



LINDEN HILL – CAPITAL HOMES

672 HANWORTH ROAD

WHITTON

TW4 5NP

SUDS STRATEGY

AUGUST 2019

FW1677/DS/001/v3

SYNOPSIS

Farrow Walsh have been commissioned by the applicant, to prepare the SUDS Strategy in support of the proposed new mixed-use development at Hanworth Road, Whitton.

REVISION HISTORY

Revision	Reason for Issue	Author	Checker	Approved	Date
v1	First issue	CC	BM	JD	14.03.2019
v2	Updated to suit revised layout	JD	BM	DM	31.07.2019
v3	Architects plans updated within Appendix A	JD	BM	DM	13.08.2019

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Appendix C – Drainage Strategy

Appendix D – SUDS Storage Calculations

Appendix E – BGS Mapping Extract

1.0 BRIEF

1.1.1. Farrow Walsh have been commissioned by the applicant, Linden Hill Capital, to prepare a SUDS Strategy report in support of the Proposed Mixed-use Development at 672 Hanworth Road, Whitton. The purpose of this document is to report on the use of SUDS within the proposed development.

2.0 DOCUMENTS EXAMINED

2.1.1. A plan of the proposals prepared by the Client (Appendix A).

2.1.2. A Design and Access Statement prepared by the client.

2.1.3. Existing drainage records provided by Thames Water (Appendix F)

2.1.4. BGS Online Mapping – Excerpt provided in Appendix E

3.0 INTRODUCTION

3.1.1. It is proposed to demolish existing structures and construct a new 3-storey mixed-use development of 20 flats, a retail unit and community space on a brownfield site located at 672 Hanworth Road, Whitton.

3.1.2. The site is bounded by Hanworth Road (NW), Powder Mill Lane (SW), and existing residential properties (NE & SW) as identified in Figure 1.

3.1.3. The site has a development area of 0.136ha comprising of a former public house and associated parking (brownfield) land.



Figure 1 – Site Location Plan

4.0 SUDS STRATEGY

4.1. EXISTING SEWERAGE SYSTEMS

4.1.1. It is proposed that the site will connect into the nearest Thames Water foul sewer (subject to Section 106 agreement). Records have been requested to confirm the presence of surface water and foul sewers within Hanworth Road and Powder Mill Lane.

4.1.2. A CCTV survey is recommended to identify any existing connections into the main sewer to minimise any works required within the highway.

4.2. PROPOSED SURFACE WATER DRAINAGE STRATEGY

4.2.1. Proposed Solution: Surface water drainage will be provided via below ground cellular storage and filter drain collection system that is to be connected to the assumed existing Thames Water Sewer within the Powder Mill Lane.

4.2.2. Building Regulations Part H guidance for disposal of surface water is as follows:

- A soakaway or infiltration system, or where not reasonably practicable;
- A surface water ditch or watercourse, or where not reasonably practicable;
- A below ground sewer

4.2.3. BGS mapping indicates that the area is underlain by sands and gravels however infiltration is not considered appropriate for the disposal of surface water on site due to the density of the development on site and in the surrounding areas. There are likely contaminated soils present beneath the site as a result of historic industrial and commercial activity at this location (see Appendix E).

4.2.4. There are no surface water ditches or watercourses located within the immediate vicinity of the site. The closest watercourse is the River Crane (a main river) which is located approximately 480m to the west of the development.

4.2.5. Based on the above points, it is considered that the most suitable discharge point for surface water can be assumed to be the existing Thames Water Sewer subject to a Section 106 approval.

4.2.6. The development area is 0.136ha with a proposed impermeable area of 0.112ha (approx. 1125m² / 82%) and thus will require collection, attenuation and treatment prior to discharge.

4.2.7. National Planning Policy Framework guidance (NPPF) requires that 40% climate change be incorporated into drainage design in accordance with the Environment Agency's 'Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities' February 2016 when assessing flood risk for a development.

4.2.8. Site surface water runoff rates are restricted to no more than 5 l/s and storage provided to prevent flooding up to the 1 in 100 year +40% climate change scenario in line with the London Plan (2016).

4.2.9. Surface Water Drainage will be provided using new below ground gravity sewers constructed within the proposed development with surplus flows being attenuated using online cellular storage tanks. The proposed surface water runoff rate for the development area of 0.112ha including an allowance for 40% additional runoff volume for climate change is:

- $Q_{1,pr} = 5.0$ l/s to existing surface water sewer (74% betterment against existing)

4.2.10. It is currently proposed that the sewers will not be offered up for adoption by Thames Water and will remain private.

4.2.11. With reference to CIRIA C753 and the surface water treatment process, a rain garden are Naylor Smart Sponge are to be utilised. A portion of the rain water will be collected in a rain garden located on the first floor between the two proposed buildings. Collected rainwater will be used to water plants within the communal garden area. A Naylor Smart Sponge will be located within the manhole collecting runoff from the linear drain within the retail unit car park to treat runoff prior to discharge into the combined system.

4.2.12. The provision of a rain garden within the development will aid in reducing the surface water runoff volume from the development and provide a community area within the development.

4.2.13. All drainage is to be constructed in accordance with all relevant industry standards, including but not limited to:

- Building Regulations Approved Document Part H 2010

4.3. ATTENUATION PROPOSALS

4.3.1. In accordance with current Environment Agency Guidance, the attenuation volume for a site should be calculated based on a 1 in 100-year return period event with an allowance for an additional 40% volume to account for predicted climate change.

4.3.2. Preliminary calculations have been undertaken to calculate the volumes of storage required for the new development. These are summarised below:

- 1 in 2 year - 2.4m³
- 1 in 30 year - 19.78m³
- 1 in 100 year - 31.6m³
- 1 in 100 year (+40% CC) - 44.3m³

4.3.3. Figure 3 (below) illustrates proposed discharge rates and the betterment provided on existing discharge rates during critical storms.

