allowances (Ref 6).

3.3% annual exceedance rainfall event		
Timeframe	Central	Upper
2050s	20%	35%
2070s	30%	40%
1% annual exceedance rainfall event		
2050s	25%	40%
2070s	30%	45%

1.5 Data Limitations

Product 4 Data was created by the EA's automated system on 08/09/2023 (see Appendix 3). The Product 4 data contains model data taken from the Cringle Brook 2017 study. The Product 4 data includes the 1 in 100-year flood event and an allowance for climate change across defended and undefended scenarios. However, it is important to note that flooding records are often incomplete and the EA's Product 4 data only supplies flood risk data relating to flooding from rivers and/or the sea, not other sources of flood risk.

It is also worth noting that for small watercourses that are partly culverted, it is often maintenance-led issues either with debris or silt accumulation or dilapidation issues (rather than solely rainfall issues), that is the principle or contributory cause of any flooding event.

2.0 Sources of Flooding

2.1 General Overview

Flooding can occur from a variety of sources, including fluvial, surface water (pluvial), groundwater, and reservoirs. The west of and south the site is located partly in Flood Zone 3 (see Figure 1) and as such, has a High probability of fluvial flooding. However, most of the site is located in Flood Zone 1 with a Low probability of fluvial flooding (Ref 7). Table 2 summarises the potential sources of flood risk at the site.

Table 2 - Sources of potential flood risk to the proposed development

Flood Source	Potential Risk					Description
	High	Medium	Low	Very Low	None	
Surface Water			X	X		There is a Low (between 1% and 0.1% chance) to Very Low (less than 0.1% chance) risk of pluvial flooding at the site. However, the drains in the area are prone to blocking which may increase the chances of surface water flooding at the site.
Fluvial	X	X			X	The site has a variable risk of fluvial flooding. The west and south of the property has a Medium (between 1% and 3% chance) to High (greater than 3% chance) risk of flooding. The north and northeast of the site (streetside) has a no risk of flooding.
Groundwater		X	X			The site has a Medium to Low vulnerability to groundwater flooding. The site is not located in an area at risk of groundwater flooding or groundwater rebound.
Reservoirs			X			Gorton reservoirs are located 4.8km to the northeast of the site and Audenshaw reservoir is located 6km to the northeast of the site. However, with proper reservoir maintenance, the risk of reservoir flooding is reduced.
Tidal					X	The site is not at risk from tidal flooding.

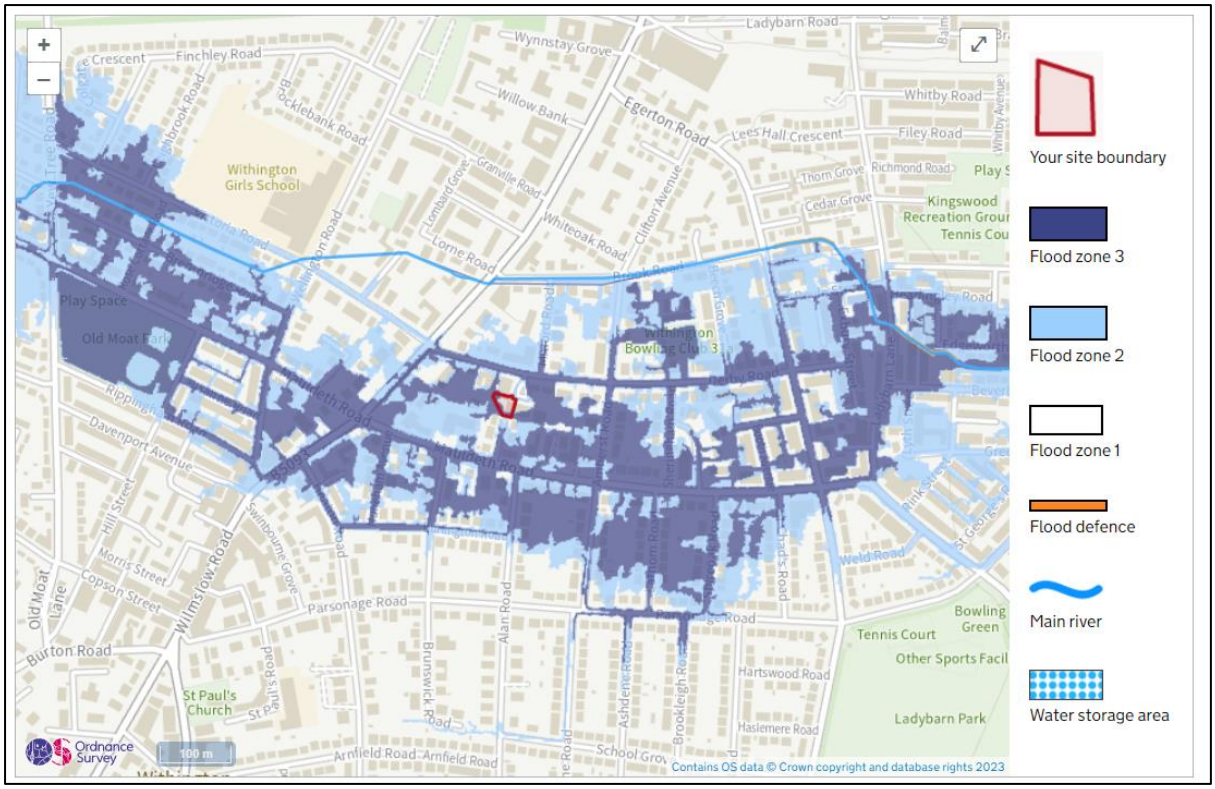


Figure 1 – Flood Zone Map for Site (Ref 7)

2.2 Surface water

Surface water flooding arises during heavy rainfall events where water accumulates on the surface in low lying or obstructed areas. The risk of surface water flooding increases with the amount of urban area drained to a brook and the creation of impermeable hard surfaces. According to Manchester City's SFRA (Ref 5), the wards at highest risk of surface water flooding in Manchester are the City Centre, Levenshulme, Didsbury East, Northenden and Charlestown. The Fallowfield ward, where the property is located, is not listed as a ward at greatest risk of surface water flooding. However, sewer and drainage problems have been identified in Fallowfield during heavy rainfall events (Ref 5).

The site has a Very Low to Low risk of flooding from surface water, which means the area has a chance of flooding of less than 0.1% or between 0.1% to 1% each year (see Figure 2). In the Low-risk scenario, surface water depths are estimated to be under 300mm (see Figure 4). In the High-risk scenario, there is no estimated flood depth (see Figure 6).

Figure 2 shows surface water accumulates to the west and southwest of the site. The EA's flood maps (based on levels taken from LiDAR data), have identified low-lying points where surface water is most likely to accumulate. As previously mentioned, the site resides between 35.63 mAOD, for the 'lower ground' basements and 37.25 mAOD, although steps lead into the properties meaning the internal FFLs of the ground floor are therefore above these levels. Hence, surface water flooding accumulates to the west and southwest of the site where the topography of the land is lowest at 36.25 mAOD.

Surface water also accumulates along Derby Road and flows west according to the velocity maps (see Figure 3). In the Low-risk velocity scenario, surface water flows at over 0.25 m/s, along Derby Road. In the High-risk velocity scenario, the flood velocity is not shown for the property (see Figure 5).

A resident at Beaconsfield informed Peak Associates that the drains around Beaconsfield and Derby Road are prone to blockages. Given that surface water travels along Derby Road and travels into Beaconsfield, Manchester City Council and/or United Utilities (UU) have a responsibility to maintain the surface water drains along the residential roads and ensure they remain unblocked to allow for the free flow of surface water.

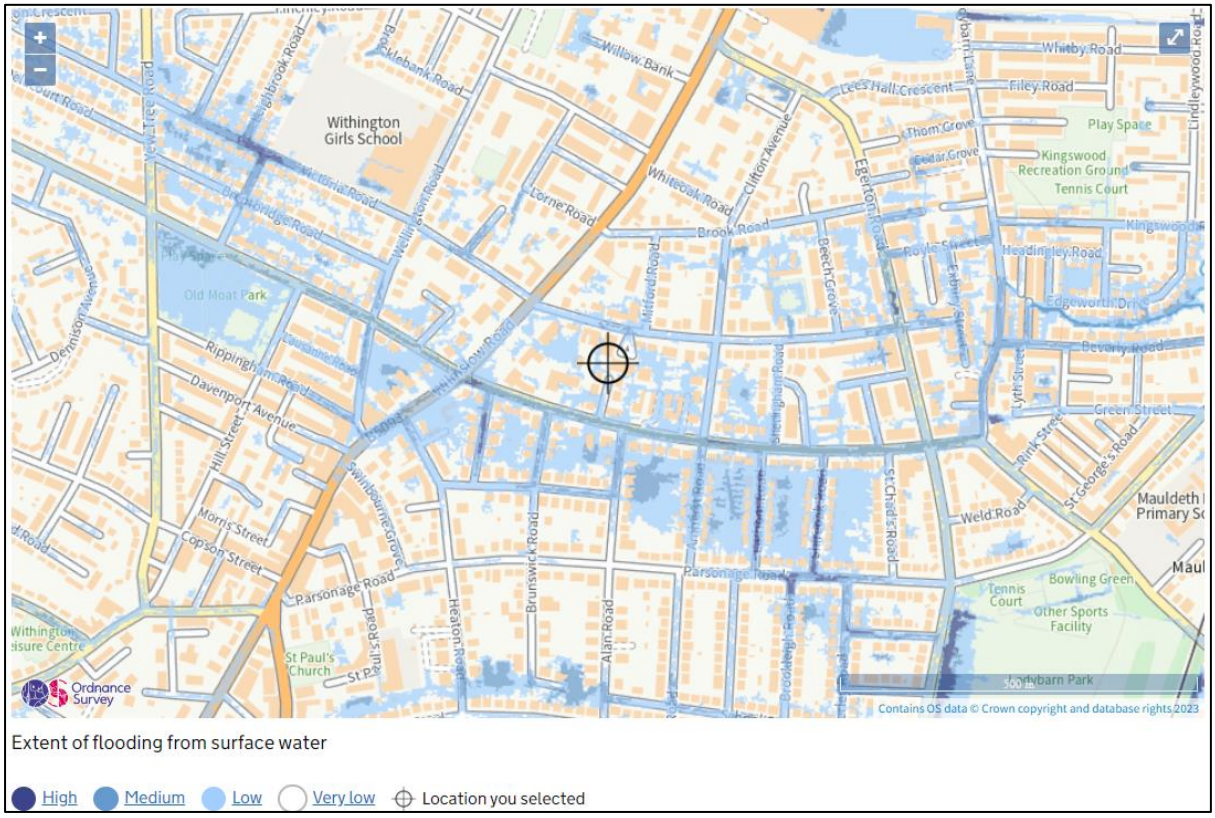


Figure 2 – Extent of Surface Water Flooding (Ref 8)

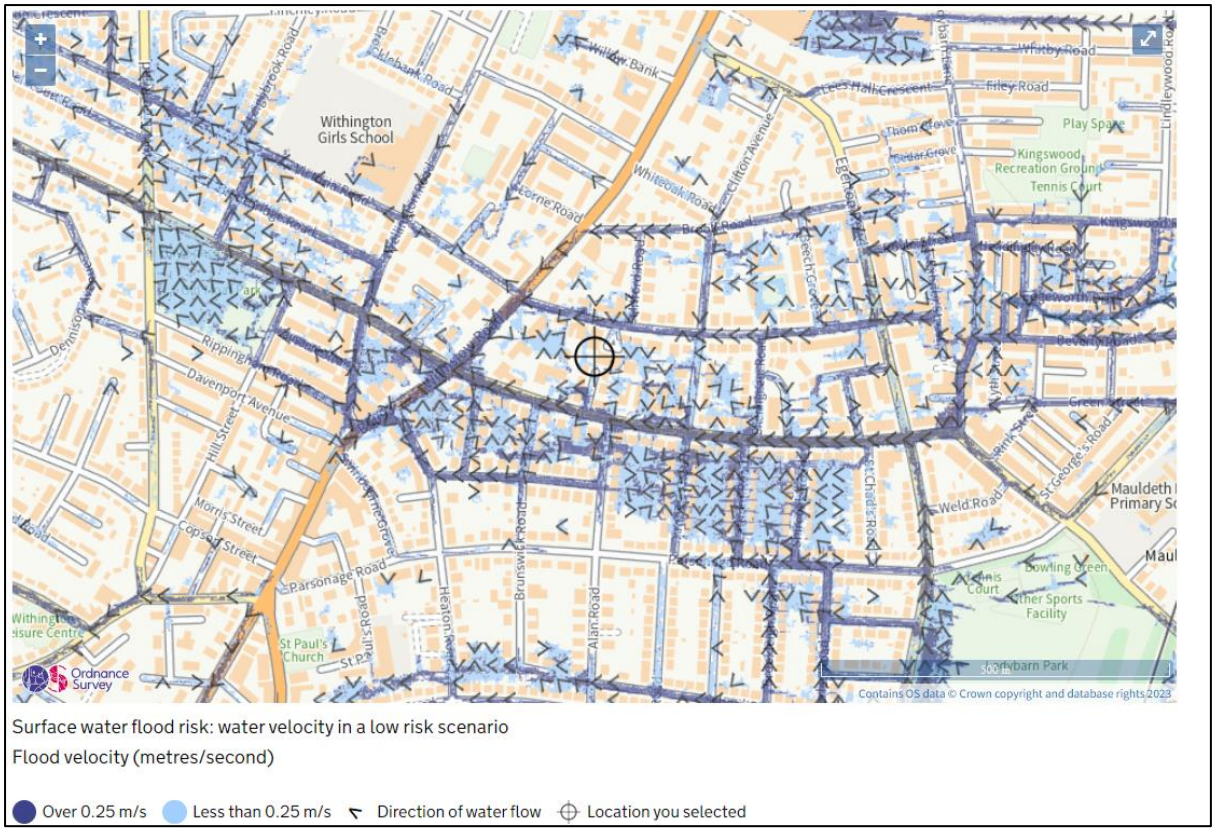


Figure 3 – Low Risk Surface Water Velocity Map (Ref 8)

