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FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

Broad Lane, Haringey, N15 4QJ

JOMAS ASSOCIATES LTD

Unit 24 Sarum Complex, Salisbury Road, Uxbridge, UB8 2RZ

www.jomasassociates.com info@jomasassociates.com

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Prepared by: JOMAS ASSOCIATES LTD

Should you have any queries relating to this report, please contact

JOMAS ASSOCIATES LTD

www.jomasassociates.com

0843 289 2187

info@jomasassociates.com

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1 EXECUTIVE SUMMARY

This Drainage Assessment reviews the existing drainage arrangement at the application site and proposes a Flood Risk Assessment in accordance with the National Planning Policy Framework (NPPF) and surface water drainage strategy in line with Local Authority and Lead Local Flood Authority (LLFA) guidance.

The site is located at Broad Lane, Haringey N15 4QJ.

The existing site formerly contained a carwash which has been demolished and the site is now cleared.

Flooding

The site is less than 1 hectare in size and within flood zone 2. The sources of flooding assessed and proposed mitigation measures are listed in the table below.

Source	Risk Category (after mitigation)	Comments
Fluvial (Rivers and Sea)	Medium	Site within flood zone 2, with raised floor level and less vulnerable use at ground floor
Coastal and tidal	Negligible	Not near coast or tidal waterbody
Groundwater	Low	Proposed finished floor levels are above external ground levels and natural topography reduces risk.
Surface water	Low	Low due to natural topography and presence of surface water drainage and infiltration
Sewers	Very Low	Low due to natural topography and sewer location
Reservoirs	Very Low	Reservoir at low danger of failure

Surface Water Drainage

It is proposed to discharge surface water via a new connection to the TW sewer in the street. Discharge will be restricted to 5l/s which is significantly less than the existing discharge rate. Total storage volume of 50 cubic metres is proposed for the system within the green/blue roof area. This caters for the 100 year +40% storm event.

Maintenance/management of all onsite drainage infrastructure has been considered within a separate maintenance plan appended to this report. This will be updated through the development process.

The proposed drainage strategy is entirely based on-site and therefore the only off-site works will be the surface water and foul outlet to the Thames Water sewer.

Overall, the proposed development has an acceptable flood risk within the terms and requirements of the NPPF. The proposals provide a high level of water treatment, runoff reduction and flooding protection for the proposed development and are in accordance with all requirements of the Lead Local Flood Authority (LLFA).

Foul Drainage

It is proposed to discharge the foul drainage from the site into the existing TW foul sewer in the street.

2 INTRODUCTION

- 2.1.1 Jomas was commissioned to undertake a Drainage Assessment for the proposed development of land located at Broad Lane, Haringey N15 4QJ.
- 2.1.2 This Drainage Assessment has been produced in support of a planning application and should be read in conjunction with the other planning documents.
- 2.1.3 The existing site contains an existing car wash which will be demolished and a mixed use building constructed. Proposed development details are provided in Appendix A.

3 SITE DESCRIPTION

3.1.1 The site is approximately 1230 square metres in size and located at Broad Lane, Haringey N15 4QJ.

3.1.2 The site location information is as follows:

- Nearest Postcode: N15 4QJ

3.2 Topography

Site Topography

3.2.1 An onsite topographic survey has been carried out and is provided in Appendix B.

3.2.2 The site is rectangular in shape and falls to the street.

4 DESIGN PRINCIPLES AND POLICY REQUIREMENTS

4.1.1 Since April 2015, Lead Local Flood Authorities (LLFA's) have become a statutory consultee on surface water drainage for many planning applications. For this site, the following is considered to be the required level of detail required for planning approval:

- A Flood Risk Assessment in accordance with the National Planning Policy Framework (NPPF) and National Planning Guidance (NPG)
- SuDS: Designs, Maintenance Plans & Calculations - for SuDS proposed, the LLFA require product specifications or design drawings, all supporting calculations and a maintenance plan. This needs to include details of any attenuation structures and in accordance with the CIRIA C753 SuDS Manual.

4.2 General Principles for Flooding

4.2.1 The National Planning Policy Framework (NPPF) states that when determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where informed by a site-specific FRA. This assessment is required for:

"Proposals of 1 hectare (ha) or greater in Flood Zone 1, all new development (including minor development and change of use) in Flood Zones 2 and 3 and an area within Flood Zone 1, which has critical drainage problems as notified to the local planning authority by the Environment Agency (EA)."

4.2.2 In accordance with the March 2014 Planning Practice Guidance (PPG), which supports the NPPF, the objectives of this FRA are to establish:

- *Whether a proposed development is likely to be affected by current or future flooding from any source;*
- *Whether it will increase flood risk elsewhere;*
- *Whether the measures proposed to deal with these effects and risks are appropriate.*

4.3 General Principles for Surface Water Drainage

4.3.1 The DEFRA Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems (March, 2015) and LLFA Policy DM25.3 requires sustainable drainage systems in all development to reduce surface water runoff and provide water treatment on site. This includes but is not limited to addressing the following issues in order of preference:

- store rainwater for later use
- use infiltration techniques, such as porous surfaces in non-clay areas
- attenuate rainwater in ponds or open water features for gradual release
- attenuate rainwater by storing in tanks or sealed water features for gradual release
- discharge rainwater direct to a watercourse

- discharge rainwater to a surface water sewer/drain
- discharge rainwater to the combined sewer.

Consideration must be given to the direction of water flow across the site and where this may be dispersed and incorporating any features that will help reduce surface water run-off. All developments should infiltrate surface water or achieve greenfield runoff rates where possible and this needs to be demonstrated as part of the planning submission.

5 FLOODING INFORMATION

5.1 Flood Risk from Rivers (Fluvial)

- 5.1.1 The Environment Agency Flood Risk Map indicates that the proposed development site is located within Flood Zone 2. Flood Zone 2 is designated as medium probability of flooding. Land in this zone has between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 year and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.
- 5.1.2 An application for modelled flood levels for the River Lee has been made to the Environment Agency. The EA has not responded after 6 weeks and so it is unlikely these levels will be received in the short term. This report can be updated as required should the flooding information be received, however as the risk of flooding is medium, this is not necessary.
- 5.1.3 As the site is within Flood Zone 2, there is a medium risk of fluvial flooding to the site.

5.2 Sequential Test

- 5.2.1 Since the development is located within Flood Zone 2 the NPPF requires that the Local Planning Authority apply the sequential test to ensure that the development is located in the most appropriate area in terms of use and flood risk.
- 5.2.2 A review of land for sale in the areas indicates that there are no other suitable sites available to the developer in areas of lower flood risk within 2 km of the site.

5.3 Exception Test

- 5.3.1 Appropriate uses for land within Flood Zone 2 include essential infrastructure and the water compatible, less vulnerable and more vulnerable uses. In Table 2 of the NPPF, office use is classified as less vulnerable while buildings used for dwelling houses are classified as more vulnerable.
- 5.3.2 As all ground floor level will be uninhabited and only for office use, this development is appropriate in this location and an Exception Test is not required.

5.4 Coastal and Tidal Flood Risk

- 5.4.1 The site is located inland and is not near any tidally influenced watercourses; therefore, there is negligible risk of flooding from this source.

5.5 Geology and Hydrogeology

- 5.5.1 Groundwater flooding occurs when the water table rises to the surface and is most likely to occur in low-lying areas underlain by permeable rocks.

- 5.5.2 The British Geological Survey (BGS) and Aquifer Maps on the MAGIC map identifies the area as follows:

Bedrock – London Clay Formation - Clay, silt and sand. Sedimentary bedrock formed between 56 and 47.8 million years ago during the Palaeogene period.

Superficial Drift – Alluvium - Clay, silt, sand and peat. Sedimentary superficial deposit formed between 11.8 thousand years ago and the present during the Quaternary period.

- 5.5.3 Infiltration testing is not required as the building fills the entire site and so infiltration is not possible.

- 5.5.4 As the ground is likely to be at least partly permeable, the site is considered to be at Medium risk of groundwater flooding. However as the floor levels is raised above the surrounding ground level, this risk is reduced to Low.

5.6 Surface Water Flood Risk (Overland Flows)

- 5.6.1 Surface water flooding occurs when the rainwater does not drain away through the normal drainage system or infiltrate the ground, but instead lies on or flows over the ground.

- 5.6.2 The EA produced a Risk of Flooding from Surface Water Map in December 2013. The maps were produced using 'direct rainfall' modelling. Although they consider local drainage capacity, non-surface water influences such as rivers, seas or groundwater are not considered. The map is based on LIDAR topographic data which is not suitable for site specific assessment and therefore, where available, topographic survey data should be used to provide a more accurate understanding of potential flow paths.

- 5.6.3 The map shows the entire country within four different risk categories, defined below in Table 1.

Table 1: EA Surface Water Flood Risk Categories

Risk Category	Definition
High	Each year, there is a chance of flooding of greater than 1 in 30 (3.3%)
Medium	Each year, there is a chance of flooding of between 1 in 30 (3.3%) and 1 in 100 (1%)
Low	Each year, there is a chance of flooding of between 1 in 100 (1%) and 1 in 1000 (0.1%)
Very Low	Each year, there is a chance of flooding of less than 1 in 1000 (0.1%)

- 5.6.4 An extract of the map, provided below, shows that the site is at low-medium risk of surface water flooding.



Figure 1: EA Flood Risk from Surface Water Map

- 5.6.5 While there is some surface water flooding shown within the site, the development area is raised above surrounding ground levels and levels indicate that surface water will flow past the site and into the sewers in Broad Lane.

- 5.6.6 Based on the EA's mapping, historical data and local topography, risk of surface water flooding to the site is considered to be Low.

5.7 Sewer/Drainage Flood Risk

- 5.7.1 Sewer flooding is often caused by excess surface water entering the drainage system when there is insufficient sewer capacity to cope with this excess water, but also due to 'one off' events such as blockages.

- 5.7.2 Thames Water is the statutory undertaker for the local public sewer network. The nearest Thames Water sewers to the site are located within the street frontage. See Appendix C for details.

- 5.7.3 A review of the local PFRA does not identify any flooding incidents at or near to the site.

- 5.7.4 On the basis there is considered to be a very low risk of sewer flooding to the site.

5.8 Reservoir Flood Risk

- 5.8.1 The EA has produced a Reservoir Flood Map that shows that the site is at some risk from reservoir flooding.
- 5.8.2 It should be emphasised that the risk of flooding from reservoir breach is very small since the EA is the enforcement authority for the Reservoirs Act (1975) and all large raised reservoirs are inspected and supervised by reservoir panel engineers.
- 5.8.3 On the basis there is considered to be a very low risk of reservoir flooding to the site.

5.9 Summary of risk levels

- 5.9.1 Post-development, the risk of flooding is summarised below.

Table 2: Flood Risk Categories

Source	Risk Category
Fluvial (Rivers and Sea)	Medium
Coastal and tidal	Negligible
Groundwater	Low
Surface water	Low
Sewers	Very low
Reservoirs	Very low

6 SITE DRAINAGE INFORMATION

6.1.1 The DEFRA Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems (March, 2015) states that the following options must be considered for disposal of surface water runoff in order of preference:

- Discharge to ground
- Discharge to a surface water body
- Discharge to a surface water sewer
- Discharge to a combined sewer

Discharge to Ground

6.1.2 The potential for surface water to discharge to ground has been assessed through a review of the likely ground conditions and possible infiltration structures.

6.1.3 The building fills the site and so infiltration is not possible

Discharge to Surface Water Body

6.1.4 There are no water courses near to the site suitable for connection of the surface water.

Discharge to Surface Water Sewer/Combined Sewer

6.1.5 Discharge to the public sewer network should only be considered once all other options for draining surface water from the site have been exhausted. There is a surface water sewer in the street fronting the site which will be used for discharge of surface water.

6.2 Sustainable Drainage Systems (SuDS)

6.2.1 To maximise the potential use of SuDS at the site, a review has been undertaken as shown in Table 3 in accordance with the SuDS Hierarchy. This review highlights the components referenced in the SuDS Hierarchy and provides recommendations on whether the components could be incorporated into the development.

Table 3: SuDS Selection Based on the SuDS Hierarchy

Component	Recommendation
Green/Blue roofs	Whilst the use of green and blue roofs provides additional environmental benefits such as enhanced aesthetics and ecology, its exposure to wind and orientation must be considered. Access to undertake the construction and maintenance easily and safely is also a high priority. If feasible, depending on the roof design, a green/blue roof will provide water quality, biodiversity and aesthetic benefits to the site. Additionally, the green/blue roof/s will offer some attenuation for run-off, reducing volumes of run-off and in higher frequency events (i.e. 1in2 year storms) will result in no run-off for the building.

Component	Recommendation
	Extensive areas of green/blue roof are proposed
Basins and Ponds	Ponds and attenuation basins can provide overland storage of surface water whilst also providing additional biodiversity and aesthetic/amenity value. There is insufficient space for a basin.
Filter Strips and Swales	Swales are linear vegetated drainage features, which provide overland conveyance and storage of surface water whilst trapping sediments and hydrocarbons within run-off. They also create biodiverse areas for planting and habitat. Swales are not suitable for this residential site.
Infiltration Devices	Infiltration devices are likely to be suitable for the main drainage system due to the permeable nature of the existing ground. Infiltration is not suitable for this site.
Permeable Paving	Whilst incorporating attenuation storage, permeable paving also provides treatment through filtration of silt (and attached pollutants), settlement and retention of solids, adsorption of pollutants and biodegradation of organic pollutants, including petrol and diesel. There are no external areas suitable for permeable paving
Tanked Systems	This is the least sustainable option in terms of the SuDS Hierarchy. However, the use of tanked systems would still be of benefit compared to traditional drainage systems as it does allow run-off to be slowed down to an acceptable discharge rate. There are no tanks proposed for the site.

7 SURFACE WATER DRAINAGE DESIGN

7.1 Site Areas

7.1.1 The existing site formerly contained a carwash which has been demolished and the site is now cleared. The existing and proposed areas are summarised below.

Table 4: Site Areas

<i>Parameter</i>	<i>Existing (m2)</i>	<i>Existing (%)</i>	<i>Proposed (m2)</i>	<i>Proposed (%)</i>
<i>Impermeable area</i>	<i>830</i>	<i>67</i>	<i>1230</i>	<i>100</i>
<i>Permeable area</i>	<i>400</i>	<i>33</i>	<i>0</i>	<i>0</i>
<i>Total area</i>	<i>1230</i>	<i>100</i>	<i>1230</i>	<i>100</i>

7.1.2 It is assumed that the surface water runoff from the site is currently picked up in the site drainage system and discharges to sewer.

7.2 Design Considerations

7.2.1 Consideration has been given to the following when calculating the proposed impermeable areas.

- The 2013 EA 'Rainfall Run-off Management for Developments' Report (SC030219) states that urban creep, the process of gradually increasing impermeable area within an urban area (through paving soft landscaped surfaces and constructed outbuildings etc), is an acknowledged issue. To include an allowance for urban creep, the impermeable area used in the drainage calculations would normally be increased by 10% in accordance with the recommendation made in SC030219, however as the development fills the site, there is no room to increase the impermeable area.

7.2.2 It is proposed to drain the site to the existing sewer at a reduced discharge rate.

7.2.3 The climate change allowance used in the Drainage Strategy is in line with updated EA guidance values published in February 2016 for increased rainfall intensities by 2115.

7.3 Greenfield Rates

7.3.1 The existing run-off rates for a variety of return periods have been calculated using the Wallingford method.

7.3.2 The greenfield run-off rates are based on the parameters provided below in Table 5.

Table 5: Rural Run-off Calculator Parameters

<i>Parameter</i>	<i>Value</i>
<i>Area (ha)</i>	0.123
<i>SAAR (mm)</i>	617
<i>Soil Type</i>	6

7.3.3 The calculations are presented in Appendix C and summarised below in table 6.

7.4 Existing Site Runoff Rates

7.4.1 The total site area is 1230 square metres and is 67% impermeable resulting in an impermeable area of 830m². Taking conservative peak 1 year, 30 year and 100 year rainfall rates of 50mm/hr, 125mm/hr and 185mm/hr respectively, the maximum existing peak discharge rates have been calculated as follows.

Contributing Area (ha) x 1 yr Rainfall (mm/hr) x 2.78

830/10000 x 50 x 2.78 = **11.5 l/s**

Contributing Area (ha) x 30 yr Rainfall (mm/hr) x 2.78

830/10000 x 125 x 2.78 = **28.8 l/s**

Contributing Area (ha) x 100yr Rainfall (mm/hr) x 2.78

830/10000 x 185 x 2.78 = **42.7 l/s**

7.4.2 The greenfield, existing and proposed site calculations are summarised below in table 6.

Table 6: Existing Greenfield Run-off Rates

<i>Parameter</i>	<i>Greenfield Value for site (l/s)</i>	<i>Existing for site (l/s)</i>	<i>Proposed Discharge for site (l/s)</i>
QBAR	0.19	NA	NA
Q1	0.16	11.5	4.1
Q30	0.44	28.8	4.3
Q100	0.62	42.7	4.4
Q100+40%	NA	NA	4.6

7.5 Drainage Design

- 7.5.1 It is proposed to discharge the site to the existing sewer at less than 5l/s. Attenuation will be within the green/blue roof areas.

Attenuation

- 7.5.2 A calculation of the required storage volume is provided in Appendix C. A total attenuation volume of approximately 50 cubic metres is proposed to cater for the 100 year +40% storm event.
- 7.5.3 It is noted that the SUDS system consists of extensive green/blue roofs covering the entire roof area.

7.6 Exceedance Flooding and Overland Flow

- 7.6.1 The area is not subject to overland flow routes or surface water flooding as discussed in sections 5.3 and 5.4 above.
- 7.6.2 The drainage system has been designed to cater for the 1 in 100 year + 40% climate change storm. ie in this storm event all surface water will be collected on site and slowly released. Thus, the overland flow route will only be in use in the event of drainage network failure, storms in excess of the 1 in 100 year + 40% climate change storm or flows from offsite flowing through the site. See overland flow plan in Appendix C.

7.7 Consents, Offsite Works and Diversions

- 7.7.1 The proposed surface water drainage strategy is accommodated on-site, with the only requirement for consent being the new surface water and foul connection the Thames Water sewers.

7.8 Maintenance

- 7.8.1 A SuDS maintenance plan has been prepared to outline the management of the potential SuDS features. The maintenance plan is provided in Appendix D.

8 FOUL DISCHARGE

8.1 Discharge to Public Sewer Network

8.1.1 Thames Water are the foul sewerage suppliers for the area.

8.1.2 The identified point of connection from the site is via the existing Thames Water sewer in the street. A Sewer connection application will be submitted to Thames Water for approval.

9 DRAINAGE DURING CONSTRUCTION

9.1 Construction Run-off Management

9.1.1 Installing the surface water and foul drainage system, whilst managing temporary run-off, are key aspects of the construction works involved in any development. The information provided below is in accordance with the 'C698 Site handbook for the construction of SUDS' (CIRIA, 2007).

9.1.2 Please note that the measures recommended below are recommendations only and need to be confirmed at the construction stage by the client and the contractor.

9.2 Management of Construction (Including Drainage)

9.2.1 Drainage is typically an early activity in the construction stage of a development, taking form during the earthworks phase. However, final construction i.e. piped drainage system connections to the SuDS devices, should not take place until the end of site development work, unless a robust strategy for silt-removal is implemented prior to occupation of the site.

9.2.2 A plan for the management of construction (including phasing of works, details of any offsite works etc.) cannot be provided at this early stage, as construction work plans are not yet known. However, the following key points are general construction issues associated with SuDS which will be addressed when these plans are complete:

- Silt-laden waters from construction sites represent a common form of waterborne pollution;
- These silt-laden waters cannot enter SUDS drainage systems unless specifically designed to accept this as it can clog the systems and pollute receiving waters. Therefore, piped drainage systems should not be connected to the attenuation SuDS devices until the late stages of construction.
- Any gullies and piped systems should be capped off during construction and fully jetted and cleaned prior to connection to the attenuation SuDS devices.

9.3 Temporary Drainage During Construction

9.3.1 The three principal aspects of drainage control during construction are trapping sediment, conveying run-off, and controlling run-off.

9.3.2 Sediment traps and barriers can include basin traps and sediment fences (with any necessary boundary controls). The principal basins are to be installed after the construction site is accessed. Sediment fences and barriers will then be installed as needed during grading.

9.3.3 Conveyance of run-off can be achieved through small ditches/stream, storm drains, channels and sloped drains with sufficient inlet/outlet protection.

9.3.4 Slope stability needs to be considered when using any channels to convey run-off across the site into any basins etc.