Storm Event	Existing (l/s)	Proposed (l/s)	Betterment (%)
Q _{bar}	24.3	5.0	79%
1 in 30 year	41.8	5.0	88%
1 in 100 year	44.0	5.0	89%
1 in 100 year + 40% CC	>44.0	5.0	>89%

Figure 2: Discharge rate comparison table

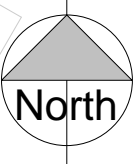
The above values are subject to confirmation at the detailed drainage design stage.

5.0 SUMMARY

5.1.1. The proposed surface water drainage and SUDS system can be summarised as follows:

- Surface water runoff from the development will be reduced to a Q_1 rate not exceeding 5.0l/s providing an 74% betterment on existing conditions.
- Hardstand surface water flow containing pollutants will be filtered and trapped by Naylor Smart Sponge and treated in-situ by biodegradation in line with CIRIA Reports C753, C697, C609 & C582 and 'Pollution Prevention Guideline' PPG3 (Environment Agency, 2006) guidance.
- Use of a cellular attenuation tank sized for up to a 1 in 100-year (+40% climate change) storm event.
- Use of rain garden within the communal area linking the first floor of each building.

Appendix A Development Layout



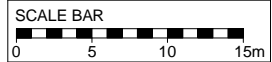
PROPOSED SITE PLAN

1 : 500

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- Designers/contractors risk assessments
- Method statement
- Permit to work
- Pre construction information

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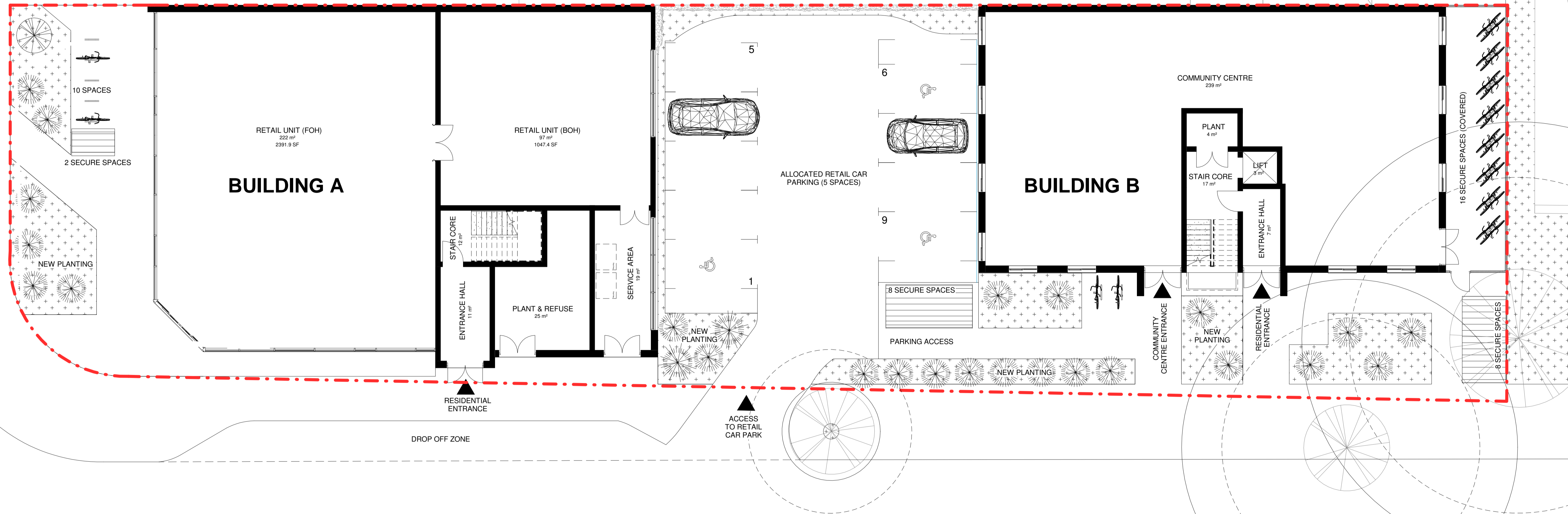
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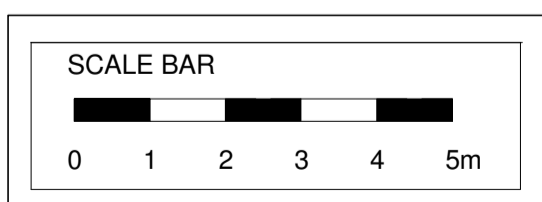
PROPOSED GROUND FLOOR
1 : 100



SCHEDULE OF ACCOMMODATION

No.	TYPE	AREA
Apt_01	2BED_3P	64 m ²
Apt_02	1BED_2P	51 m ²
Apt_03	2BED_3P	62 m ²
Apt_04	2BED_3P	63 m ²
Apt_05	1BED_2P	51 m ²
Apt_06	2BED_3P	61 m ²
Apt_07	2BED_4P	70 m ²
Apt_08	2BED_3P	61 m ²
Apt_09	1BED_2P	50 m ²
Apt_10	1BED_2P	50 m ²
Apt_11	2BED_4P	70 m ²
Apt_12	2BED_4P	70 m ²
Apt_13	2BED_4P	72 m ²
Apt_14	2BED_3P	68 m ²
Apt_15	1BED_2P	50 m ²
Apt_16	2BED_3P	64 m ²

