SUDS / DRAINAGE ASSESSMENT FOR PLANNING

AT

90-94 NOTTINGHAM ROAD, SOMERCOTES, DERBYSHIRE, DE55 4LY

December 2020

Ark Environmental Consultancy Ltd

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1.0 Scope

This report contains the details of a SUDS Drainage Strategy for planning carried out by Ark Environmental Consulting Limited ("ARK Ltd") for 90-94 NOTTINGHAM ROAD, SOMERCOTES, DERBYSHIRE, DE55 4LY, henceforth referred to as "the site" in this report.

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2.0 Introduction

The information source used to undertake this FRA has been collected from the following sources:

- British Geological Survey Website and iGeology Website
- EA Website
- Amber Valley Borough Council: Strategic Flood Risk Assessment, policies, mapping and guidance
- Amber Valley Borough Council Joint Preliminary Flood Risk Assessment (2011 and as updated);
- Derbyshire County Council as the Lead Local Flood Authority (LLFA) SUDS guidance
- Internet mapping and searches

3.0 Existing Site Status and Setting

3.1 Site Location and Status

The application site stands on a corner plot, fronting Nottingham Road (B600), at the junction with Victoria Street; the site comprises a part 2 and 3 storey building and hardstanding and shrubland / garden area.

The site is 85% impermeable and is c. 0.1115ha (1,115.00m2).

The site location plan and existing layout is included within Appendix A.

3.2 Geology

Geology

Based on BGS mapping and boreholes (and know conditions of the majority of Hounslow area):

- Bedrock: Pennine Lower Coal Measures Formation - Mudstone, Siltstone And Sandstone
- Superficial deposits: none noted

Geology & SUDS

Given the geology and proximity to other properties, the SUDS strategy necessarily needs to be storage on site using the highest forms of SUDS feasible, with restricted discharge to sewer, likely using the existing connections if they are found to be in suitable condition.

It is considered that given the geology and site setting / constraints, there is no need to undertake BRE365 testing because a soakaway is not an option.

3.4 Topography

The site ground level is at c. 149.7mAOD (based on OS levels)

Slight slope downwards to the west along Victoria Road and to the north and rear of the site (yard area) otherwise relatively flat site surrounded by roads / other properties).

Requirement for Full Topo to be valid assessment:

Note to LLFA: a full detailed topographic survey is not considered necessary specifically for this site and scheme given it is:

a) a change of use
b) not in a flood risk zone for fluvial or pluvial (surface water)
c) the existing drainage operates under gravity
d) out scheme does not propose any lower levels that could result in lower inverts

Critical: therefore the inverts of existing and proposed manholes / connections can be expressed in metres depth below ground level (Mbgl) rather than relative to ordnance datum and still be valid given the type of scheme.

3.5 Existing Drainage & Greenfield

Public sewer records have not been sourced however there are public sewers located within the adjacent streets given the existing connection(s) at the site and neighbouring properties.

A specific drainage survey of the site has not been carried out, however, there is at least one connection from the existing building to the public sewer network.

Furthermore, the invert levels for the adjacent sewers are understood to be at least c. 1.2m below ground level (148.5mAOD); the existing property discharges using gravity; gravity drainage will be feasible for ground and upper floors.

All site inverts can be above the sewer connection inverts.

There is no evidence of any existing SUDS.

The site currently discharges unattenuated.

An assessment of the Greenfield equivalent discharge for the site has been carried out. This has confirmed an average discharge rate (QBAR) of a nominal 0.57 l/s. This low rate is due to a simple fact: the site is small.

A copy of the calculation output is included in Appendix C.

3.6 Note on Drainage Rates Building Regs Part H and BS EN 752-4

The joint DEFRA/EA R&D rainfall runoff management for developments Report-SC030219 states that

"a practicable minimum limit on the discharge rate from a flow attenuation device is often a compromise between attenuating to a satisfactorily low flow rate while keeping the risk of blockage to an acceptable level. This limit is set at 5 litres per second, using an appropriate vortex or other flow control device".

Technology has indeed moved on and there are manufacturers providing improved flow control devices since the DEFRA/EA report was published, permitting flows lower than 5 l/sec through their devices without increasing the flood risk from blockages.

Drainage rates are a function of the size of the site, rainfall inputs, nature of the site and the likely coefficients / geology, etc.

It is impossible for this site based on the function of the size to discharge even at 2.0 l/s in the 1in200year event, (in fact the calculations demonstrate 1.74 l/s).

Thus, this and other very small sites (single dwelling plots usually) will have a maximum feasible discharge rate significantly lower than the lowest allowed restriction rate; this is a fact and is controlled by the official guidance. That is why a pragmatic sustainable response is required.

In accordance with Building Regs Part H, for surface water drainage, a self-cleansing velocity of 0.7 l/sec must be maintained in all pipes and all pipes sizes are required to be of a minimum pipe size of 75mm. Thus, peak flow rates lower than 3 l/sec will fail to meet BS EN 752-4 and/or the Building Regulations Part H requirements.

The reason for the Building Regs and BS is simple: “mitigate at source” and “design out the risk” i.e. it is logical to not design modern systems with pipes / restriction devices that could be too easily blocked over time as these will cause greater risks of flooding and make any expensive and heavily engineered SUDS schemes totally pointless.

4.0 Assessment of Proposed Development

4.1 Proposed Development

The proposed development (Appendix B) comprises:

- Majority demolish existing structure; retain part facade
- Erect new multi storey building as a residential apartment block
    - Maximisation of porous and permeable areas as amenity / access
    - Maximisation of highest forms of SUDS
- **Reduces flood risk overall and meets LLFA SUDS requirements**
    - Restricting discharge on a previously unattenuated site
    - New SUDS to meet 2020 requirements

4.2 Foul Drainage

Based on proposed residential development the maximum peak foul discharge generated represents a minimal increase which unlikely to give rise to any capacity concerns within the public sewer network.

Subject to the approval of the Water Company, it is proposed to connect the foul discharge to the public foul sewer via the existing connection, subject to condition and level.

This scheme also reduces flood risk because it incorporates significantly more SUDS attenuation on the site than the existing arrangement given the simple fact that it has to because the guidance and the LLFA requirements are much more strict.

Thus the peak discharge will be reduced significantly and this is a betterment.

Subject to exact confirmation of the public sewer invert level and the proposed finished development levels, it is expected that a gravity connection will be feasible.

4.3 Surface Water Drainage

In accordance with the NPPF, PPG and LLFA policy requirements, sustainable drainage systems (SUDS) should be incorporated wherever possible to reduce positive surface water run-off and flood risk to other areas.

Intrusive ground investigation works have not been carried out on site at this stage, however, the likely stratum as per the British Geological Survey (BGS) mapping suggests the stratum would not be suitable for the use of infiltration SUDS techniques given also the site constraints.

As a precaution for the discharge connection, so as not to rely on an unknown and to demonstrate a worse case of SUDS storage on site with restricted discharge, it is recommended that SUDS techniques are restricted to the use of the highest forms of SUDS feasible i.e. surface storage, with also permeable paving and underground storage.

It is proposed to provide an attenuation based surface water strategy to serve run-off from the proposed roof area; the attenuation provides the required restriction on site.

There is no need to provide formal heavy engineered restriction devices because it is not possible for the site to discharge above the lowest restriction rate feasible.

4.4 SUDS Storage Calculations

Calculations have been prepared based on the Micro Drainage software package to assess the size of structure require, based on the following design criteria.

- The site as existing is discharging 100% unattenuated to the sewer
- The scheme will result in a c. 55% impermeable site
- Use 65% of the site in the calculations
    - This is 10% greater than the 55% reduction from existing rates including for climate change
    - This is a significant oversizing and betterment
- Design event for storage - 100 year (with climate change; see below)
- Climate change allowance - 40%
- Discharge rate used purely for the calculations to generate an oversized volume of storage – 3.0 l/s (no restriction device actually required)
- The storage calculation output is included within Appendix C.
    - Storage required: 26.0m3

The site will store on site for 100% of the impermeable areas + an additional 10% for the full 1in100year+40% climate change at the site.

SUDS storage needs to be as high / shallow as is feasible in order to maximise opportunity for gravity drainage given the topography of the site: rear is lower.

4.5 SUDS Specifications: SUDS Hierarchy Compliant

Formal SUDS Type	Source Control	Dimensions	Storage Volume
Porous amenity areas Communal Garden area to rear	Yes	n/a	n/a
Permeable Paving	YES	n/a	n/a
Above ground planted beds with raised edges / reduced levels for storage	YES	2 number Total of c. 11m x 1.1m Use 0.4m height / depths = 4.84m3	4.84m3
Planters with integrated storage	Yes	Total of 15.0m length by 0.4m width = 6.0m2 Total height of 1.0m 0.6m for soil depth at the surface Void for storage to be 0.4m below the soil storage = 2.4m3 of storage (6.0m2 x 0.4m)	2.4m3
Permeable Parking Spaces with lined granular underground storage (assume a 30% void space for the granular angular material)	YES Permeable paving takes roof runoff	Each car park space is 12.25m2 (4.9m by 2.5m standard) A) 2 car park spaces to east at 0.3m depth = 24.5m2 x 0.2m = 4.9m3 Use 30% void for granular = 2.20m3 B) 11 car park spaces main area at 0.45m depth = 134.75m2 x 0.45m = 60.64m3 Use 30% void for granular = 18.192m3 Total: 20.39m3 (2.20m2 + 18.19m2)	20.39m3
		Total	27.63m3 Greater than the already significantly oversized 26.0m3 required

The indicative layout plan included within Appendix D shows locations for the SUDS structures.