9.3.5 Run-off control measures will need to be implemented in order not overwhelm the temporary system and cause flooding issues. Run-off rates from the site will be managed so they are no greater than pre-development or in keeping with the best practice guidance

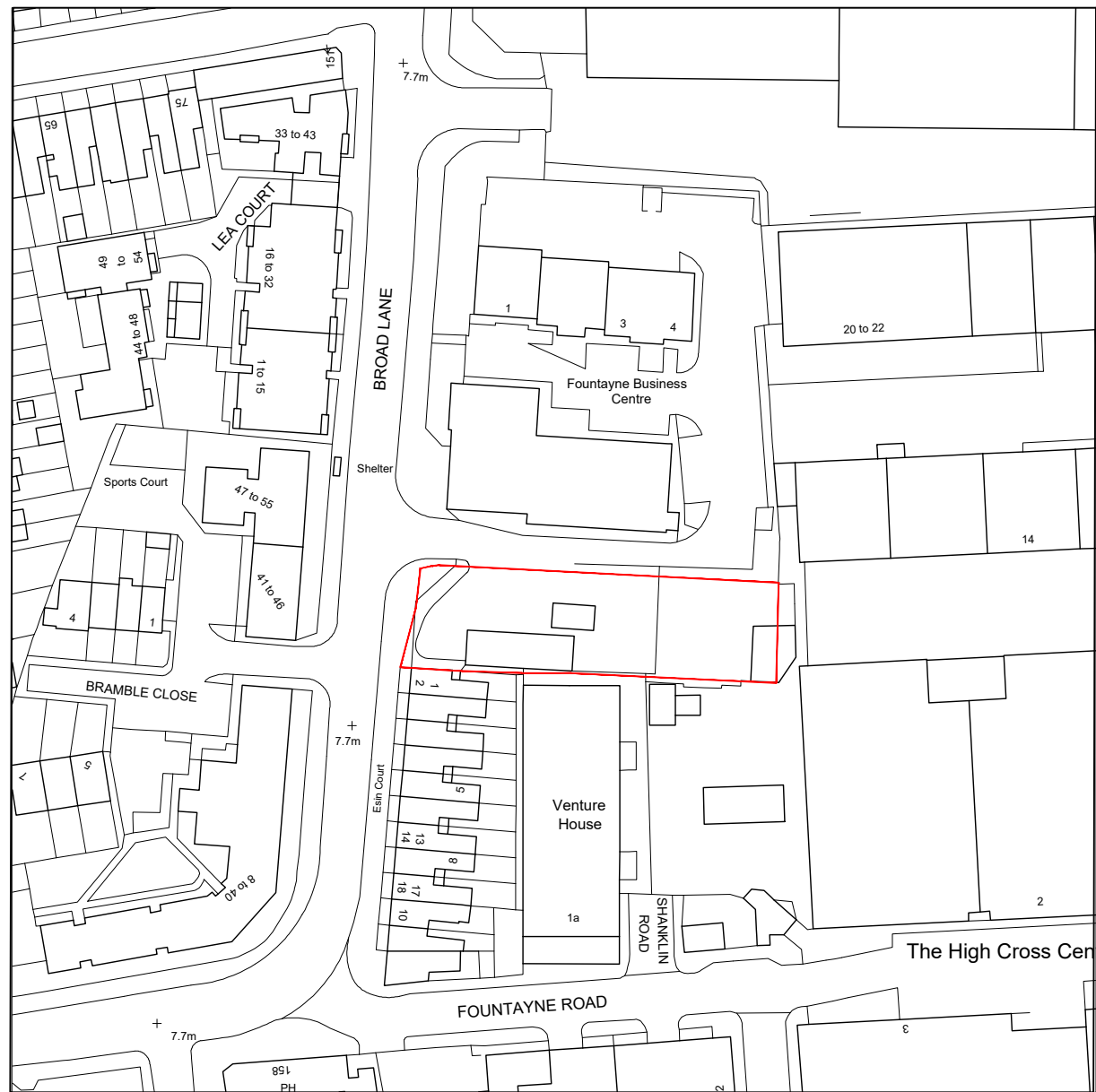
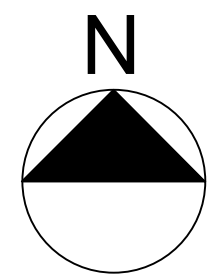
to minimise risk of blockage. Any additional conveyance measures are to be installed as needed during grading.

- 9.3.6 Run-off control to include provision of perimeter ditches or appropriate levels grading to direct any water from the construction site to remain on site.
- 9.3.7 Any necessary surface stabilisation measures are to be applied immediately on all disturbed areas where construction work is either delayed or incomplete.
- 9.3.8 Maintenance inspections are to be performed weekly, and maintenance repairs to be made immediately after periods of rainfall.

9.4 Protection of Drainage Infrastructure during Construction

- 9.4.1 All drainage infrastructure should be protected from damage by construction traffic and heavy machinery through the implementation of measures such as protective barriers, and storing construction materials away from the drainage infrastructure.

Appendix A: Proposed Development Details



OS PLAN 1:1250



OS PLAN 1:500

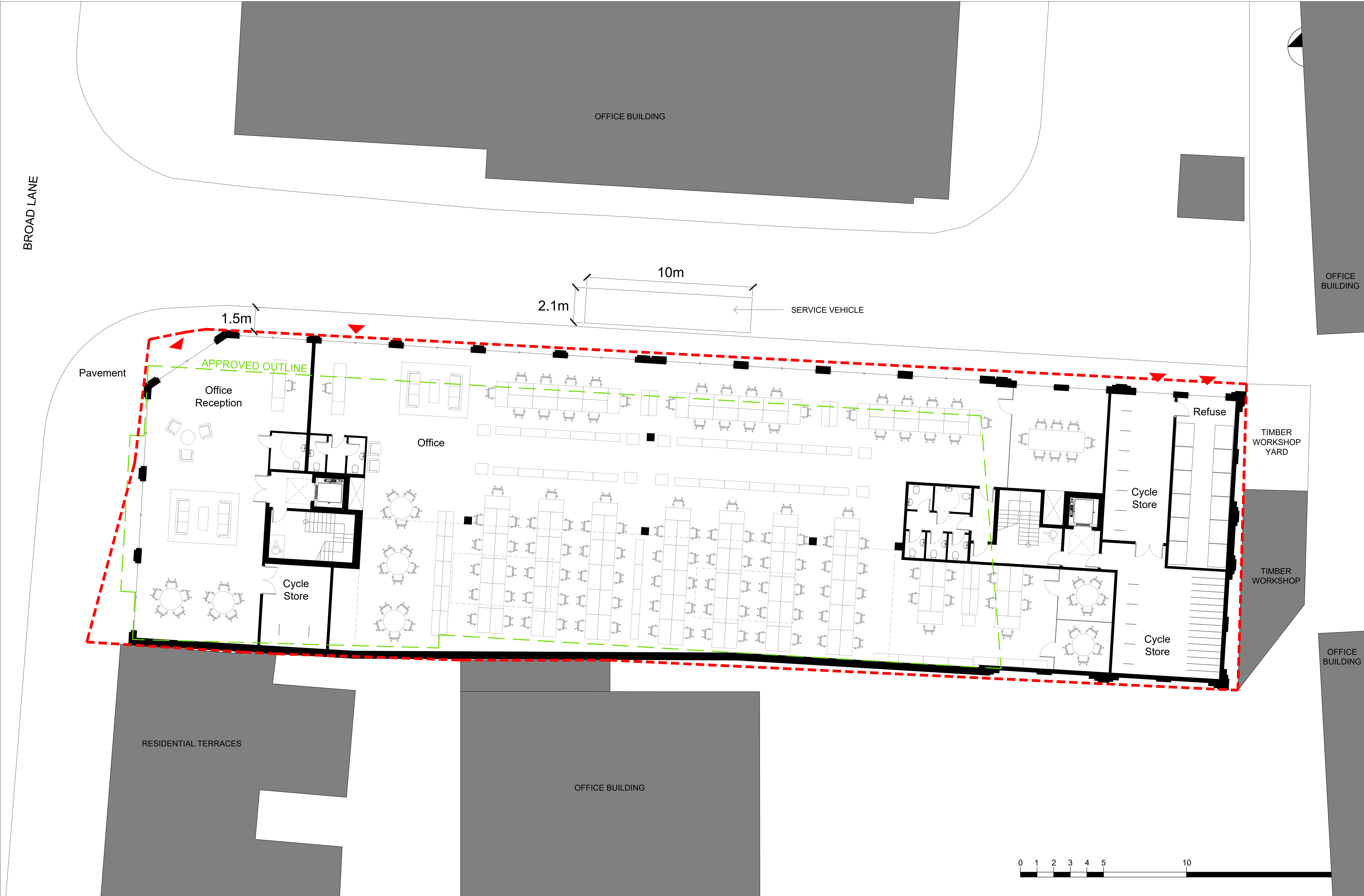


All dimensions to be checked on site prior to construction or manufacture. Refer also to written specification of works where applicable. No dimensions should be scaled from this drawing for construction purposes. Any discrepancies found between this drawing and other drawings should be referred to consultants immediately.

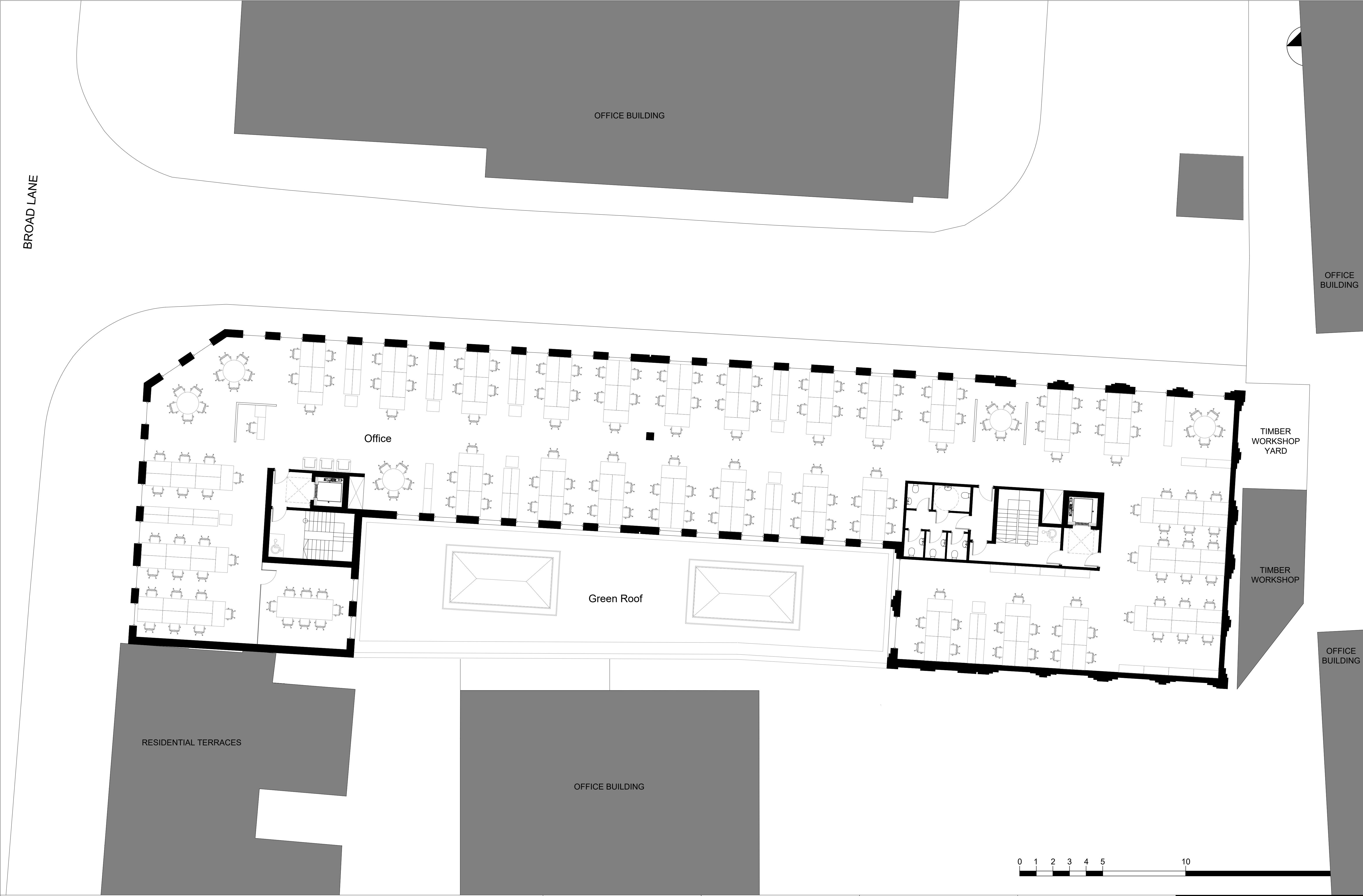
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REV	AMENDMENTS	DATE	CLIENT BROAD LANE PROPERTIES LIMITED		SCALE 1:1250/500 @ A1	DATE JULY 2022	CHECKED MS	DRAWING No. 2106_PL_001
								REVISION

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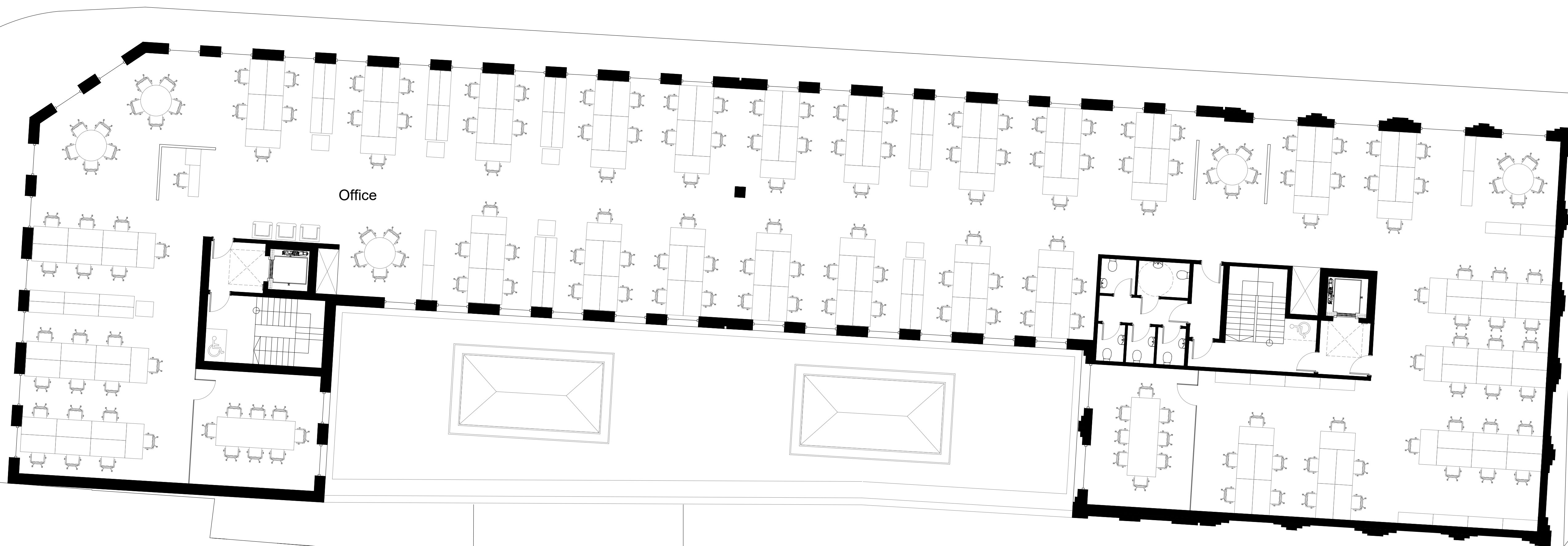
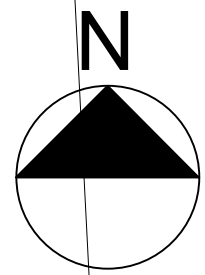


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				CLIENT BROAD LANE PROPERTIES LIMITED		SCALE 1:100 @ A1		DATE JULY 2022	CHECKED MS	DRAWING No. 2106_PL_110	REVISION A	
REV		AMENDMENTS		DATE								



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REV	AMENDMENTS	DATE												

BROAD LANE



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REV	AMENDMENTS	DATE

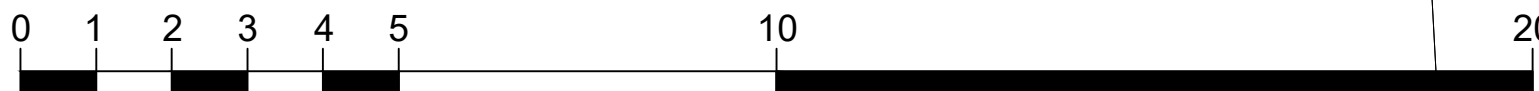
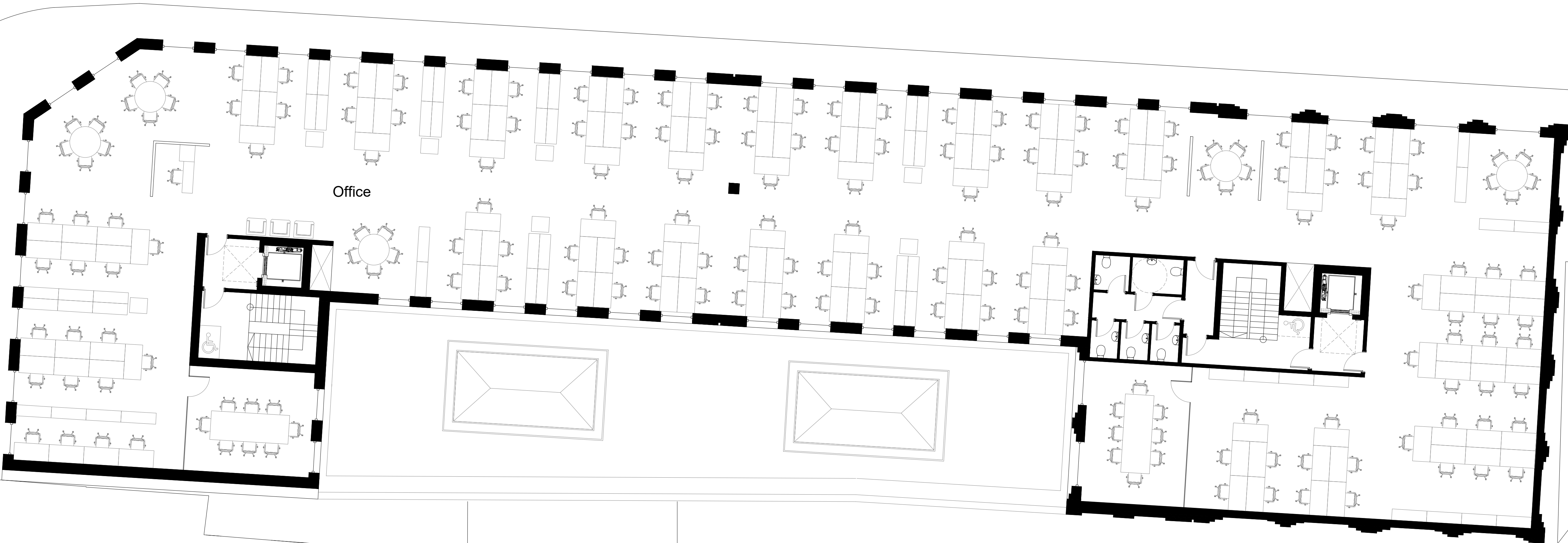
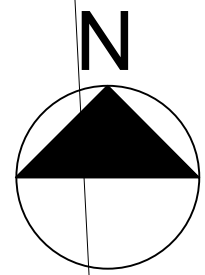
PROJECT FORMER CAR WASH SITE, BROAD LANE, HARINGEY
CLIENT BROAD LANE PROPERTIES LIMITED

DRAWING PROPOSED SECOND FLOOR PLAN
SCALE 1:100 @ A1
DATE JULY 2022
CHECKED MS

STATUS PLANNING
DRAWING No. 2106_PL_112
REVISION

Mark Smith Architects Limited

BROAD LANE

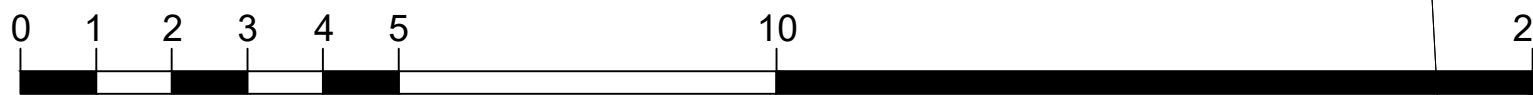
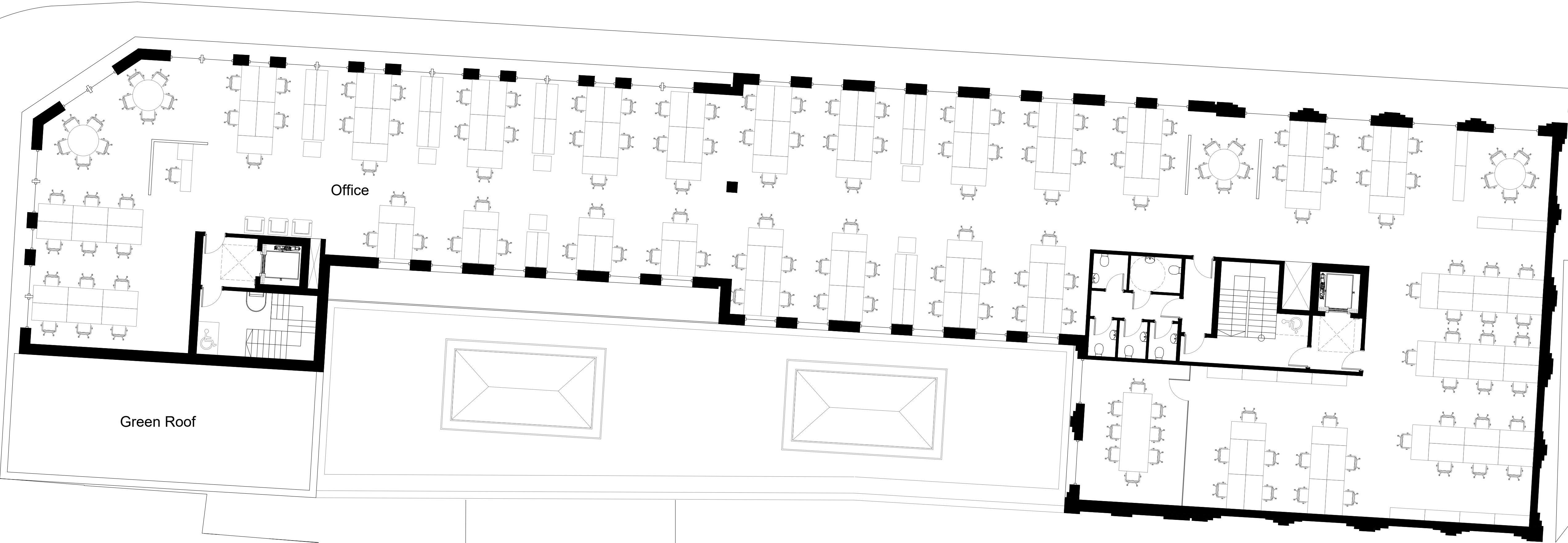
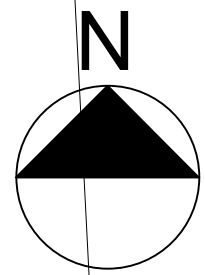


All dimensions to be checked on site prior to construction or manufacture. Refer also to written specification of works where applicable. No dimensions should be scaled from this drawing for construction purposes. Any discrepancies found between this drawing and other drawings should be referred to consultants immediately.