5 X 1BED_2P
7 X 2BED_3P
4 X 2BED_4P
16 APARTMENTS



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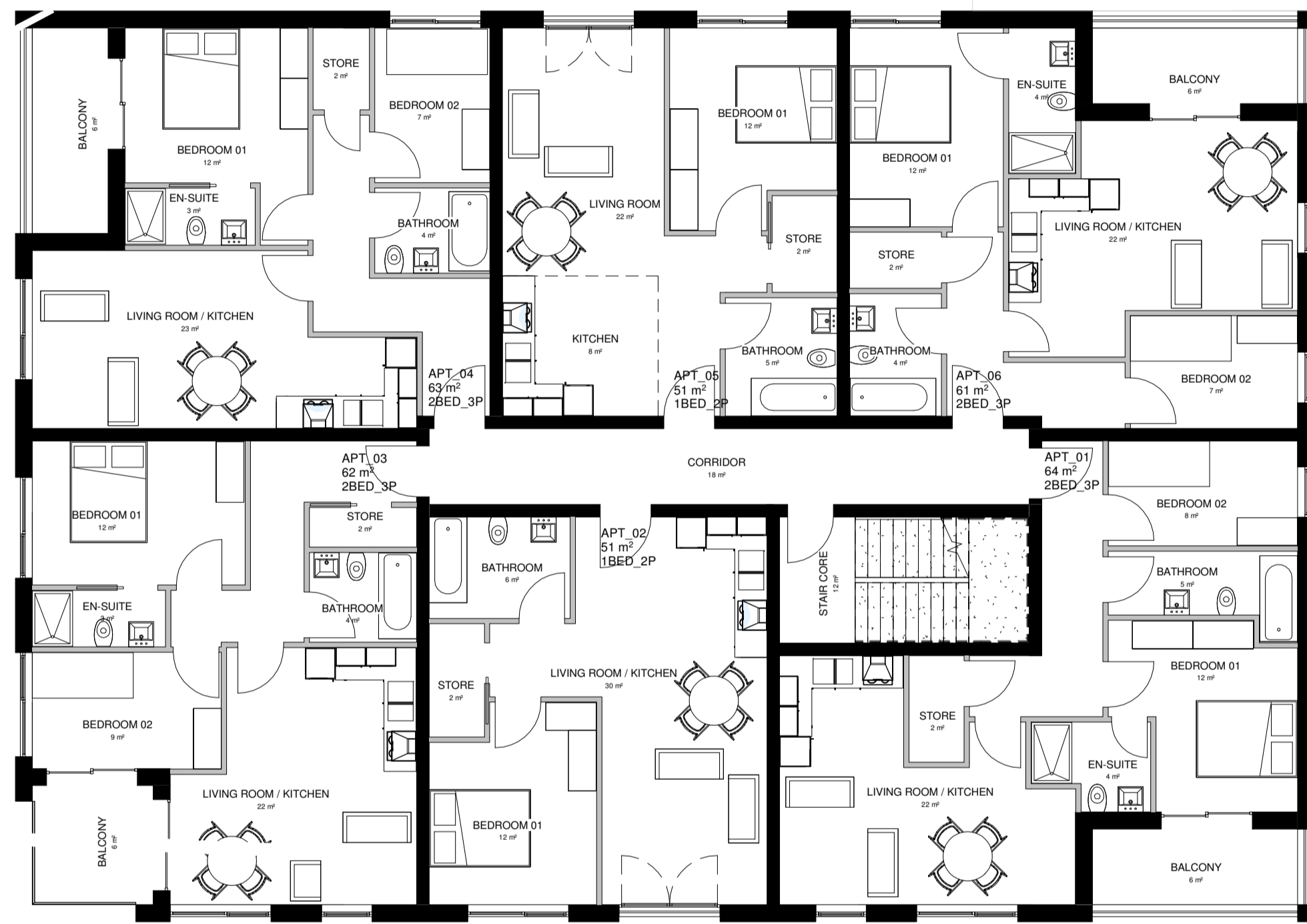
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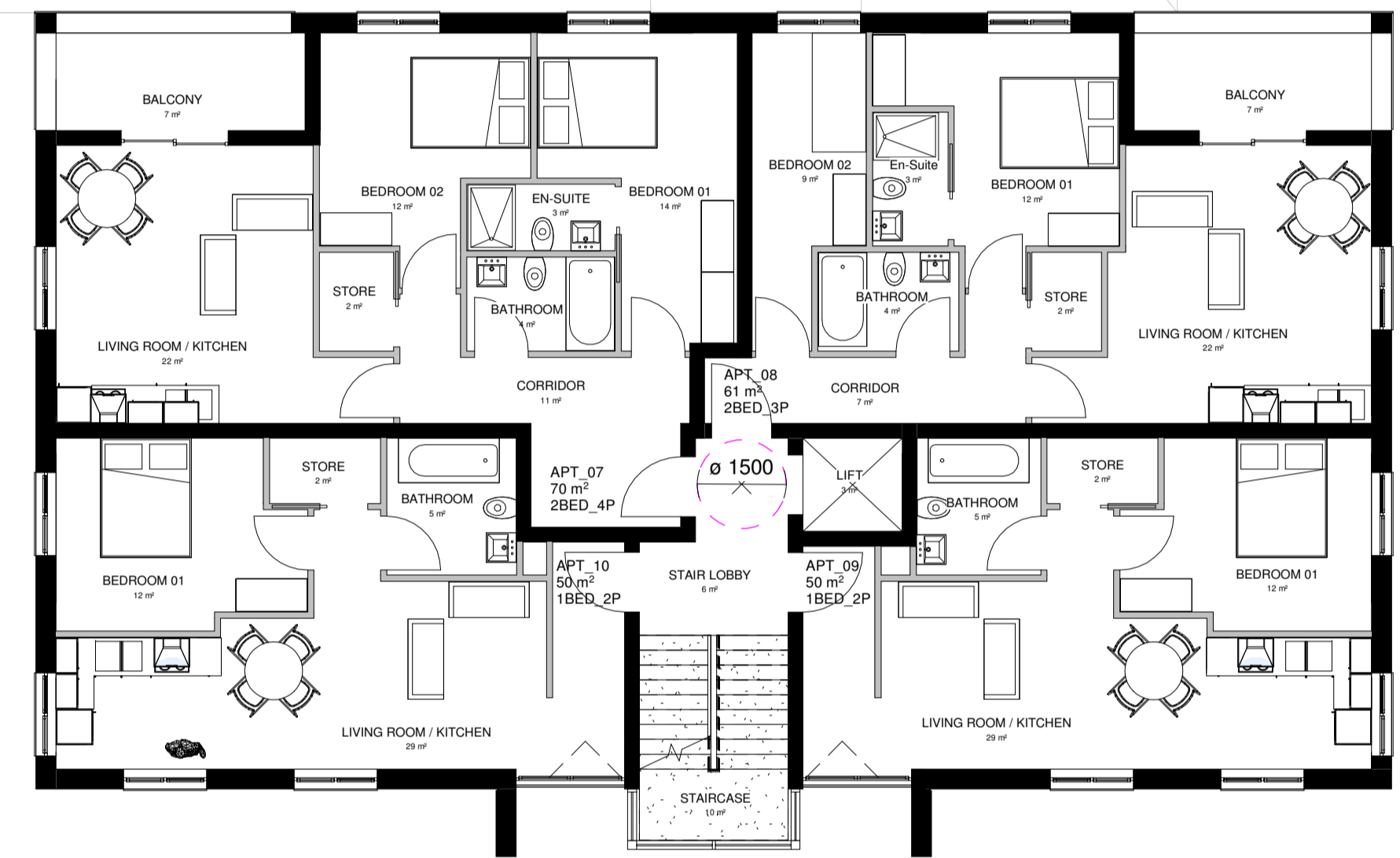
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8129	(000) 002	P