It is proposed to connect the now restricted discharge from the surface storage, planter storage, permeable paving + lined granular storage directly to the public sewer system. The scheme restricts the discharge to the sewer hence the approval of Anglian Water is considered obtainable during detailed designs as this is betterment with future-proofing for the 100 year lifetime of the scheme and reduces flood risk to and from the infrastructure.

Why use Lined Granular rather than Lined Geocellular?

This is a more sustainable form as the granular material can be reclaimed materials and also does not require more heavily engineered conveyance infrastructure.

Even though there are recycled plastic geocellular products on the market, these still require energy and emissions to produce.

Granular material is in lifecycle terms a much more sustainable approach.

But what about the void ratio of Granular vs Geocellular?

The calculations include for only a 30% void for the granular storage. It is considered that given the actual volume of storage calculated has been significantly over calculated and the scheme incorporates more storage than is required regardless, this is appropriate to account for the lifetime silting up of the granular material.

4.6 Connections / Invert Levels

The surface storage and storage planters are at height and hence can discharge easily with gravity to meet the invert of the sewer at Victoria Street.

For the shallow granular:

- Lowest ground level for the area of granular = 149.40mAOD (c. 300mm lower than Victoria Street)
- Top layer of 0.3m
- Granular of 0.45m
- Hence granular lowest invert of 148.65mAOD
- This allows a 150m fall to road to get to sewer invert of 148.50mAOD
- The distance from granular outfall to the sewer invert is c. 10.0 metres

Given short distance, this provides suitable gradient to enable gravity drainage.

4.7 Green Roofs

The rooftop areas have not been included as part of the SUDS strategy at this stage because the exact make-up for a green roof would not be confirmed. It is not possible or necessary at this stage to design to exact specifications of green roof as the stratum depth is not known and will have structural implications that are not necessary to quantify for the planning stage.

The SUDS strategy has been done in this way at this stage so there is no reliance on an unknown to demonstrate compliance.

Regardless: this scheme has majority pitched roofs and hence a green roof is not suitable or commensurate with the scale of the scheme.

4.8 Pipe Sizes / Manholes / Pipe Runs

These will be confirmed as part of detailed designs; specifications of landscaping and drainage products need to be confirmed through planning and at a later date.

This is not required at this stage to demonstrate scheme can accommodate the surface water flows or meet LLFA requirements.

Further Enhancements

The SUDS strategy does not rely on any green roof areas to meet the required storage volumes. The cycle storage roof is geocellular storage below a sedum roof: the make-up of the sedum roof is irrelevant because it is the geocellar that provides the storage not the soil of the sedum roof.

Whilst internal rainwater harvesting is not proposed, it is recommended that rainwater pipes are fitted with water butts wherever feasible. Whilst the use of water butts won't reduce the

design criteria of the receiving below ground drainage system, their use will reduce the time of entry and provide a supply of water for irrigation.

It will be necessary for the surface water drainage system to comply with the Environment Agency's pollution prevention guidance. Roof run-off is classified as uncontaminated and, in accordance with EA pollution prevention guidance, will not require any treatment. Any surface water run-off draining through permeable paving and the granular storage will receive an adequate level of filtration through the associate substrate.

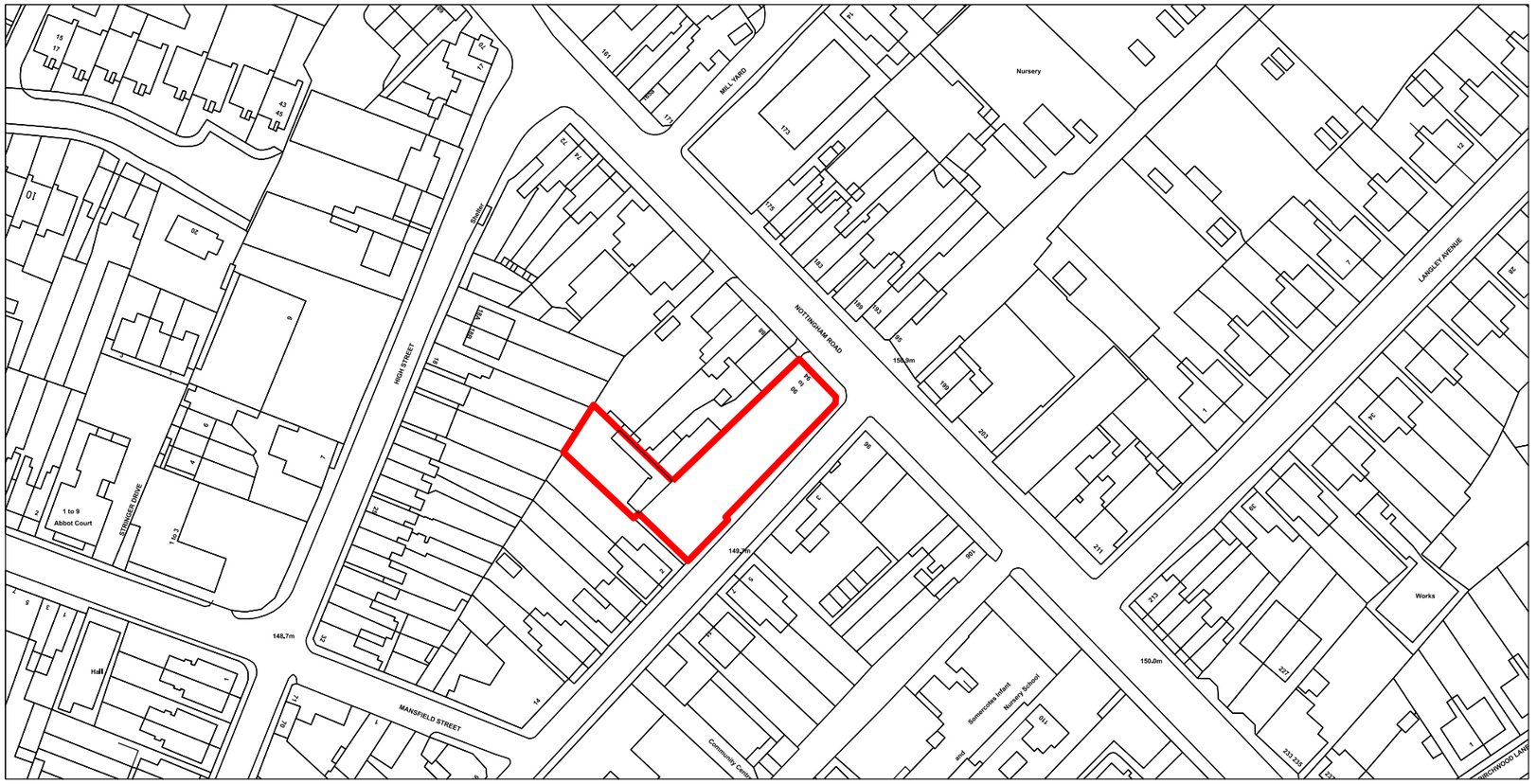
4.9 Maintenance

With respect to maintenance, the proposed SUDS techniques should be maintained in accordance with the appropriate regimes set out within the SUDS manual and will be the responsibility of the owner / management company.

A SUDS maintenance schedule is included within Appendix E.

APPENDICES

APPENDIX A



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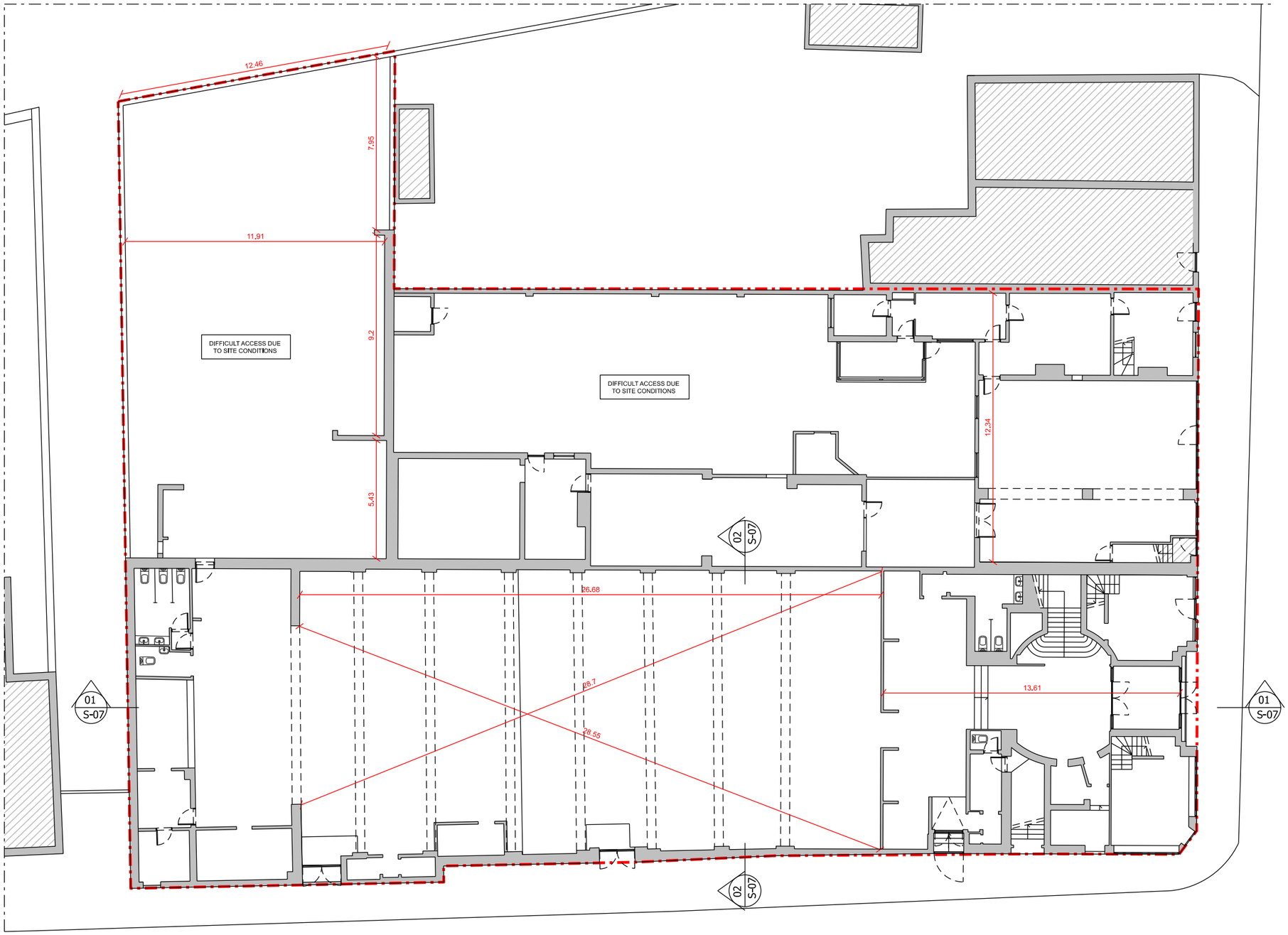