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			PROJECT FORMER CAR WASH SITE, BROAD LANE, HARINGEY		DRAWING PROPOSED THIRD FLOOR PLAN		STATUS PLANNING		Mark Smith Architects Limited	
REV	AMENDMENTS	DATE	CLIENT BROAD LANE PROPERTIES LIMITED		SCALE 1:100 @ A1	DATE JULY 2022	CHECKED MS	DRAWING No. 2106_PL_113		
								REVISION		

BROAD LANE



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REV	AMENDMENTS	DATE

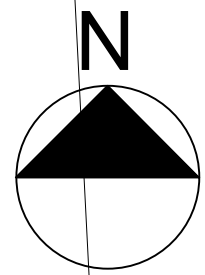
PROJECT FORMER CAR WASH SITE, BROAD LANE, HARINGEY
CLIENT BROAD LANE PROPERTIES LIMITED

DRAWING PROPOSED FOURTH FLOOR PLAN		
SCALE 1:100 @ A1	DATE JULY 2022	CHECKED MS

STATUS PLANNING	
DRAWING No. 2106_PL_114	REVISION

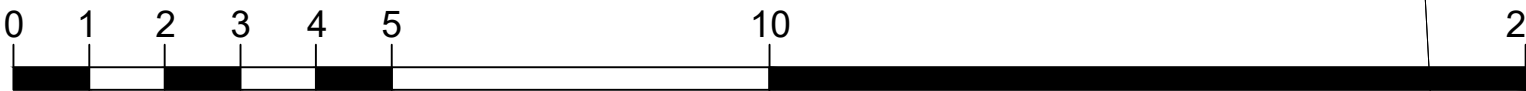
Mark Smith Architects Limited

BROAD LANE



Green Roof

Office

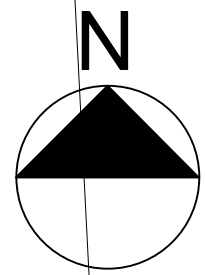


All dimensions to be checked on site prior to construction or manufacture. Refer also to written specification of works where applicable. No dimensions should be scaled from this drawing for construction purposes. Any discrepancies found between this drawing and other drawings should be referred to consultants immediately.

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			PROJECT FORMER CAR WASH SITE, BROAD LANE, HARINGEY		DRAWING PROPOSED FIFTH FLOOR PLAN		STATUS PLANNING		Mark Smith Architects Limited	
REV	AMENDMENTS	DATE	CLIENT BROAD LANE PROPERTIES LIMITED		SCALE 1:100 @ A1	DATE JULY 2022	CHECKED MS	DRAWING No. 2106_PL_115		
								REVISION		

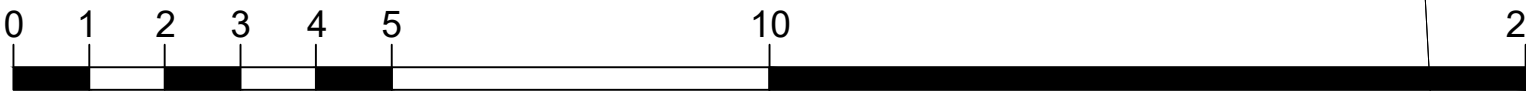
BROAD LANE



Green Roof

PV Panels

Office



All dimensions to be checked on site prior to construction or manufacture. Refer also to written specification of works where applicable. No dimensions should be scaled from this drawing for construction purposes. Any discrepancies found between this drawing and other drawings should be referred to consultants immediately.

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REV	AMENDMENTS	DATE

PROJECT FORMER CAR WASH SITE, BROAD LANE, HARINGEY
CLIENT BROAD LANE PROPERTIES LIMITED

DRAWING
PROPOSED
SIXTH - EIGHTH FLOOR PLAN

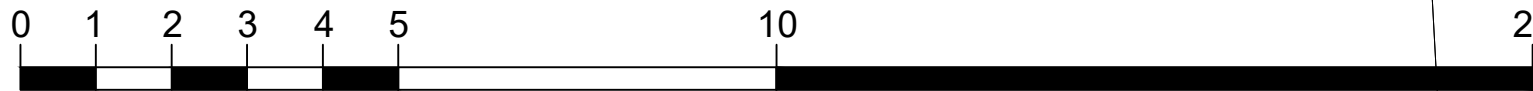
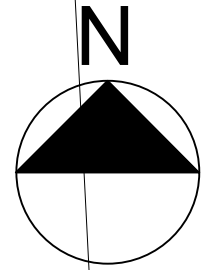
SCALE 1:100 @ A1	DATE JULY 2022	CHECKED MS
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STATUS PLANNING	
DRAWING No. 2106_PL_116	REVISION

Mark Smith Architects Limited



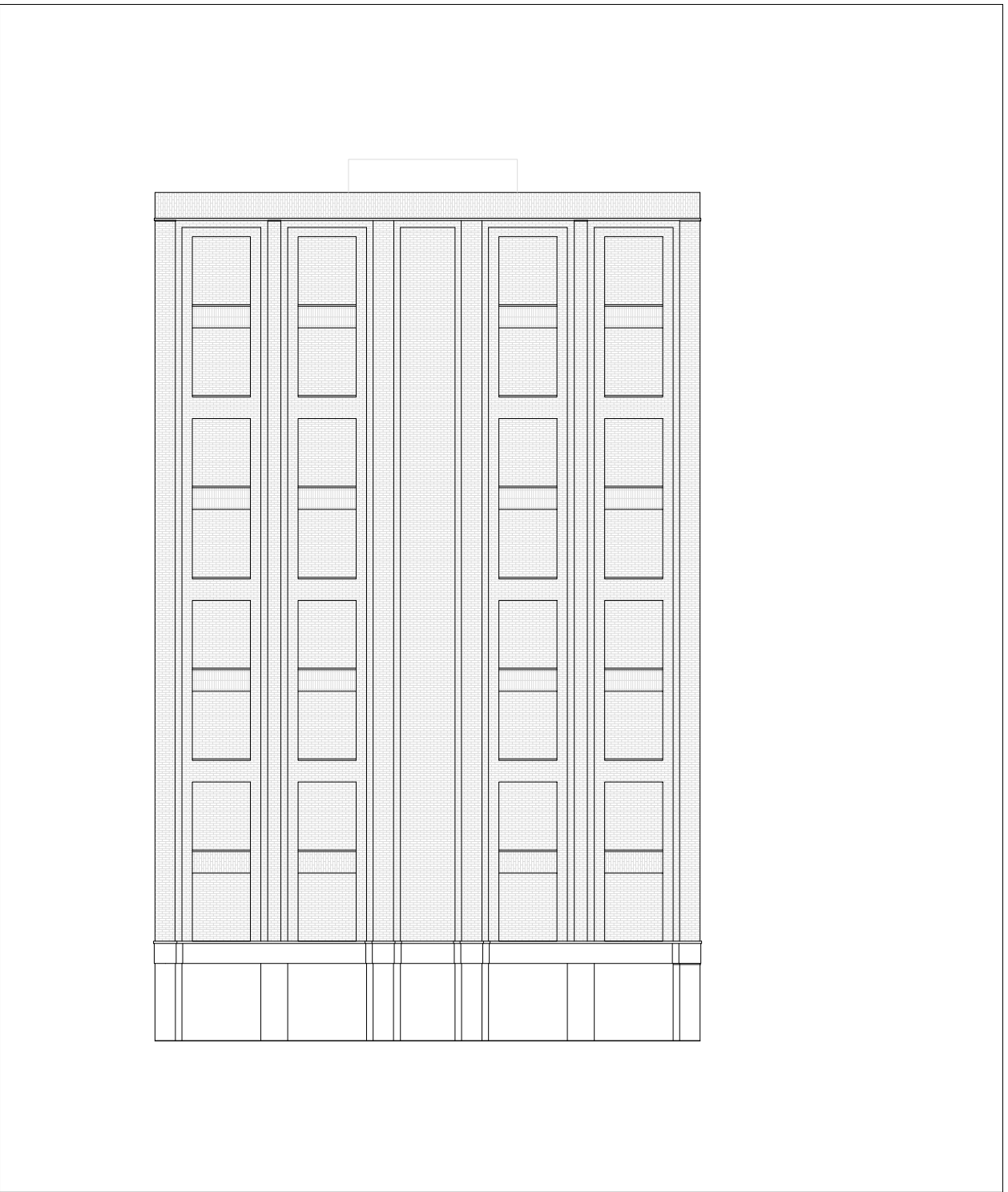
BROAD LANE



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REV	AMENDMENTS	DATE	CLIENT BROAD LANE PROPERTIES LIMITED		SCALE 1:100 @ A1	DATE JULY 2022	CHECKED MS	DRAWING No. 2106_PL_117		REVISION	



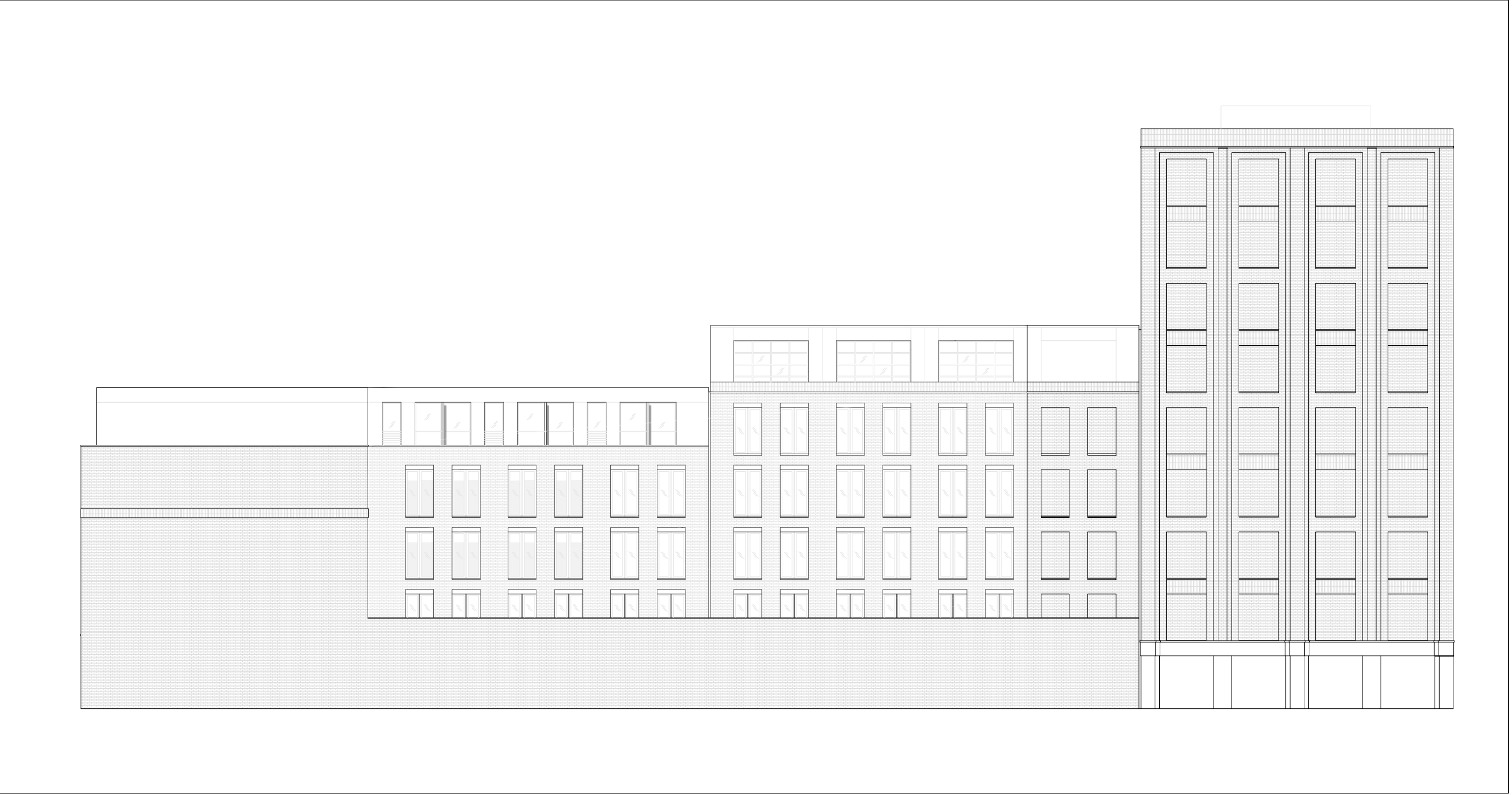
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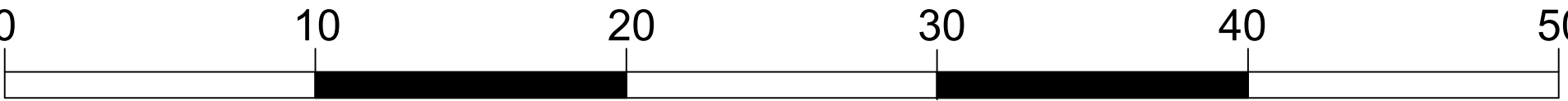
Proposed East Elevation



Proposed West Elevation



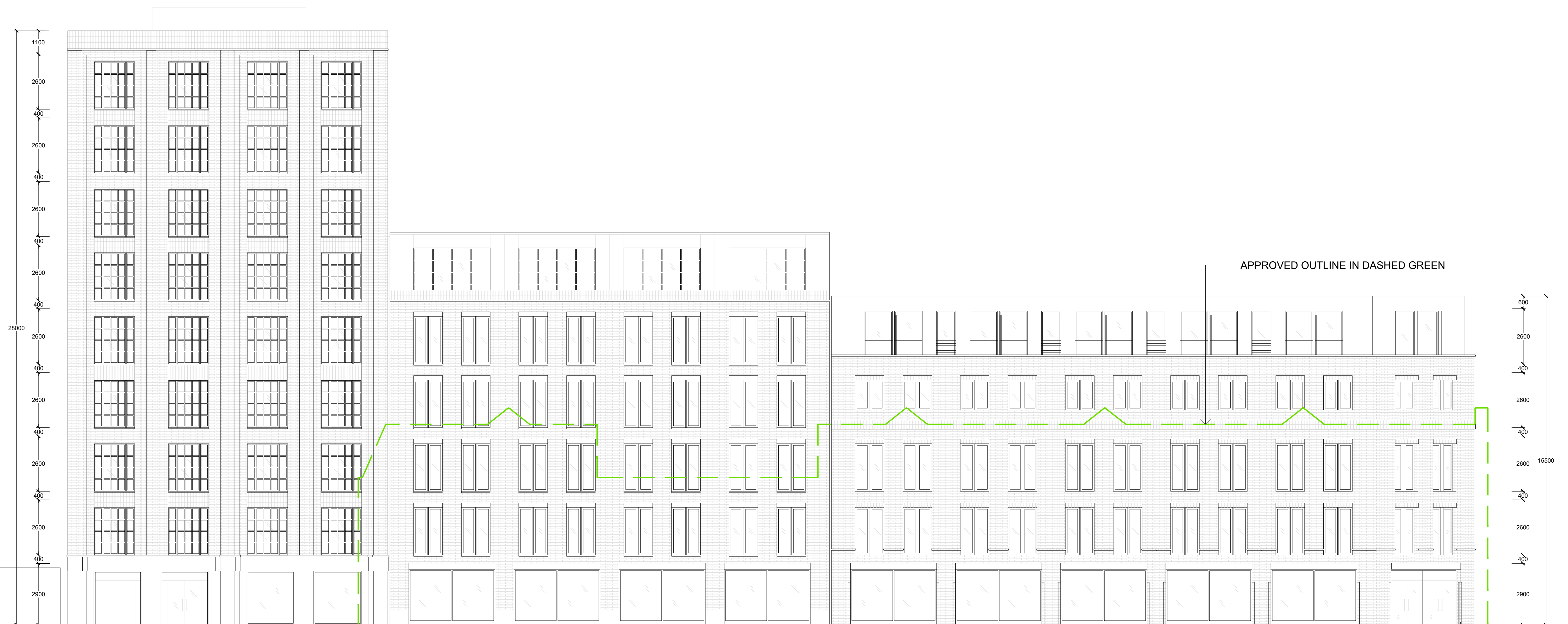
Proposed South Elevation



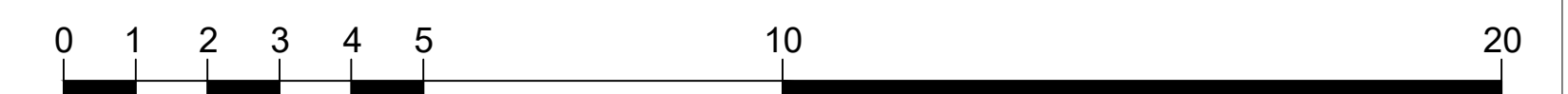
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			PROJECT FORMER CAR WASH SITE, BROAD LANE, HARINGEY		DRAWING PROPOSED ELEVATIONS		STATUS PLANNING		Mark Smith Architects Limited	
REV	AMENDMENTS	DATE	CLIENT BROAD LANE PROPERTIES LIMITED	SCALE 1:200 @ A1	DATE JULY 2022	CHECKED MS	DRAWING No. 2106_PL_120	REVISION		



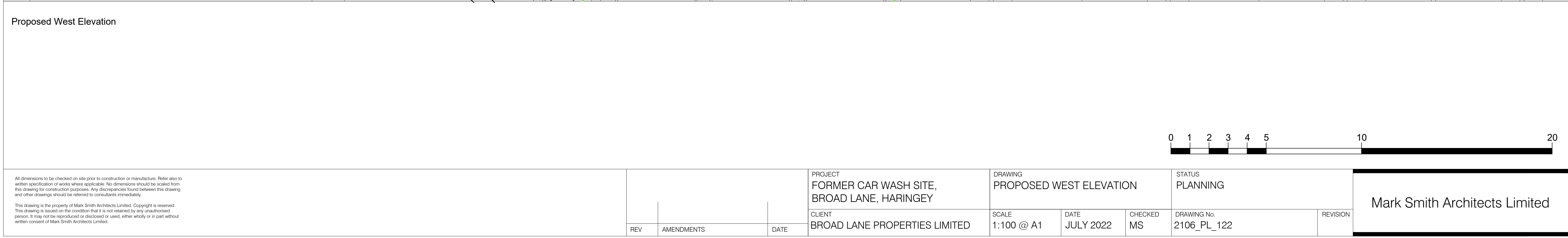
Proposed North Elevation

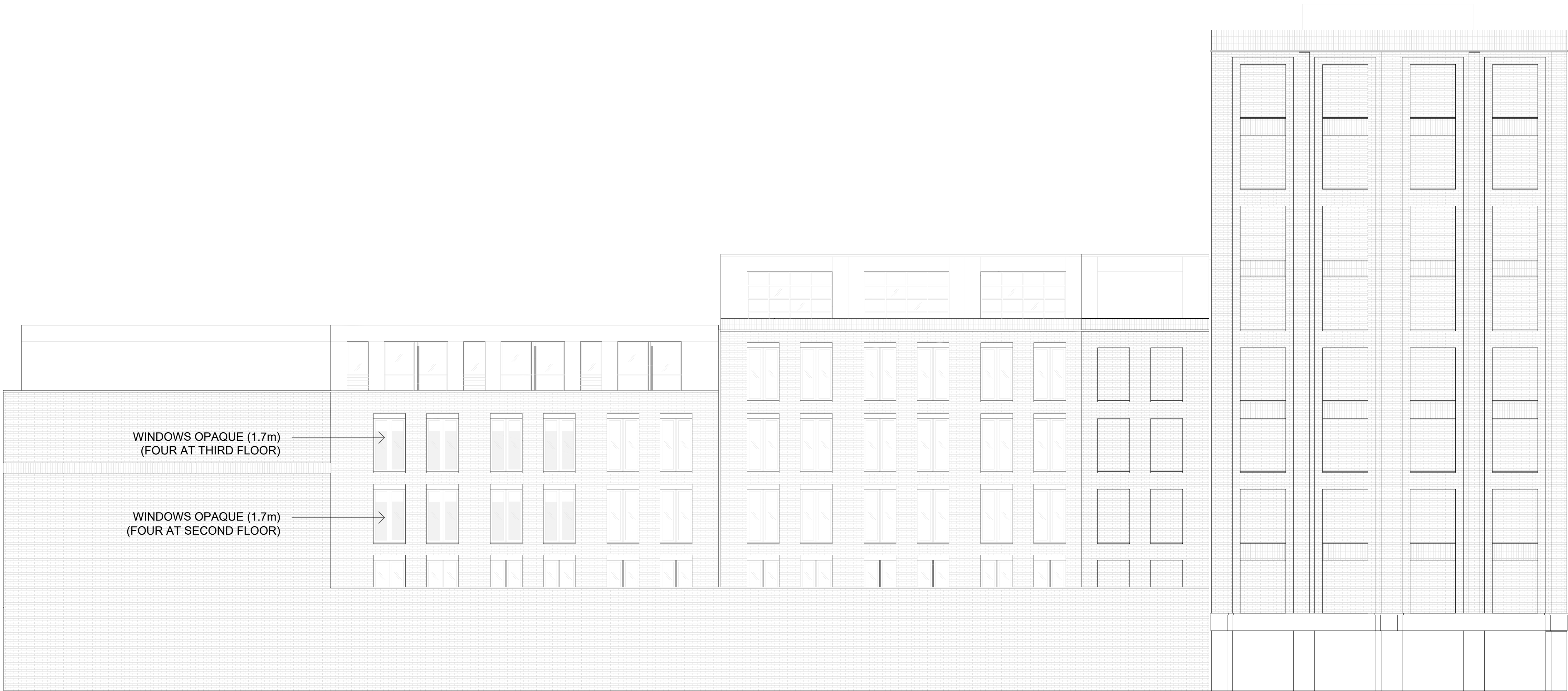


All dimensions to be checked on site prior to construction or manufacture. Refer also to written specification of works where applicable. No dimensions should be scaled from this drawing for construction purposes. Any discrepancies found between this drawing and other drawings should be referred to consultants immediately.