BUILDING A



BUILDING B

PROPOSED FIRST FLOOR
1 : 100

SCHEDULE OF ACCOMMODATION

No.	TYPE	AREA
Apt_01	2BED_3P	64 m ²
Apt_02	1BED_2P	51 m ²
Apt_03	2BED_3P	62 m ²
Apt_04	2BED_3P	63 m ²
Apt_05	1BED_2P	51 m ²
Apt_06	2BED_3P	61 m ²
Apt_07	2BED_4P	70 m ²
Apt_08	2BED_3P	61 m ²
Apt_09	1BED_2P	50 m ²
Apt_10	1BED_2P	50 m ²
Apt_11	2BED_4P	70 m ²
Apt_12	2BED_4P	70 m ²
Apt_13	2BED_4P	72 m ²
Apt_14	2BED_3P	68 m ²
Apt_15	1BED_2P	50 m ²
Apt_16	2BED_3P	64 m ²

5 X 1BED_2P
7 X 2BED_3P
4 X 2BED_4P
16 APARTMENTS



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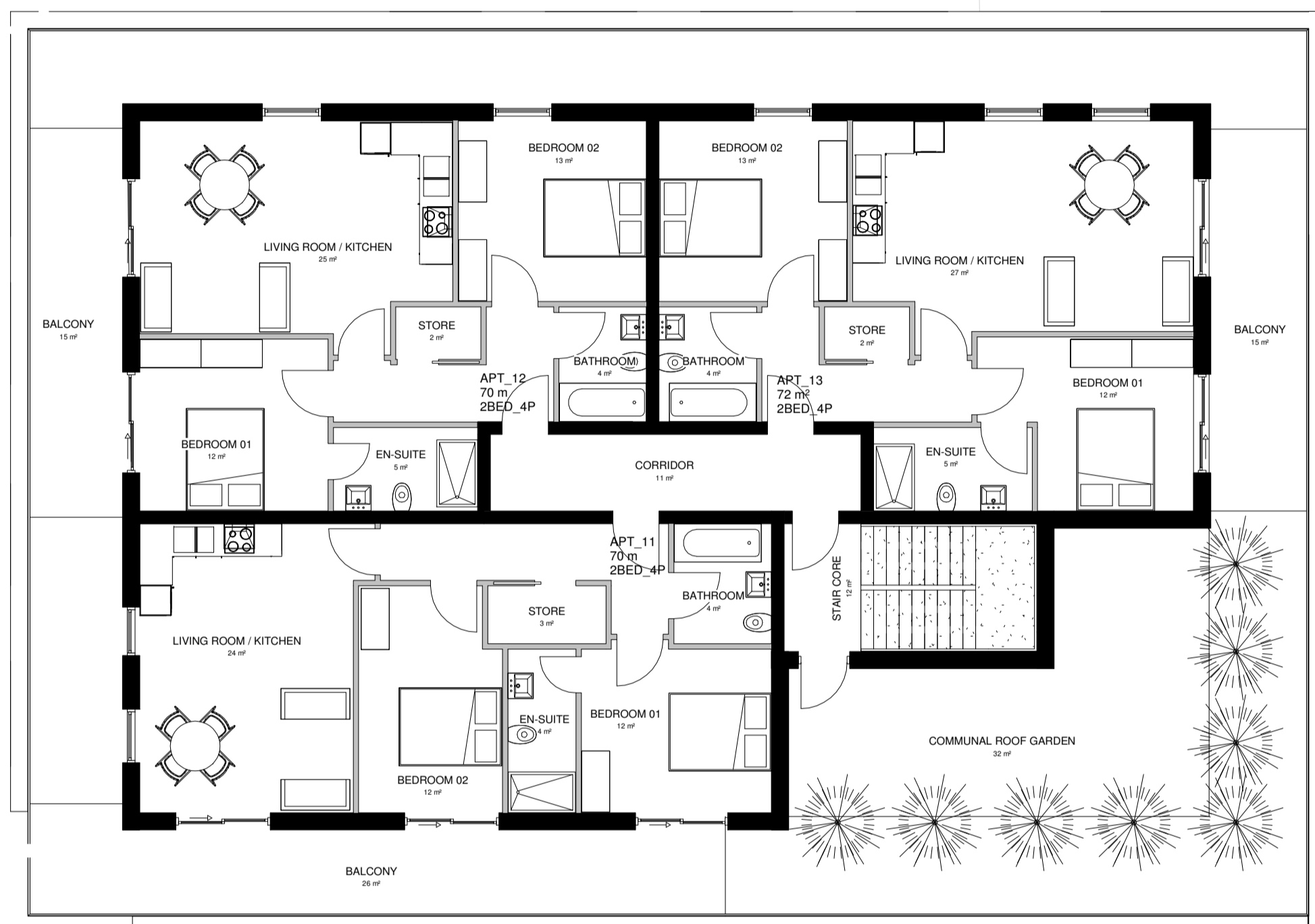