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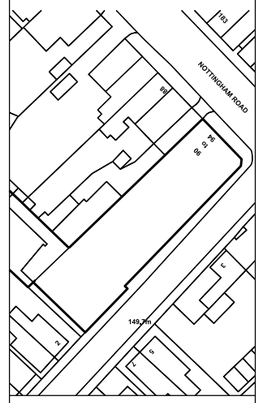

Boundary Line

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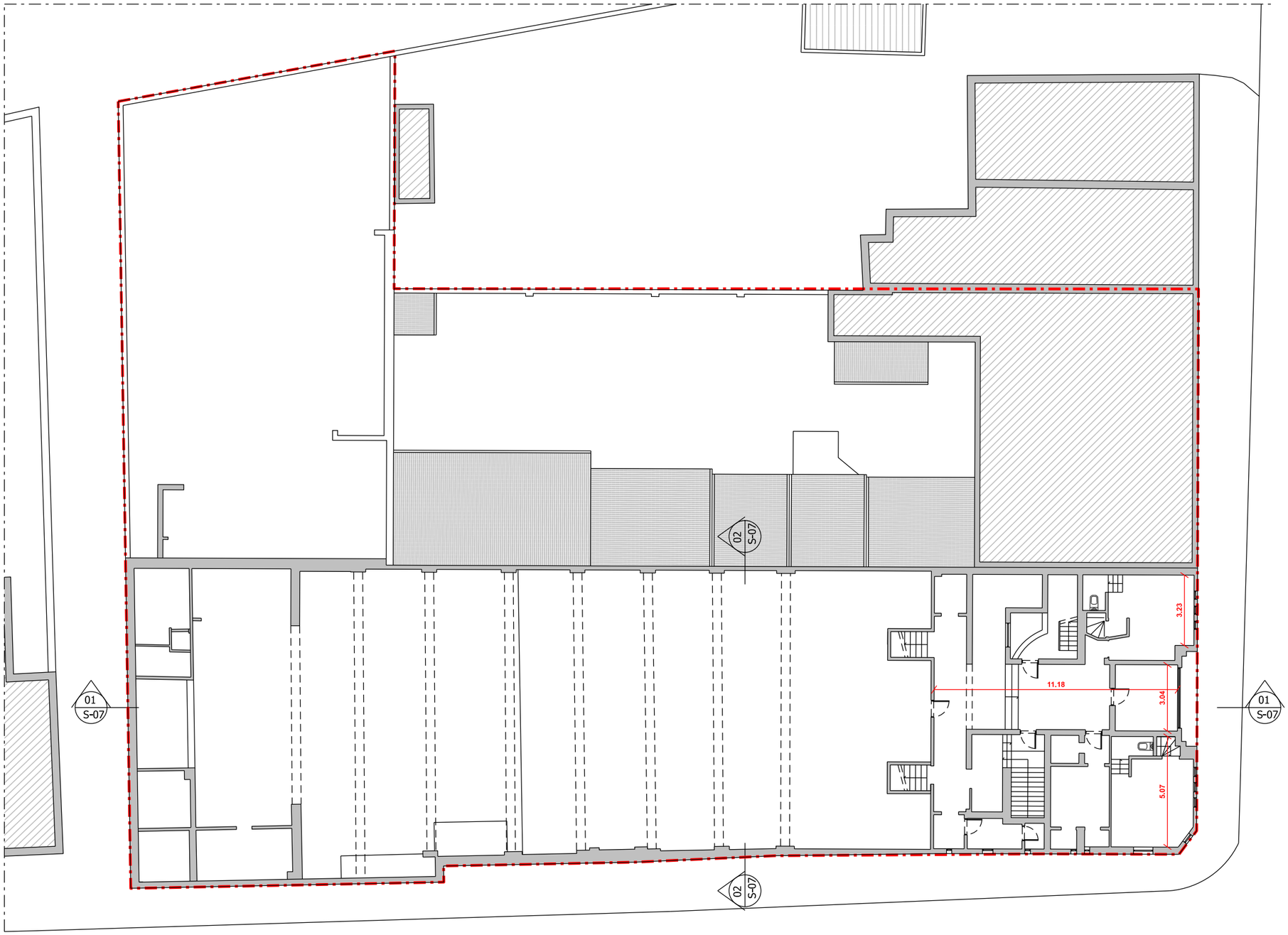

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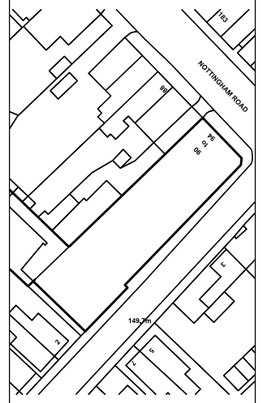

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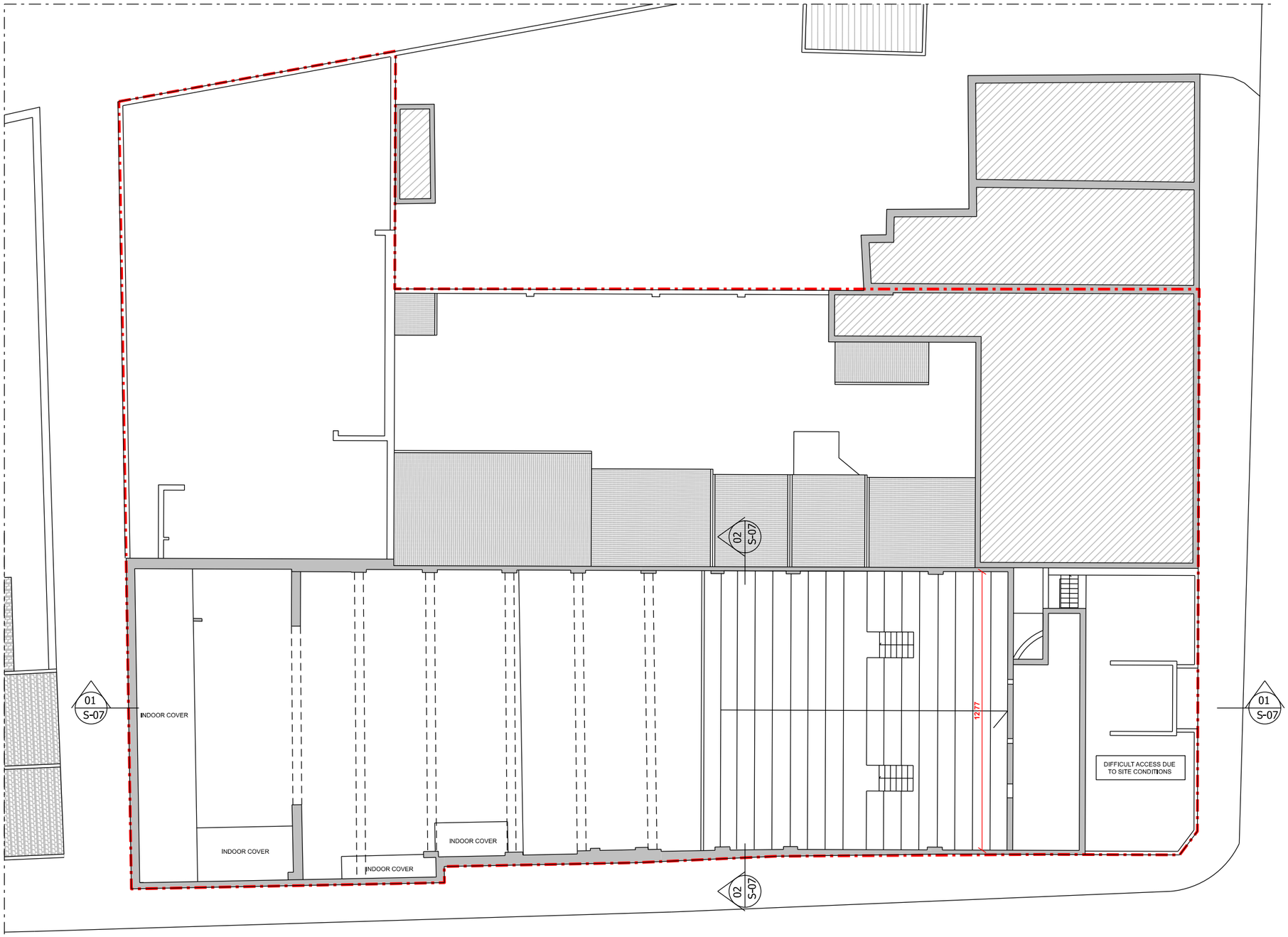