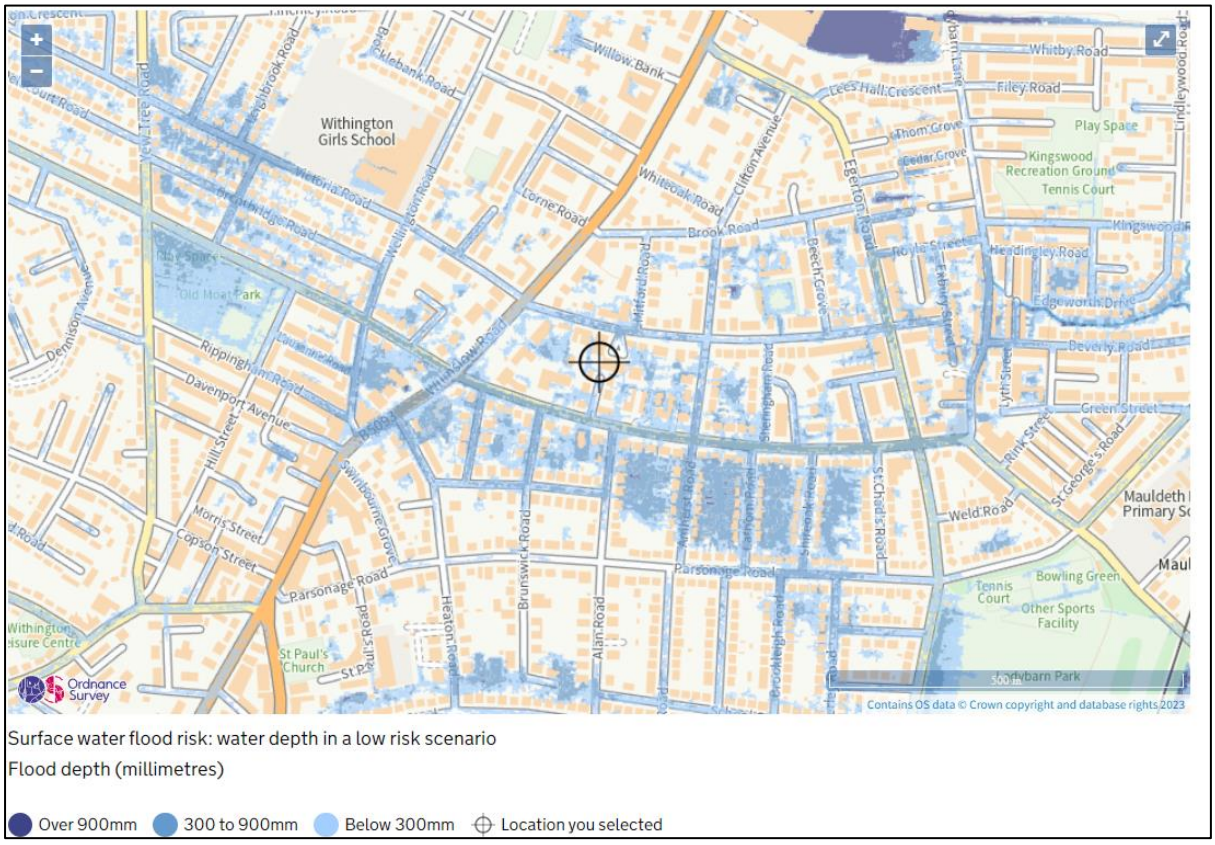


Figure 4 – Low Risk Surface Water Depth Map (Ref 8)

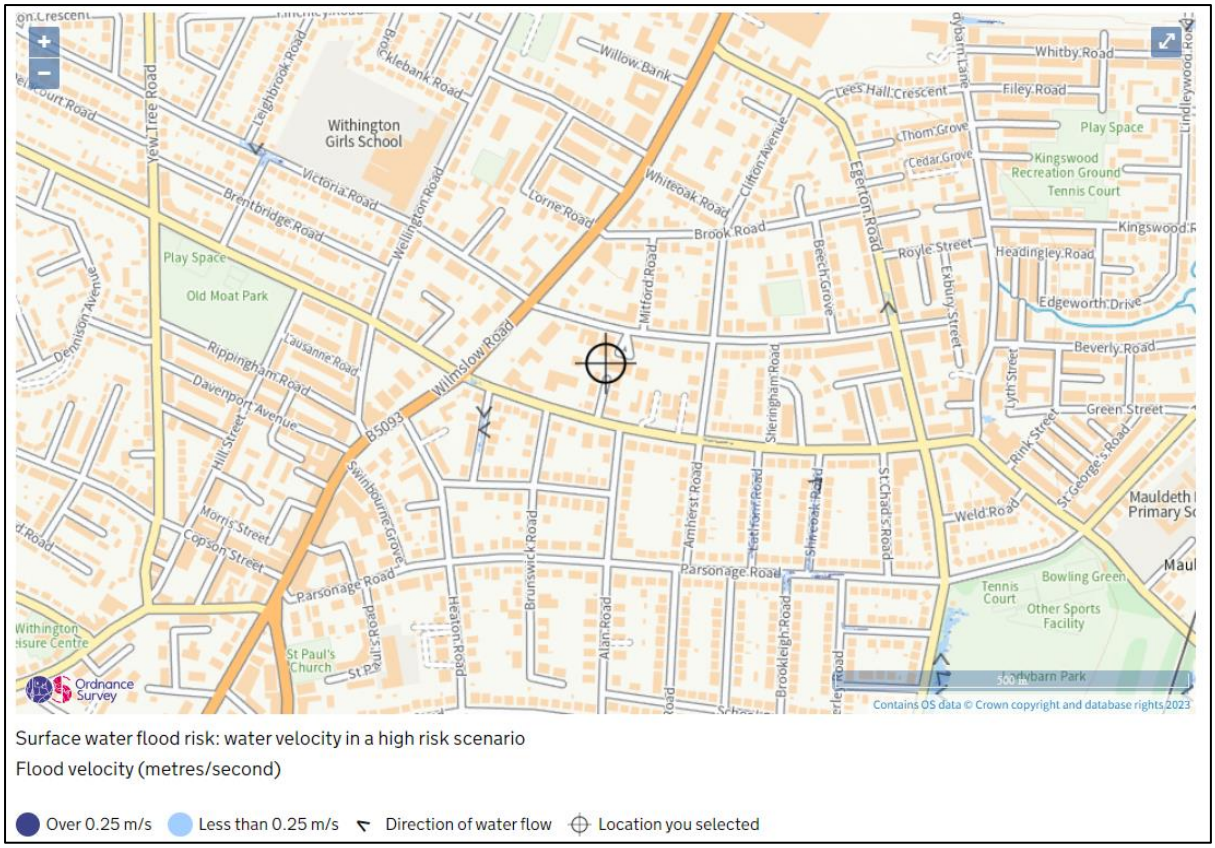


Figure 5 – High Risk Surface Water Velocity Map (Ref 8)

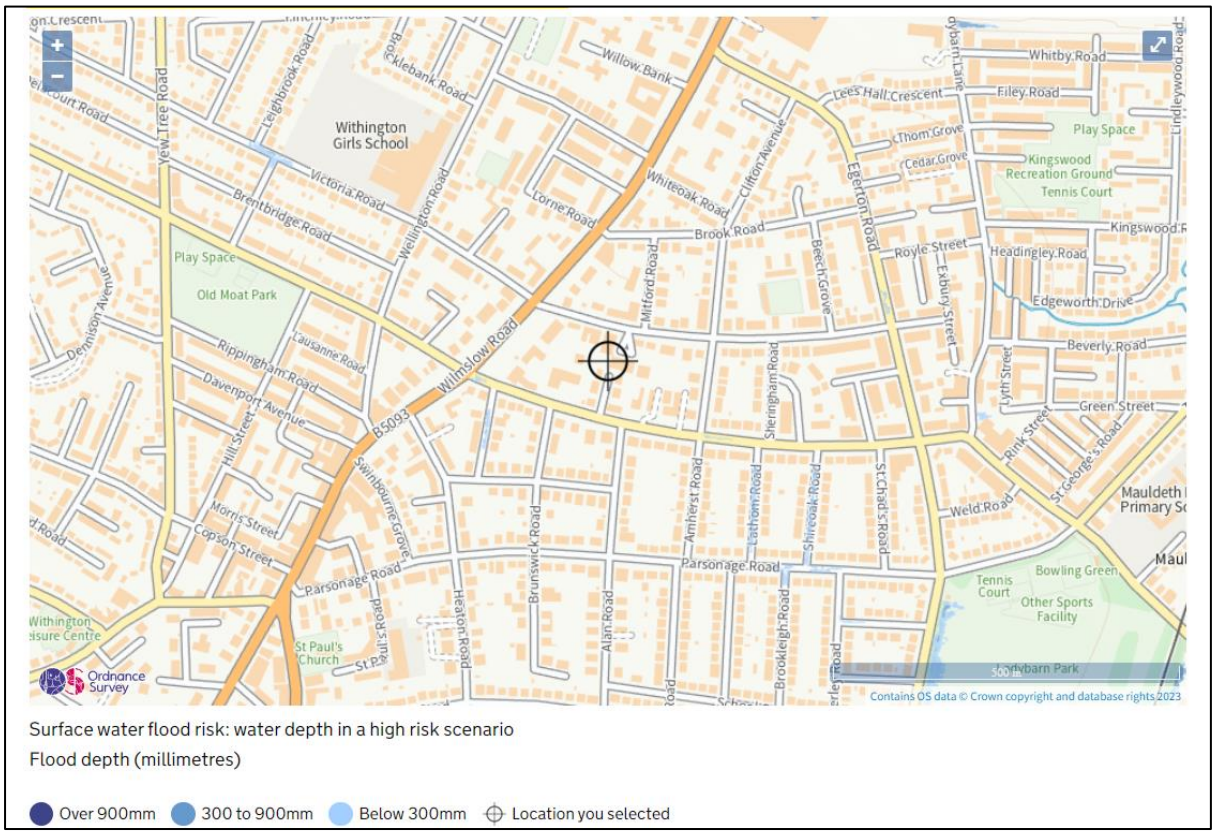


Figure 6 – High Risk Surface Water Depth Map (Ref 8)

2.3 Fluvial

Fluvial flooding occurs when the flow capacity of a watercourse is reached, causing water to flood nearby areas. As previously mentioned, the west of the site is located partly in Flood Zone 3, whereas the north and northeast (streetside) section of the site is located in Flood Zone 1 (Ref 7).

The fluvial flood risk is variable across the site. The west and southwest of the site has a Medium (between 1% and 3.3% chance) to High (greater than 3.3%) risk of fluvial flooding. The north and northeast of the site (streetside) has no risk of fluvial flooding (see Figure 7).

The main source of fluvial flood risk to the site is from Cringle Brook, which is located approximately 145m north of the site, where it is culverted. The inlet of the culvert is located approximately 500m northeast to the site, alongside the outfall of the culvert located approximately 1.2km to the northwest, where Cringle Brook joins Platt Brook. The site is protected from fluvial flooding to some degree due to the presence of natural high ground and other asset defences along the brook (see Appendix 3).

In the EA's Product 4 data (see Appendix 3) the site is located closest to node point 5 (ea013_0238_CRIN01_1551u) and at this point in the undefended 1 in 100-year flood scenario, Cringle Brook is predicted to reach 38.47 mAOD, which is higher than the site. However, node point 5 is located over 100m away from the site and therefore it is more useful to assess the flood depths at 2D Map Reference 7 where the site is located.

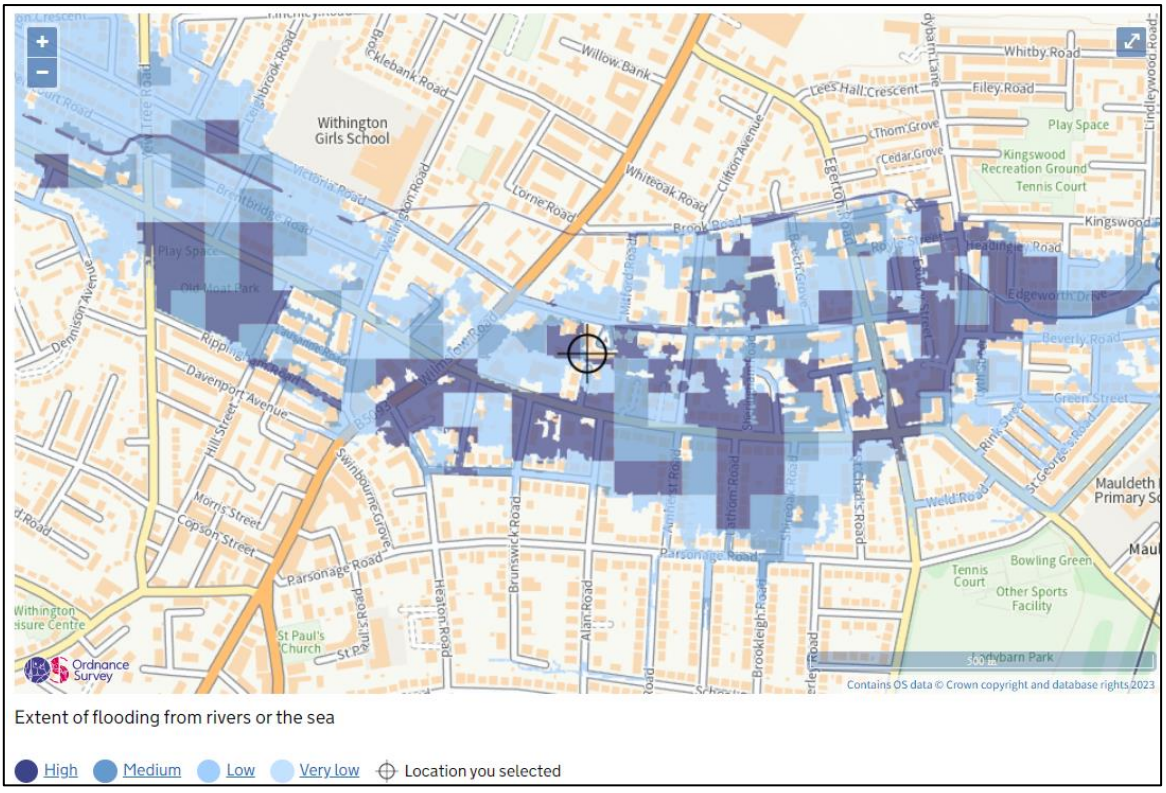


Figure 7: Fluvial flood risk map (Ref 8).