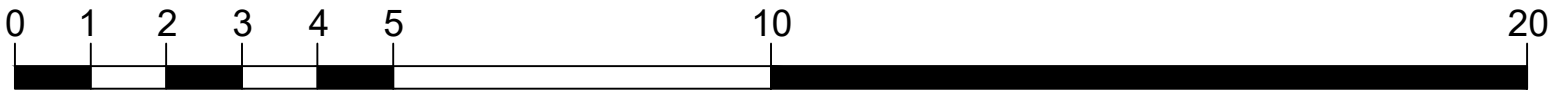
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			PROJECT FORMER CAR WASH SITE, BROAD LANE, HARINGEY	DRAWING PROPOSED NORTH ELEVATION			STATUS PLANNING		Mark Smith Architects Limited		
			CLIENT BROAD LANE PROPERTIES LIMITED	SCALE 1:100 @ A1	DATE JULY 2022	CHECKED MS	DRAWING No. 2106_PL_121				REVISION
REV	AMENDMENTS	DATE									





Proposed South Elevation



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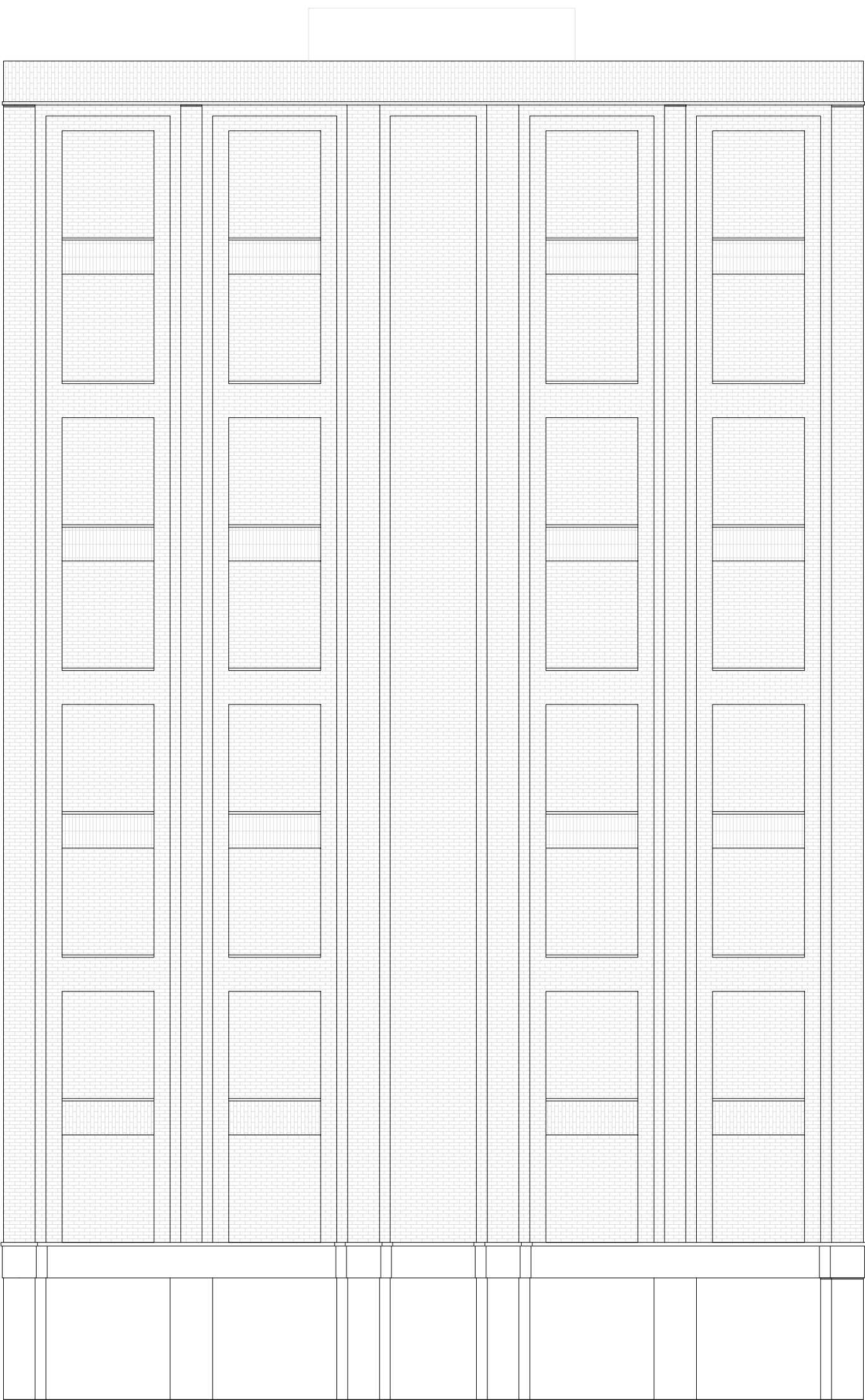
REV	AMENDMENTS	DATE

PROJECT FORMER CAR WASH SITE, BROAD LANE, HARINGEY
CLIENT BROAD LANE PROPERTIES LIMITED

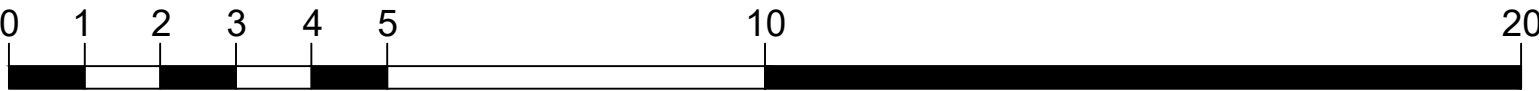
DRAWING PROPOSED SOUTH ELEVATION
SCALE 1:100 @ A1

DATE JULY 2022	CHECKED MS
STATUS PLANNING	DRAWING No. 2106_PL_123

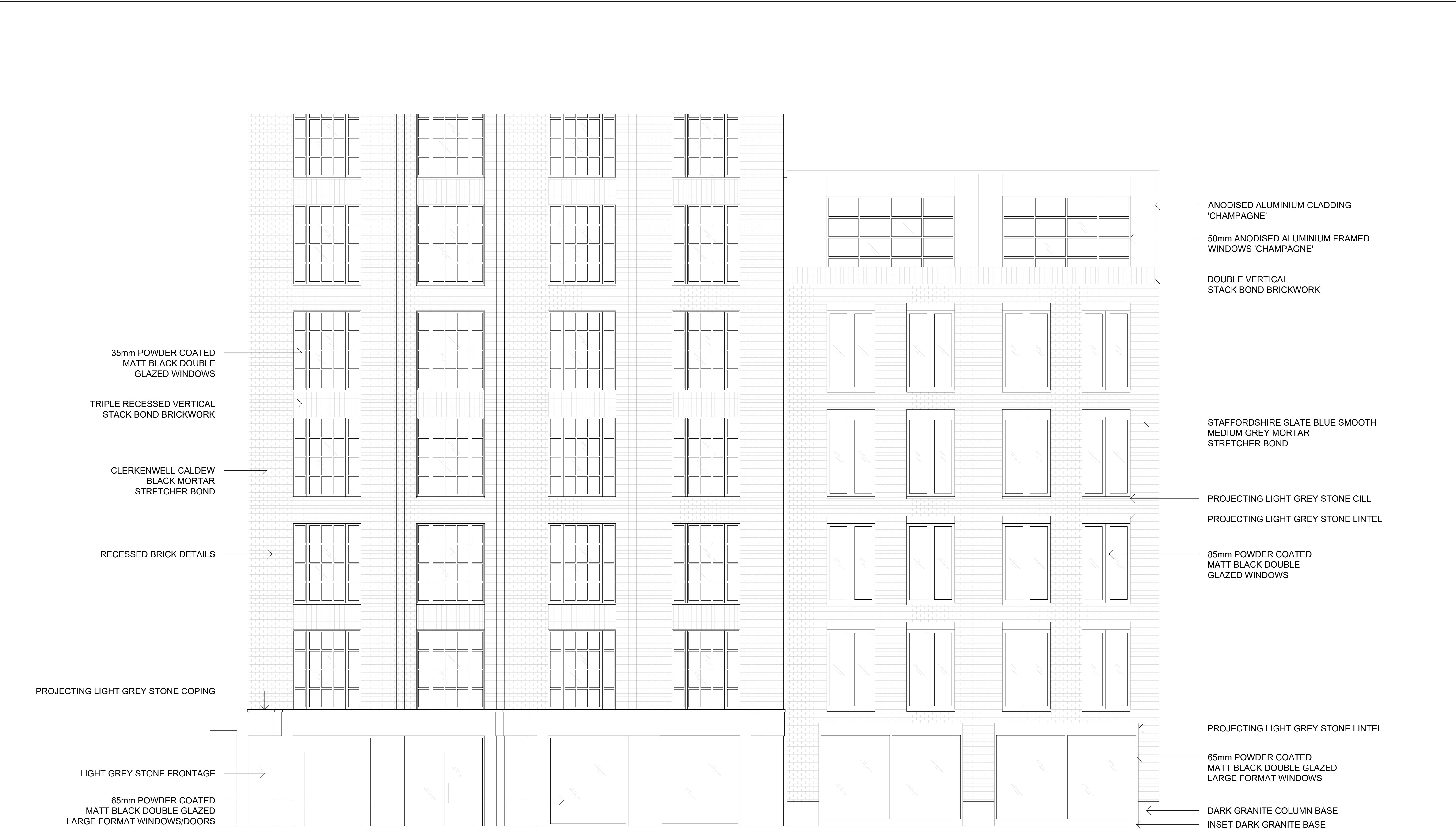
REVISION
Mark Smith Architects Limited



Proposed East Elevation



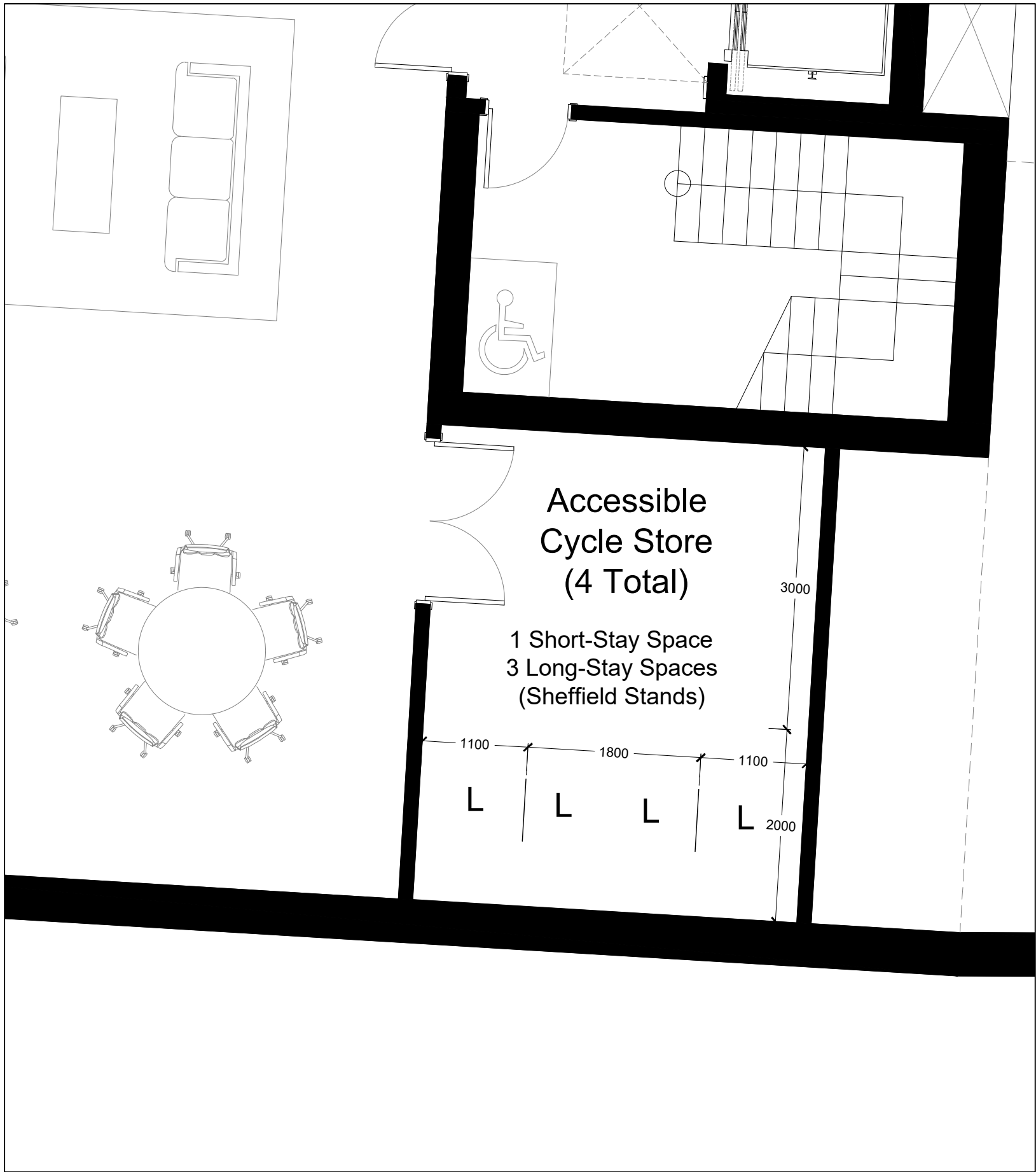
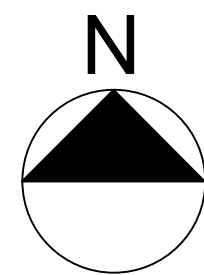




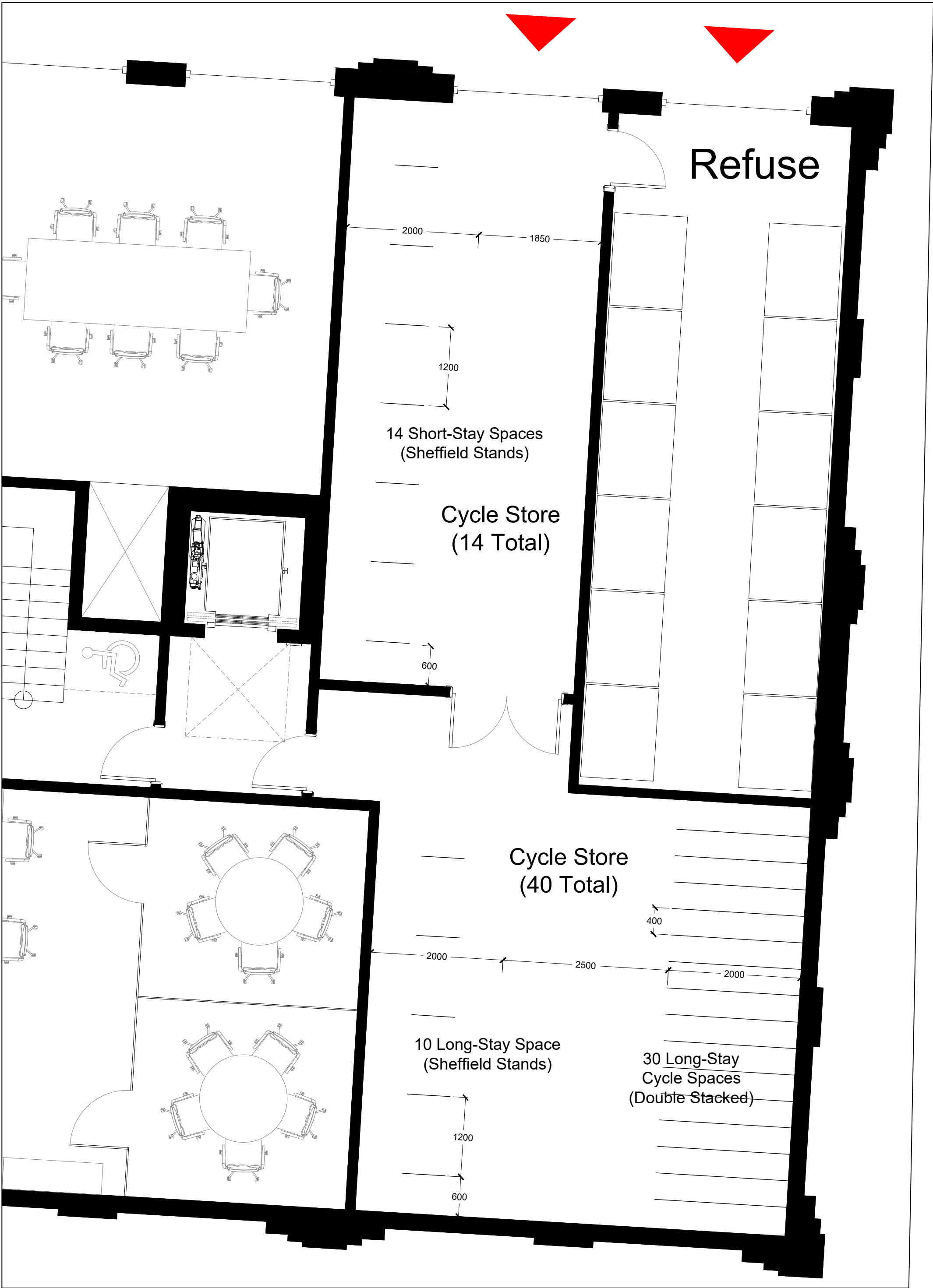
Proposed North Elevation



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			REV	AMENDMENTS	DATE	CLIENT BROAD LANE PROPERTIES LIMITED	SCALE 1:50 @ A1	DATE JULY 2022	CHECKED MS	



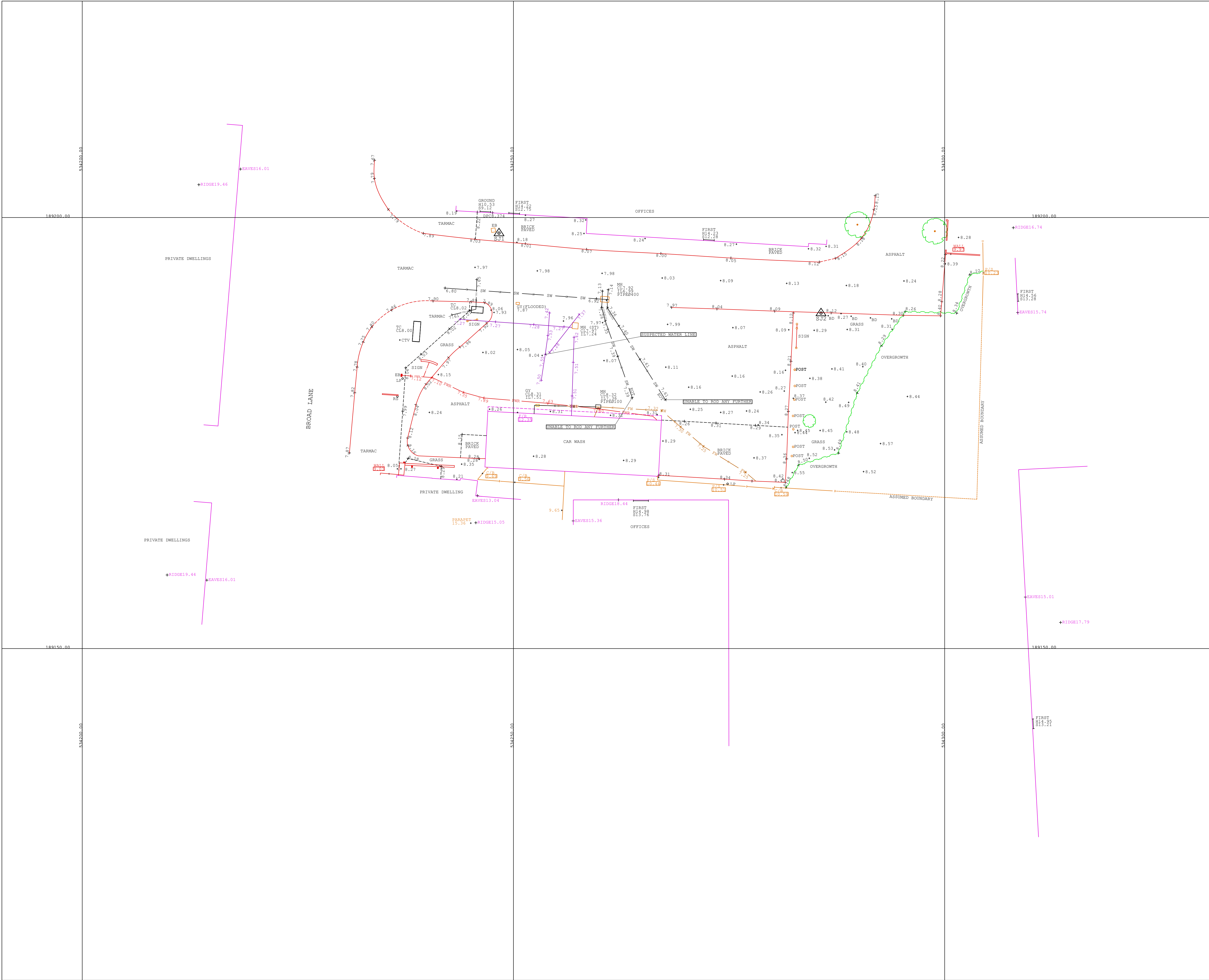
Front Cycle Store



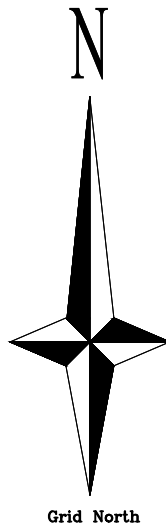
Rear Cycle Store / Bin Store



Appendix B: Topographic Survey



Co-ordinate Table				
Station	Type	Easting (mS)	Northing (mS)	Level (mS)
SJ1	PK Nail	534248.324	189198.193	8.209
SJ2	PK Nail	534285.663	189188.915	8.260
LEVELS RELATED TO GPS GRID MODEL, TRANSFORMED FROM OSGB36(02)				



UTILITY LEGEND	
	POWER CARRYING FEATURE
	WATER MAIN
	TELECOM
	DATA / COMMS
	GAS
	ASSUMED CONNECTION
	UNIDENTIFIED SERVICE
	FOUL WATER RUN
	SURFACE WATER RUN
	END OF TRACE

- NOTES :
1. SURVEY IS BASED ON A BEST FIT WITH THE OS NATIONAL GRID FROM GPS DERIVED CO-ORDINATES OF SJ.
 2. ALL LEVELS ON KERB LINES ARE CHANNEL LEVELS UNLESS NOTED OTHERWISE.
 3. SERVICE ROUTES HAVE BEEN IDENTIFIED BY LIFTING OF INSPECTION COVERS & VISUAL INSPECTION FROM THE SURFACES.
 4. FOR SAFETY REASONS, DRAINAGE PIPE SIZES HAVE BEEN DETERMINED FROM THE SURFACE AND SHOULD BE TREATED AS APPROXIMATE ONLY.
 5. DRAINAGE PIPE SIZES ARE DIAMETERS AND ARE SHOWN IN MILLIMETERS.