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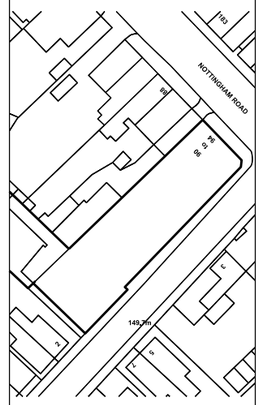

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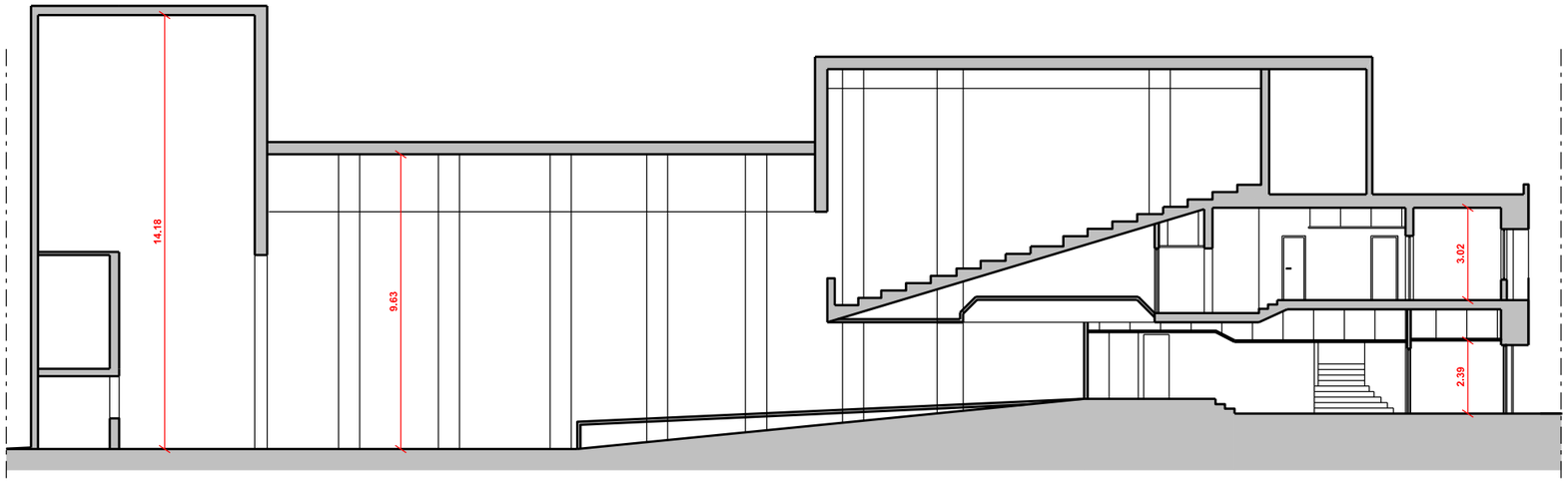

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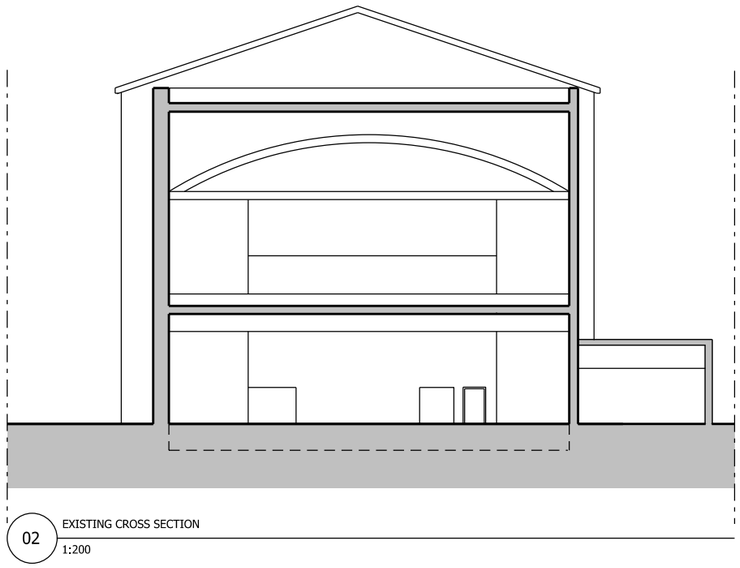

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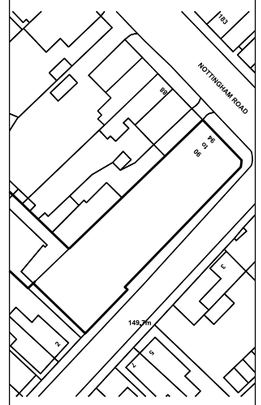

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EXISTING SECTIONS

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APPENDIX B

GROSS DEVELOPMENT AREA

GROUND FLOOR: 586,50 SQM
FRIST FLOOR: 590,00 SQM
SECOND FLOOR: 592,10 SQM

TOTAL GROSS DEVELOPMENT AREA: 1768,60 SQM

SCHEDULE OF ACCOMMODATION

TOTAL 1NO BEDROOM FLATS: 13
TOTAL 2NO BEDROOM FLATS: 5
TOTAL 3NO BEDROOM FLATS: 2

Unit 01/ 2 Bedroom flat - 3 Occupants : 61,00 Sqm
Unit 02/ 1 Bedroom flat - 1 Occupant: 42,60 Sqm
Unit 03/ 1 Bedroom flat - 1 Occupant: 45,80 Sqm
Unit 04/ 1 Bedroom flat - 2 Occupants : 58,50 Sqm
Unit 05/ 2 Bedroom flat - 3 Occupants : 61,00 Sqm
Unit 06/ 2 Bedroom flat - 3 Occupants : 66,00 Sqm
Unit 07/ 1 Bedroom flat - 2 Occupants : 55,60 Sqm
Unit 08/ 1 Bedroom flat - 1 Occupant: 40,10 Sqm
Unit 09/ 1 Bedroom flat - 1 Occupant: 39,10 Sqm
Unit 10/ 1 Bedroom flat - 2 Occupants : 54,20 Sqm
Unit 11/ 3 Bedroom flat - 5 Occupants : 99,50 Sqm
Unit 12/ 1 Bedroom flat - 2 Occupants : 56,60 Sqm
Unit 13/ 2 Bedroom flat - 3 Occupants : 61,00 Sqm
Unit 14/ 2 Bedroom flat - 3 Occupants : 66,00 Sqm
Unit 15/ 1 Bedroom flat - 2 Occupants : 55,60 Sqm
Unit 16/ 1 Bedroom flat - 1 Occupants : 40,10 Sqm
Unit 17/ 1 Bedroom flat - 1 Occupants : 39,10 Sqm
Unit 18/ 1 Bedroom flat - 2 Occupants : 54,40 Sqm
Unit 19/ 3 Bedroom flat - 5 Occupants : 102,50 Sqm
Unit 20/ 1 Bedroom flat - 2 Occupants : 56,60 Sqm

PARKING AND BIKES

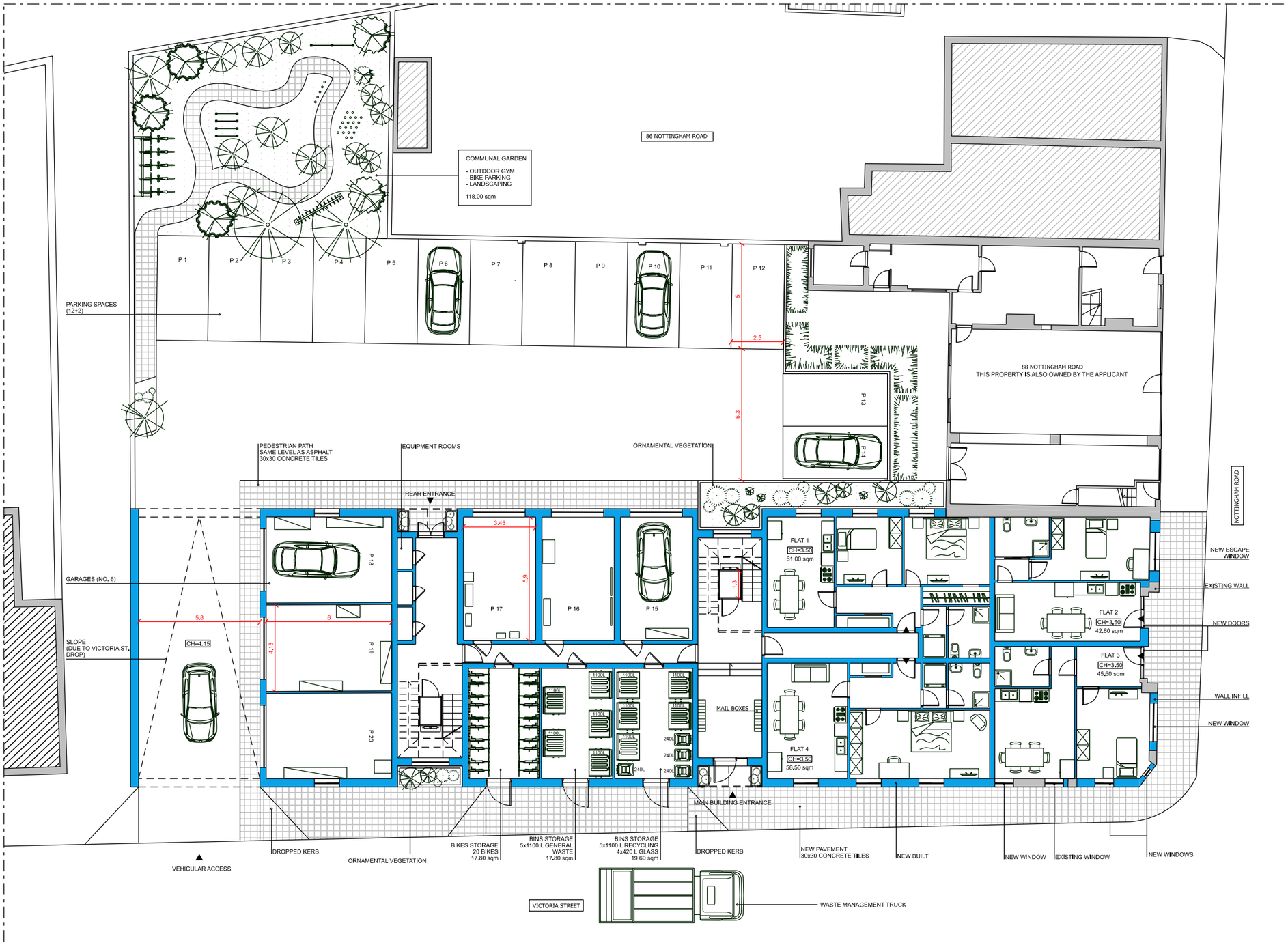
OUTDOOR PARKING SPACES: 14
GARAGES: 6
BIKES STORARE: 20