Table 3: Estimated Water Depths at the proposed development site at Node Point 7.

Flood Scenario	Water Depth (mAOD)
Undefended 1 in 100-year	36.33
Undefended 1 in 100-year +30% CCA	36.34
Undefended 1 in 100-year +35% CCA	36.34
Undefended 1 in 100-year +70% CCA	36.35
Undefended 1 in 1000-year	36.38
Defended 1 in 100-year at node 7	36.33
Defended 1 in 100-year +30% CCA	36.34
Defended 1 in 100-year +35% CCA	36.34
Defended 1 in 100-year +70% CCA	36.36
Defended 1 in 1000-year	36.38

The north and northeast of the site which resides at 37+ mAOD, as shown in Appendix 2, is clearly well above the estimated water depths in all 1 in 100-year scenarios and 1 in 1000-year scenarios (see Table 3). In the defended 1 in 100-year plus 70% CCA the estimated water depth is 36.36 mAOD. When comparing this to the ground level at the property's existing southern boundary the site, this is at 36.48 mAOD, shown in the topographic survey (Appendix 2). This is 120mm above the estimated flood depth at node point 7.

However, the property's entrance area is at the 37.97 mAOD threshold limit, which is 1.61m above the estimated water depth of 36.38 mAOD at node point 7 in the 1 in 1000-year defended scenario. This is due to the steps leading into the property meaning the FFLs at the entrance are much higher than the ground level. This can be seen in the topographic survey (Appendix 2) which states the threshold level of the property to be 37.97 mAOD. The threshold level is known as the critical water level entry point for properties. The 1 in 100 year + 70% CCA undefended scenario is at 36.35mAOD. The site, which is currently built is therefore above the flood level by at 0.65mAOD+ due to varying levels across the current building.

The 1 in 100 year +35% the defended and undefended scenario only differ by 0.01m from 36.35mAOD to 36.34mAOD. This is below the finished floor levels of the ground floor of 36.65 mAOD, by 0.3m. (See Plan 2 and Appendix 2).

The lowest section of the site to the south resides at 36.18 mAOD. As seen in Table 3, this is below the estimated water depths at node point 7 in all 1 in 100-year scenarios and 1 in 1000-year scenarios. Currently, the lowest section of the site is a garden/hardstanding area.

However, the 'lower ground' basement area of the property, proposed to be converted to a flat, resides below ground level of the area of the proposed extension, which is 35.63mAOD (See Appendix 2), meaning it is at risk of flooding in all 1 in 100-year and 1 in 1000-year scenarios. Basements are common in Beaconsfield and as outlined in Section 3.0, the

basement at the property will be protected from water ingress via water-proofing measures and an effective drainage system.

2.4 Reservoirs

The EA's 'Long-Term Flood Risk Map' (Ref 8) identifies the site as at risk of flooding from reservoirs (see Figure 8). Gorton reservoirs are located 4.8km to the northeast of the site, with the Audenshaw reservoirs, adjacent to Gorton reservoirs, located approximately 6km to the northeast of the site.

Flooding from reservoirs may come from overtopping due to greater inflows than outflows, or from full or partial failure of the dam walls. The site's relatively proximity to reservoirs means there is an obvious risk of reservoir flooding from dam failure or overtopping of the reservoir. The reservoir undertaker is responsible for providing emergency flood and evacuation plans to the relevant persons interested in the reservoir. Furthermore, inspections are to be undertaken by an independent qualified civil engineer, and a report is completed, including any maintenance works required, the time of the next inspection, and any safety measures that must be completed in a designated timeframe. mmm

Hence, the risk of flooding from reservoirs is low. Reservoirs are regularly inspected by engineers and are typically safe in the UK. For this reason, this FRA has classified the risk of reservoir flooding as Low, although it is important to note that the EA's flood maps do not categorise reservoir flooding in terms of High to Low risk.

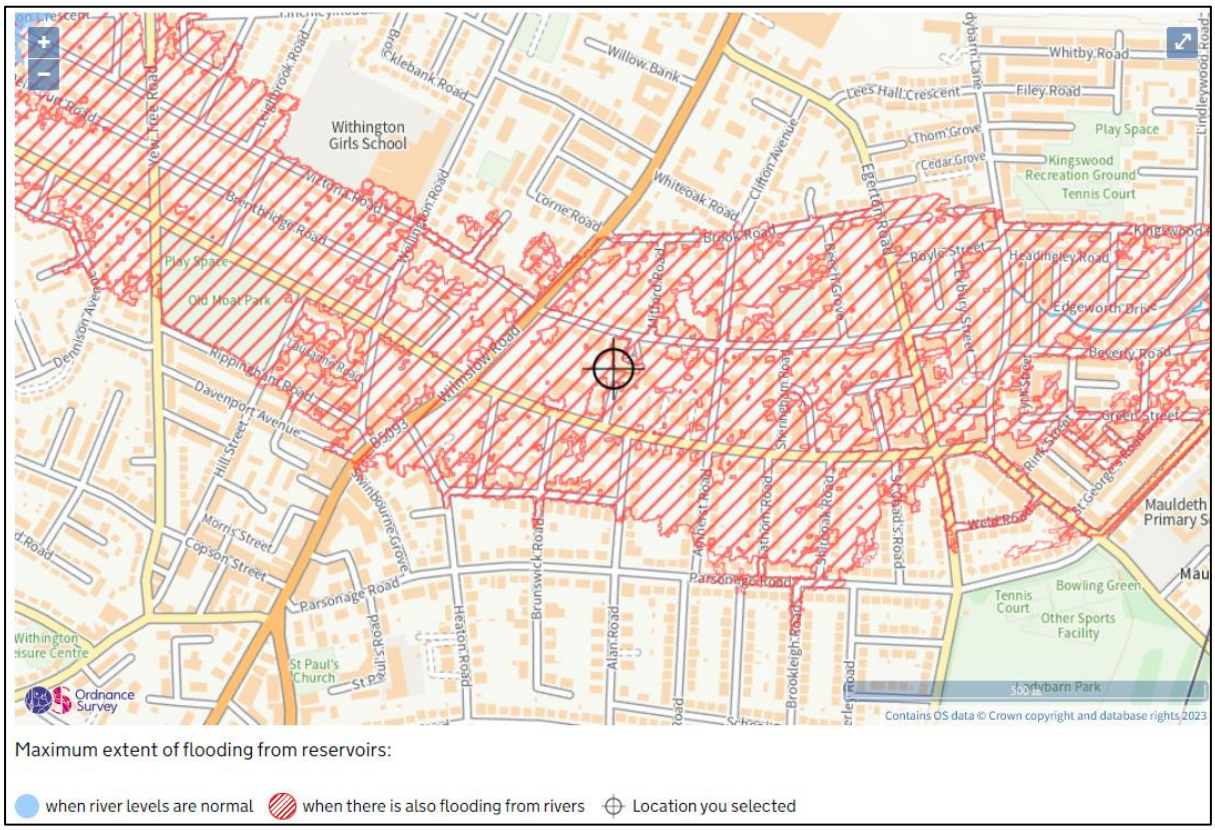


Figure 8 – Extent of Flood Risk From Reservoirs (Ref 8)

2.5 Groundwater

Groundwater flooding occurs when water stored beneath ground level rises to breach the surface. According to Manchester City Council's SFRA (Ref 5), there are no known reports of groundwater flooding in the Manchester, Trafford and or the Salford authorities. However, there are sections of Trafford with high water tables and increasing water tables. In addition, mine water rebound is a potential issue for all three districts (Ref 5).

Nonetheless, Manchester City Council's SFRA groundwater map indicates that No. 5, 6 and 7 Beaconsfield are not located in an area at risk of groundwater flooding, nor is it located in an area of shallow groundwater or in an area at risk of groundwater rebound (see Figure 9). Likewise, the site has a Medium to Low vulnerability to groundwater according to DEFRA's groundwater vulnerability map (see Figure 10; Ref 9).

As mentioned in sub-section 1.3, the site resides on a bedrock composed of sandstone, which should easily drain groundwater. For these reasons, this FRA has not identified groundwater flooding as a risk to the proposed development. That being said, due to the 'lower ground' basement at No. 5, 6 and 7 it is imperative that groundwater levels are monitored.

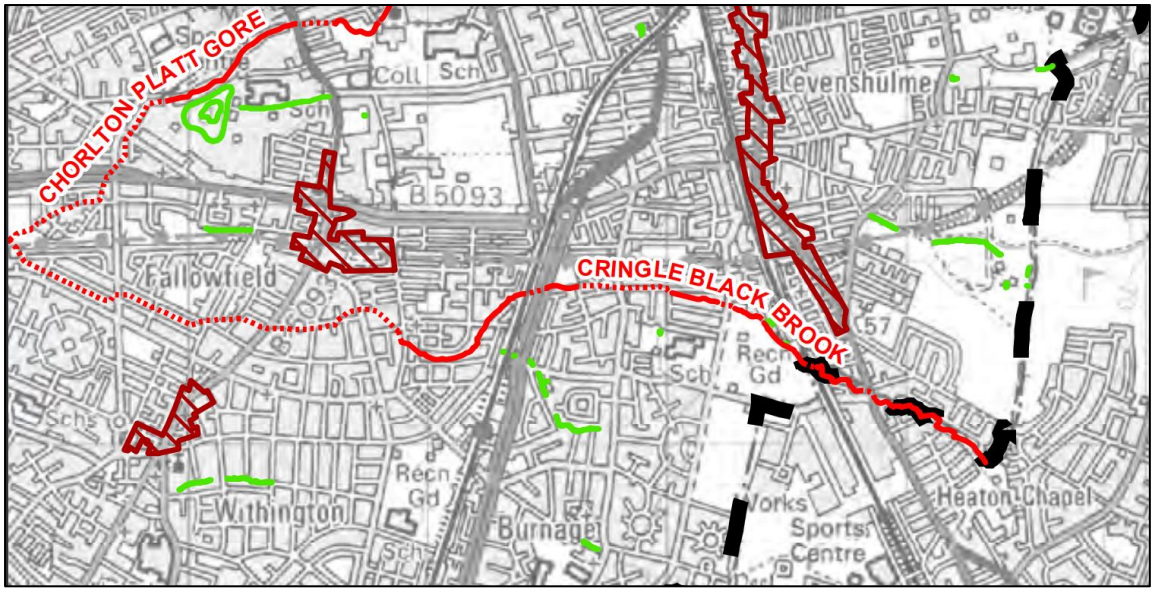


Figure 9: Areas Susceptible to Groundwater flooding in Manchester City (Ref 5). Note: The site is located in a grey area on the map which is not at risk of groundwater flooding or located within a critical drainage area.



Figure 10: DEFRA's Groundwater Vulnerability Map. Note: The site has a Medium to Low groundwater vulnerability (Ref 9).

2.6 Tidal

The site is not at risk from tidal flooding, and therefore, analysis is not applicable.

3.0 Accounting for Flooding Within the Proposed Development

The NPPF classifies the proposed development as a 'More Vulnerable' development (Ref 10) given the use of the property is residential. However, the proposed extension at No. 5, 6 and 7 Beaconsfield is approximately 143m^2 and therefore well under 250m^2 meaning the extension is considered a 'minor extension' (Ref 11).

'More vulnerable' developments located in Flood Zone 3 require the sequential test. However, the proposed development at No. 5, 6 and 7 Beaconsfield is an extension to the existing residential properties and the potential flood risks at the site can be adequately managed. For these reasons, it is the view of this FRA that the sequential test for the site is passed, providing the existing 'lower ground' basement is water-proofed and an effective drainage scheme at the site is put in place designed to the British Standard (Ref 12).

As outlined in Section 2.0, the site has a Very Low (less than 0.1% chance) to Low (between 0.1% and 1% chance) risk of surface water flooding each year. Surface water accumulates to a depth of 300mm but can travel at over 0.25 m/s along the impermeable surfaces during 'short and sharp' rainfall events.

Surface water gathers at the lowest lying points of the site's garden/hardstanding area to the west and southwest. Some surface water also accumulates along Derby Road and Beaconsfield.

To protect the properties and, in particular, the properties with basements at Beaconsfield from surface water flooding, it is imperative that the Council and/or United Utilities keep the roadside drains clear and well maintained. In addition, the property owners should seek to keep the property's drains free from debris to prevent surface water from gathering on site. In addition, cellars need to be built to a flood resilient design that excludes water up to and including the entrance (steps) to the cellar from the ground floor.

The proposed extension at No. 5, 6 and 7 Beaconsfield will increase the amount of impermeable surfaces on site and potentially increase surface water runoff. For this reason, this FRA recommends that the site implements SuDS to mimic the natural drainage of the site as closely as possible and reduce surface water flooding.

Furthermore, this FRA recommends a drain investigation is undertaken during the construction of the proposed development to ensure that the creation of additional flats at No.5, 6 and 7 Beaconsfield does not cause increased pressure on the area's drainage systems or exacerbate surface water flooding.

In terms of fluvial flood risk, No. 5, 6 and 7 Beaconsfield's curtilage is located partly in Flood Zone 3, which has a High probability of flooding (Ref 7). The west and southwest of the site has a Medium (between 1% and 3.3% chance) to High (greater than 3.3% chance) risk of flooding, although the north and northeast of the site has no risk of fluvial flooding. This is because the western and southern areas of the site resides at a lower elevation of 36.19 and 36.18 respectfully mAOD whereas the north and northeast of the site reside above 37 mAOD.

In the defended 1 in 100-year plus 35% CCA the estimated water depth is 36.35 mAOD and the site in which the proposed extension is to be built at 36.38 mAOD is 30mm above the estimated flood depth at node point 7. However, the site at 36.38 mAOD is 20mm below the estimated water depth of 36.40 mAOD at node point 7 in the 1 in 1000-year scenario + CC. In the undefended 1 in 100 year + 35% CCA the site resides 40mm above the flood level of 36.34mAOD.

Therefore, in order to create the recommended free board of 300mm, the extension's finished floor levels at the southwest of the current flats should be set at a minimum of 36.64mAOD, with Plan X demonstrating the elevation of the finished floor levels at 36.65 mAOD.

The ground level in the area where the proposed extension is due to be built is already at 36.65mAOD (Plan 2 and Appendix 2). Such an increase only represents an increase of 0.27mAOD relative to the existing levels. The undefended scenario was chosen due to the

distance from the defences not likely to have an impact on the property. This floor level will also be 0.27m above the worse case 1:1000 year scenario flood level at Node Point 7 (See Table 3 and Appendix 3).