Revisions	
A	UTILITY DATA ADDED 28/11/2019
B	
C	

Drawing No: SJG1260		Revision Sheet 1/1
Surveyed By:- SJ	Drawn By:- JH	Checked By:- DR
Client:- Dovetail Architects	Sheet Size A1	Date 12/03/2014
Scale:- 1:200		

Project:- Broad Lane, Tottenham

SYMBOLS	LEGEND
	AV Air Valve
	BD Bollard
	BN Borehole
	CB Cable Box
	CHV Chimney
	CL Cover Level
	CMC Concrete
	CTV Cable TV
	DK Drop Kerb
	DP Down Pipe
	DR Drain
	ELC Electricity
	EP Elec Pole
	ER Earth Rod
	FB Flower Bed
	FN Fire Hydrant
	FP Footpath
	GF Gate Post
	GV Gas Valve
	IC Inspec. Cover
	IL Invert Level
	JB Junction Box
	KO Kerb Outlet
	LB Letter Box
	LF Lamp Post
	MH Manhole
	MK Marker
	NP Name Plate
	O/H Overhead
	OSBM Ordnance Bench Mark
	P Post Or Pillar
	PM Parking Meter
	RD Rodding Eye
	RS Road Sign
	SAP Sapling
	SC Stop Cock
	SL Sump Level
	ST Stop Tap
	SV Sluice Valve
	TAR Tarmac
	TL Traffic Lights
	TP Telegraph Pole
	TV Television Box
	UTL Unable to lift
	VP Vent Pipe
	WM Water Meter
	WO Wash Out

FENCE TYPES		
B/W Barbed Wire	C/P Chestnut Paling	P/S Fallsade
C/B Close Boarded	I/B Iron Railing	P/W Post & Wire
C/I Corrugated Iron	I/W Interwoven	
C/L Chainlink	P/S Post & Rail	

BOX AROUND LEVEL INDICATES LEVEL AT TOP OF FEATURE - (SEE EXAMPLE)

SURVEYED BY:-

SJGEOMATICS
SURVEYORS

GPS - LAND - BUILDING - UNDERGROUND - BIM - SCANNING

27 Norwich Road
Halesworth
Suffolk
IP19 8BX

Tel. 01986 874721 Fax. 01986 875175
email. mail@sjgeomatics.co.uk
web. www.sjgeomatics.co.uk

Also: 8 Speyside Court | Orton Southgate | Peterborough PE2 6SN
Tel. 0844 6697544 | Fax. 0844 6697545
email. peterborough@sjgeomatics.co.uk
Company Registration Number 8081329

Appendix C: Drainage Drawings and Calculations

Flood map for planning

Your reference
Broad Lane

Location (easting/northing)
534267/189205

Created
30 Jan 2023 15:20

Your selected location is in flood zone 2, an area with a medium probability of flooding.

This means:

- you must complete a flood risk assessment for development in this area
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (see www.gov.uk/guidance/flood-risk-assessment-standing-advice)

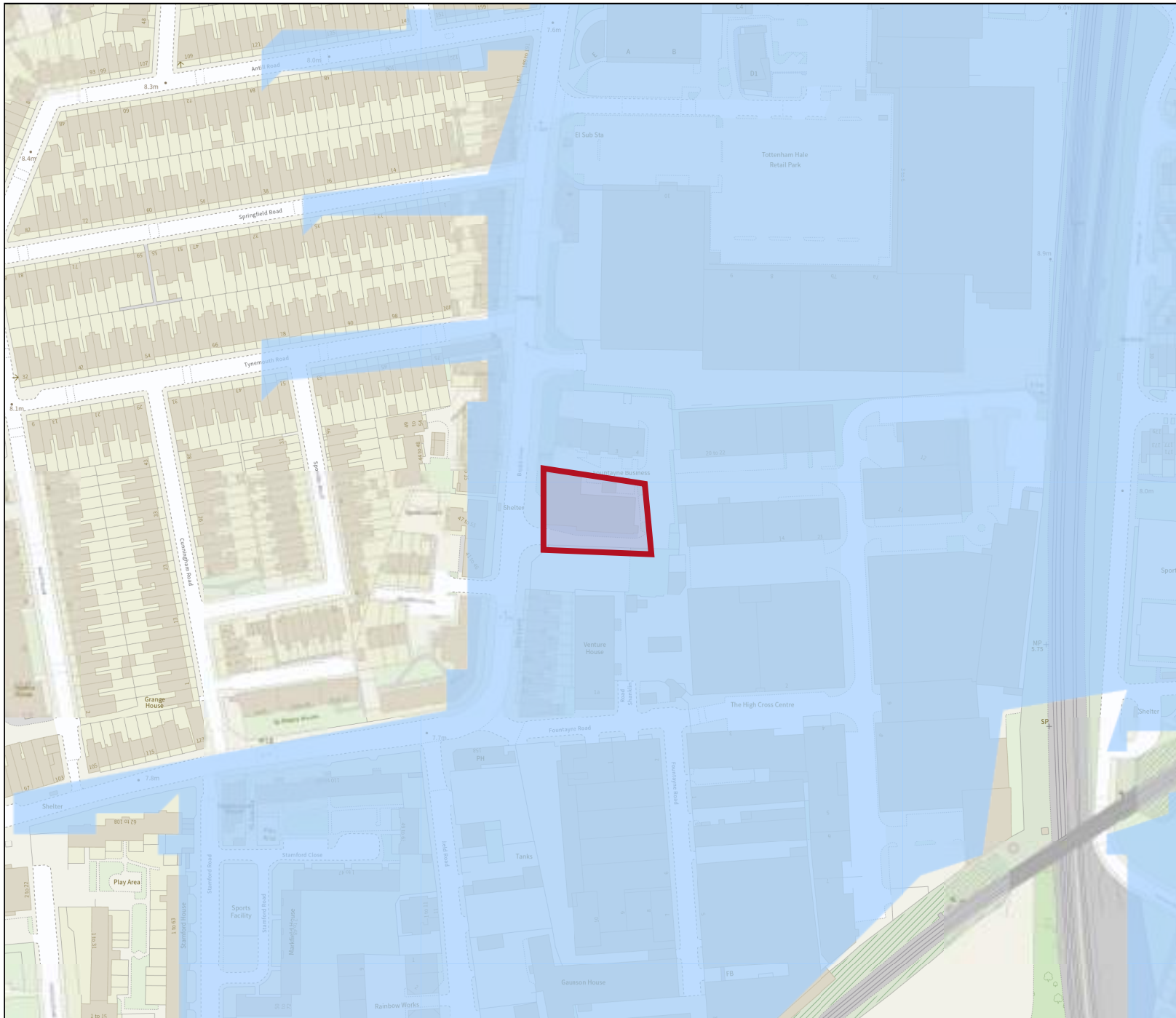
Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2022 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>



Flood map for planning

Your reference

Broad Lane

Location (easting/northing)

534267/189205

Scale

1:2500

Created

30 Jan 2023 15:20

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area

0 20 40 60m

Asset Location Search



Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0845 850 2777
Email: developer.services@thameswater.co.uk

Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0845 850 2777
Email: developer.services@thameswater.co.uk

The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 534286,189189

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
201A	n/a	n/a
2107	8.01	5.96
2106	7.96	5.76
2109	7.93	6.59
2105	7.96	6
3105	7.94	6.57
2108	7.81	6.03
3101	7.9	6.25
2101	7.87	5.26
2104	7.91	5.59
2102	7.76	5.04
2103	7.67	6.12
2209	7.59	5.16
321C	n/a	n/a
321B	n/a	n/a
1002	7.72	1.17
1109	7.7	5.24
1108	7.74	5.24
1107	7.72	5
1206	7.86	6.27
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.		



ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

	Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
	Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
	Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
	Trunk Surface Water
	Trunk Foul
	Storm Relief
	Trunk Combined
	Bio-solids (Sludge)
	Vent Pipe
	Proposed Thames Surface Water Sewer
	Proposed Thames Foul Sewer
	Gallery
	Foul Rising Main
	Surface Water Rising Main
	Combined Rising Main
	Sludge Rising Main
	Proposed Thames Water Rising Main
	Vacuum

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plans are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
- 5) 'na' or '0' on a manhole level indicates that data is unavailable.

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

	Air Valve
	Dam Chase
	Fitting
	Meter
	Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

	Control Valve
	Drop Pipe
	Ancillary
	Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

	Outfall
	Undefined End
	Inlet

- 6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

Other Symbols

Symbols used on maps which do not fall under other general categories

	Public/Private Pumping Station
	Change of characteristic indicator (C.O.C.I.)
	Invert Level
	Summit
Areas	Lines denoting areas of underground surveys, etc.
	Agreement
	Operational Site
	Chamber
	Tunnel
	Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

	Foul Sewer
	Surface Water Sewer
	Combined Sewer
	Culverted Watercourse
	Gulley
	Proposed
	Abandoned Sewer

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Greenfield runoff rate estimation for sites

www.ukstds.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

Default

Edited

SOIL type:

HOST class:

SPR/SPRHOST:

Hydrological characteristics

Default

Edited

SAAR (mm):

Hydrological region:

Growth curve factor 1 year:

Growth curve factor 30 years:

Growth curve factor 100 years:

Growth curve factor 200 years:

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

Default

Edited

Q_{BAR} (l/s):

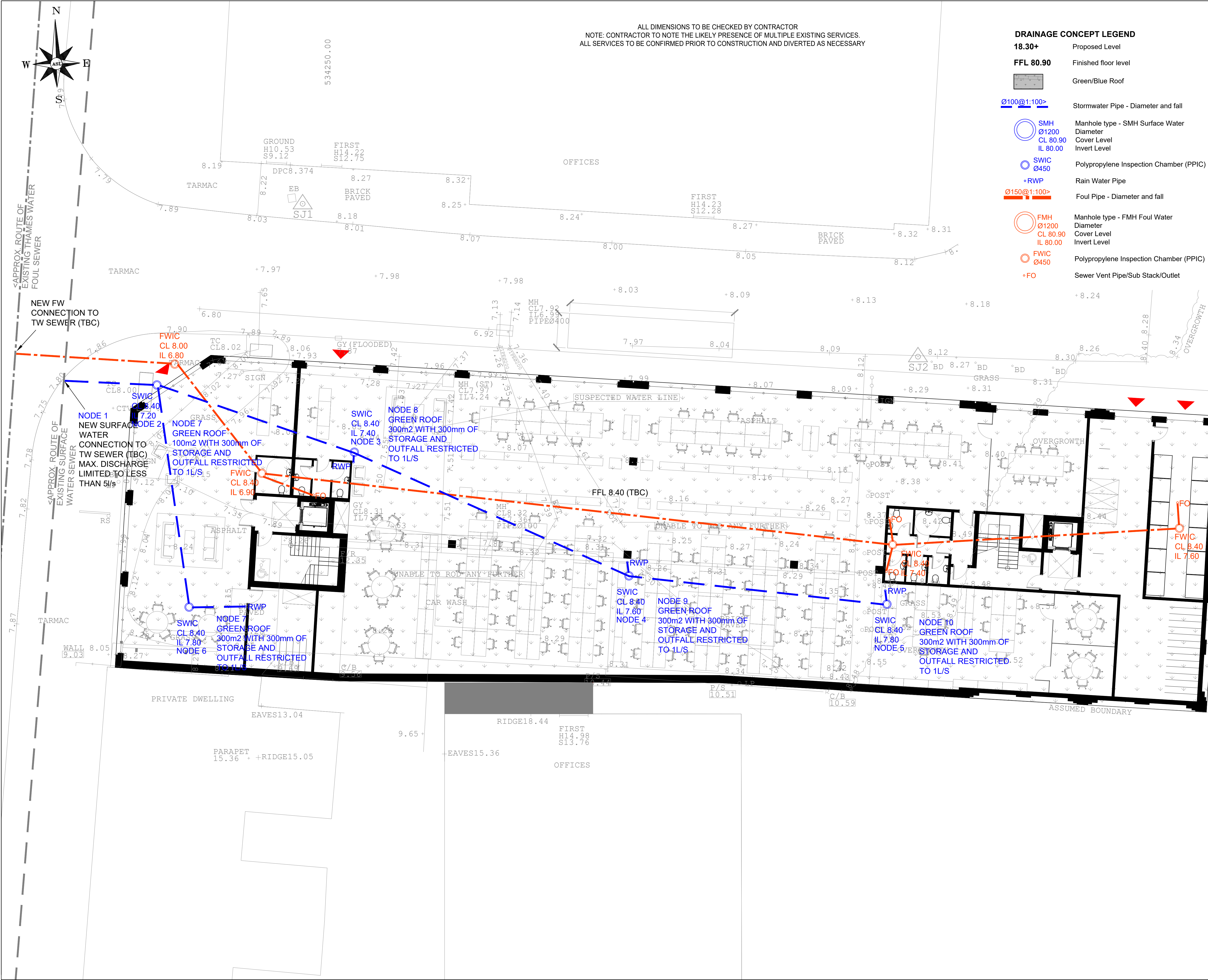
1 in 1 year (l/s):

1 in 30 years (l/s):

1 in 100 year (l/s):

1 in 200 years (l/s):

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.



ALL DIMENSIONS TO BE CHECKED BY CONTRACTOR
NOTE: CONTRACTOR TO NOTE THE LIKELY PRESENCE OF MULTIPLE EXISTING SERVICES.
ALL SERVICES TO BE CONFIRMED PRIOR TO CONSTRUCTION AND DIVERTED AS NECESSARY

DRAINAGE CONCEPT LEGEND

18.30+ Proposed Level

FFL 80.90 Finished floor level

Green/Blue Roof

Ø100@1:100 Stormwater Pipe - Diameter and fall

SMH Ø1200 CL 80.90 IL 80.00 Manhole type - SMH Surface Water Diameter Cover Level Invert Level

SWIC Ø450 Polypropylene Inspection Chamber (PPIC)

RWP Rain Water Pipe

Ø150@1:100 Foul Pipe - Diameter and fall

FMH Ø1200 CL 80.90 IL 80.00 Manhole type - FMH Foul Water Diameter Cover Level Invert Level

FWIC Ø450 Polypropylene Inspection Chamber (PPIC)

FO Sewer Vent Pipe/Sub Stack/Outlet

Job No.	P4932J2734	Rev.
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- DRAINAGE NOTES
- THIS DRAWING IS FOR PLANNING ONLY AND IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT SERIES DESIGN DRAWINGS, SPECIFICATIONS AND DOCUMENTATION.
 - CONSTRUCTION TO BE IN ACCORDANCE WITH ALL BRITISH AND EUROPEAN STANDARDS AND BUILDING REGULATIONS.
 - ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS IN METRES ABOVE LOCAL DATUM.
 - ANY DISCREPANCIES IN THE DETAILS SHOWN ARE TO BE REPORTED TO THE EMPLOYER'S REPRESENTATIVE/ENGINEER PRIOR TO CONSTRUCTION.
 - ALL EXISTING SERVICES ARE TO BE LOCATED PRIOR TO THE COMMENCEMENT OF ANY WORKS. THE CONTRACTOR MUST NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICT WITH THE PROPOSED WORKS.
 - THE GENERAL SPECIFICATION OF MATERIALS AND WORKMANSHIPS FOR THE CONSTRUCTION OF THE ACCESS ROAD, FOOTPATHS AND OTHER AREAS OF HARDSTANDING SHALL BE THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, VOLUME 1. SPECIFICATIONS OF HIGHWAY WORKS (SHW) PUBLISHED BY THE STATIONARY OFFICE.
 - NODE NUMBERS REFER TO CALCULATIONS WITHIN DRAINAGE REPORT
 - ALL RWP AND FO SHOWN ARE INDICATIVE ONLY AND SUBJECT TO APPROVAL AND SETTING OUT BY THE ARCHITECT.
 - NOTE THE PRESENCE OF NUMEROUS TREES. DRAINAGE DESIGN TO BE REVISED AS NECESSARY TO ACCOMMODATE TREE PROTECTION AND HAND DIGGING MAY BE REQUIRED FOR DRAINAGE INSTALLATION.
 - UNLESS NOTED OTHERWISE, PIPES TO BE:
FOUL PIPES UNDER BUILDING Ø100@1:40,
FOUL PIPES EXTERNAL Ø100@1:80,
SURFACE WATER PIPES Ø150@1:100

Notes.

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- This survey was measured for a scale of 1:100, any subsequent enlargements should be verified on site.

Amendments

Rev	Date	By	Chkd

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ENVIRONMENTAL

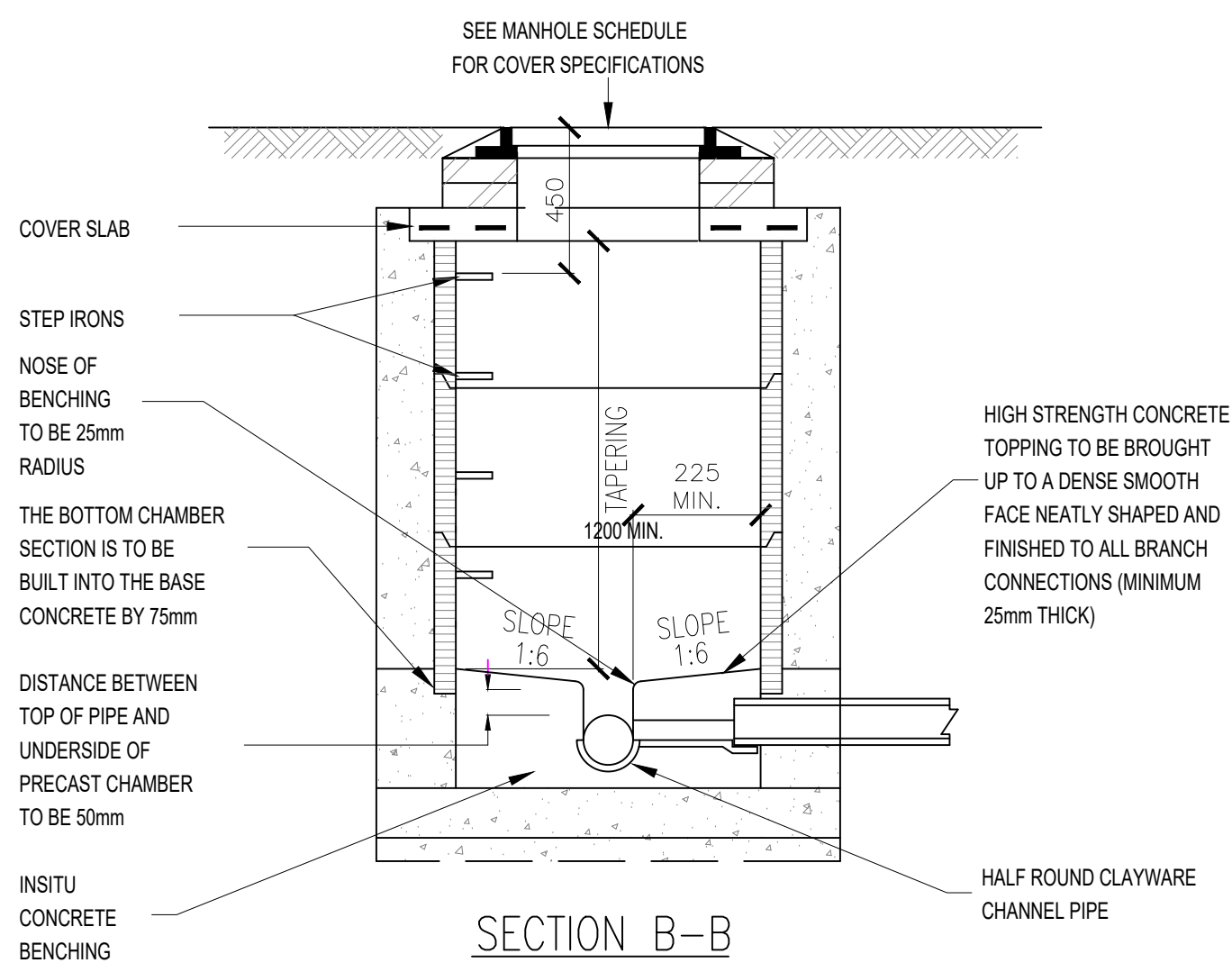
Jomas Associates Ltd.
Unit 24 Sarum Complex,
Salisbury Road,
Uxbridge, UB8 2RZ

Project
Broad Lane, Haringey

Drawing
Proposed Drainage Plan

Dwg no	Checked	Surveyor
C01	AW	-
Date	30.01.23	Scale 1:100 @ A1
Job No.	P4932J2734	Rev. -
Grid	Contours	Level Datum

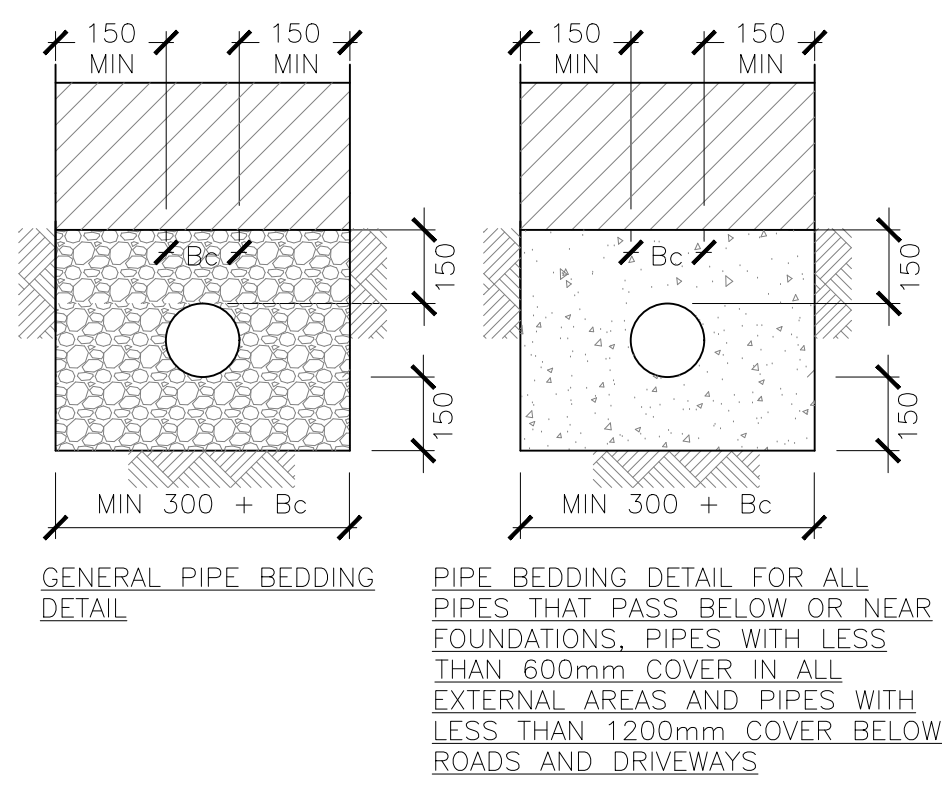
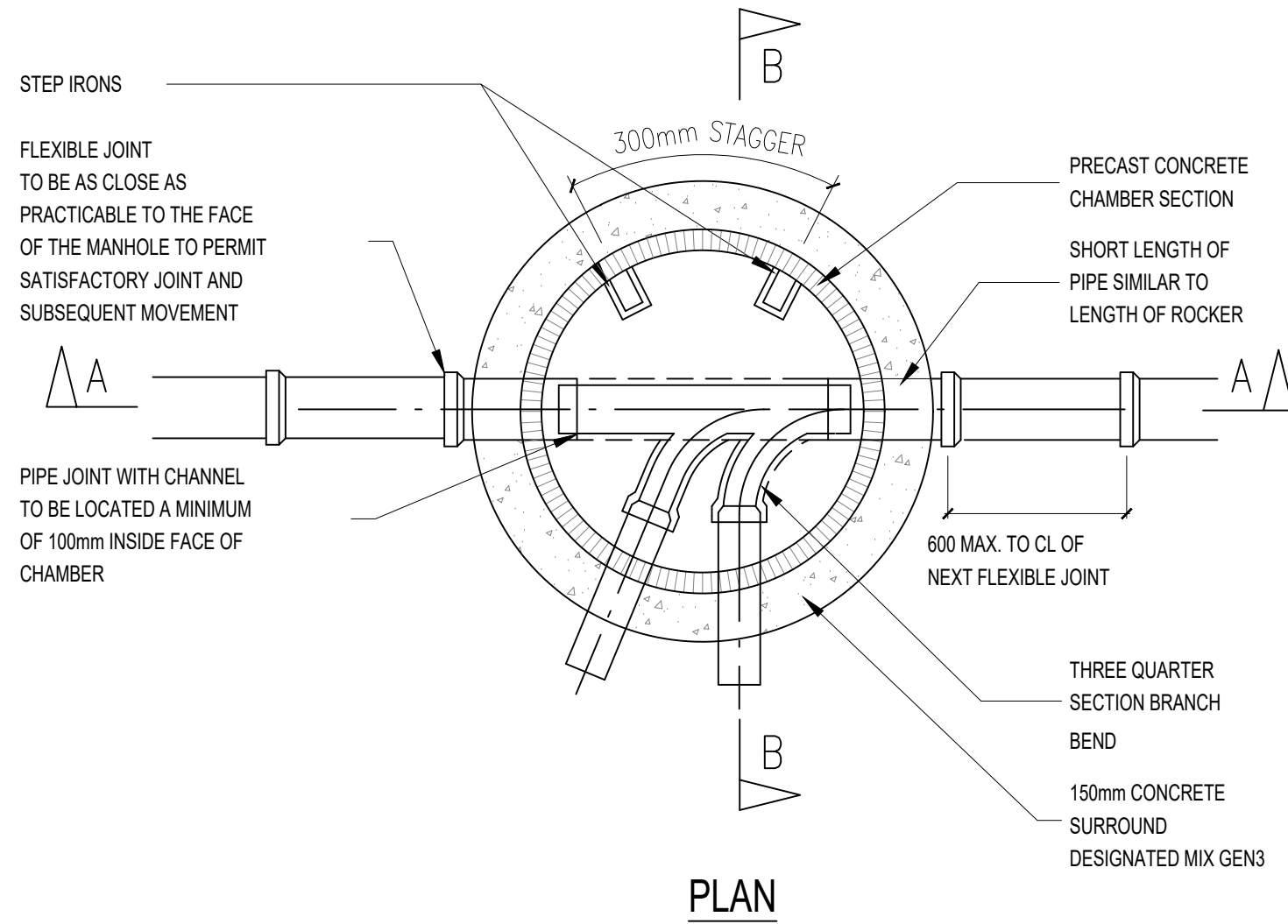
NOTE: Details for private drainage only.