WASTE MANAGMENT PROVISION

GENERAL WASTE: 5x1100 L REFUSE BINS
RECYCLING: 5x1100 L MIXED RECYCLING BINS
RECYCLING: 4x240L BINS FOR GLASS

AMENITY SPACE

COMMUNAL GARDEN: 118 sqm
INDOOR RELAXATION AREAS: 26 sqm



01 PROPOSED GROUND FLOOR PLAN
1:200

M 1:200
0 1 2 3 4 5 6 8 10 12 14 16 18 20 [m]

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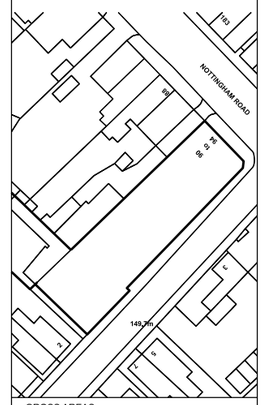

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Address
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drawing title
PROPOSED FLOOR PLAN

date	scale	
SEPTEMBER 2020	1:200@A3	GFS

drawing number	sheet no.	rev
S-08	8 OF 14	-

GROSS DEVELOPMENT AREA

GROUND FLOOR: 586,50 SQM
FIRST FLOOR: 590,00 SQM
SECOND FLOOR: 592,10 SQM

TOTAL GROSS DEVELOPMENT AREA: 1768,60 SQM

SCHEDULE OF ACCOMMODATION

TOTAL 1NO BEDROOM FLATS: 13
TOTAL 2NO BEDROOM FLATS: 5
TOTAL 3NO BEDROOM FLATS: 2

Unit 01/ 2 Bedroom flat - 3 Occupants : 61,00 Sqm
Unit 02/ 1 Bedroom flat - 1 Occupant : 42,60 Sqm
Unit 03/ 1 Bedroom flat - 1 Occupant : 45,80 Sqm
Unit 04/ 1 Bedroom flat - 2 Occupants : 58,50 Sqm
Unit 05/ 2 Bedroom flat - 3 Occupants : 61,00 Sqm
Unit 06/ 2 Bedroom flat - 3 Occupants : 66,00 Sqm
Unit 07/ 1 Bedroom flat - 2 Occupants : 55,60 Sqm
Unit 08/ 1 Bedroom flat - 1 Occupant : 40,10 Sqm
Unit 09/ 1 Bedroom flat - 1 Occupant : 39,10 Sqm
Unit 10/ 1 Bedroom flat - 2 Occupants : 54,20 Sqm
Unit 11/ 3 Bedroom flat - 5 Occupants : 99,50 Sqm
Unit 12/ 1 Bedroom flat - 2 Occupants : 56,60 Sqm
Unit 13/ 2 Bedroom flat - 3 Occupants : 61,00 Sqm
Unit 14/ 2 Bedroom flat - 3 Occupants : 66,00 Sqm
Unit 15/ 1 Bedroom flat - 2 Occupants : 55,60 Sqm
Unit 16/ 1 Bedroom flat - 1 Occupants : 40,10 Sqm
Unit 17/ 1 Bedroom flat - 1 Occupants : 39,10 Sqm
Unit 18/ 1 Bedroom flat - 2 Occupants : 54,40 Sqm
Unit 19/ 3 Bedroom flat - 5 Occupants : 102,50 Sqm
Unit 20/ 1 Bedroom flat - 2 Occupants : 56,60 Sqm

PARKING AND BIKES

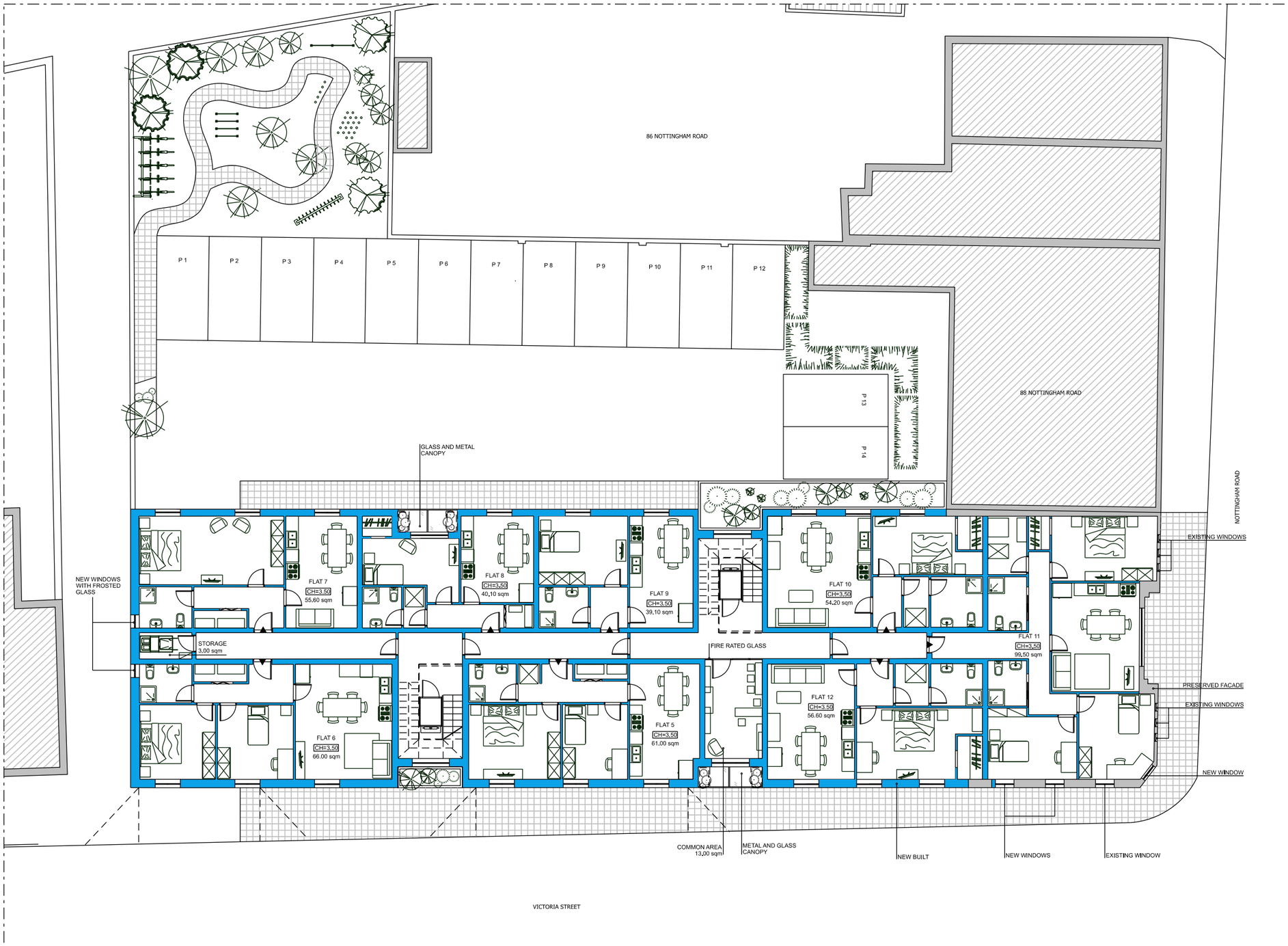
OUTDOOR PARKING SPACES: 14
GARAGES: 6
BIKES STORARE: 20

WASTE MANAGMENT PROVISION

GENERAL WASTE: 5x1100 L REFUSE BINS
RECYCLING: 5x1100 L MIXED RECYCLING BINS
RECYCLING: 4x240L BINS FOR GLASS

AMENITY SPACE

COMMUNAL GARDEN: 118 sqm
INDOOR RELAXATION AREAS: 26 sqm



01 PROPOSED FIRST FLOOR PLAN
1:200

M 1:200
0 1 2 3 4 5 6 8 10 12 14 16 18 20 [m]

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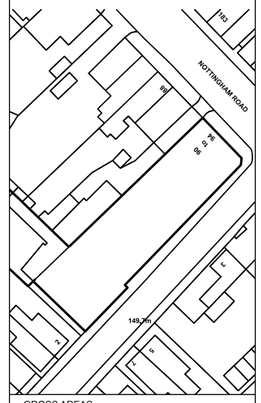