The current property has steps leading up into it, which creates additional height. As seen in the topographic survey (Appendix 2) the ground floor levels are 37+ mAOD. Thus being protected from all fluvial flooding scenarios in relation to the 2D model. The 3D model is over 100m away and therefore is not accurate enough to provide flood levels for this property.

Although the basement areas are in Flood Zone 1, this is based on the ground level not the flood level. Therefore, the basement at No. 5, 6 and 7 resides below the current ground level, meaning it is at risk of fluvial flooding in all 1 in 100-year and 1 in 1000-year scenarios. Basements are common in Beaconsfield because the water table is low. Nonetheless, the existing 'lower ground' basement at the proposed development requires protection from potential fluvial and surface water flooding.

The failure mode would be flood water reaching the 1:100 year plus 35 % CC level (36.34mAOD) and seeping into the cellars because its not tanked and may have ageing brick work that could cause a leak. The solution is to make sure that the cellars are relined up to ground floor and entrance/egress levels using an appropriate flood resilient water proofing method. cellar's entrance will then need to sit 300mm above the 1:100 plus 70% CC level which is 36.68mAOD (See Table 3). However, it is important to note that access to the existing basements will be internal.

British Standard (BS) 8102:2009 is the "Code of practice for the protection of below-ground structures against water from the ground" which is suggested by the EA and DEFRA standing advice page (Ref 11). This standard provides industry recommendations and guidance on dealing with and preventing the entry of water into a structure (Ref 12). Although BS 8102-2009 is typically used (Ref 12) to protect structures below the ground that are vulnerable to high water tables (which the site does not have) the methodologies of BS 8102-2009 can be used to protect the property and basement from water ingress. Hence, the principles of BS 8102-2009 need to be followed and adhered to for the proposed development site.

At sites where the water table is classified as Low 'Type A' waterproofing protection is acceptable. Type A is a barrier type of protection which includes, but is not limited to external and internal waterproofing, loading coats, sandwich waterproofing and concrete walls (see Figure 12). There are different grades of waterproofing including:

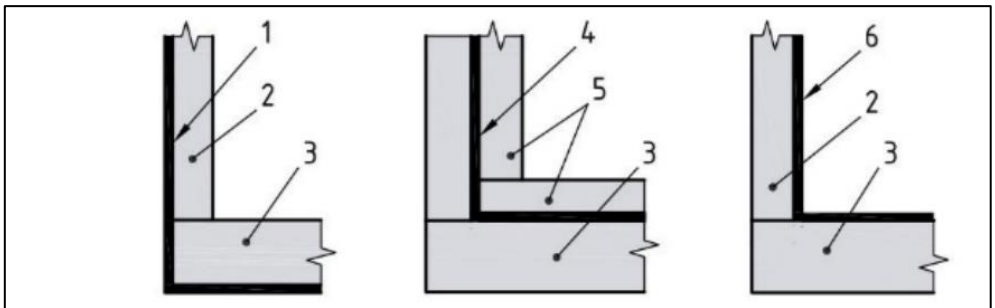
- Grade 1 – Car parks, plant rooms and workshops. Some seepage and damp areas are tolerable dependent on intended use. Local drainage might be necessary to deal with seepage.

- Grade 2 – Plant rooms, storage areas, and workshops requiring a drier environment than Grade 1. No water penetration is acceptable, although damp areas are tolerable and ventilation might be required.
- Grade 3 – Ventilated residential/commercial areas, including offices, restaurants and leisure centres. No water penetration is acceptable. Ventilation or dehumidification is required appropriate to the intended use.

Given that the proposed development site is residential, the site must be waterproofed up to Grade 3 (Ref 12). This FRA recommends that the basement at the property is waterproofed up to Grade 3. With the proposed finished floor level being 36.65 mAOD, it is not necessary for the ground floor of extension to be waterproofed.

Risk associated with water table	Water table classification (see Note)	Waterproofing protection			
		Type A	Type B		Type C
			Piled wall	Reinforced concrete wall to BS EN 1992	
Low	Low	Acceptable	Acceptable	Acceptable	Acceptable
↑	Variable	Acceptable if the "variable" classification is due to surface water. The manufacturer's advice should be sought.	Acceptable where: a) the piled wall is directly accessible for repair and maintenance from inside the structure; or b) the piled wall is combined with a fully bonded waterproofing barrier; or c) the piled wall is faced internally with a concrete wall to BS EN 1992.	Acceptable	Acceptable
↓	High	Acceptable where: a) an appropriate cementitious multi-coat render or cementitious coatings are used; b) the wall is of concrete to BS EN 1992.		Acceptable	Acceptable
High					

Figure 11: Types of waterproofing protection based on water table classification (Ref 12).



a) Type A (barrier) protection

Key
1 External waterproofing
2 Masonry or concrete wall, as appropriate (see Table 1)
3 Concrete floor slab
4 Sandwiched waterproofing
5 Loading coat
6 Internal waterproofing

Figure 12: Schematic illustration of Type A waterproofing protection (Ref 12).

Gorton reservoirs are located 4.8km to the northeast of the site and Audenshaw reservoirs located approximately 6km to the northeast of the site. Due to the site's proximity to

reservoirs, the EA's maps have identified the site as being at risk of reservoir flooding. That being said, it is important to note that reservoir failure is unlikely given engineers should be regularly working on and monitoring the UK's reservoirs. Hence, this FRA has classified the risk of reservoir flooding the property as Low. If a failure occurs, all occupants should vacate the basement and get to high ground.

The site is not located in an area at risk of tidal flooding (Ref 7). Hence, this FRA does not discuss methods for accounting for tidal flooding at the site.

Moreover, the basement will be protected from water ingress using Type A barrier protection measures. The basement will be waterproofed up to Grade 3. With the proposed FFLs being set at 36.65 mAOD, the site will be protected from flood events by 300mm. The implementation of SuDS and raising of all sensitive electrical equipment (i.e., electrical plug sockets) to 600mm above the flood level are further means of mitigating flood risk at the proposed development.

Nonetheless, due to the likelihood of surface water flooding along Derby Road and Beaconsfield, it would be appropriate for the site's occupiers to monitor the flood warnings of the nearby area (see Figure 13).

Similarly, the site's occupiers and other residents in the local area might wish to monitor Cringle Brook and report any debris and obstructions at Cringle Brook to the EA. For example, the culvert entrance of Cringle Brook could be inspected. This will ensure the flood alleviation scheme at Cringle Brook is being regularly monitored and maintained by the EA. A residents' flood forum in the area could be a method of liaising with the LLFA and EA if, for example, siltation or debris build up started to cause an increase in flooding in the area.



Figure 13: The area near the site that should be monitored for flood alerts and warnings. Note: The area covered broadly equates to the area where the risk of flooding in any year is greater than 1% (Ref 13).

4.0 Conclusions and Recommendations

The proposed extension at No. 5, 6 and 7 Beaconsfield is under 250m^2 meaning it is classified as a 'minor extension' by the NPPF. The west and southwest of the site resides partly in Flood Zone 3 whereas the rest of the site resides in Flood Zone 1.

Surface water flooding accumulates in the west and southwest of the site (Figure 2) which resides at 36.18 mAOD (See Appendix 2). The property, which resides at 37+ mAOD and has raised steps into the entrance of the house, is protected from surface water flooding. However, the 'lower ground' basement at 5, 6 and 7 Beaconsfield resides below the ground floor of the proposed extension of 36.65 mAOD at 35.63 mAOD and is therefore vulnerable to surface water and/or fluvial related flooding.

Therefore, the extension's finished flood levels that are to be created at the southwest of the current building is required to be placed at 36.64mAOD, with the proposed extension being elevated to an FFL of 36.65 mAOD. Using the undefended 1 in 100 year + CCA of 36.34mAOD (See Table 3) and the requirement for the finished floor levels to be 300mm above the flood level, this is the reason for the 36.64mAOD elevation. The ground level in the area of the site is already at 36.38mAOD so a increase of 0.26mAOD. The undefended scenario was chosen due to the distance from the defences not likely to have an impact on the property.

To protect the basement from flooding, this FRA recommends that the basement implement Type A barrier protection measures. Type A is a barrier type of protection which includes, but is not limited to external and internal waterproofing, loading coats, sandwich waterproofing and concrete walls (see Figure 12). These measures include waterproofing the basement up to Grade 3. Moreover, this FRA recommends that the internal and external walls of the house are waterproofed up to Grade 3. Grade 3 – Ventilated residential/commercial areas, including offices, restaurants and leisure centres. No water penetration is acceptable. Ventilation or dehumidification is required appropriate to the intended use.

It is important that the basement is relined to provide waterproofing from flood to ceiling level to ensure no leaks can enter through older brickwork. For the same reason, this FRA recommends that all sensitive electrical equipment (i.e., plug sockets are raised to 600mm) above the ground floor level.

It is the sole responsibility of the developer to provide suitable protection to the basement and ensure all warnings for flooding are followed within the area to protect the occupants of the property. In addition, a qualified engineer and contractor with the necessary qualifications must be sought to implement the correct protection that the property needs to make the basement safe for the conversion into flats.

Drain blockages around the Beaconsfield area might exacerbate surface water flooding at the property. For this reason, this FRA recommends that a drain investigation is undertaken to ensure that the creation of new apartments at the property does not put added stress on the area's drainage system. It is the responsibility of the council and/or UU to ensure that drains along Derby Road and Beaconsfield remain clear of debris. The freeboard proposed will also provide additional safety and flood resilience.

The planned extension increases the amount of impermeable surfaces in the area which may also increase runoff. To mimic the site's natural drainage and reduce runoff SuDS is recommended.

The site is low risk of groundwater flooding, and the property is underlain by sandstone bedrock which should easily drain water away due to its high permeability. The site's risk of reservoir flooding is directly related to reservoir maintenance and upkeep. It is the responsibility of reservoir engineers to ensure that reservoir safety is maintained at all times. There is no risk of tidal flooding at the property.

As the proposal is to have bedrooms in the basement, two means of egress should be provided. One in the form of a door and the other a window. Thus meaning the occupant has suitable exit routes. The external access to the basements are proposed to be replaced with internal access, alongside each 'lower ground' basement having an egress window with the sill at 36.65 mAOD.

To summarise, this FRA makes the following recommendations to reduce the chance of flooding at the property:

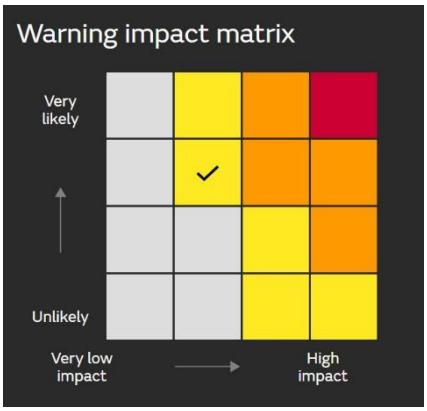
1. The finished floor levels of the proposed extension 36.64mAOD which is 300mm above the flood level of 36.34mAOD and above the estimated surface water flood depths at the site. It would be best practice to raise all sensitive electrical equipment such as plug sockets above the flood level.
2. It is imperative that the basement at the property is relined and implements Type A barrier protection including waterproofing measures up to Grade 3. Figure 11/12 (Ref 12)
3. It is recommended that the external and all basement perimeter walls of the existing cellars are waterproofed to Grade 3.
4. It would be beneficial to conduct a drainage investigation at the site during construction to ensure that the creation of additional apartments at the property will not place added stress on the area's current drainage system and the site has free flowing drainage connections in good condition to the public network.
5. Surface water drains on the property should be maintained by the property owners. It is the responsibility of the property owners to remove any drain blockages on their property. Working drains should prevent the accumulation of surface water on site.
6. The property owners should monitor the roadside drains on Derby Road and Beaconsfield and inform the appropriate authorities in the event of a roadside drain blockage. It is the responsibility of the Council and/or United Utilities to maintain the roadside drains.
7. The site's occupiers and landlords should monitor flood alerts and warning systems for the wider residential area surrounding Cringle Brook.
8. The site's occupiers and other residents in the local area might wish to monitor Cringle Brook and report any debris and obstructions at Cringle Brook to the EA. This will ensure the flood alleviation scheme at Cringle Brook is being regularly monitored and maintained by the EA. A residents' flood forum in the area would be a method of liaising with the LLFA and EA if for example siltation or debris build up started to cause an increase in flooding.