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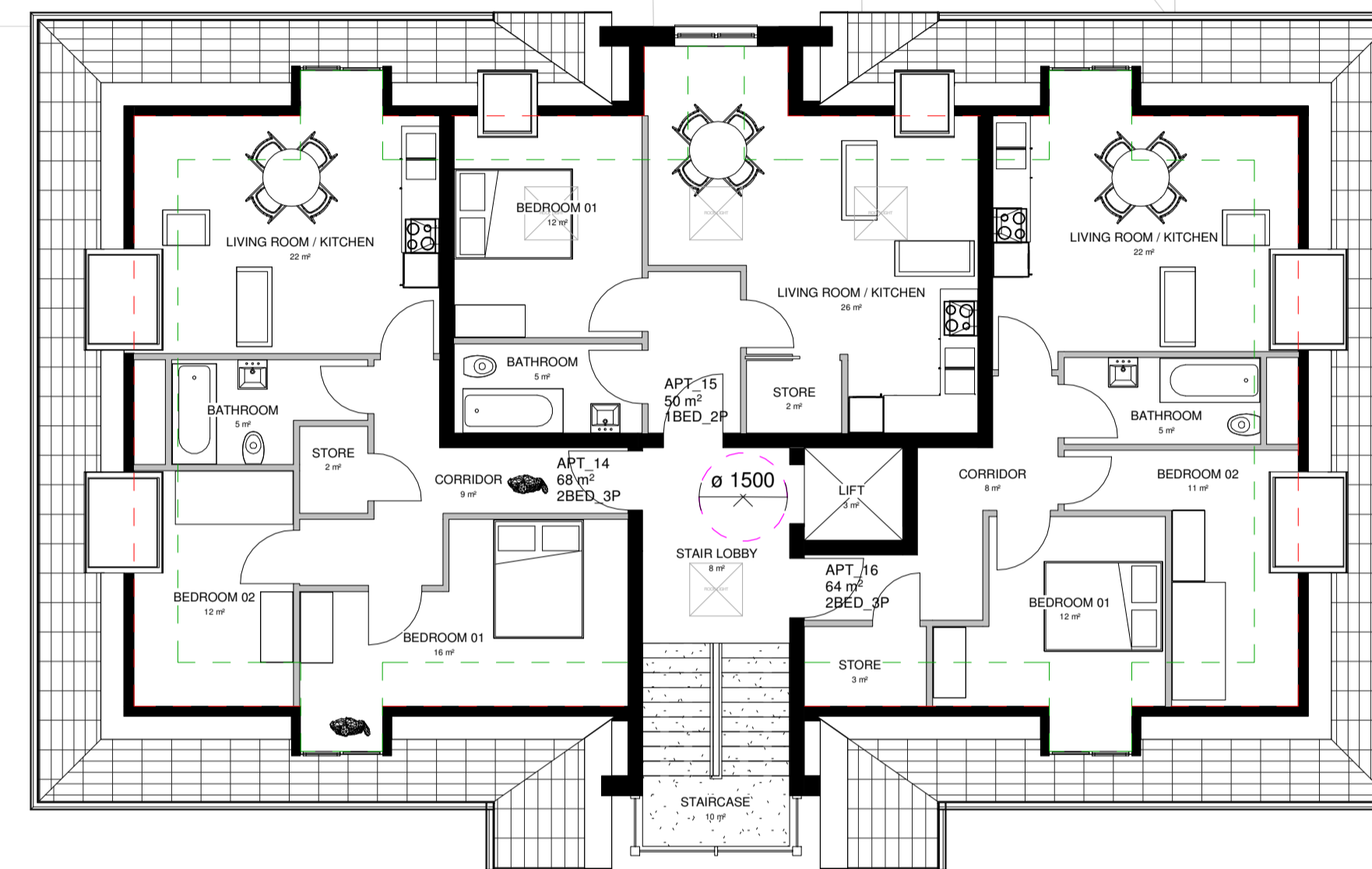
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8129	(000) 003	T



BUILDING A



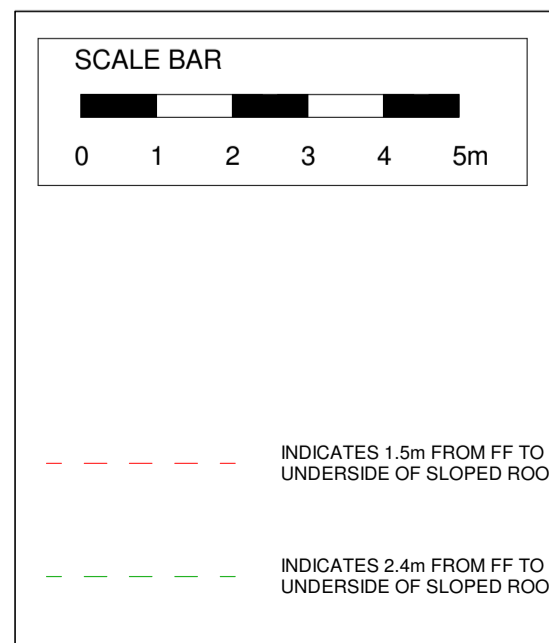
BUILDING B

PROPOSED SECOND FLOOR
1 : 100

SCHEDULE OF ACCOMMODATION

No.	TYPE	AREA
Apt_01	2BED_3P	64 m ²
Apt_02	1BED_2P	51 m ²
Apt_03	2BED_3P	62 m ²
Apt_04	2BED_3P	63 m ²
Apt_05	1BED_2P	51 m ²
Apt_06	2BED_3P	61 m ²
Apt_07	2BED_4P	70 m ²
Apt_08	2BED_3P	61 m ²
Apt_09	1BED_2P	50 m ²
Apt_10	1BED_2P	50 m ²
Apt_11	2BED_4P	70 m ²
Apt_12	2BED_4P	70 m ²
Apt_13	2BED_4P	72 m ²
Apt_14	2BED_3P	68 m ²
Apt_15	1BED_2P	50 m ²
Apt_16	2BED_3P	64 m ²