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drawing title
PROPOSED FLOOR PLAN

date	scale	
SEPTEMBER 2020	1:200@A3	GFS

drawing number	sheet no.	rev
S-09	9 OF 14	-

GROSS DEVELOPMENT AREA

GROUND FLOOR: 586,50 SQM
FRIST FLOOR: 590,00 SQM
SECOND FLOOR: 592,10 SQM

TOTAL GROSS DEVELOPMENT AREA: 1768,60 SQM

SCHEDULE OF ACCOMMODATION

TOTAL 1NO BEDROOM FLATS: 13
TOTAL 2NO BEDROOM FLATS: 5
TOTAL 3NO BEDROOM FLATS: 2

Unit 01/ 2 Bedroom flat - 3 Occupants : 61,00 Sqm
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Unit 20/ 1 Bedroom flat - 2 Occupants : 56,60 Sqm

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OUTDOOR PARKING SPACES: 14
GARAGES: 6
BIKES STORARE: 20

WASTE MANAGMENT PROVISION

GENERAL WASTE: 5x1100 L REFUSE BINS
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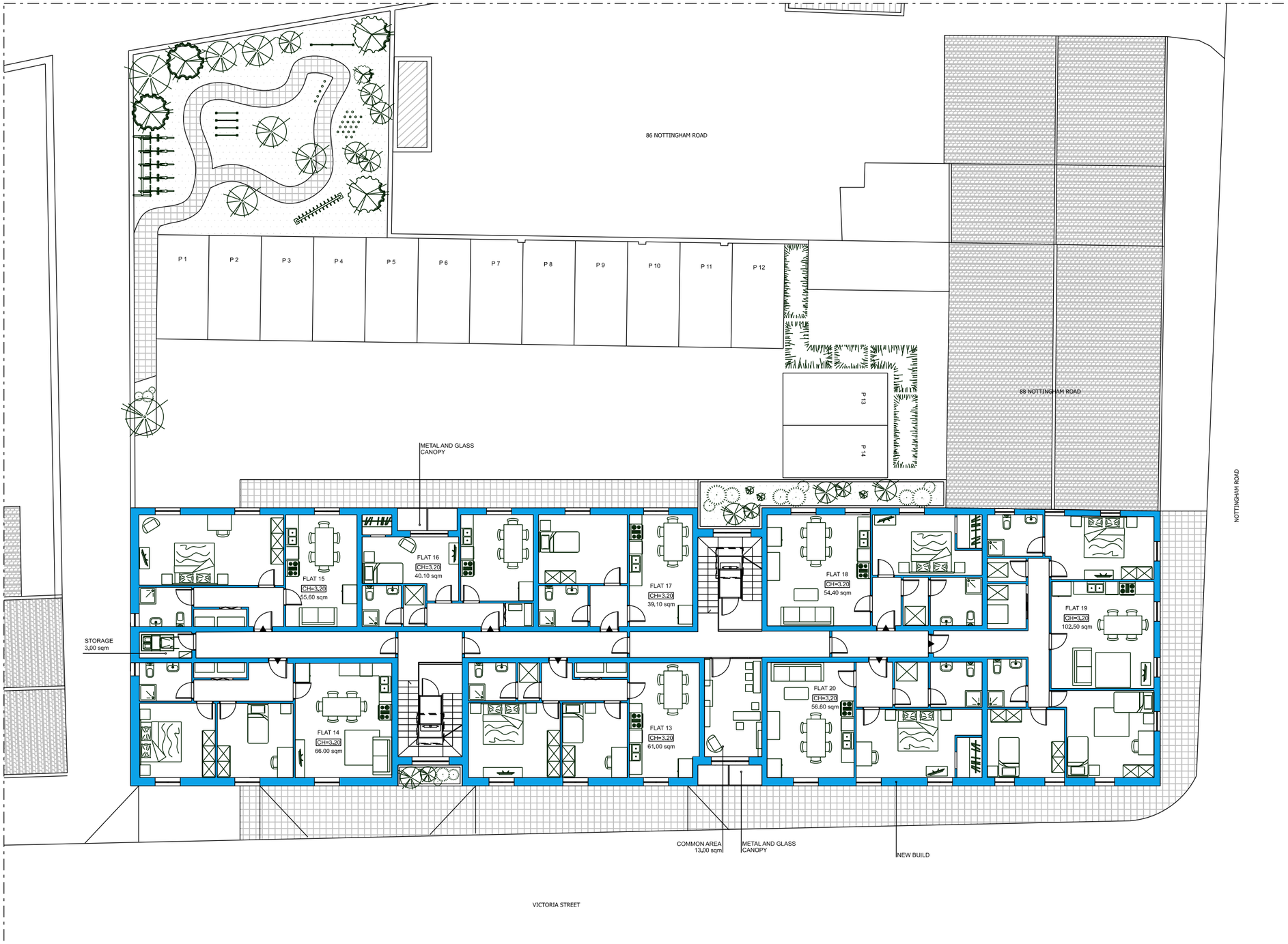
RECYCLING: 4x240L BINS FOR GLASS

AMENITY SPACE

COMMUNAL GARDEN: 118 sqm
INDOOR RELAXATION AREAS: 26 sqm



01 PROPOSED SECOND FLOOR PLAN
1:200

M 1:200
0 1 2 3 4 5 6 8 10 12 14 16 18 20 [m]

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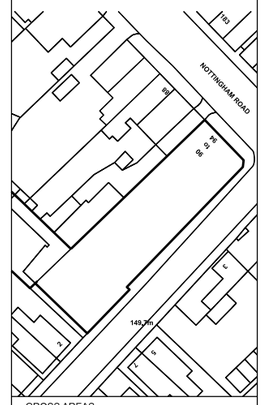

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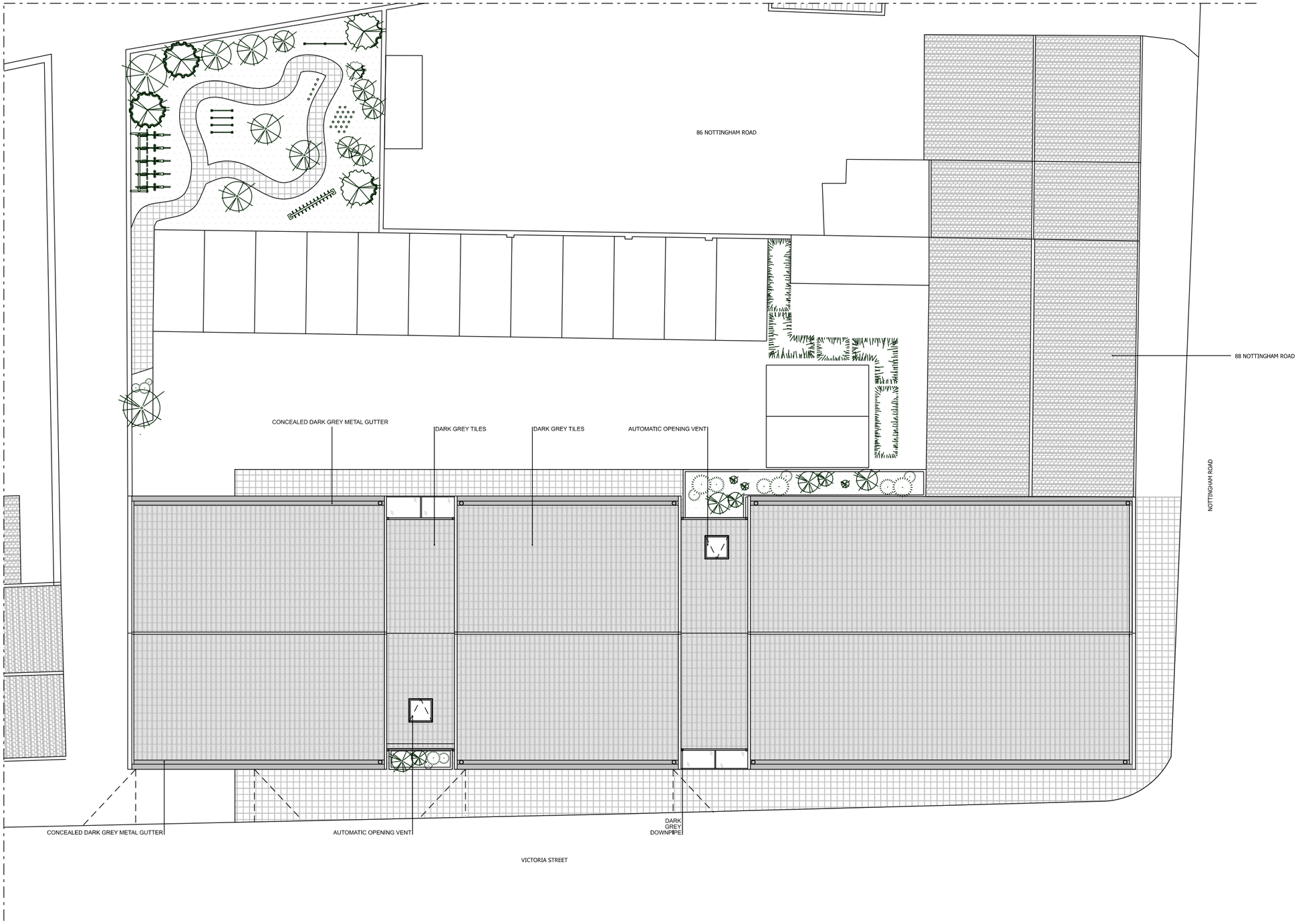
drawing title
PROPOSED FLOOR PLAN

date	scale	
SEPTEMBER 2020	1:200@A3	GFS

drawing number	sheet no.	rev
S-10	10 OF 14	-



01 PROPOSED ROOF PLAN

1:200

M 1:200

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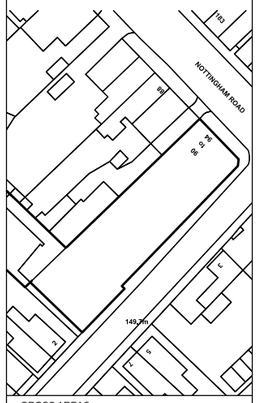