5.0 References

1. British Geological Survey (Geology of Britain). Available At: http://mapapps.bgs.ac.uk/geologyofbritain/home.html
2. AEDA (Agricultural & Environmental Data Archive), Cringle Brook flood alleviation scheme (Accessed at: http://www.environmentdata.org/archive/ealit:601)
3. Government Website: The Environment Agency's Catchment Data Explorer (Accessed at: https://environment.data.gov.uk/catchment-planning)
4. Government Website: Flood risk assessments: climate change allowances (Accessed: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#when-to-use-climate-change-allowances)
5. Manchester City, Salford City and Trafford Councils Level 1/2 Hybrid SFRA (2010) (Accessed at: https://www.manchester.gov.uk/)
6. Government Website: Climate Change Allowances (Accessed at https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow)
7. Government website. *Flood Map for Planning.* Online at: https://flood-map-for-planning.service.gov.uk/flood-zone-results?easting=385340&northing=389908&location=M20%205PB&fullName=%20&recipientemail=%20
8. Government website. *Check the long term flood risk for an area in England.* Online at: https://www.gov.uk/check-long-term-flood-risk
9. Magic Map: DEFRA's Groundwater Vulnerability Map (accessed at: https://magic.defra.gov.uk/MagicMap.aspx)
10. Government Website: National Planning Policy Framework - Annex 3: Flood risk vulnerability classification (accessed at: https://www.gov.uk/guidance/national-planning-policy-framework/annex-3-flood-risk-vulnerability-classification)
11. Government Website: Preparing a flood risk assessment: standing advice (accessed at: https://www.gov.uk/guidance/flood-risk-assessment-standing-advice#advice-for-minor-extensions)
12. British Standard (BS) 8102:2009 is the "Code of practice for the protection of below-ground structures against water from the ground"
13. Flood Warning Area Details for Cringle Brook (Accessed at: https://riverlevels.uk/flood-warning-cringle-brook-at-fallowfield#:~:text=No%20current%20or%20recent%20warnings.,-Cringle%20Brook%20at)

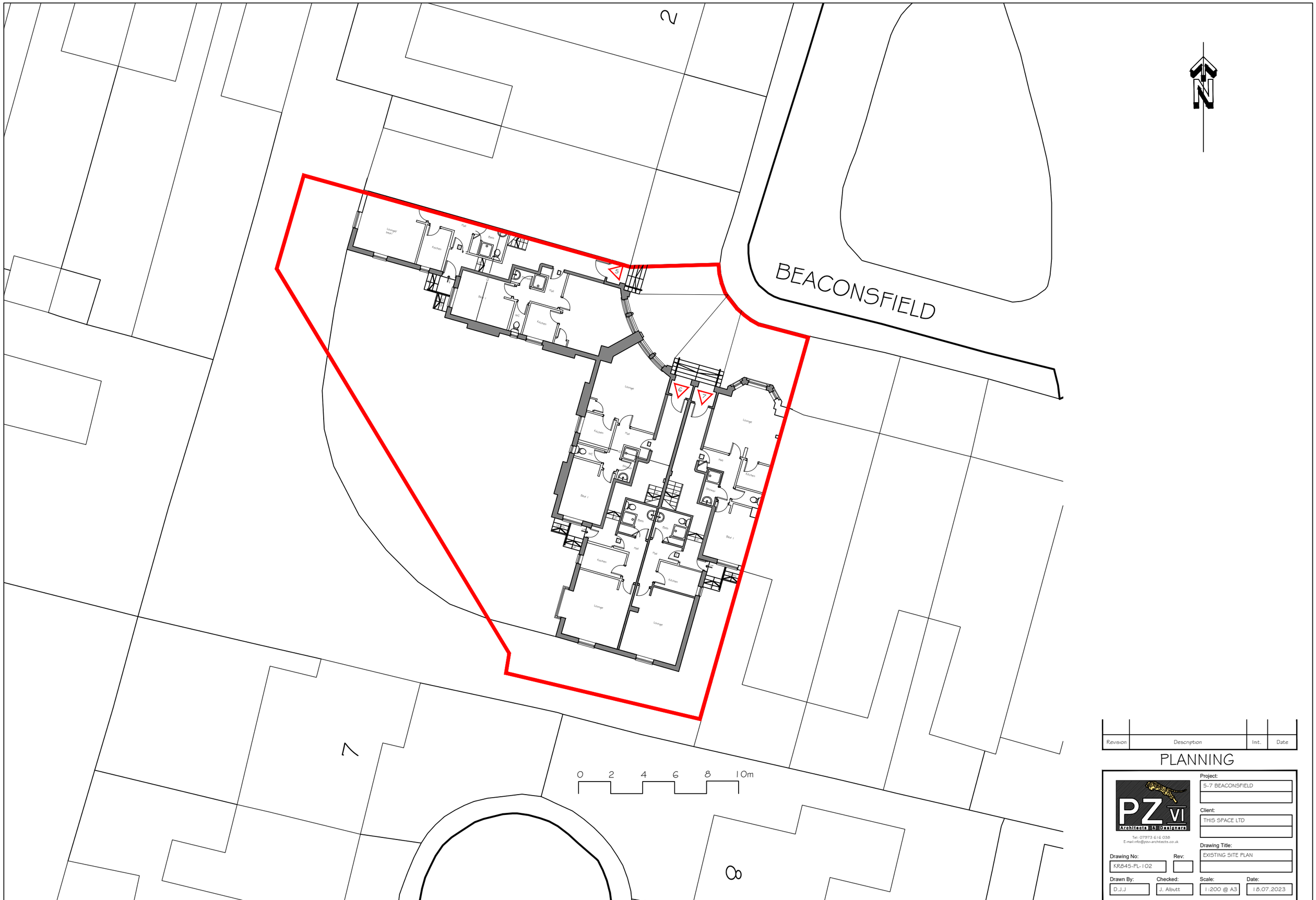
Flood Risk Assessment (FRA) Glossary

Abbreviation or Key Word	Definition/Description
Flood Zone 1 (Low Probability)	Land having less than a 1 in 1,000 annual probability of river or sea flooding. Shown as clear on a flood zone map.
Flood Zone 2 (Medium Probability)	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding. Or land having between 1 in 200 and 1 in 1,000 sea flooding. Both shown as light blue on a flood zone map.
Flood Zone 3a (High Probability)	Land having a 1 in 100 or greater annual probability of river flooding, or land having a 1 in 200 or greater annual probability of sea flooding. Shown in dark blue on the flood zone map.
Flood Zone 3b – The Functional Floodplain	This zone comprises land where water must flow or be stored in times of flooding. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. This is not separately distinguished on a flood zone map and is also shown in dark blue.
Annual Probability of Surface water Flooding	The flood map for surface water assesses flooding scenarios as a result of rainfall with the following chance of occurring in any given year (annual probability of flooding shown in brackets. - 1:30 (3.3%) - 1:100 (1%) - 1:1000 (0.1%) -
Flood Warnings	As the UK's official weather service, the MET Office is responsible for issuing weather warnings, which warn of impacts caused by serve weather. The Met Office provide warnings up to seven days ahead of rain, thunderstorms, wind, snow, lightening, ice and fog. Met Office weather warnings are available in a number of ways, which make it easy to get the very latest information wherever you are. These include the Met Office App and website, social media, email alerts, TV, Radio and RSS. It is recommended that the site owner sign up to the national weather warning service. More information can be found here: https://www.metoffcie.go.uk/weather/guides/warnings

	The Met Office issues weather warnings, through the National Severe Weather Warning Service, when severe weather has the potential to bring impacts to the UK. These warnings are given a colour (yellow, amber or red) depending on a combination of both the impact the weather may have and the likelihood of those impacts occurring. 
Yellow Weather Warning	Yellow weather warnings can be issued for a range of weather situations. Many are issued when it is likely that the weather will cause some low level impacts, including some disruption to travel in a few places. Many people may be able to continue with their daily routine, but there will be some that will directly impact and so it is important to access if you could be affected. Other Yellow warnings are issued when the weather could bring much more severe impacts to the majority of people but the certainty of those impacts occurring is much lower. It is important to read the content of yellow warnings to determine which weather situation is being covered by the yellow warning.
Amber Weather Warning	There is an increased likelihood of impacts from severe weather, which could potentially disrupt your plans. This means there is the possibility of travel delays, road and rail closures, power cuts and the potential risk to life and property. You should think about changing your plans and taking action to protect yourself and your property. You may want to consider the impact of the weather on your family and your community and whether there is anything you need to do ahead of the severe weather to minimise the impact.
Red Weather Warning	Dangerous weather is expected and, if you haven't already don so, you should take action now to keep yourself and others safe from the impacts of the severe weather. It is very likely that there will be a risk to life, with substantial disruption to travel, energy supplies and possibly widespread damage to property and infrastructure. You should avoid travelling, where possible and follow the advice of the emergency services and local authorities.
Flood Plan	It is recommended that the applicant and future owners, occupiers and landlords of the property prepare a flood plan to protect life and property during a flood event.

	Before a flood: - Find out if you are at risk of flooding. - Find out if you can receive flood warnings. - Prepared and keep a list of all your important contacts to hand or save them on your mobile phone. - Think about what items you can move now and what you would want to move to safety during a flood such as pets, cars furniture and electrical equipment. - Know how to turn off gas, electricity and water supplies. - Prepared a flood kit of essential items and keep it handy, It can include copies of important documents, a torch, a battery powered or windup radio, blankets an warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication. - Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property. During a flood: - Tune into your local radio station on a battery or windup radio. - Fill jugs and saucepans with water. - Grab you flood kit – if you have one prepared. - Collect blankets, torch, first aid kit, medication and food. - Move important documents, personal items, valuables and lightweight belongings upstairs or to high shelves. - Raise large items of furniture or put them in large bags if you have them. - Move people, outdoor belongings, cars and pets to higher ground. - Switch off water, gas an electricity at the mains when water enters your home. Do not touch sources of electricity when standing in water. - Fit flood protection products if you have them for example flood boards, airbrick covers and sandbags. - Put plugs in sinks and baths. Weigh them down with a pillowcase or plastic bag filled with soil. - If you do not have non-return valves fitted plug water inlet pipes with towels or clothes. - Move your family and pets upstairs or to a high place with a means of escape. - Listen to the advice of the emergency service and evacuate if told to do so. - Avoid walking or driving through flood water. Six inches of fast flowing water can knock over an adult and two feet of water van move a car. After a flood: - If you have flooded, contact your insurance company as soon as possible. - Take photographs and videos of your damaged property as a record for your insurance company. - If you don't have insurance, contact your local authority for information on grants and charities what may help you. - Flood water can contain sewage, chemicals and animal waste. Always wear waterproof outerwear, including gloves, wellington boots and a face mask. - Have your electrics, central heating and water checked by a qualifies engineer before switching them back on.

Plan 1: Existing Site



Revision	Description	Int.	Date

PLANNING

PZ VI Architects & Designers

Tel: 07973 616 036
E-mail:info@pzvi-architects.co.uk

Project: 5-7 BEACONSFIELD

Client: THIS SPACE LTD

Drawing Title: EXISTING SITE PLAN

Drawing No: KR845-PL-102

Rev:

Drawn By: D.J.J

Checked: J. Albutt

Scale: 1:200 @ A3

Date: 18.07.2023

Plan 2: Proposed Development



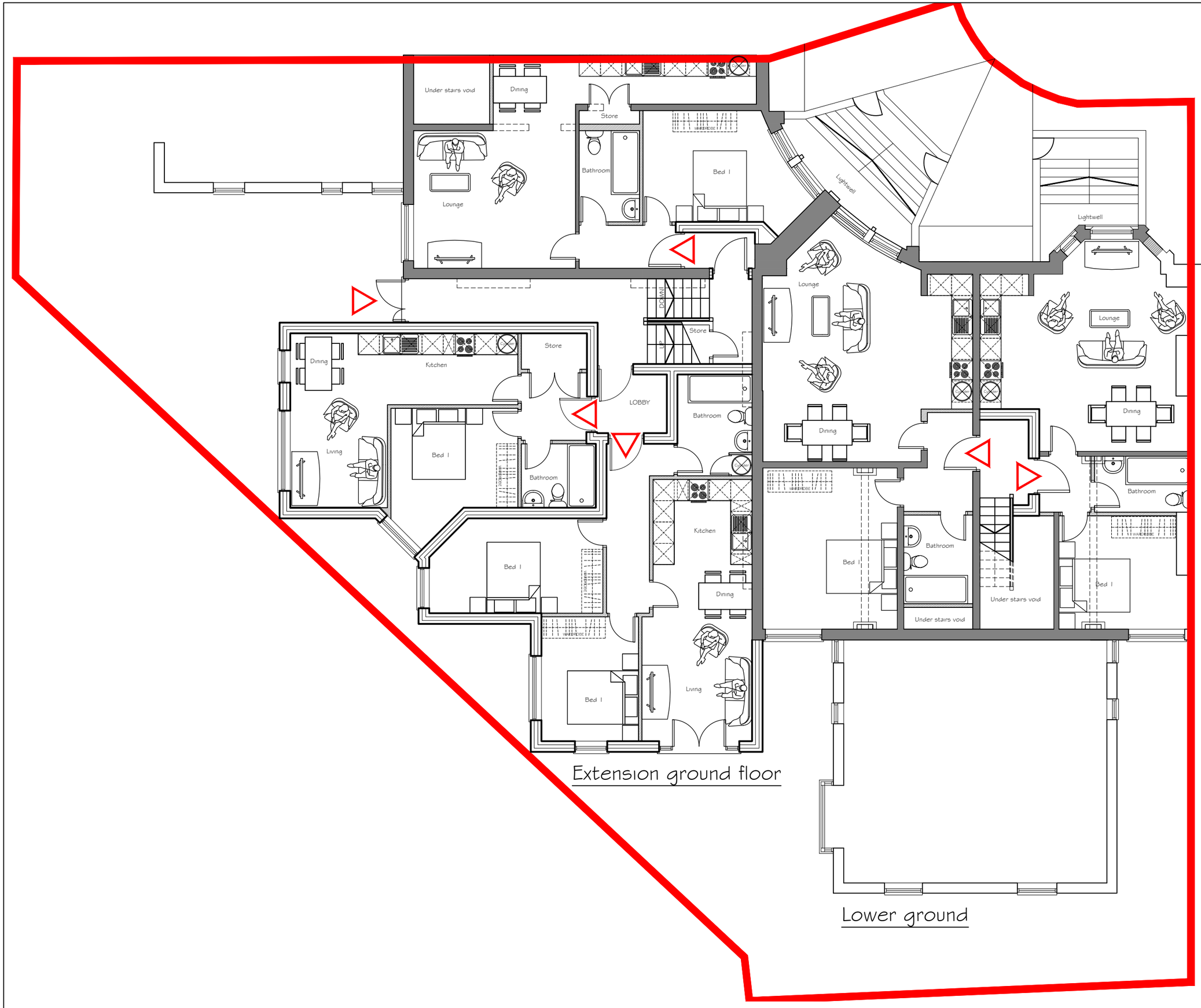
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Client:	THIS SPACE LTD
Drawing Title:	PROPOSED SITE PLAN
Drawing No:	KR845-SK-201
Rev:	
Drawn By:	D.J.J
Checked:	J. Albutt
Scale:	1:200 @ A3
Date:	23.02.2024



Extension ground floor

Lower ground

Revision	Description	Init.	Date

SKETCH

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Project: 5-7 BEACONSFIELD

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Drawing Title: PROPOSED LOWER-GROUND FLOOR PLANS