5 X 1BED_2P
7 X 2BED_3P
4 X 2BED_4P
16 APARTMENTS



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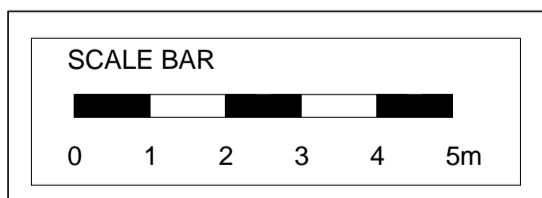
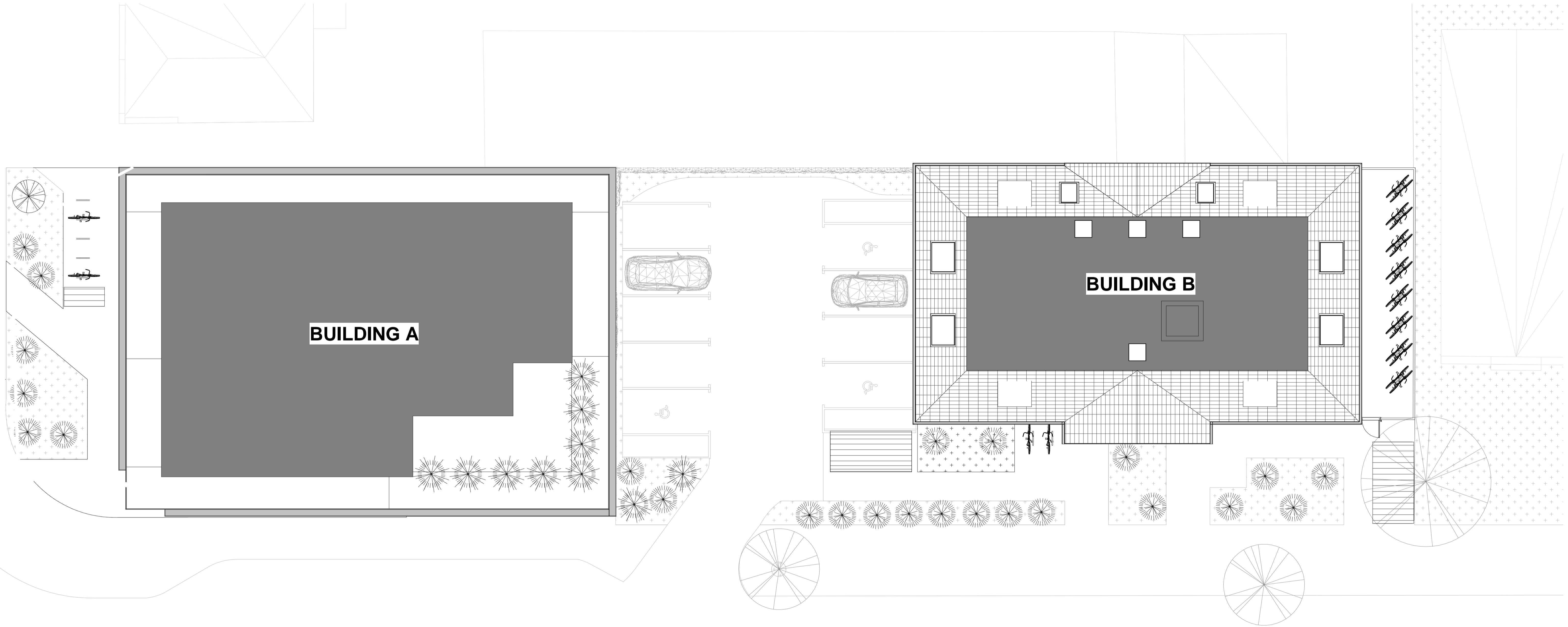
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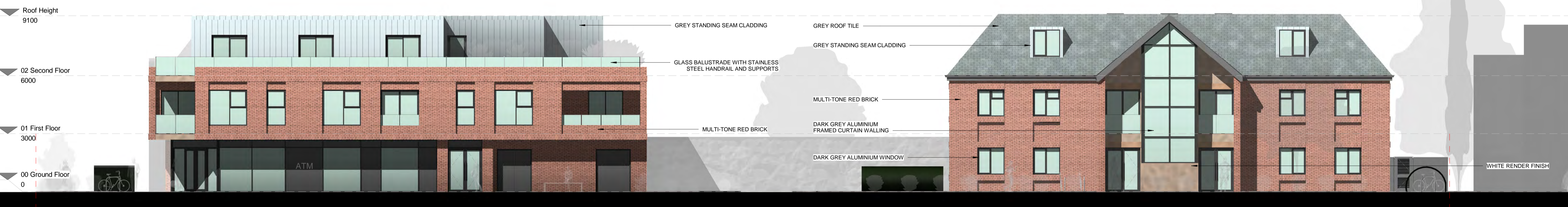
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PROPOSED ROOF PLAN		
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8129	(000) 005	K



WEST ELEVATION
1 : 100



SOUTH ELEVATION
1 : 100

SCALE BAR

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- Pre construction information