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PROPOSED FLOOR PLAN

date	scale	
SEPTEMBER 2020	1:200@A3	GFS

drawing number	sheet no.	rev
S-11	11 OF 14	-



01 PROPOSED EAST SIDE ELEVATION

1:200

M 1:200

0 1 2 3 4 5 6 8 10 12 14 16 18 20 [m]

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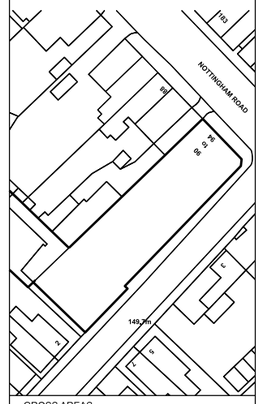

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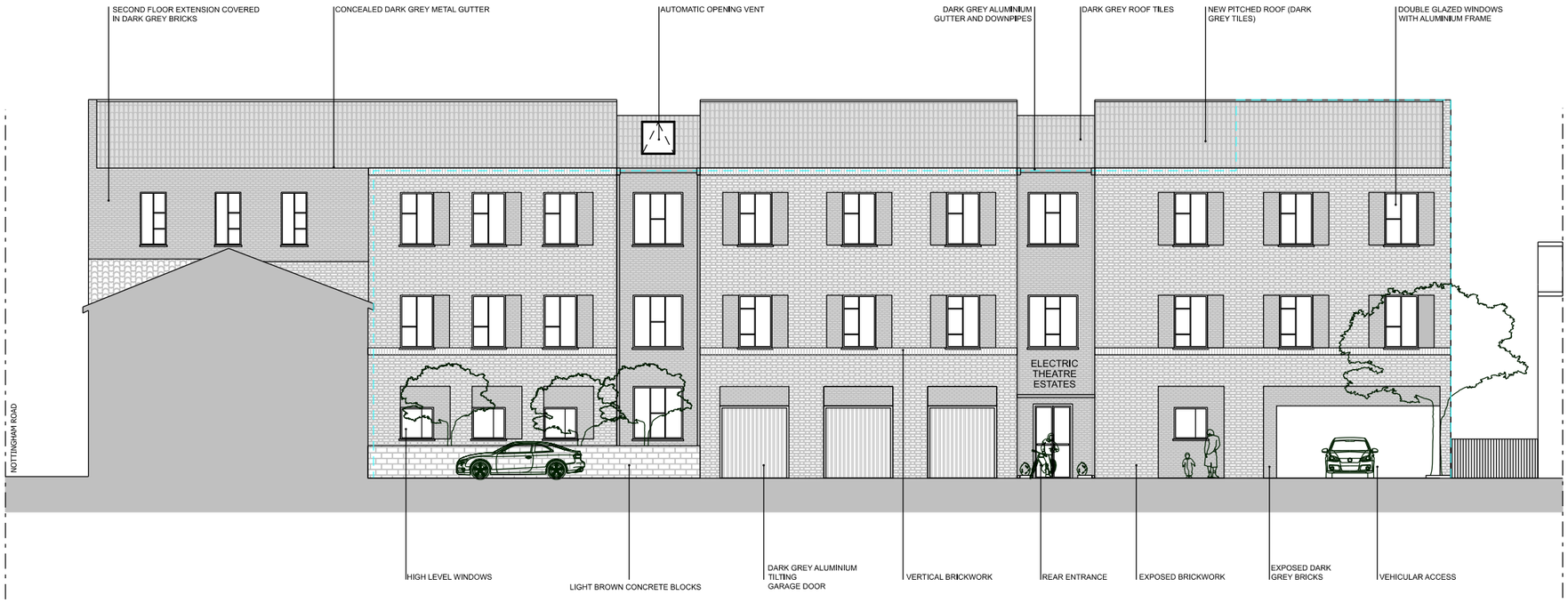
PROPOSED ELEVATION

date	scale	
SEPTEMBER 2020	1:200@A3	GFS

drawing number	sheet no.	rev
S-12	12 OF 14	-



01 PROPOSED WEST SIDE ELEVATION

1:200

M 1:200

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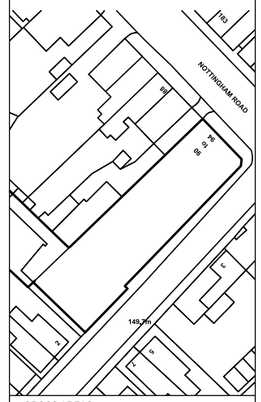

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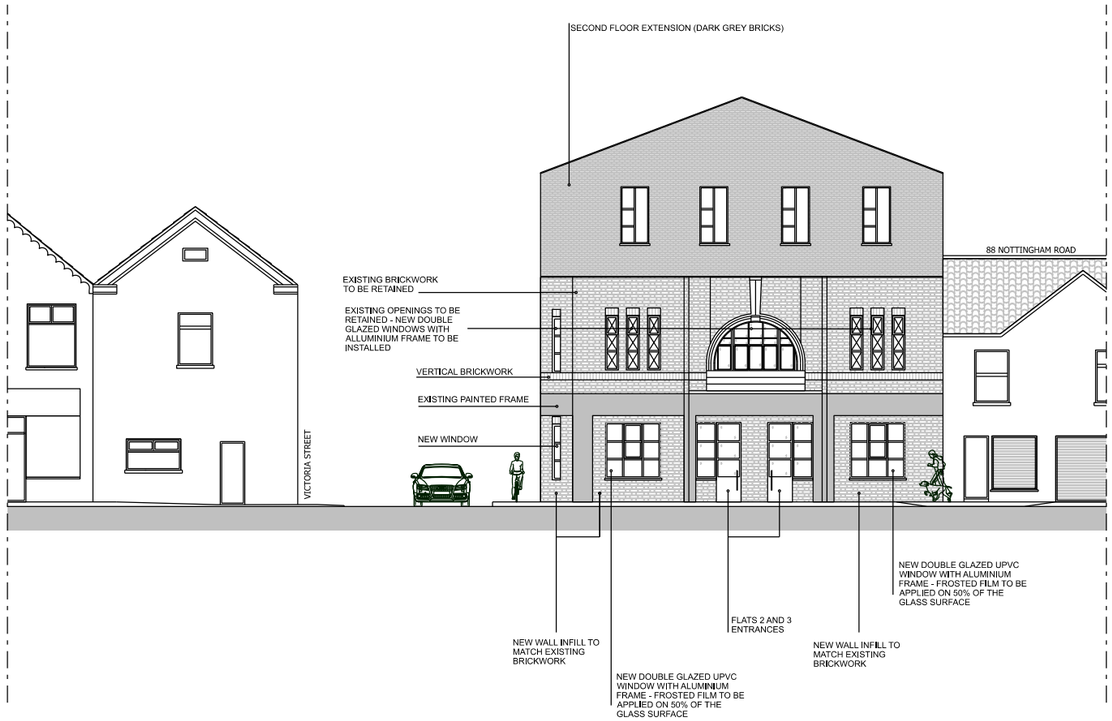
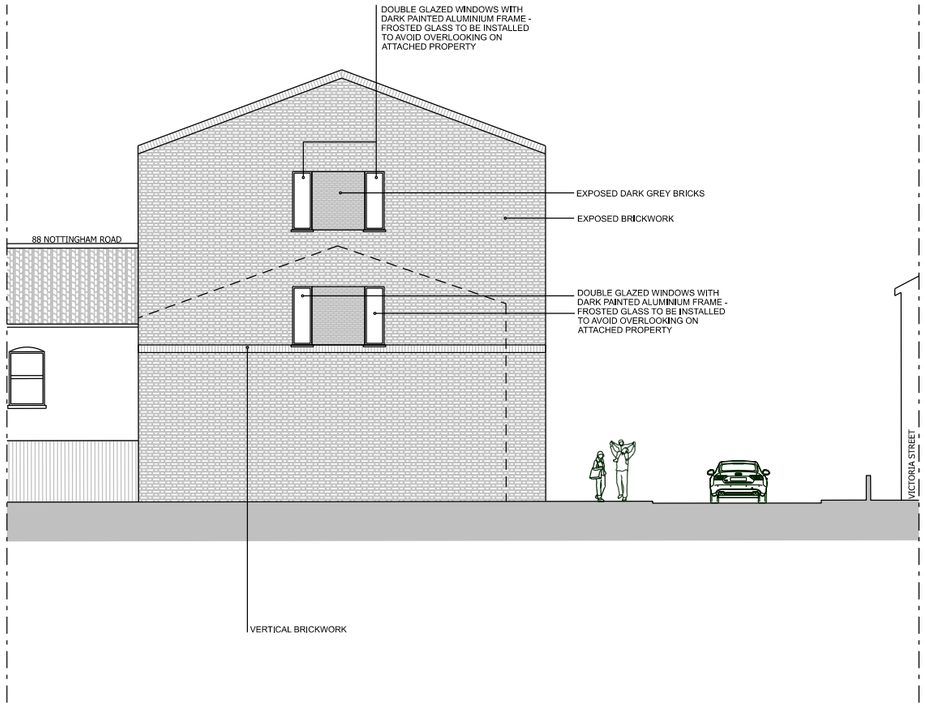
S-13	13 OF 14	-



01 PROPOSED FRONT ELEVATION

1:200



02 PROPOSED REAR ELEVATION

1:200

M 1:200

0 1 2 3 4 5 6 8 10 12 14 16 18 20 [m]

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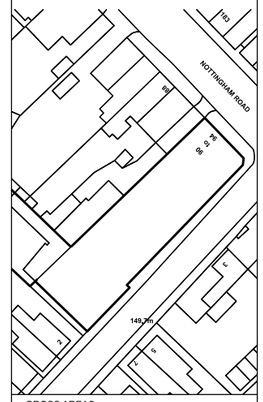

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drawing title
PROPOSED ELEVATION

date	scale	
SEPTEMBER 2020	1:200@A3	GFS

drawing number	sheet no.	rev
S-14	14 OF 14	-

APPENDIX C

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	George Locke
Site name:	90-94 NOTTINGHAM ROAD, DE55 4LY
Site location:	90-94 NOTTINGHAM ROAD, DE55 4LY

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.