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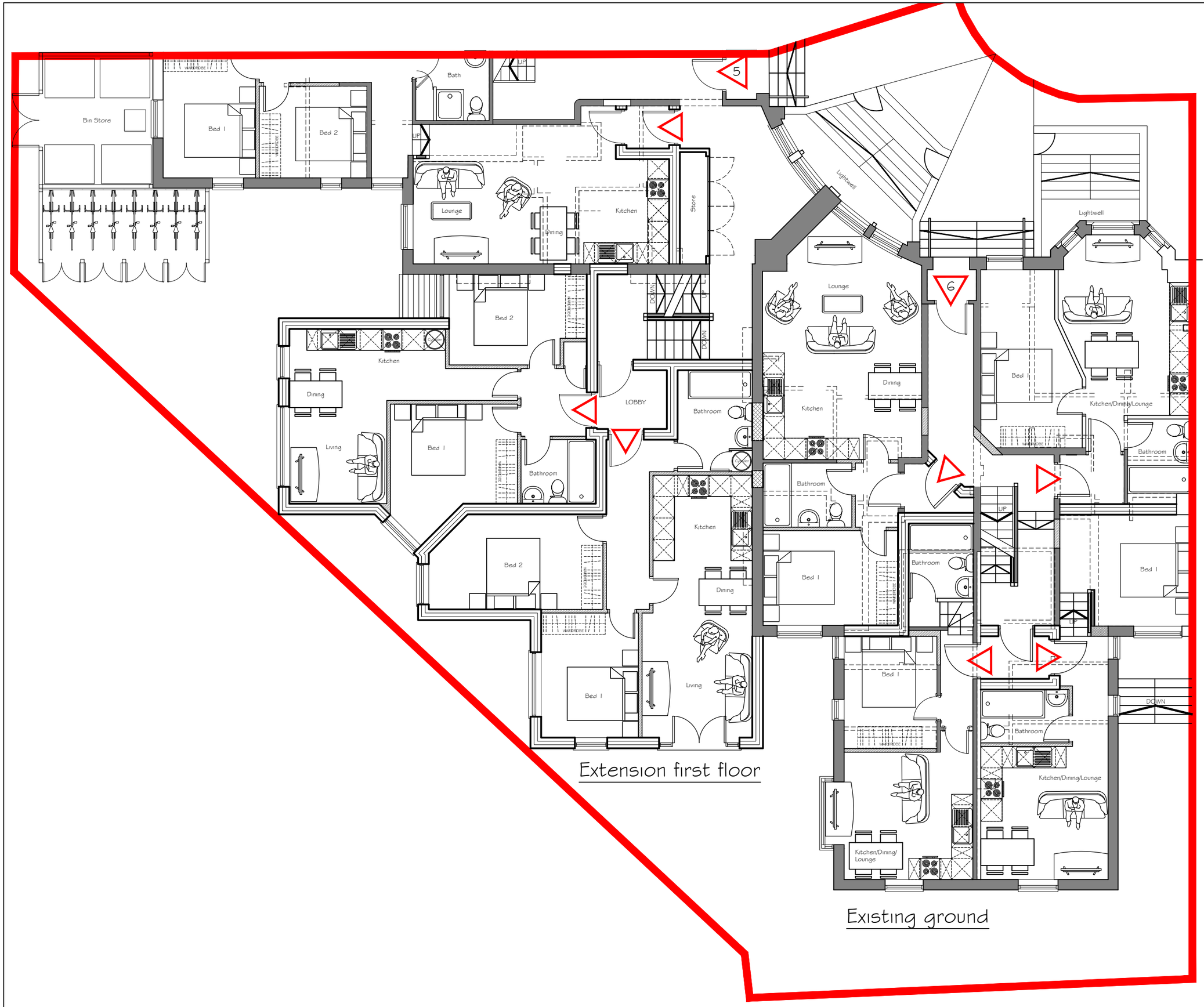
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Checked: J. Albutt

Scale: 1:100 @ A3

Date: 23.02.2024



Extension first floor

Existing ground

Revision	Description	Init.	Date

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Drawing No: KR845-SK-203

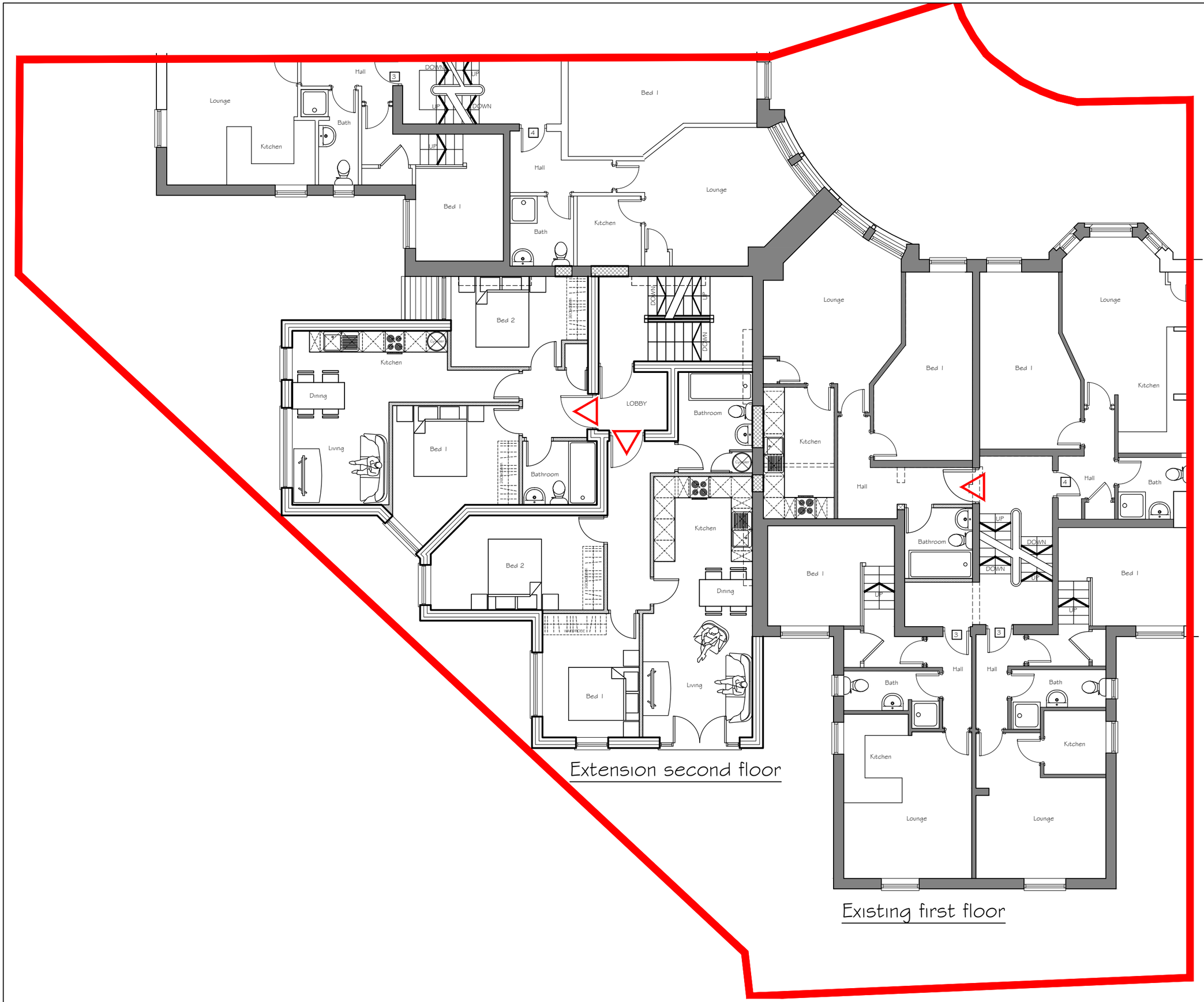
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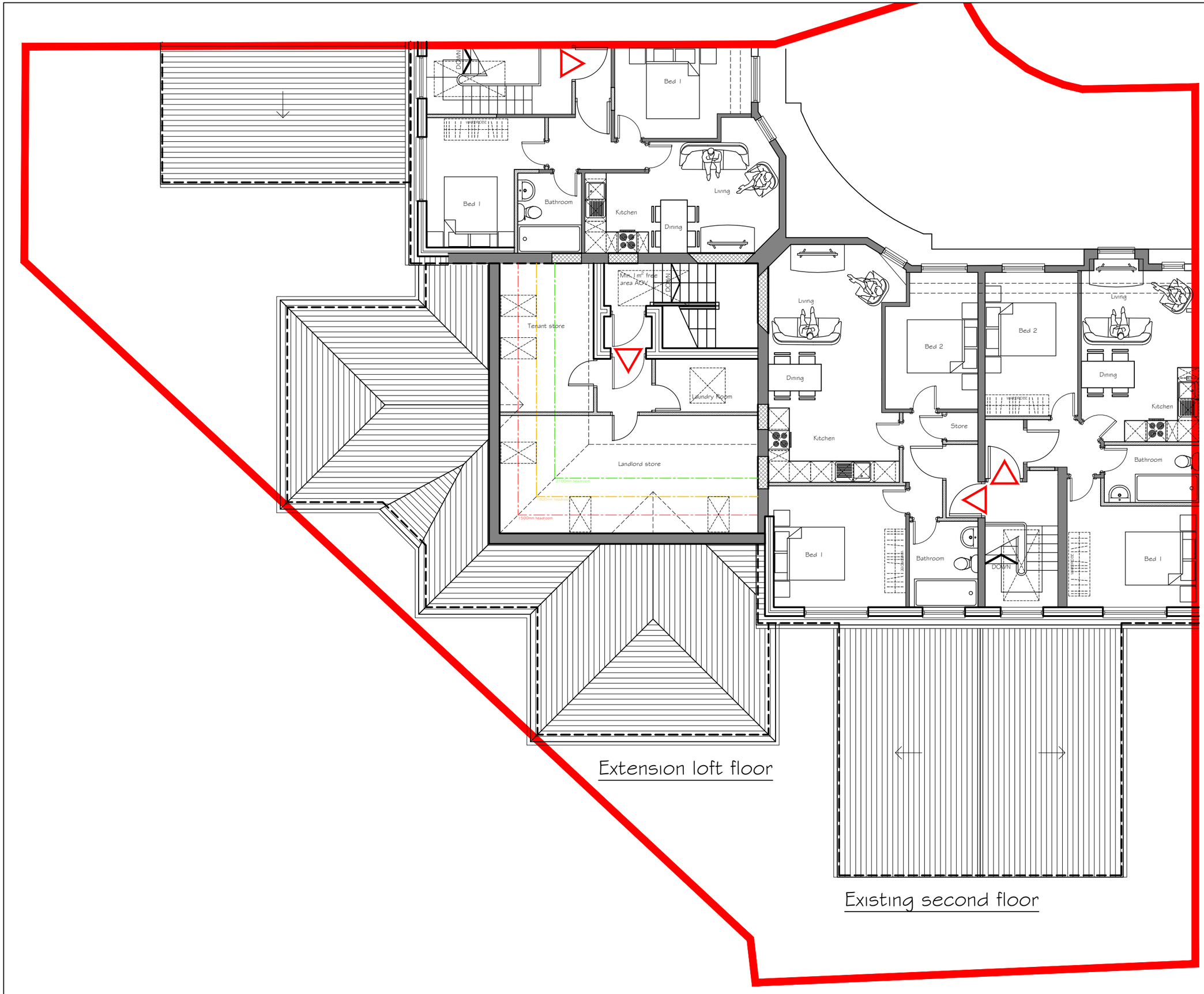
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Drawing No:	KR845-SK-204
Rev:	
Drawn By:	D.J.J
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Extension loft floor

Existing second floor

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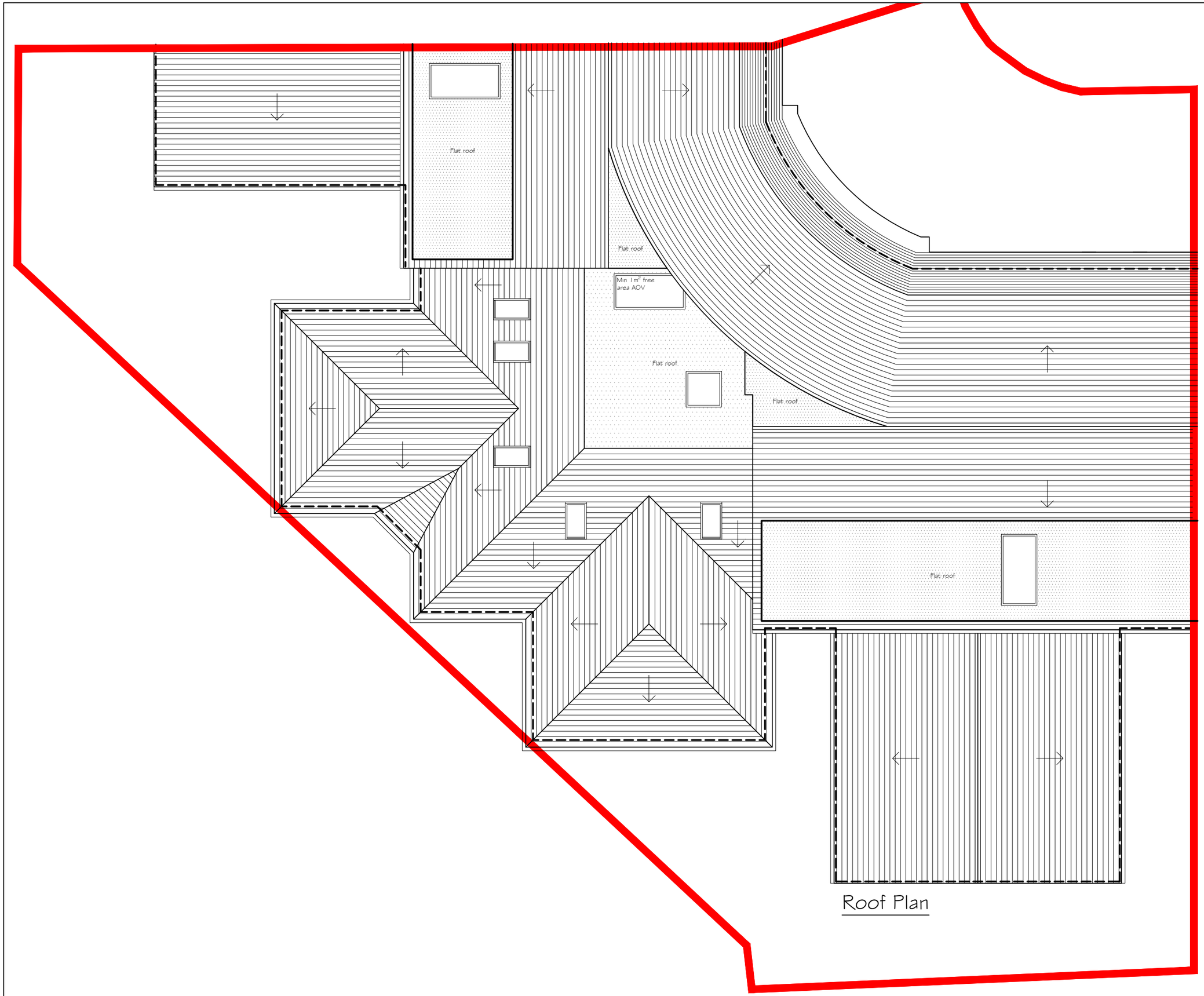
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Roof Plan