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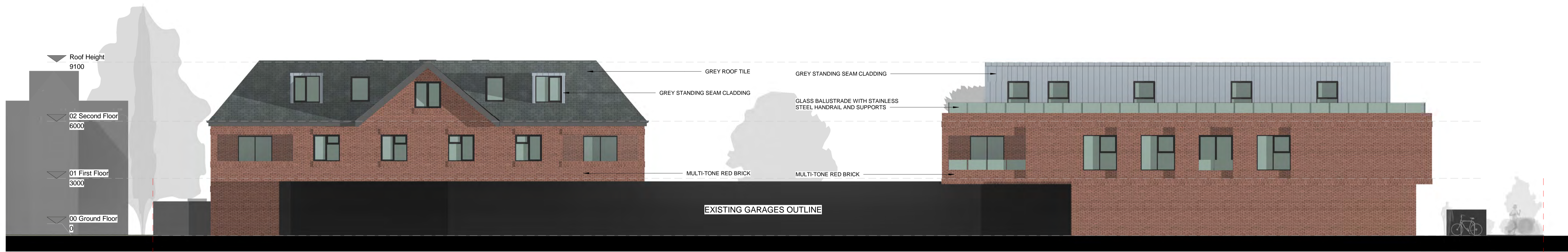
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PROPOSED SOUTH AND WEST ELEVATIONS

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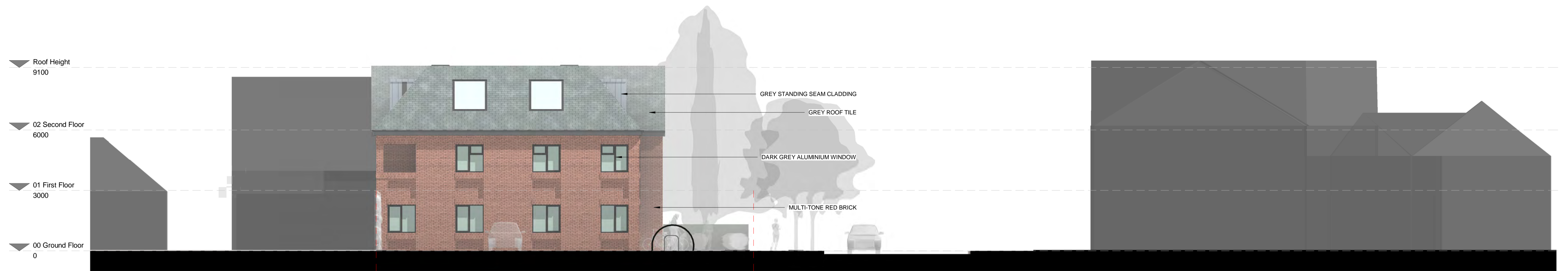


NORTH ELEVATION
1 : 100



EAST ELEVATION
1 : 100

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BUILDING B - WEST ELEVATION
1 : 100