NOTES:
CHAMBERS WITH OUTGOING PIPES
GREATER THAN 500mm DIAMETER
SHALL BE FITTED WITH GUARD BARS,
SAFETY CHAINS OR OTHER SAFETY
DEVICES. TOE HOLES TO BE
PROVIDED IN BENCHING OF SEWERS
GREATER THAN 450mm DIAMETER
FOR ACCESS TO INVERT. WHERE
INTERNAL HEIGHT EXCEEDS 1800mm
MANHOLE MAY BE PROVIDED WITH
REDUCING COVER AND SHAFT.
SHAFT DIAMETER TO BE 600mm
DIAMETER OR 900mm DIAMETER IF
LONGER THAN 900mm.

PIPE DIAMETER	ROCKER PIPE * LENGTH
150mm-450mm	500mm-750mm
475mm-750mm	750mm-1000mm
OVER 750mm	1200mm

* OR LINTEL AND COMPRESSIBLE SEALANT IN ACCORDANCE WITH CLAUSE 689 OF THE SPECIFICATION.

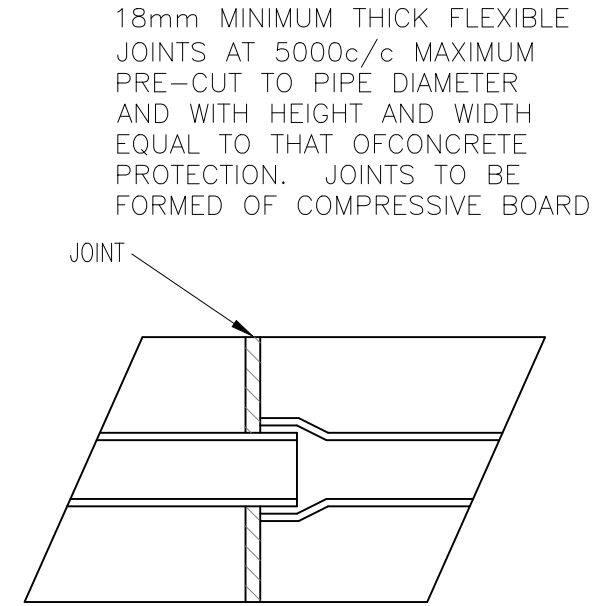


SELECTED FILL: FREE FROM STONES
LARGER THAN 40mm, LUMPS OF CLAY
OVER 100mm, TIMBER, FROZEN
MATERIAL, VEGETABLE MATTER.

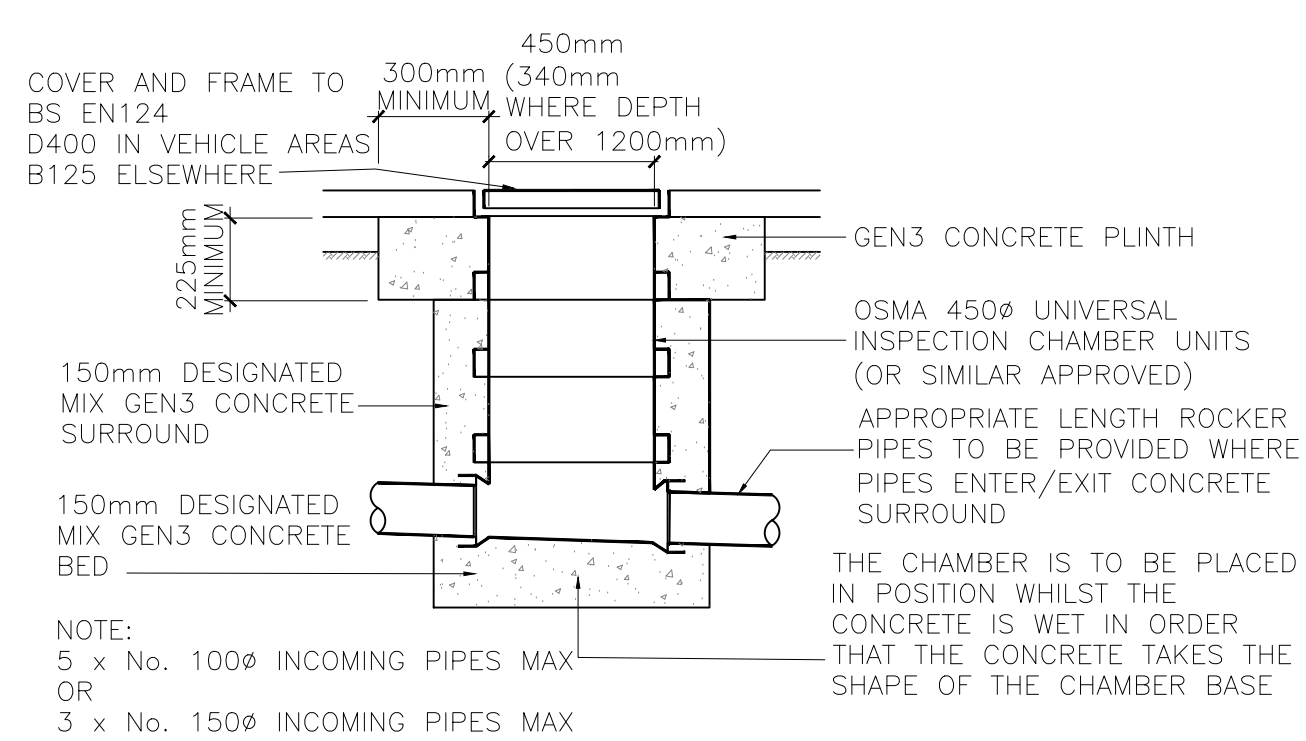
GRANULAR MATERIAL: TO CONFORM TO BS
EN 1610 ANNEX B TABLE B.15 AND
SHOULD BE SINGLE SIZE MATERIAL OR
GRADED MATERIAL FROM 5mm up TO A
MAXIMUM SIZE OF 10mm FOR 100mm
PIPES, 14mm FOR 150mm PIPES,
10mm FOR PIPES FROM 150mm up TO
600mm DIAMETER AND 40mm FOR PIPES
MORE THAN 600mm DIAMETER.

GEN1 CONCRETE IN ACCORDANCE WITH
BS 8500-1:2002.

NOTE:
PIPES LESS THAN 1200mm BELOW ROADS
AND LESS THAN 600mm BELOW OTHER
EXTERNAL AREAS SHALL HAVE A 150mm
GEN1 CONCRETE SURROUND. OTHER THAN
PIPES CAST WITHIN PILECAPS ALL PIPES
BELOW SUSPENDED SLAB SHALL HAVE
GRANULAR SURROUND AS SHOWN.



FLEXIBLE JOINTS IN CONCRETE PROTECTION
SCALE 1:10



EXTERNAL POLYPROPYLENE INSPECTION CHAMBER (PPIC)
MAXIMUM DEPTH TO INVERT OF CHAMBER TO BE 1200mm (3000mm FOR REDUCED ACCESS)
CUT TO INTERMEDIATE SIZES
SCALE 1:20

Job. No.	P4932J2734	Rev.
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NOTES

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4. ALL EXISTING SERVICES ARE TO BE LOCATED PRIOR TO THE COMMENCEMENT OF ANY WORKS. THE CONTRACTOR MUST NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICT WITH THE PROPOSED WORKS.
5. FOR GRAVITY SEWERS, ALL DRAINAGE AND FITTINGS ARE TO BE INSTALLED TO JOINT UP TO 440-1 OR CLAYWARE TO BS EN295 OR CONCRETE TO BS5911 PART 100
6. CHAMBER WALLS 225 THICK TO BE CONSTRUCTED IN CLASS B ENGINEERING BRICKS TO SHW SERIES 2400 IN DESIGNATION (I) MORTAR OR IN-SITU STRENGTH CLASS C16/20 CONCRETE TO CLAUSE 2602
7. CHAMBER WALLS AND COVER SLAB TO BE CONSTRUCTED IN PRECAST CONCRETE TO BS EN 1917 AND BS 5911-3.
8. CONCRETE MIXES INDICATED ON THIS DRAWING ARE DESIGNATED MIXES IN ACCORDANCE WITH BS8500-1:2006. ALL CONCRETE TO BE SULPHATE RESISTANT
9. BACKFILL TO ALL TRENCHES UNDER CARRIAGEWAYS TO BE TYPE 1 SUB-BASE MATERIAL, ELSEWHERE BACKFILL TO BE TYPE 1 IN ACCORDANCE WITH THE SPECIFICATION, FREE DRAINING READILY COMPACTABLE MATERIAL, FREE FROM RUBBISH AND ORGANIC MATTER. ALL SOFT SPOTS AND LUMPS AND LARGE STONES TO BE COMPACTED IN LAYERS NOT EXCEEDING 150mm THICK.
10. A FLEXIBLE JOINT SHALL BE PROVIDED AS CLOSE AS IS FEASIBLE TO OUTSIDE FACE OF ANY STRUCTURE INTO WHICH A PIPE IS BUILT, IN ACCORDANCE WITH THE DETAIL.
11. THE GENERAL SPECIFICATION OF MATERIALS AND WORKMANSHIPS FOR THE CONSTRUCTION OF THE ACCESS ROAD FOOTPATHS AND OTHER AREAS OF HARDSTANDING SHALL BE THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, CLASSIFICATION OF SPECIFICATION OF FOOTWAY WORKS (SHW) PUBLISHED BY THE STATIONARY OFFICE.
12. ALL PIPES TO BE LAID SOFFIT TO SOFFIT UNLESS NOTED OTHERWISE.
13. MANHOLE COVERS AND FRAMES SHALL COMPLY WITH BS EN124 AND SHALL BE OF A NON-ROCKING DESIGN WHICH DOES NOT RELY ON THE USE OF CURSOR INSERTS. CLASS D COVERS SHALL BE USED IN CARRIAGWAYS, HARD SHOULDERS AND PARKING AREAS USED BY ALL TYPE OF ROAD VEHICLES. CLASSES C AND D SHALL BE USED IN FOOTWAYS, PEDESTRIAN AREAS AND ALL COMPARABLE LOCATIONS.

Notes.

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3. This survey was measured for a scale of 1:100, any subsequent enlargements should be verified on site.

Amendments

Rev	Date		By	Chkd

JOMAS
ENGINEERING
ENVIRONMENTAL

Jomas Associates Ltd.
Unit 24 Sarum Complex,
Salisbury Road,
Uxbridge, UB8 2RZ

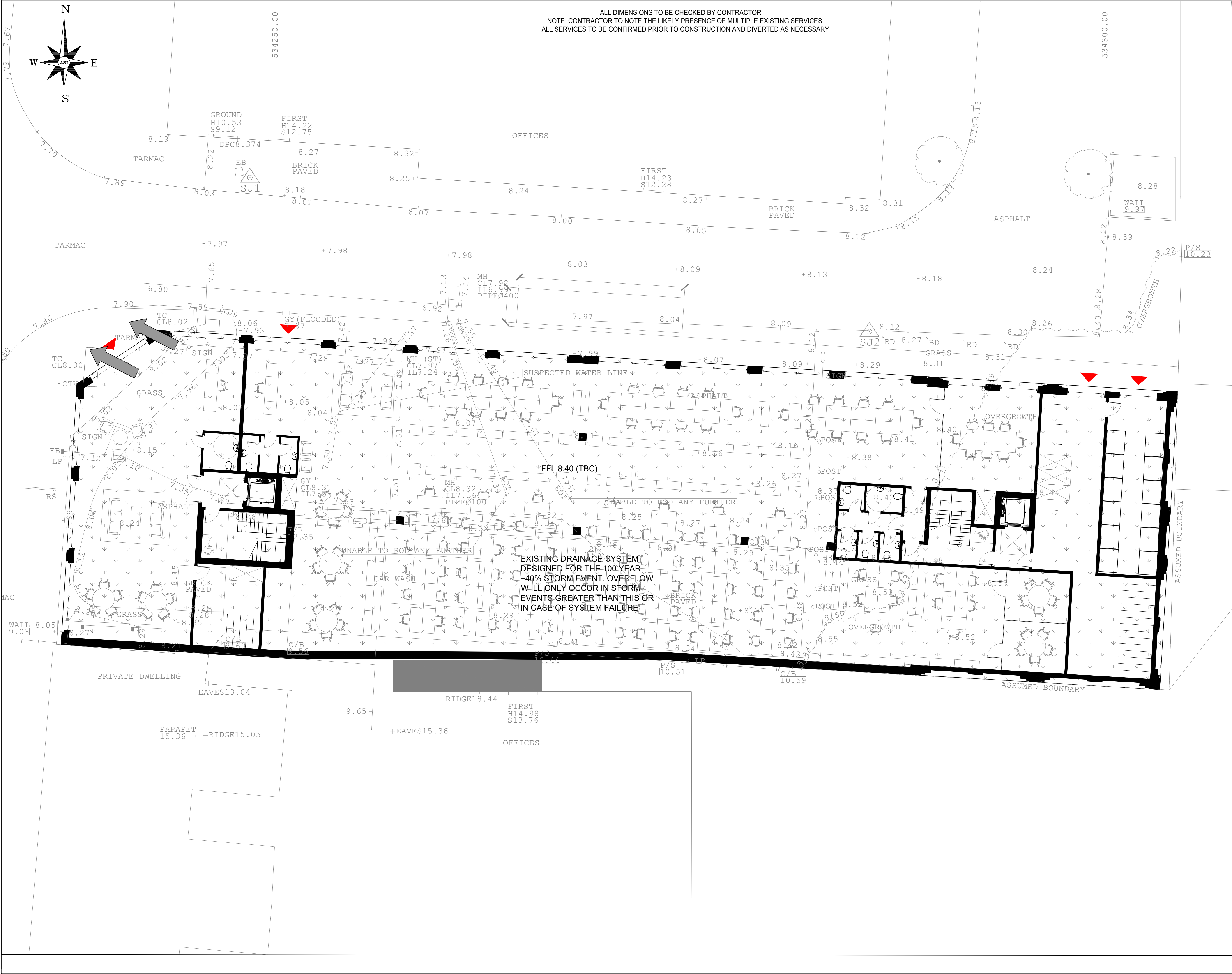
Project

Broad Lane, Haringey

Drawing

Proposed Drainage Details

Dwg no C02		Checked AW		Surveyor -	
Date 30.01.23		Scale		AS SHOWN	
Job No. P4932J2734					Rev. -
Grid	Contours	Level Datum			



Job No.

P4932J2734

Rev.

DRAINAGE NOTES

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8. UNLESS NOTED OTHERWISE, PIPES TO BE:
FOUL PIPES UNDER BUILDING #100@140;
FOUL PIPES EXTERNAL #100@180;
SURFACE WATER PIPES #150@100

STORMWATER CONCEPT LEGEND

18.30x

Proposed Level

FFL 80.90

Finished floor level

Overland flow

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Amendments

Rev	Date	By	Chkd
A	16.11.22	For Planning	AW

JOMAS

ENGINEERING ENVIRONMENTAL

Jomas Associates Ltd.
Unit 24 Sarum Complex,
Salisbury Road,
Uxbridge, UB8 2RZ

Project

Broad Lane, Haringey

Drawing

Proposed Overland Flow

Dwg no	Checked	Surveyor
C03	AW	-
Date	30.01.23	Scale 1:100
Job No.	P4932J2734	Rev. -

Grid	Contours	Level Datum

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	10	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	0.600
Time of Entry (mins)	2.00	Include Intermediate Ground	x
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1			8.400	450	50.000	50.000	1.400
2			8.400	450	60.000	40.000	1.200
3			8.400	450	70.000	40.000	1.000
4			8.400	450	80.000	40.000	0.800
5			8.400	450	90.000	40.000	0.700
6			8.400	450	55.000	40.000	0.700
7	0.015	2.00	20.000	450	65.000	40.000	0.700
8	0.030	2.00	20.000	450	45.000	40.000	0.700
9	0.030	2.00	20.000	450	85.000	40.000	0.700
10	0.030	2.00	20.000	450	95.000	40.000	0.700
11	0.020	2.00	20.000	450	60.000	40.000	0.700

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.004	2	1	14.142	0.600	7.200	7.000	0.200	70.7	150	2.55	50.0
1.003	3	2	10.000	0.600	7.400	7.200	0.200	50.0	150	2.36	50.0
1.002	4	3	10.000	0.600	7.600	7.400	0.200	50.0	150	2.24	50.0
1.001	5	4	10.000	0.600	7.800	7.600	0.200	50.0	150	2.12	50.0
4.001	6	2	5.000	0.600	7.800	7.200	0.600	8.3	150	2.03	50.0
5.000	7	2	5.000	0.600	19.300	7.700	11.600	0.4	100	2.01	50.0
3.000	8	3	25.000	0.600	19.300	7.700	11.600	2.2	100	2.08	50.0
2.000	9	4	5.000	0.600	19.300	7.650	11.650	0.4	100	2.01	50.0
1.000	10	5	5.000	0.600	19.300	7.700	11.600	0.4	100	2.01	50.0
4.000	11	6	5.000	0.600	19.300	7.700	11.600	0.4	100	2.01	50.0

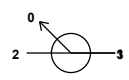
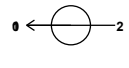
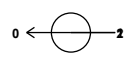
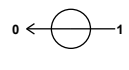
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.004	1.197	21.2	16.9	1.050	1.250	0.125	0.0	102	1.327
1.003	1.426	25.2	12.2	0.850	1.050	0.090	0.0	74	1.414
1.002	1.426	25.2	8.1	0.650	0.850	0.060	0.0	58	1.271
1.001	1.426	25.2	4.1	0.450	0.650	0.030	0.0	41	1.051
4.001	3.511	62.1	2.7	0.450	1.050	0.020	0.0	21	1.767
5.000	11.890	93.4	2.0	0.600	0.600	0.015	0.0	11	4.876
3.000	5.310	41.7	4.1	0.600	0.600	0.030	0.0	21	3.333
2.000	11.915	93.6	4.1	0.600	0.650	0.030	0.0	14	5.994
1.000	11.890	93.4	4.1	0.600	0.600	0.030	0.0	14	5.981
4.000	11.890	93.4	2.7	0.600	0.600	0.020	0.0	12	5.338

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.004	14.142	70.7	150	Circular	8.400	7.200	1.050	8.400	7.000	1.250
1.003	10.000	50.0	150	Circular	8.400	7.400	0.850	8.400	7.200	1.050
1.002	10.000	50.0	150	Circular	8.400	7.600	0.650	8.400	7.400	0.850
1.001	10.000	50.0	150	Circular	8.400	7.800	0.450	8.400	7.600	0.650
4.001	5.000	8.3	150	Circular	8.400	7.800	0.450	8.400	7.200	1.050
5.000	5.000	0.4	100	Circular	20.000	19.300	0.600	8.400	7.700	0.600
3.000	25.000	2.2	100	Circular	20.000	19.300	0.600	8.400	7.700	0.600
2.000	5.000	0.4	100	Circular	20.000	19.300	0.600	8.400	7.650	0.650
1.000	5.000	0.4	100	Circular	20.000	19.300	0.600	8.400	7.700	0.600
4.000	5.000	0.4	100	Circular	20.000	19.300	0.600	8.400	7.700	0.600