Revision	Description	Int.	Date

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Drawing Title: PROPOSED ROOF PLAN

Drawing No: KR845-SK-206

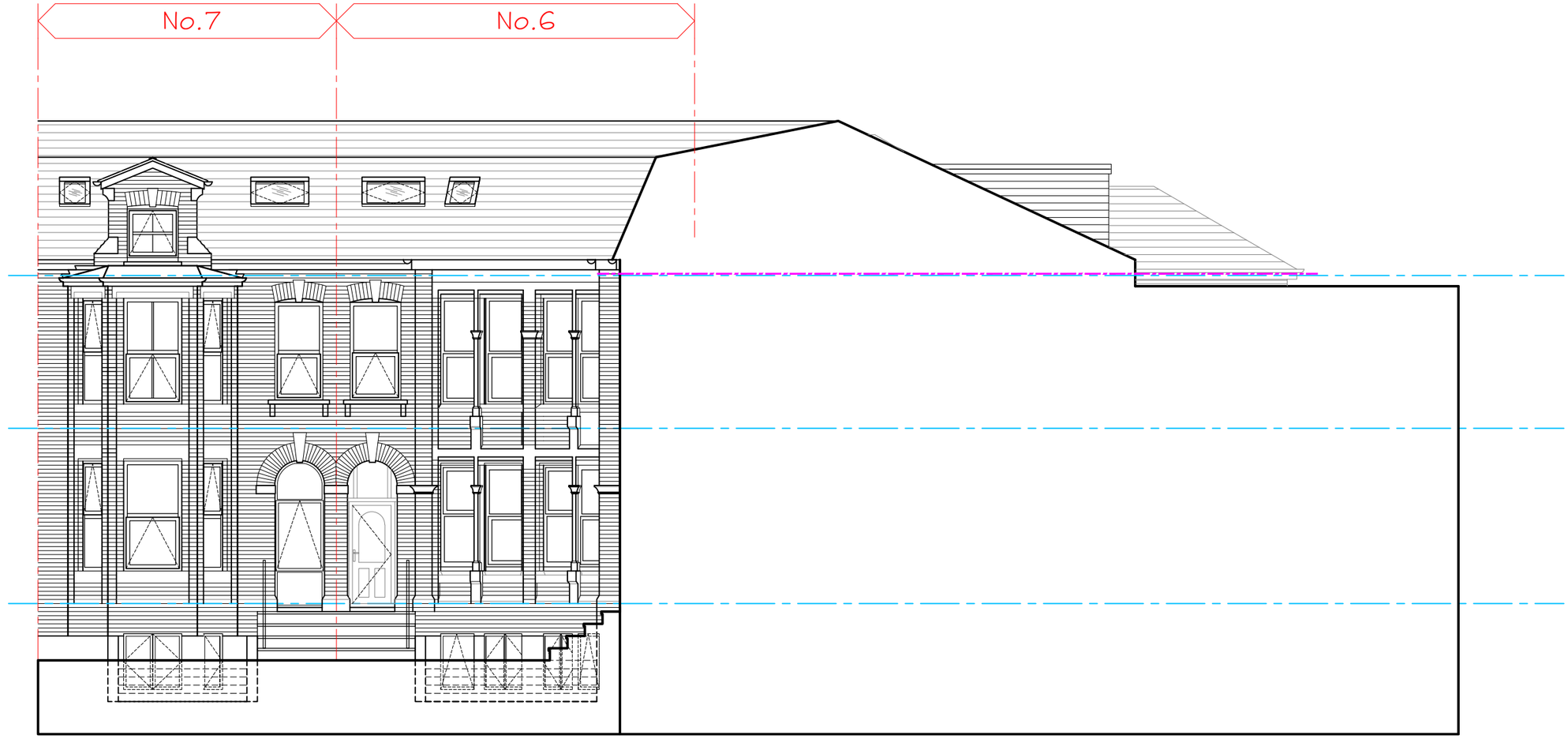
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NORTH

0 2 4 6 8 10m 20m

Revision	Description	Init.	Date

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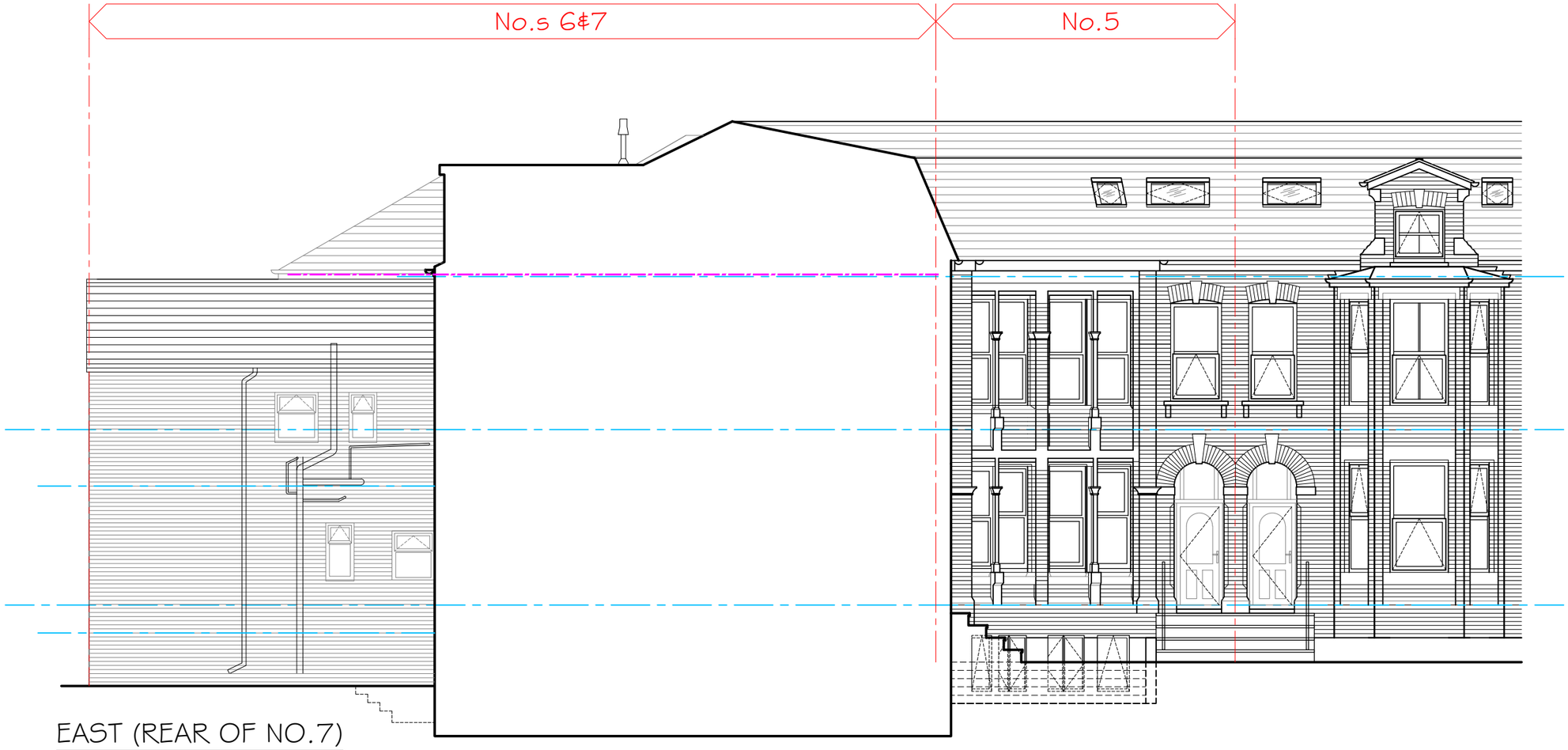
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EAST (REAR OF NO.7)

EAST (FRONT OF NO.5)

0 2 4 6 8 10m 20m

Revision	Description	Int.	Date

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Drawing Title: PROPOSED EAST ELEVATION

Drawing No: KR845-SK-208

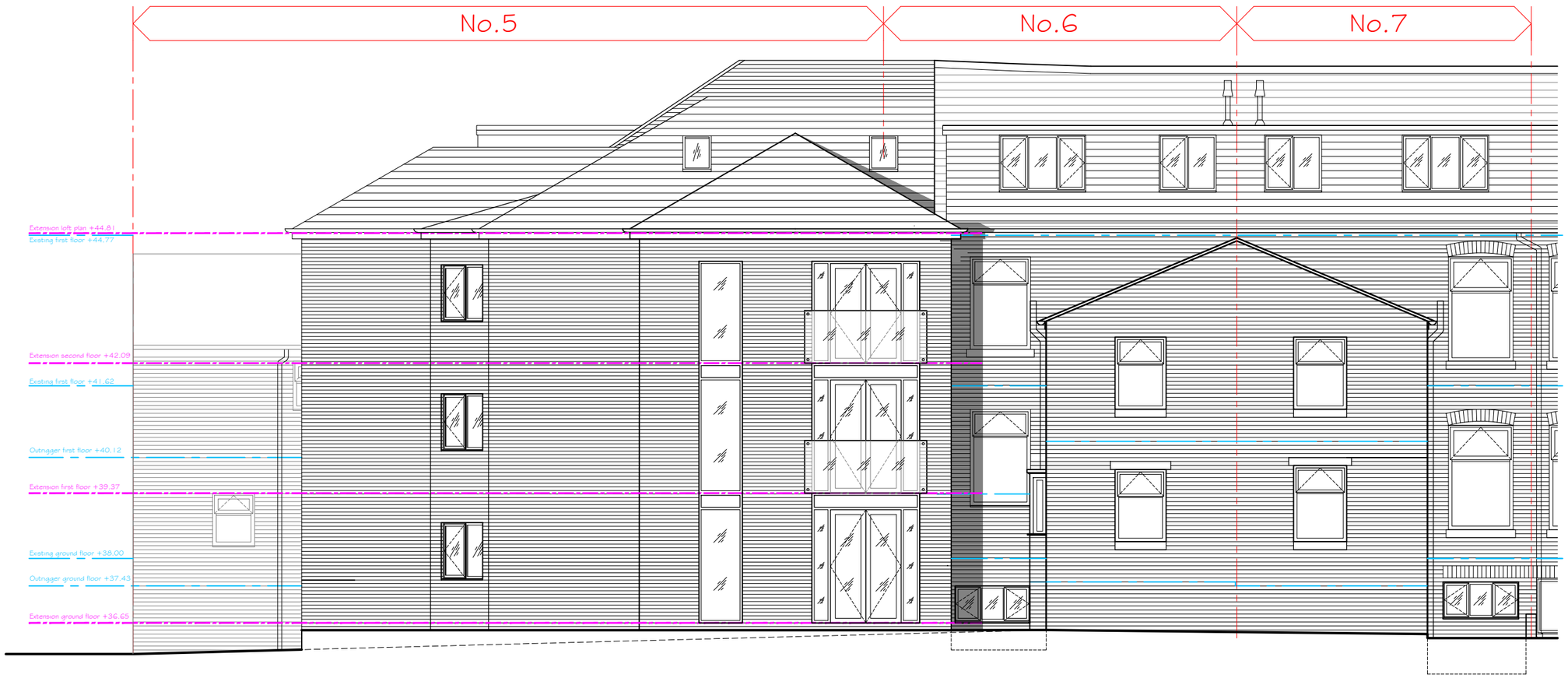
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SOUTH

0 2 4 6 8 10m 20m

Revision	Description	Init.	Date

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Drawing No: KR845-SK-209

Rev:

Drawn By: D.J.J

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Scale: 1:100 @ A3

Date: 23.02.2024



WEST

0 2 4 6 8 10m 20m

Revision	Description	Init.	Date

SKETCH

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Project: 5-7 BEACONSFIELD

Client: THIS SPACE LTD

Drawing Title: PROPOSED WEST ELEVATION

Drawing No: KR845-SK-210

Rev:

Drawn By: D.J.J

Checked: J. Albutt

Scale: 1:100 @ A3

Date: 23.02.2024

Appendix 1: Site Photographs



Photo 1: Front Entrance to site.



Photo 2: Back entrance to site.



Photo 3: Existing back garden area of site.



Photo 4: Existing back garden area of site.



Photo 5: Existing hardstanding area of site.



Photo 6: Existing garden/hardstanding area of site.



Photo 7: Entrance to basement.



Photo 8: Inside basement.



Photo 9: Inside basement.



Photo 10: Basement control room.