Site Details

Latitude:	53.08065° N
Longitude:	1.36978° W
Reference:	1419519049
Date:	Dec 02 2020 13:24

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.088

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	739	739
Hydrological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 30 years:	2	2
Growth curve factor 100 years:	2.57	2.57
Growth curve factor 200 years:	3.04	3.04

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):	0.45	0.45
1 in 1 year (l/s):	0.38	0.38
1 in 30 years (l/s):	0.91	0.91
1 in 100 year (l/s):	1.16	1.16
1 in 200 years (l/s):	1.38	1.38

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.

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	George Locke
Site name:	90-94 NOTTINGHAM ROAD, DE55 4LY
Site location:	90-94 NOTTINGHAM ROAD, DE55 4LY

This is an estimation of the storage volume requirements that are needed 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). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	53.08066° N
Longitude:	1.36982° W
Reference:	3228758965
Date:	Dec 23 2020 12:04

Site characteristics

Total site area (ha):	0.1115
Significant public open space (ha):	0
Area positively drained (ha):	0.1115
Impermeable area (ha):	0.0724
Percentage of drained area that is impermeable (%):	65
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.11
Net impermable area for storage volume design (ha):	0.08
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	63
Rainfall 100 yrs 12 hrs:	--	77
FEH / FSR conversion factor:	1	1
SAAR (mm):	739	739
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 10 year:	1.49	1.49
Growth curve factor 30 year:	2	2
Growth curve factor 100 years:	2.57	2.57
Q_{BAR} for total site area (l/s):	0.57	0.57
Q_{BAR} for net site area (l/s):	0.57	0.57

Design criteria

Climate change allowance factor:	1.4
Urban creep allowance factor:	1.1
Volume control approach	Use long term storage
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	3

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	3	3
1 in 30 years (l/s):	3	3
1 in 100 year (l/s):	3	3

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m³):	26	26
Long term storage 1/100 years (m³):	0	0
Total storage 1/100 years (m³):	26	26

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APPENDIX D

90-94 Nottingham Road, DE55 4LY

AppD SUDS Layout

Increase in porous and permeable areas

Exceedance Routes

Exceedance routes to permeable paving area and planting areas

SUDS store for the 1in100year+40%cc

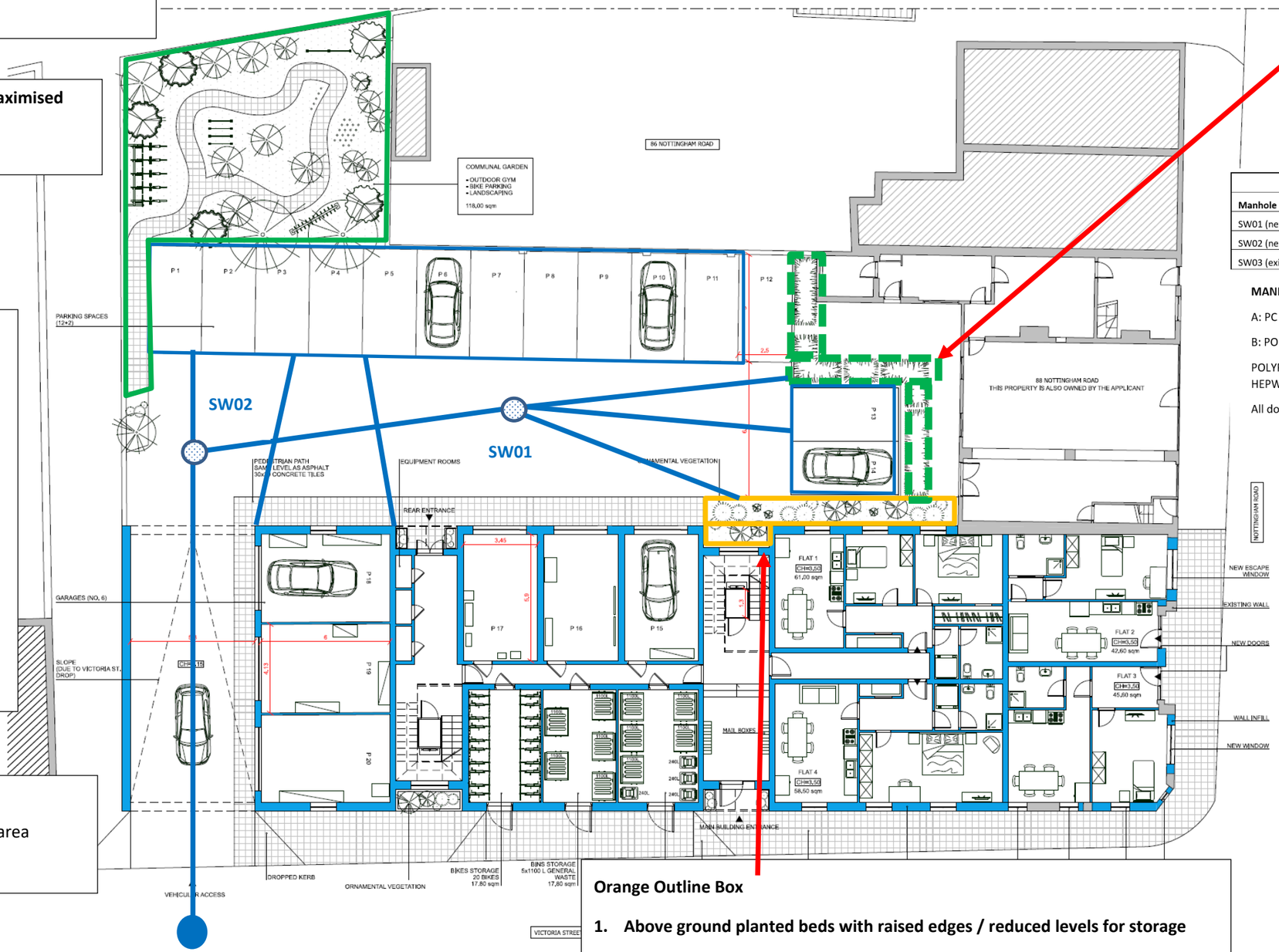
Porous and permeable areas maximised

SUDS source control

2. Above ground rain storage planter connected to rain downpipes

Storage and source control to address SUDS hierarchy.

Refer to report for calculations and dimensions.



Surface Water Drainage				
Manhole No.	**Invert (Metres bgl)**	**Type**	**Cover Size**	**Internal**
SW01 (new)	0.4	B	450	450
SW02 (new)	0.8	B	450	450
SW03 (existing)	1.2	n/a	n/a	n/a

MANHOLE TYPES

A: PC MANHOLE UNITS TO BS 5911 PART 200 KITE MARKED

B: POLYPROPYLENE INSPECTION CHAMBER-450 dia

POLYPROPYLENE INSPECTION CHAMBERS TO BE MANUFACTURED BY HEPWORTH OR SIMILAR APPROVED

All downpipes and gulleys to be roddable

Blue Outline Box

3. Shallow Geocellular Storage Areas under permeable access area

(Refer to FRA&SUDS for dimensions)

Oversized for lowest discharge restriction to reduce flood risk overall under communal permeable / porous areas.

Refer to FRA&SUDS Strategy report.

Surface SUDS: Source Control

Access and parking permeable area

Discharge to existing manhole / new connection to sewer

Refer to topo and FRA&SUDS report for inverts assessment

Orange Outline Box

1. Above ground planted beds with raised edges / reduced levels for storage

Storage and source control to address SUDS hierarchy.

Refer to report for calculations and dimensions.

Proposed:
613.25m2 impermeable (roof / hardstanding) = 55%
501.75m2 permeable / porous = 45%
See green outline

Existing:
85% impermeable: 947.75m2

86 NOTTINGHAM ROAD

88 NO

CONCEALED DARK GREY METAL GUTTER

DARK GREY TILES

DARK GREY TILES

AUTOMATIC OPENING VENT

NOTTINGHAM ROAD

CONCEALED DARK GREY METAL GUTTER

AUTOMATIC OPENING VENT

DARK GREY DOWNPIPE

VICTORIA STREET

APPENDIX E

SUDS Maintenance Schedule

Installation	Maintenance Required	Frequency	Responsibility
Rain storage planter AND Landscaped Rain Garden (area of garden with perimeter raised or the area is lowered with outfall to fit gravity drainage connections)	Inspection / weeding / jetting	De-silting and jetting if required to be part of maintenance plan	Estate/Building Management Company
Granular Storage	No maintenance or access specifically required	No maintenance or access specifically required	No maintenance or access specifically required
Permeable Paving (incl. associated distribution pipework and sump chambers)	Inspection, debris removal and jetting	Typically, inspection is recommended annually or after a severe or significant storm event, with any jetting/cleaning being carried out as necessary.	Estate/Building Management Company