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.004	2	450	Manhole	Adoptable	1	450	Manhole	Adoptable
1.003	3	450	Manhole	Adoptable	2	450	Manhole	Adoptable
1.002	4	450	Manhole	Adoptable	3	450	Manhole	Adoptable
1.001	5	450	Manhole	Adoptable	4	450	Manhole	Adoptable
4.001	6	450	Manhole	Adoptable	2	450	Manhole	Adoptable
5.000	7	450	Manhole	Adoptable	2	450	Manhole	Adoptable
3.000	8	450	Manhole	Adoptable	3	450	Manhole	Adoptable
2.000	9	450	Manhole	Adoptable	4	450	Manhole	Adoptable
1.000	10	450	Manhole	Adoptable	5	450	Manhole	Adoptable
4.000	11	450	Manhole	Adoptable	6	450	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	50.000	50.000	8.400	1.400	450		1.004	7.000	150
2	60.000	40.000	8.400	1.200	450		5.000 4.001 1.003 1.004	7.700 7.200 7.200 7.200	100 150 150 150
3	70.000	40.000	8.400	1.000	450		3.000 1.002	7.700 7.400	100 150
4	80.000	40.000	8.400	0.800	450		1.003 2.000 1.001	7.400 7.650 7.600	150 100 150
5	90.000	40.000	8.400	0.700	450		1.002 1.000	7.600 7.700	150 100
6	55.000	40.000	8.400	0.700	450		1.001 4.000	7.800 7.700	150 100
							4.001	7.800	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
7	65.000	40.000	20.000	0.700	450				
						0	5.000	19.300	100
8	45.000	40.000	20.000	0.700	450				
						0	3.000	19.300	100
9	85.000	40.000	20.000	0.700	450				
						0	2.000	19.300	100
10	95.000	40.000	20.000	0.700	450				
						0	1.000	19.300	100
11	60.000	40.000	20.000	0.700	450				
						0	4.000	19.300	100

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
10	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node 7 Online Orifice Control

Flap Valve	x	Invert Level (m)	19.300	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.030		

Node 8 Online Orifice Control

Flap Valve	x	Invert Level (m)	19.300	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.030		

Node 9 Online Orifice Control

Flap Valve	x	Invert Level (m)	19.300	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.030		

Node 10 Online Orifice Control

Flap Valve	x	Invert Level (m)	19.300	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.030		

Node 11 Online Orifice Control

Flap Valve	x	Invert Level (m)	19.300	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.030		

Node 7 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	19.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	100.0	0.0	0.300	100.0	0.0	0.301	1.0	0.0

Node 8 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	19.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	300.0	0.0	0.300	300.0	0.0	0.301	1.0	0.0

Node 9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	19.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	300.0	0.0	0.300	300.0	0.0	0.301	1.0	0.0

Node 10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	19.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	300.0	0.0	0.300	300.0	0.0	0.301	1.0	0.0

Node 11 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	19.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	100.0	0.0	0.200	100.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	122.465	34.653
2 year 15 minute winter	85.940	34.653
2 year 30 minute summer	77.041	21.800
2 year 30 minute winter	54.064	21.800
2 year 60 minute summer	50.567	13.363
2 year 60 minute winter	33.595	13.363
2 year 120 minute summer	33.528	8.860
2 year 120 minute winter	22.275	8.860
2 year 180 minute summer	26.408	6.796
2 year 180 minute winter	17.166	6.796
2 year 240 minute summer	21.041	5.560
2 year 240 minute winter	13.979	5.560
2 year 360 minute summer	15.973	4.110
2 year 360 minute winter	10.383	4.110
2 year 480 minute summer	12.460	3.293
2 year 480 minute winter	8.278	3.293
2 year 600 minute summer	10.108	2.765
2 year 600 minute winter	6.907	2.765
2 year 720 minute summer	8.932	2.394
2 year 720 minute winter	6.003	2.394
2 year 960 minute summer	7.230	1.904
2 year 960 minute winter	4.789	1.904
2 year 1440 minute summer	5.170	1.385
2 year 1440 minute winter	3.474	1.385
2 year 2160 minute summer	3.679	1.017
2 year 2160 minute winter	2.535	1.017
2 year 2880 minute summer	3.068	0.822
2 year 2880 minute winter	2.062	0.822
2 year 4320 minute summer	2.371	0.620
2 year 4320 minute winter	1.562	0.620
2 year 5760 minute summer	2.008	0.514
2 year 5760 minute winter	1.299	0.514
2 year 7200 minute summer	1.759	0.449
2 year 7200 minute winter	1.135	0.449
2 year 8640 minute summer	1.584	0.404
2 year 8640 minute winter	1.022	0.404
2 year 10080 minute summer	1.456	0.372
2 year 10080 minute winter	0.940	0.372
10 year 15 minute summer	246.485	69.747
10 year 15 minute winter	172.972	69.747
10 year 30 minute summer	156.910	44.400
10 year 30 minute winter	110.112	44.400
10 year 60 minute summer	102.685	27.137
10 year 60 minute winter	68.222	27.137
10 year 120 minute summer	62.424	16.497
10 year 120 minute winter	41.473	16.497
10 year 180 minute summer	47.163	12.137
10 year 180 minute winter	30.657	12.137
10 year 240 minute summer	36.693	9.697
10 year 240 minute winter	24.378	9.697
10 year 360 minute summer	27.208	7.001
10 year 360 minute winter	17.686	7.001

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
10 year 480 minute summer	20.879	5.518
10 year 480 minute winter	13.872	5.518
10 year 600 minute summer	16.738	4.578
10 year 600 minute winter	11.437	4.578
10 year 720 minute summer	14.656	3.928
10 year 720 minute winter	9.850	3.928
10 year 960 minute summer	11.717	3.085
10 year 960 minute winter	7.762	3.085
10 year 1440 minute summer	8.230	2.206
10 year 1440 minute winter	5.531	2.206
10 year 2160 minute summer	5.740	1.586
10 year 2160 minute winter	3.955	1.586
10 year 2880 minute summer	4.711	1.262
10 year 2880 minute winter	3.166	1.262
10 year 4320 minute summer	3.542	0.926
10 year 4320 minute winter	2.332	0.926
10 year 5760 minute summer	2.934	0.751
10 year 5760 minute winter	1.899	0.751
10 year 7200 minute summer	2.526	0.644
10 year 7200 minute winter	1.630	0.644
10 year 8640 minute summer	2.242	0.572
10 year 8640 minute winter	1.447	0.572
10 year 10080 minute summer	2.036	0.519
10 year 10080 minute winter	1.314	0.519
30 year 15 minute summer	331.574	93.824
30 year 15 minute winter	232.684	93.824
30 year 30 minute summer	212.425	60.109
30 year 30 minute winter	149.071	60.109
30 year 60 minute summer	138.857	36.696
30 year 60 minute winter	92.253	36.696
30 year 120 minute summer	82.237	21.733
30 year 120 minute winter	54.636	21.733
30 year 180 minute summer	61.546	15.838
30 year 180 minute winter	40.007	15.838
30 year 240 minute summer	47.587	12.576
30 year 240 minute winter	31.616	12.576
30 year 360 minute summer	34.934	8.990
30 year 360 minute winter	22.708	8.990
30 year 480 minute summer	26.682	7.051
30 year 480 minute winter	17.727	7.051
30 year 600 minute summer	21.331	5.835
30 year 600 minute winter	14.575	5.835
30 year 720 minute summer	18.644	4.997
30 year 720 minute winter	12.530	4.997
30 year 960 minute summer	14.881	3.918
30 year 960 minute winter	9.857	3.918
30 year 1440 minute summer	10.388	2.784
30 year 1440 minute winter	6.981	2.784
30 year 2160 minute summer	7.177	1.983
30 year 2160 minute winter	4.945	1.983
30 year 2880 minute summer	5.842	1.566
30 year 2880 minute winter	3.926	1.566

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 4320 minute summer	4.329	1.132
30 year 4320 minute winter	2.851	1.132
30 year 5760 minute summer	3.545	0.907
30 year 5760 minute winter	2.294	0.907
30 year 7200 minute summer	3.025	0.772
30 year 7200 minute winter	1.952	0.772
30 year 8640 minute summer	2.665	0.680
30 year 8640 minute winter	1.720	0.680
30 year 10080 minute summer	2.405	0.614
30 year 10080 minute winter	1.552	0.614
100 year 15 minute summer	430.183	121.727
100 year 15 minute winter	301.883	121.727
100 year 30 minute summer	278.294	78.748
100 year 30 minute winter	195.294	78.748
100 year 60 minute summer	182.728	48.290
100 year 60 minute winter	121.400	48.290
100 year 120 minute summer	106.459	28.134
100 year 120 minute winter	70.729	28.134
100 year 180 minute summer	79.131	20.363
100 year 180 minute winter	51.437	20.363
100 year 240 minute summer	61.001	16.121
100 year 240 minute winter	40.528	16.121
100 year 360 minute summer	44.736	11.512
100 year 360 minute winter	29.080	11.512
100 year 480 minute summer	34.207	9.040
100 year 480 minute winter	22.726	9.040
100 year 600 minute summer	27.356	7.483
100 year 600 minute winter	18.692	7.483
100 year 720 minute summer	23.901	6.406
100 year 720 minute winter	16.063	6.406
100 year 960 minute summer	19.003	5.004
100 year 960 minute winter	12.588	5.004
100 year 1440 minute summer	13.162	3.528
100 year 1440 minute winter	8.846	3.528
100 year 2160 minute summer	8.999	2.487
100 year 2160 minute winter	6.200	2.487
100 year 2880 minute summer	7.258	1.945
100 year 2880 minute winter	4.878	1.945
100 year 4320 minute summer	5.297	1.385
100 year 4320 minute winter	3.488	1.385
100 year 5760 minute summer	4.283	1.096
100 year 5760 minute winter	2.772	1.096
100 year 7200 minute summer	3.619	0.923
100 year 7200 minute winter	2.336	0.923
100 year 8640 minute summer	3.162	0.807
100 year 8640 minute winter	2.041	0.807
100 year 10080 minute summer	2.833	0.723
100 year 10080 minute winter	1.828	0.723
100 year +40% CC 15 minute summer	602.257	170.418
100 year +40% CC 15 minute winter	422.636	170.418
100 year +40% CC 30 minute summer	389.612	110.247
100 year +40% CC 30 minute winter	273.412	110.247

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 60 minute summer	255.819	67.606
100 year +40% CC 60 minute winter	169.960	67.606
100 year +40% CC 120 minute summer	149.043	39.388
100 year +40% CC 120 minute winter	99.021	39.388
100 year +40% CC 180 minute summer	110.784	28.508
100 year +40% CC 180 minute winter	72.012	28.508
100 year +40% CC 240 minute summer	85.402	22.569
100 year +40% CC 240 minute winter	56.739	22.569
100 year +40% CC 360 minute summer	62.631	16.117
100 year +40% CC 360 minute winter	40.712	16.117
100 year +40% CC 480 minute summer	47.889	12.656
100 year +40% CC 480 minute winter	31.817	12.656
100 year +40% CC 600 minute summer	38.299	10.476
100 year +40% CC 600 minute winter	26.168	10.476
100 year +40% CC 720 minute summer	33.461	8.968
100 year +40% CC 720 minute winter	22.488	8.968
100 year +40% CC 960 minute summer	26.604	7.006
100 year +40% CC 960 minute winter	17.623	7.006
100 year +40% CC 1440 minute summer	18.427	4.939
100 year +40% CC 1440 minute winter	12.384	4.939
100 year +40% CC 2160 minute summer	12.598	3.482
100 year +40% CC 2160 minute winter	8.680	3.482
100 year +40% CC 2880 minute summer	10.162	2.723
100 year +40% CC 2880 minute winter	6.829	2.723
100 year +40% CC 4320 minute summer	7.415	1.939
100 year +40% CC 4320 minute winter	4.883	1.939
100 year +40% CC 5760 minute summer	5.996	1.535
100 year +40% CC 5760 minute winter	3.881	1.535
100 year +40% CC 7200 minute summer	5.066	1.292
100 year +40% CC 7200 minute winter	3.270	1.292
100 year +40% CC 8640 minute summer	4.427	1.129
100 year +40% CC 8640 minute winter	2.857	1.129
100 year +40% CC 10080 minute summer	3.966	1.012
100 year +40% CC 10080 minute winter	2.560	1.012

Results for 2 year Critical Storm Duration. Lowest mass balance: 90.62%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	23	7.045	0.045	4.1	0.0000	0.0000	OK
30 minute winter	2	23	7.246	0.046	4.1	0.0073	0.0000	OK
60 minute winter	3	71	7.432	0.032	2.5	0.0051	0.0000	OK
30 minute winter	4	25	7.626	0.026	1.6	0.0041	0.0000	OK
30 minute winter	5	25	7.819	0.119	0.8	0.0189	0.0000	OK
15 minute winter	6	13	7.812	0.112	0.8	0.0178	0.0000	OK
15 minute winter	7	12	19.504	0.204	2.8	0.4201	0.0000	SURCHARGED
30 minute winter	8	24	19.505	0.205	3.8	1.4696	0.0000	SURCHARGED
30 minute winter	9	24	19.505	0.205	3.8	1.4696	0.0000	SURCHARGED
30 minute winter	10	24	19.505	0.205	3.8	1.4696	0.0000	SURCHARGED
15 minute winter	11	13	19.507	0.207	3.7	0.7012	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	2	1.004	1	4.1	0.911	0.193	0.0635	11.4
60 minute winter	3	1.003	2	2.5	0.829	0.097	0.0364	
30 minute winter	4	1.002	3	1.6	0.694	0.065	0.0237	
30 minute winter	5	1.001	4	0.8	0.503	0.032	0.0164	
15 minute winter	6	4.001	2	0.8	0.378	0.013	0.0131	
15 minute winter	7	Orifice	2	0.8				
30 minute winter	8	Orifice	3	0.8				
30 minute winter	9	Orifice	4	0.8				
30 minute winter	10	Orifice	5	0.8				
15 minute winter	11	Orifice	6	0.8				

Results for 10 year Critical Storm Duration. Lowest mass balance: 90.62%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	30	7.045	0.045	4.2	0.0000	0.0000	OK
30 minute winter	2	29	7.247	0.047	4.2	0.0074	0.0000	OK
120 minute winter	3	144	7.432	0.032	2.5	0.0051	0.0000	OK
60 minute winter	4	52	7.626	0.026	1.7	0.0042	0.0000	OK
60 minute winter	5	52	7.819	0.119	0.8	0.0189	0.0000	OK
30 minute winter	6	29	7.812	0.112	0.9	0.0179	0.0000	OK
30 minute winter	7	25	19.515	0.215	3.9	1.4664	0.0000	SURCHARGED
60 minute winter	8	52	19.514	0.214	4.8	4.0802	0.0000	SURCHARGED
60 minute winter	9	52	19.514	0.214	4.8	4.0802	0.0000	SURCHARGED
60 minute winter	10	52	19.514	0.214	4.8	4.0802	0.0000	SURCHARGED
30 minute winter	11	28	19.523	0.223	5.1	2.2564	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	2	1.004	1	4.2	0.918	0.199	0.0648	23.1
120 minute winter	3	1.003	2	2.5	0.832	0.099	0.0369	
60 minute winter	4	1.002	3	1.7	0.699	0.066	0.0240	
60 minute winter	5	1.001	4	0.8	0.507	0.033	0.0167	
30 minute winter	6	4.001	2	0.9	0.386	0.014	0.0134	
30 minute winter	7	Orifice	2	0.8				
60 minute winter	8	Orifice	3	0.8				
60 minute winter	9	Orifice	4	0.8				
60 minute winter	10	Orifice	5	0.8				
30 minute winter	11	Orifice	6	0.9				

Results for 30 year Critical Storm Duration. Lowest mass balance: 90.62%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	30	7.046	0.046	4.3	0.0000	0.0000	OK
30 minute winter	2	30	7.247	0.047	4.3	0.0075	0.0000	OK
60 minute winter	3	59	7.432	0.032	2.6	0.0051	0.0000	OK
60 minute winter	4	58	7.627	0.027	1.7	0.0042	0.0000	OK
60 minute winter	5	58	7.819	0.119	0.9	0.0189	0.0000	OK
30 minute winter	6	30	7.813	0.113	0.9	0.0179	0.0000	OK
30 minute winter	7	28	19.524	0.224	5.2	2.3213	0.0000	SURCHARGED
60 minute winter	8	58	19.522	0.222	6.5	6.3182	0.0000	SURCHARGED
60 minute winter	9	58	19.522	0.222	6.5	6.3182	0.0000	SURCHARGED
60 minute winter	10	58	19.522	0.222	6.5	6.3182	0.0000	SURCHARGED
30 minute winter	11	30	19.536	0.236	7.0	3.5224	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	2	1.004	1	4.3	0.923	0.203	0.0658	31.4
60 minute winter	3	1.003	2	2.6	0.834	0.102	0.0377	
60 minute winter	4	1.002	3	1.7	0.703	0.068	0.0244	
60 minute winter	5	1.001	4	0.9	0.510	0.034	0.0169	
30 minute winter	6	4.001	2	0.9	0.387	0.014	0.0137	
30 minute winter	7	Orifice	2	0.9				
60 minute winter	8	Orifice	3	0.9				
60 minute winter	9	Orifice	4	0.9				
60 minute winter	10	Orifice	5	0.9				
30 minute winter	11	Orifice	6	0.9				

Results for 100 year Critical Storm Duration. Lowest mass balance: 90.62%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	1	58	7.046	0.046	4.4	0.0000	0.0000	OK
60 minute winter	2	58	7.248	0.048	4.4	0.0076	0.0000	OK
60 minute winter	3	59	7.433	0.033	2.6	0.0052	0.0000	OK
60 minute winter	4	59	7.627	0.027	1.7	0.0043	0.0000	OK
60 minute winter	5	59	7.819	0.119	0.9	0.0189	0.0000	OK
60 minute winter	6	57	7.813	0.113	0.9	0.0179	0.0000	OK
30 minute winter	7	30	19.535	0.235	6.8	3.4448	0.0000	SURCHARGED
60 minute winter	8	59	19.532	0.232	8.5	9.1693	0.0000	SURCHARGED
60 minute winter	9	59	19.532	0.232	8.5	9.1693	0.0000	SURCHARGED
60 minute winter	10	59	19.532	0.232	8.5	9.1693	0.0000	SURCHARGED
60 minute winter	11	57	19.553	0.253	5.7	5.1323	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	2	1.004	1	4.4	0.930	0.209	0.0672	50.6
60 minute winter	3	1.003	2	2.6	0.836	0.104	0.0384	
60 minute winter	4	1.002	3	1.7	0.708	0.069	0.0248	
60 minute winter	5	1.001	4	0.9	0.514	0.035	0.0172	
60 minute winter	6	4.001	2	0.9	0.388	0.015	0.0140	
30 minute winter	7	Orifice	2	0.9				
60 minute winter	8	Orifice	3	0.9				
60 minute winter	9	Orifice	4	0.9				
60 minute winter	10	Orifice	5	0.9				
60 minute winter	11	Orifice	6	0.9				

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 90.62%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	1	59	7.048	0.048	4.6	0.0000	0.0000	OK
60 minute winter	2	59	7.249	0.049	4.6	0.0078	0.0000	OK
60 minute winter	3	60	7.433	0.033	2.7	0.0053	0.0000	OK
60 minute winter	4	60	7.627	0.027	1.8	0.0043	0.0000	OK
60 minute winter	5	60	7.820	0.120	0.9	0.0190	0.0000	OK
60 minute winter	6	59	7.813	0.113	1.0	0.0180	0.0000	OK
60 minute winter	7	57	19.557	0.257	5.9	5.5232	0.0000	SURCHARGED
60 minute winter	8	60	19.548	0.248	11.9	13.9788	0.0000	SURCHARGED
60 minute winter	9	60	19.548	0.248	11.9	13.9788	0.0000	SURCHARGED
60 minute winter	10	60	19.548	0.248	11.9	13.9788	0.0000	SURCHARGED
60 minute winter	11	58	19.585	0.285	7.9	8.1351	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	2	1.004	1	4.6	0.941	0.219	0.0695	65.5
60 minute winter	3	1.003	2	2.7	0.839	0.108	0.0397	
60 minute winter	4	1.002	3	1.8	0.716	0.072	0.0254	
60 minute winter	5	1.001	4	0.9	0.520	0.036	0.0176	
60 minute winter	6	4.001	2	1.0	0.388	0.016	0.0144	
60 minute winter	7	Orifice	2	0.9				
60 minute winter	8	Orifice	3	0.9				
60 minute winter	9	Orifice	4	0.9				
60 minute winter	10	Orifice	5	0.9				
60 minute winter	11	Orifice	6	1.0				



Blue Roofs



The BauderBLUE Roof System is a sustainable drainage method designed to attenuate and manage stormwater on a flat roof over a 24-hour period via a restrictive flow outlet.

This rooftop solution is specified where construction is being carried out in urban areas and particularly within flood sensitive areas.

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BAUDER BLUE ROOF SYSTEM

Sustainable Urban Drainage





Development and expansion of towns and cities has seen exponential use of impervious surfaces causing artificially high rates of rainwater runoff. In measures to prevent flooding, planners are restricting the amount of rainwater leaving a site via the drainage system which can be limited to 5-10 litres per second per hectare, the same flow rates for regional greenfield sites.

A BauderBLUE Roof is a solution for urban areas where options for ground-based attenuation systems are limited, and in particular, where construction is being carried out within flood sensitive areas. This rooftop sustainable urban drainage system (SuDS) has weight load implications and the project's structural engineer will need to be engaged with the design process from an early stage.

Blue Roof for SuDS

The specifically engineered Bauder outlet restricts the discharge of stormwater to a calculated and predesigned flow rate to significantly slow down the volume of water leaving the site. As the storm passes, water continues to discharge from the roof at a controlled rate over a 24-hour period that helps to avoid downstream or localised flooding.

The BauderBLUE Roof System can be constructed at either rooftop or podium level. The designed void space between the flat roof waterproofing membrane and hard or soft landscaping finish allows the stormwater to attenuate.

Key Features

- Simple low maintenance design.
- Bespoke, project specific discharge rates to match the requirement of the SuDS report for the site.
- Can be created on zero falls or up to 1:40 pitch.
- Correct volume and weight of water storage with built in overflow to ensure the maximum water level (HMax) is never exceeded and a tell-tale parapet overflow is utilised to visibly identify if water levels rise close to the HMax.
- Designed to work in conjunction with the Bauder Total Green Roof System and Bauder Hot Melt System.

Specification Support



Specification downloads:

www.bauder.co.uk/technical-centre



Telephone helpline:

0845 271 8800



BLUE ROOF DESIGN

System Configuration

The BauderBLUE Roof is designed for use with either the Bauder Total Green Roof System as a warm roof or the Bauder Hot Melt cold roof construction.

The design of the void space requires free-flowing water movement to the specifically engineered outlets.

The baseplate of the blue roof system sits within a standard Bauder outlet and slows water leaving the roof via a calculated number of restrictive flow holes. The number of flow holes, up to a maximum of 12, is calculated to reflect the SuDS calculation for permitted discharge rate for the site.

If, in the event of a storm of greater magnitude than 1:100 plus 40% for climate change, then water will evacuate the roof through the central overflow.

The design of every blue roof is individual to the project and geographical location. The roof should have minimal penetrations in the construction. We use details of the roof area and the drainage requirements for the site to produce a roof specific discharge report as part of our service.