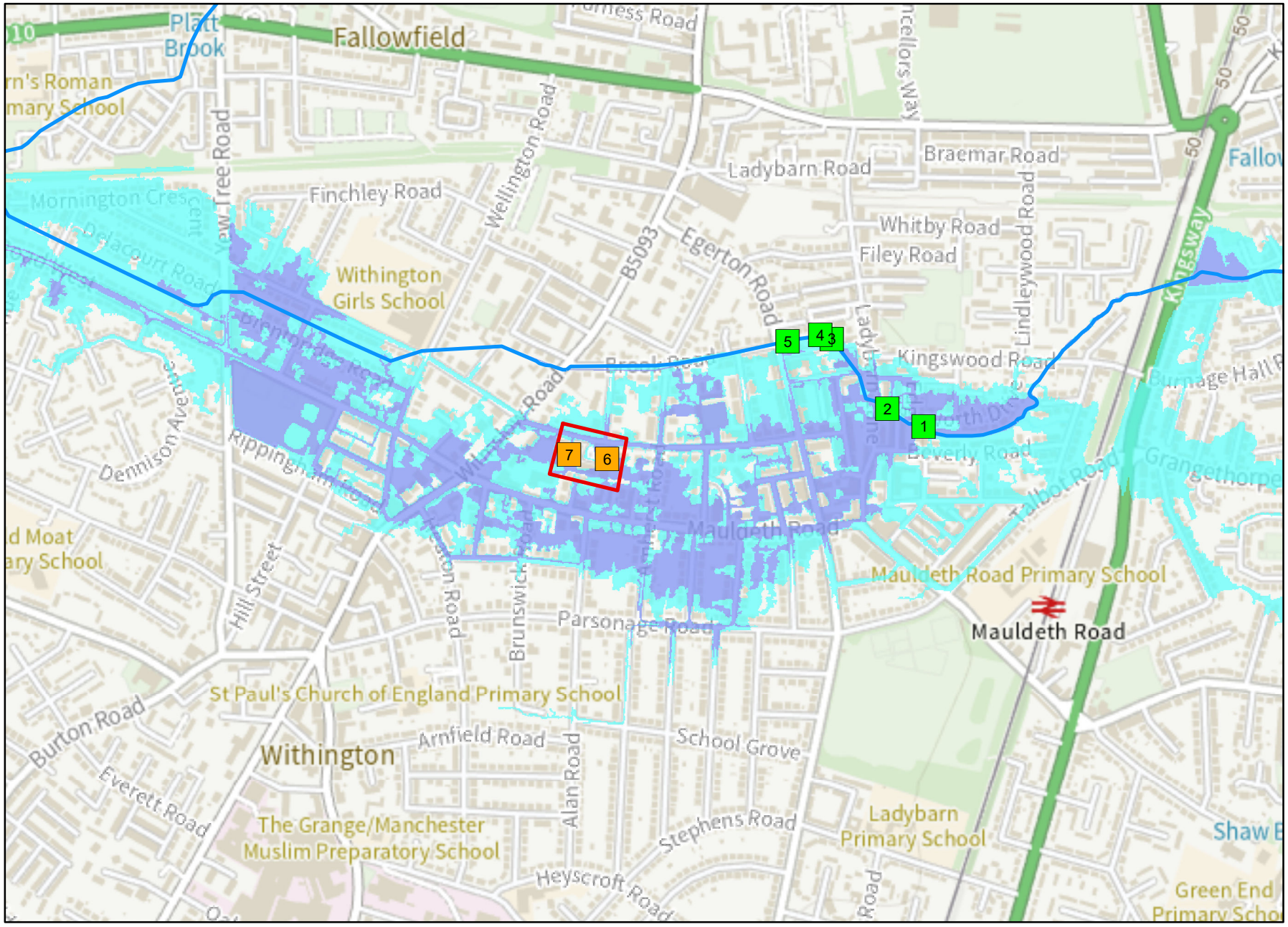
Photo 11: Surface water drain and manhole on site.

Appendix 2: Topographic Data


E 385350
E 385375
N 393325
N 393300
OC04
E 385346.625
N 393331.822
Ht 36.189
OC05
E 385346.839
N 393320.548
Ht 36.213
OC01
E 385375.517
N 393319.244
Ht 36.775
OC06
E 385356.217
N 393309.007
Ht 36.395
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E 385360.629
N 393294.858
Ht 36.329
Grass
Concrete
Tarmac
Dense Vegetation
Obscured Detail
Dense Vegetation
Basement Light Level
Basement Light Level
Concrete
B E A C O N S F I E L D
MH CL36.16
MH CL36.24
MH CL36.45
MH CL36.34
MH CL36.45
UTL
RW
GU
CB
DP
GP
ST
IC
LP
TP
FB
RW GU PI
34.90 IL 100ø
34.92 IL 100ø
34.99 IL 100ø
34.98 IL 100ø
150ø 34.24 IL
34.25 IL 150ø
EV42.58
RL40.35
EV42.96
RL44.53
EV42.80
EV44.51
RL48.43
EV42.81
EV42.69
RL44.49
EV44.45
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EV44.91
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36.61
36.93
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36.84
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36.89
36.87
36.84
36.86
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Appendix 3: Environment Agency Product 4 Data

Detailed Flood Map Centred on Derby Road, Manchester, M14 6UW.
Created 08/09/2023 [GMMC325246AB]



Environment Agency

1:10,001

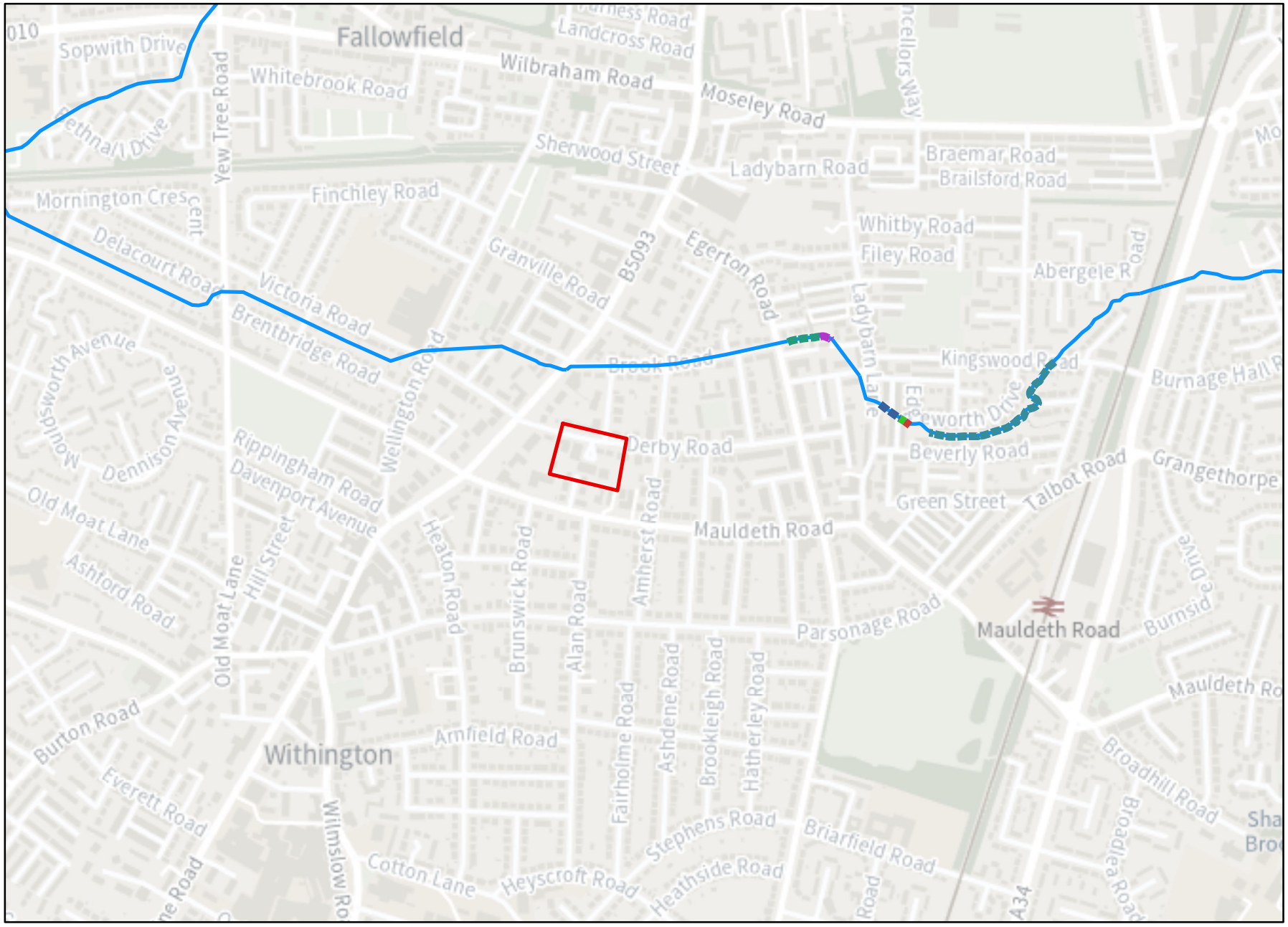
N

Legend

- Site Location
- Model Measurements
- 2D Levels
- Main River
- Flood Zone 3
- Flood Zone 2

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Flood Defence Map Centred on Derby Road, Manchester, M14 6UW.
Created 08/09/2023 [GMMC325246AB]



Environment Agency

1:10,001

N

Legend

- Site Location
- Main River

Defences

Asset ID

- 32270
- 32271
- 32357
- 32358
- 8870
- 8871

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					Undefended												Defended											
Map Reference	Model Node Reference	Easting	Northing	Data	50 % AEP (1 in 2 year)	20 % AEP (1 in 5 year)	10 % AEP (1 in 10 year)	5 % AEP (1 in 20 year)	4 % AEP (1 in 25 year)	2 % AEP (1 in 50 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 30% increase in flow	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)	0.1 % AEP (1 in 1000 year) + 30% increase in flow	50 % AEP (1 in 2 year)	20 % AEP (1 in 5 year)	10 % AEP (1 in 10 year)	5 % AEP (1 in 20 year)	4 % AEP (1 in 25 year)	2 % AEP (1 in 50 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 30% increase in flow	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)	0.1 % AEP (1 in 1000 year) + 30% increase in flow
1	ea013_0238_CRIN01_1884	386000	393377	Modelled Water Level (m aodN)	39.27	39.41	39.73	39.76	39.77	39.80	39.81	39.81	39.84	39.84	39.85	39.83	39.89	39.91	39.27	39.41	39.73	39.76	39.77	39.80	39.81	39.81	39.84	39.84	39.85	39.83	39.89	39.91
				Modelled Flow (cumecs)	3.03	3.69	4.37	5.04	5.13	5.81	5.84	5.97	6.70	6.80	7.65	6.43	9.67	10.93	3.03	3.69	4.37	5.04	5.13	5.81	5.84	5.97	6.70	6.80	7.65	6.43	9.67	10.93
2	ea013_0238_CRIN01_1807d	385933	393410	Modelled Water Level (m aodN)	38.49	38.80	39.31	39.32	39.32	39.33	39.33	39.33	39.34	39.34	39.34	39.34	39.34	39.35	38.49	38.80	39.31	39.32	39.32	39.33	39.33	39.33	39.34	39.34	39.34	39.34	39.34	39.35
				Modelled Flow (cumecs)	3.03	3.69	4.29	4.43	4.46	4.62	4.68	4.72	4.82	4.86	5.27	4.84	5.88	6.25	3.03	3.69	4.29	4.43	4.46	4.62	4.68	4.72	4.82	4.86	5.27	4.84	5.88	6.25
3	ea013_0238_CRIN01_1633d	385830	393539	Modelled Water Level (m aodN)	37.88	38.09	38.52	38.54	38.54	38.55	38.55	38.56	38.57	38.57	38.81	38.56	38.64	38.68	37.88	38.09	38.52	38.54	38.54	38.55	38.55	38.56	38.57	38.57	38.81	38.56	38.64	38.68
				Modelled Flow (cumecs)	3.03	3.69	4.28	4.38	4.38	4.40	4.41	4.42	4.44	4.44	4.45	4.44	4.48	4.50	3.03	3.69	4.28	4.38	4.38	4.40	4.41	4.42	4.44	4.44	4.45	4.44	4.48	4.50
4	ea013_0238_CRIN01_1810u	385809	393546	Modelled Water Level (m aodN)	37.88	38.09	38.52	38.54	38.54	38.54	38.56	38.56	38.56	38.57	38.58	38.61	38.57	38.64	37.88	38.09	38.52	38.54	38.54	38.56	38.56	38.56	38.57	38.58	38.61	38.57	38.64	38.69
				Modelled Flow (cumecs)	3.03	3.69	4.28	4.37	4.38	4.40	4.41	4.42	4.44	4.44	4.45	4.44	4.47	4.50	3.03	3.69	4.28	4.37	4.38	4.40	4.41	4.42	4.44	4.44	4.45	4.44	4.47	4.50
5	ea013_0238_CRIN01_1551u	385749	393534	Modelled Water Level (m aodN)	37.83	38.02	38.43	38.45	38.45	38.47	38.47	38.47	38.49	38.50	38.53	38.48	38.56	38.61	37.83	38.02	38.43	38.45	38.45	38.47	38.47	38.47	38.49	38.50	38.53	38.48	38.56	38.61
				Modelled Flow (cumecs)	3.03	3.69	4.27	4.37	4.38	4.40	4.41	4.42	4.44	4.44	4.44	4.43	4.47	4.49	3.03	3.69	4.27	4.37	4.38	4.40	4.41	4.42	4.44	4.44	4.44	4.43	4.47	4.49

					Undefended												Defended											
Map Reference	Model Node Reference	Easting	Northing	Data	5 % AEP (1 in 20 year)	4 % AEP (1 in 25 year)	2 % AEP (1 in 50 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 30% increase in flow	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)	0.1 % AEP (1 in 1000 year) + 30% increase in flow	2 % AEP (1 in 50 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 30% increase in flow	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)	0.1 % AEP (1 in 1000 year) + 30% increase in flow
6	2D Levels	385417	393318	Modelled Water Level (m aodN)	36.64	36.70	36.77	36.78	36.78	36.80	36.80	36.81	36.79	36.83	36.85	36.76	36.77	36.78	36.80	36.80	36.81	36.79	36.83	36.85						
7		385346	393326	Modelled Water Level (m aodN)		36.27	36.21	36.33	36.33	36.34	36.34	36.35	36.33	36.38	36.40	36.32	36.32	36.33	36.34	36.35	36.36	36.34	36.38	36.40						

Model data taken from Cringle Brook 2017

AEP - Annual Exceedence Probability

m aodN - metres above ordnance datum Newlyn

cumecs - cubic metres per second

Notes: *Climate Change Scenario - 30%, 35% and 70% increases in flow calculated for the 2080's (2070 - 2115). Please see https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances for more information regarding the new climate change guidance. The location of the site and the type (vulnerability) of development determine the climate change allowances to consider in any flood risk assessment.

Flood Defences

Start Date	Asset Type	Asset ID	Standard of Protection	Upstream Actual Crest Level (m aod)	Downstream Actual Crest Level (m aod)
01/01/2004	Wall	32270	100	39.28	39.21
01/01/2004	Wall	32271	100	39.73	39.40
01/01/2004	Wall	32357	100	40.97	40.67
01/01/2004	Wall	32358	100	40.71	40.72
01/01/2004	Wall	8870	100	39.83	39.64
01/01/2004	Natural High Ground	8871	100	41.17	39.56