Restrictor Flow Hole

Bauder Infograph Video



To view the entire animation: <https://www.bauder.co.uk/blue-roofs>

BLUE ROOF SURFACE FINISHES



BLUE ROOFS

BLUE ROOF DESIGN CONSIDERATIONS

Many local planning authorities (LPAs) are adopting early perspectives that encompass Schedule 3 of the Flood and Water Act 2010 to bring in measures that prevent flooding. Within construction and development, planners are restricting the amount of rainwater leaving a site via the drainage system, limiting water egress to 5-10 litres per second per hectare, the same flow rates for regional greenfield sites.

We have a comprehensive Blue Roof Design Considerations Guide available to download from, www.bauder.co.uk/technical-centre.

Design of a Blue Roof

A blue roof can be at rooftop or podium level and is designed to attenuate storm water within a void which sits directly above the waterproofing layer and beneath a surface finish such as a vegetated green roof or hard landscaping.

A blue roof should not be designed as a water storage facility but should allow all the water to evacuate the roof over a 24-hour period from the end of the projected maximum rainfall event.

Key Aspects

- 1. Single Point Source and Guarantee.** Consider the waterproofing, blue roof and surface design finish as one element, to ensure compatibility and guarantee clarity.
- 2. Void Space.** To have the correct capacity to accommodate the predicted stormwater levels during a 1:100 year storm and the permanent load of the required finish and any imposing loading.
- 3. British Standards.** Standards and Systems Codes of Practice for waterproofing and roof detailing.
- 4. Roof Penetrations.** must be minimal or eliminated in the area where water is to be attenuated, other than the rainwater outlets or emergency overflows that are required for drainage functionality.
- 5. Emergency Overflow.** Unconnected to the blue roof outlet flow restrictor, to discharge the rainwater.

Drainage

The discharge rate for the site is set by the local planning authority. The blue roof may be included to supplement other methods, or designed as the sole solution. The blue roof may be designed to accept a higher or lower percentage of the controlled discharge depending on other attenuation or storage options available in other areas of the site or because the building will have loading restrictions or limited available height for the rooftop solution.

Deck Construction

The implementation of a blue roof will have considerable loading implication on the roof and its waterproofing. The roof deck construction will need to be designed not only to accept the dead and imposed loads*, but also the weight loading associated with the water to be attenuated on the roof.

A blue roof can be designed on zero falls providing the waterproofing system holds relevant certification and the roof is designed in accordance with British Standards.

Waterproofing

Consideration must be given to the appropriate form of waterproofing so that it can meet the demands placed on it by the blue roof.

If the blue roof construction has a finish where germination of any plant seedlings is possible the membrane should be tested and approved to the current FLL and GRO guidelines.

Our blue roof solutions utilise two robust waterproofing constructions; a bituminous warm or cold roof build-up with the Bauder Total Roof System (Green for soft landscaping) or a Bauder Hot Melt cold roof construction. Both systems carry BBA certification and are suitable to maintain the integrity required for blue and green roof applications.

Void-Forming Component

The void forming component must have the correct structural capacity to resist the permanent load of the required finish and any imposing loading.

The void-forming components must:

- Have the capacity to fully accommodate the predicted storm water for a 24-hour period.
- Be resistant to chemicals such as fertilisers, petro-based compounds and water bound pollutants carried in by rainfall typically from 4-9pH.
- Allow free-flowing movement of water to the flow restrictor outlets.
- Be designed beneath the surface finish and be able to prevent any ponding or flooding occurring on the surface finish.



Blue Roof Outlets

Restrictor Outlets

The design, manufacture and installation of a flow restrictor and outlet is critical to the success of a blue roof as the outlet will be subjected to greater water pressures than standard gravity-fed drainage and it could be immersed for long periods.

Emergency Overflows

Emergency drainage will be provided with the primary outlet and a secondary method of drainage to facilitate the removal of excess rainfall if the designed capacity is exceeded. The emergency overflow outlet will be specified and the base of the overflow pipe should be placed level with the top of the void height or H-Max.

Maintenance access is important to allow for clearing of any silt, debris, or leaf and plant matter which could block or restrict the flow of water through the emergency outlet. This is particularly important if trees are located nearby, as they can be a frequent source of material.

Surface Finishes

The surface finish will be able to freely drain in to the attenuating void space without submitting to ponding water or flooding.

Suitable permeable surface finishes are:

- Paving or decking on a pedestal support system.
- Extensive green roofs, such as sedum or wildflower systems.
- Intensive green roofs, such as lawns, planters and more substantial planting.
- BioSOLAR.

Impermeable surface finishes require approaches to ensure the water can drain or filter in to the blue roof void space so that attenuation of rainwater can occur.

Ensuring Success

Designing a blue roof requires specialist knowledge and a cohesive approach with full compatibility of the waterproofing void components, outlets and finish. We provide the complete design package and guarantees for every project to ensure success.

BREEAM

If you are working to BREEAM, please contact a member of our technical team, who can advise on best practice for your individual project

Pollution

This category addresses the prevention and control of pollution and surface water run-off associated with the building's location and use.

Pol 03 – Flood and surface water management

This section emphasises the importance to avoid, reduce and delay the discharge of rainfall to public sewers and watercourses, thereby minimising the risk and impact of localised flooding on-site and off-site, watercourse pollution and other environmental damage.

A BauderBLUE roof system is a solution for urban areas where options for ground-based attenuation systems are limited. This rooftop sustainable urban drainage system (SuDS) has specifically engineered outlets to restrict the discharge of stormwater to a calculated and predesigned flow rate to significantly slow down the volume of water leaving the site.

BLUE ROOF FLOW RESTRICTORS



Bauder Bitumen Blue Roof Flow Restrictor

The Bauder Bitumen Blue Roof Flow Restrictor is designed to be used in conjunction with a standard Bauder Bitumen Blue Roof Vertical Outlet DN70. The Bauder Blue Roof Bitumen Flow Restrictor is comprised of four parts; Baseplate, overflow pipe, Baseplate inner and Baseplate outer seal. The polyamide Baseplate fits within the 70mm vertical outlet, with the EPDM outer seal creating a watertight fit. The HDPE Overflow slots into the central hole of the Baseplate with an inner EPDM seal preventing any leaks.

Baseplate has a number (1-12) of 10mm restrictive flow holes bespoke to the project.



Bauder Hot Melt Blue Roof Flow Restrictor

The Bauder Hot Melt Blue Roof Flow Restrictor is designed to be used in conjunction with a Bauder Hot Melt Compact Vertical Outlet DN70. The Bauder Hot Melt Blue Roof Flow Restrictor is comprised of four parts; Baseplate, Overflow pipe, inner and outer seal. The polyamide Baseplate fits within the 70mm vertical outlet, with the EPDM outer seal creating a watertight fit. The HDPE Overflow slots into the central hole of the Baseplate with an inner EPDM seal preventing any leaks.

The Baseplate has a number (1-12) of 10mm restrictive flow holes bespoke to the project.

DRAINAGE VOID FORMER

Attenuation Cell 100 - For Blue Roofs



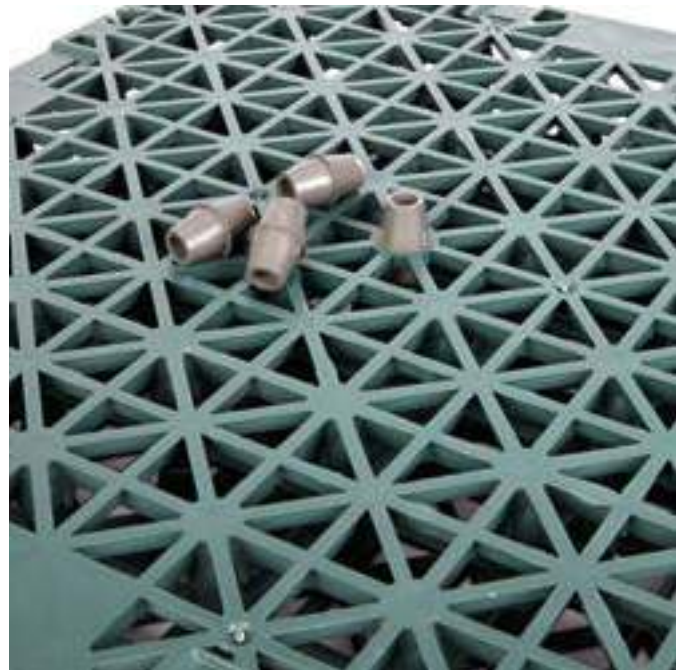
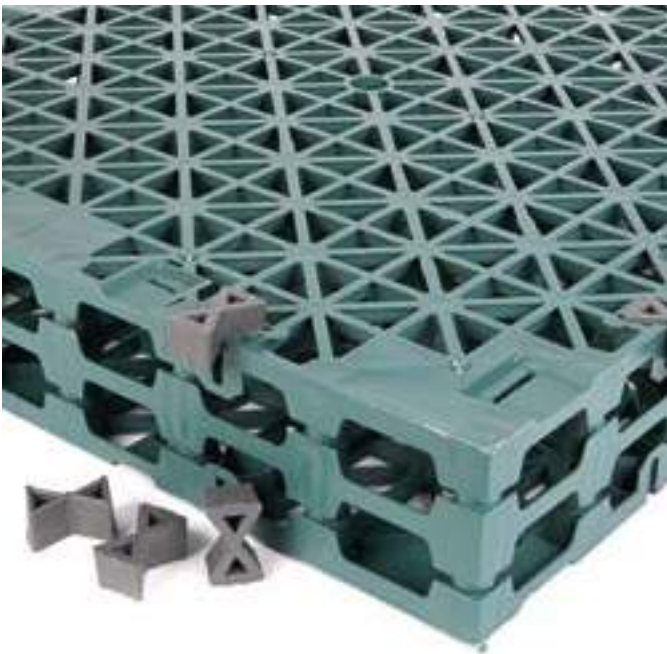
The Bauder Attenuation Cell 100 is a multi-directional drainage layer used primarily as a void former in our blue roof systems.

The boards are designed to create the void space required between the flat roof waterproofing and the hard or soft landscaping finish to allow the stormwater to attenuate. The product is over 95% void and has excellent compressive strength for use under green roofs and hard landscaping surfaces. Attenuation Cell 100 is laid on a protection layer above the completed waterproofing to provide continuous drainage.

Material	Recycled HDPE
Board size	0.6 x 0.6m
Thickness	100mm
Weight	2.9Kg/m ²
Water holding capacity	95 litres/m ² (95% void space)
Compressive strength	≥400kN/m ² vertically 100kN/m ² laterally

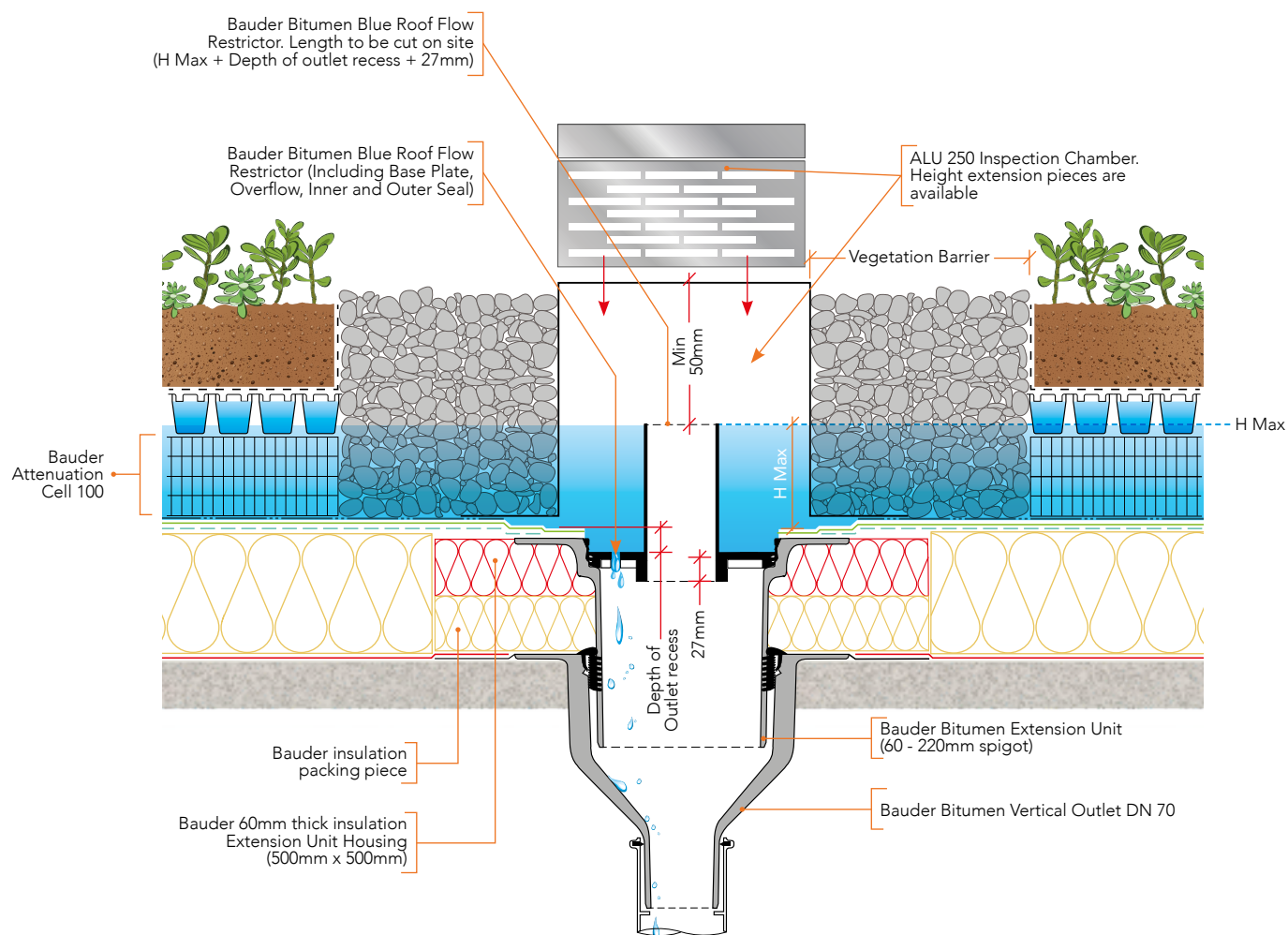
Attenuation Cell Connectors

The Cross Connectors link the boards together horizontally, the Shear Connectors connect two layers of Attenuation Cell 100 should they be required.



GENERAL DETAILING

Blue roofs for SuDS

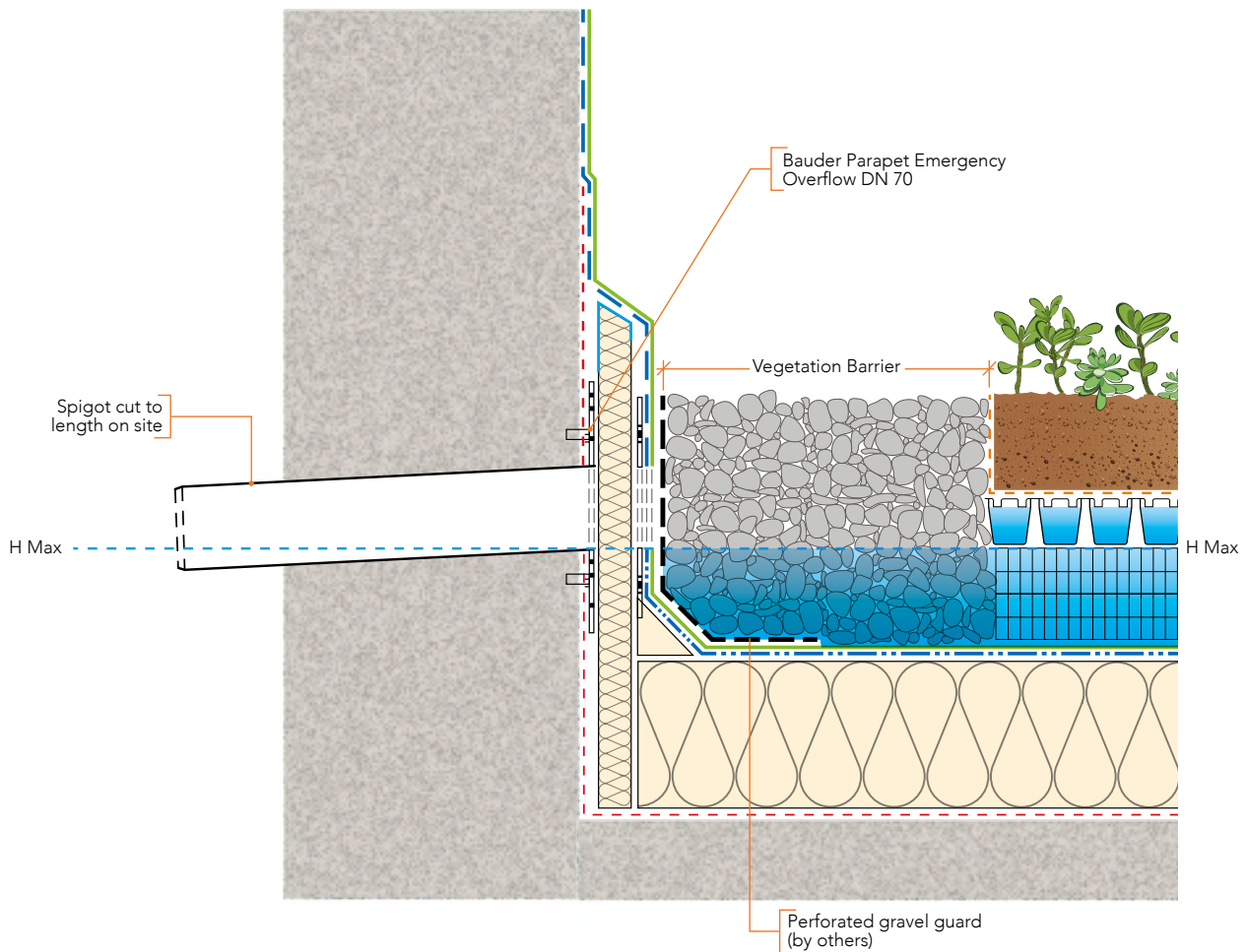


The cross section above shows the BauderBLUE Roof System. The Flow Restrictor sits securely within the outlet and precisely controls the flow rate of rainwater off the roof (each restrictor is bespoke to the roof requirements).

The Attenuation Cell 100 provides an open void for holding back rainwater in the short term. This will only start to fill in heavy storm conditions when the restricted flow is exceeded. During a heavy storm, the water builds up to a maximum (normally set at a 1:100 Yr storm event (+40% for global warming)). In the event of this being exceeded the water is safely discharged through the overflow in the centre of the flow restrictor.

Prior to finalising the roof design Bauder carries out detailed calculations to establish the configuration of the restrictors and their individual flow rate plus the maximum depth of water allowed to build up on the roof (H-Max).

The layers above the Attenuation Cell 100 (DSE drainage board, substrate and vegetation) are the green roof elements, and whilst they greatly help with the attenuation of water on the roof they are separate to the blue roof elements.



NFRC guidelines for blue roofs recommend that a parapet overflow is always installed to enable excess water to drain off the roof.

The Bauder Emergency Overflow is designed to act as a highly visible 'tell-tale' of the level of water on the roof. It provides a useful indicator should water build up to the H-Max point. Bauder's Flow Restrictors have additional vertical overflows to prevent the H-Max ever being exceeded.



National Innovation Centre for Data
Newcastle upon Tyne

Appendix D: SuDS Maintenance Report

WE LISTEN, WE PLAN, WE DELIVER

Geotechnical Engineering and Environmental Services across the UK.

DRAINAGE MAINTENANCE PLAN

Broad Lane, Haringey, N15 4QJ

JOMAS ASSOCIATES LTD

Unit 24 Sarum Complex, Salisbury Road, Uxbridge, UB8 2RZ

www.jomasassociates.com info@jomasassociates.com

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Should you have any queries relating to this report, please contact

JOMAS ASSOCIATES LTD

www.jomasassociates.com

info@jomasassociates.com

1.0 GENERAL

- 1.1** Sustainable Drainage Systems (SuDS) are an environmentally friendly approach to managing rainfall. SuDS techniques use landscape features to deal with surface water with the aim to:
- 1.1.1 Control the flow, volume and frequency of water leaving a development.
 - 1.1.2 Prevent pollution by intercepting silt and cleaning runoff from hard surfaces.
 - 1.1.3 Provide attractive surroundings for the community.
- 1.2** The surface water drainage strategy for this development utilises Green/blue roofs as the main SUDS features. The following sections provides a brief description of these features and outlines the maintenance programme that should be adopted.

2.0 CLEANING OF THE DRAINAGE SYSTEM

- 2.1** Drainage systems should be inspected at regular intervals and where necessary, thoroughly cleaned out at the same time. Any defects discovered should be made good.
- 2.2** The following operations should be carried out during the periodic cleaning of a drainage system:-

Product Type	Period	Responsibility	Maintenance Methods
<i>Silt Trap</i>	As necessary and before wet season	Owner/ Maintenance Company	- Sediment and debris that accumulated during summer needs to be removed before the wet season. - Inspect and clean out routinely prior to inlet pipework to minimise debris reaching the tank. - Conduct inspections more frequently during the wet season for the area where sediment or trash accumulates more often. Clean and repair as needed.
<i>Standard Manholes/ Inspection Chambers</i>	As necessary	Owner/ Maintenance Company	Remove and clean any soil and vegetation that covers the manhole cover to prevent blockage of the drainage system at the manhole.

Product Type	Period	Responsibility	Maintenance Methods
			Renew/replace any damaged/missing bolts and damaged/missing manhole covers.
Drainage Pipes	Six monthly interval	Owner/ Maintenance Company	Inspect underground drainage pipes to ensure that the distribution pipework arrangement is operational and free from blockages. If required, take remedial action.
Green/Blue Roof	As required	Owner/ Maintenance Company	Inspect the roof after any precipitation to ensure no displacement of any organic matter onto the surface of the pavement.
	As required	Owner/ Maintenance Company	Regular maintenance as recommended by manufacturer for storage system and outlets
	Annually and after large storms	Owner/ Maintenance Company	Inspection/check of all inlets to ensure that they are in good condition and operating as designed.

3.0 SKETCHES AND PLANS

3.1 The locations of the above features can be found by examining Drawing P4932J2734-C01

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JOMAS ASSOCIATES LTD

Unit 24 Sarum Complex

Salisbury Rd

Uxbridge

UB8 2RZ

CONTACT US

Website: www.jomasassociates.com

Tel: 0333 305 9054

Email: info@jomasassociates.com