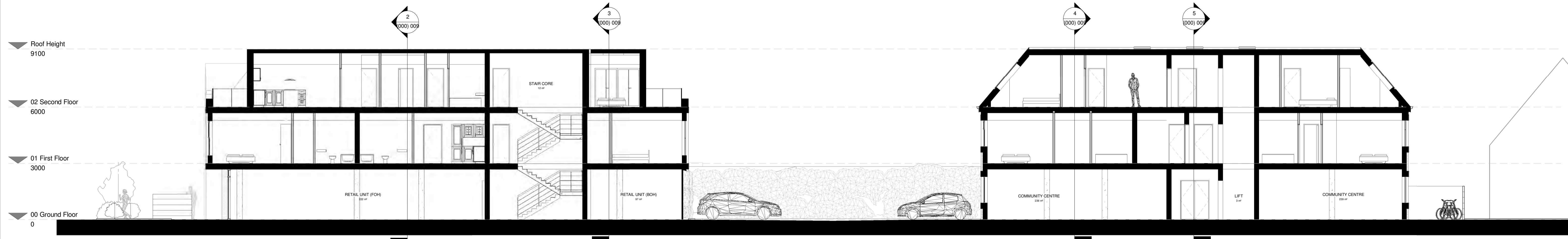


BUILDING A - EAST ELEVATION
1 : 100

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BUILDING A

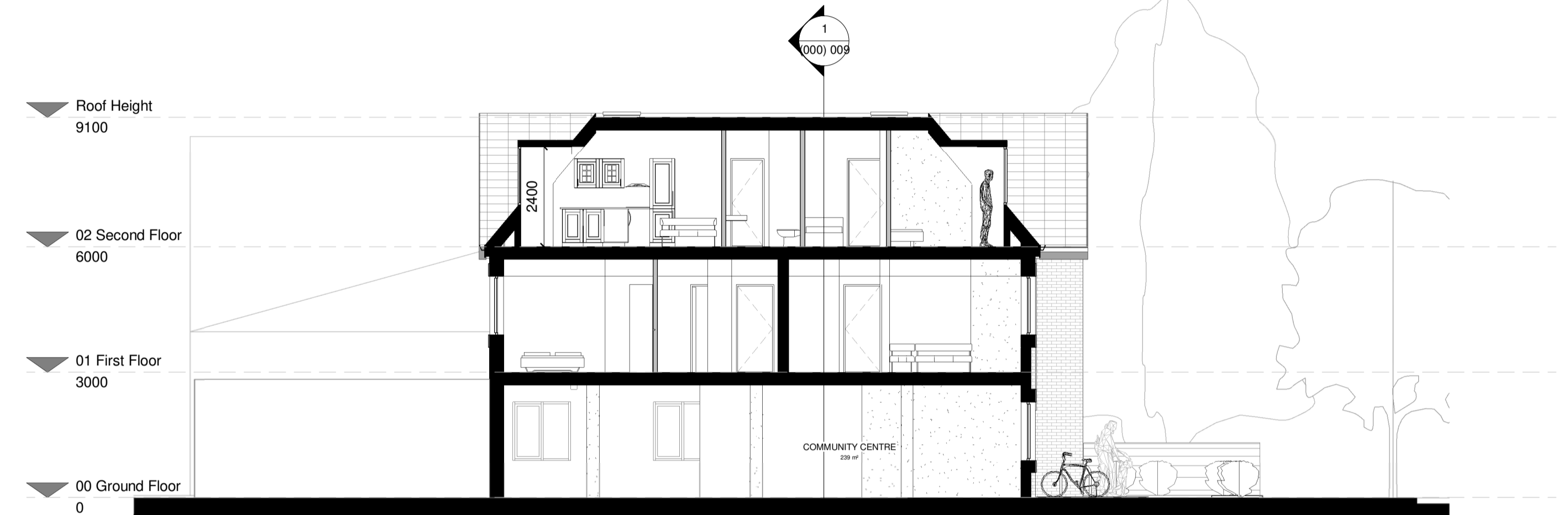
BUILDING B



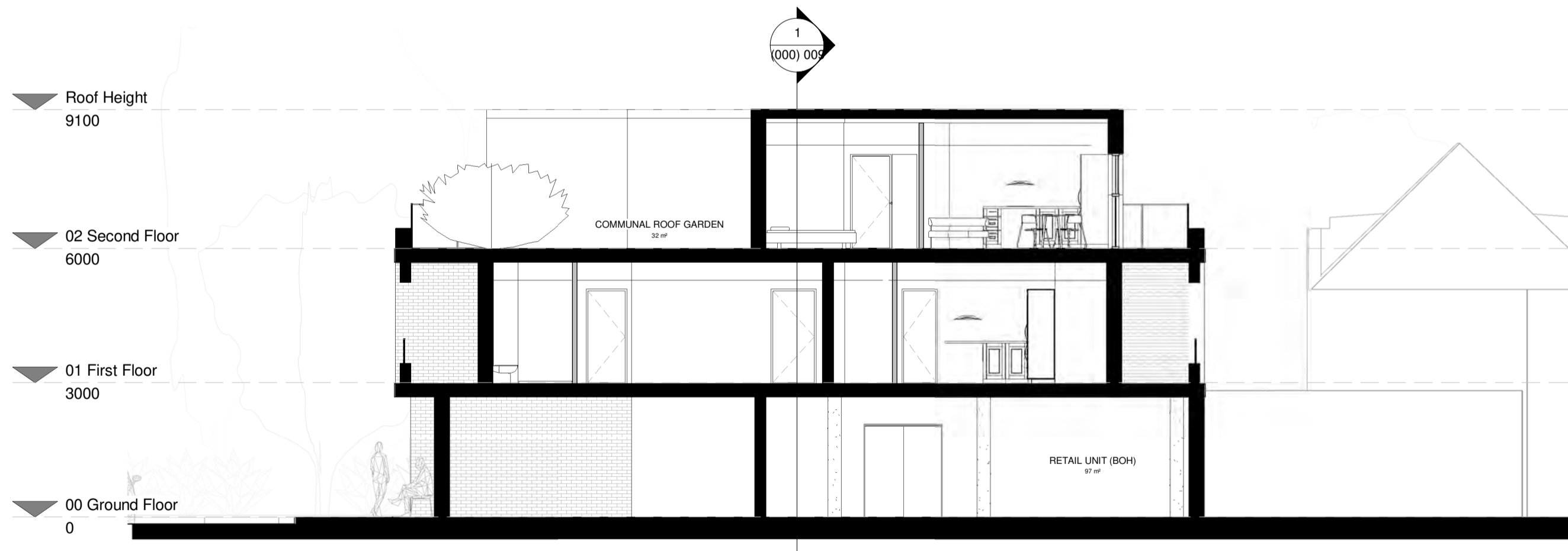
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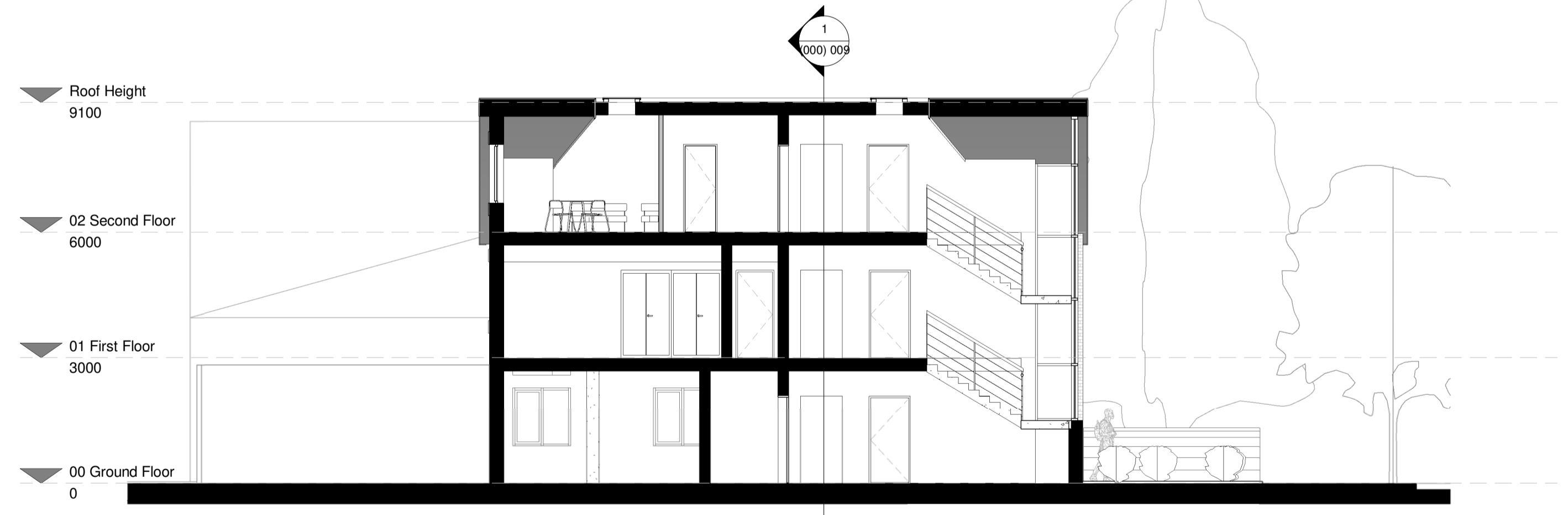
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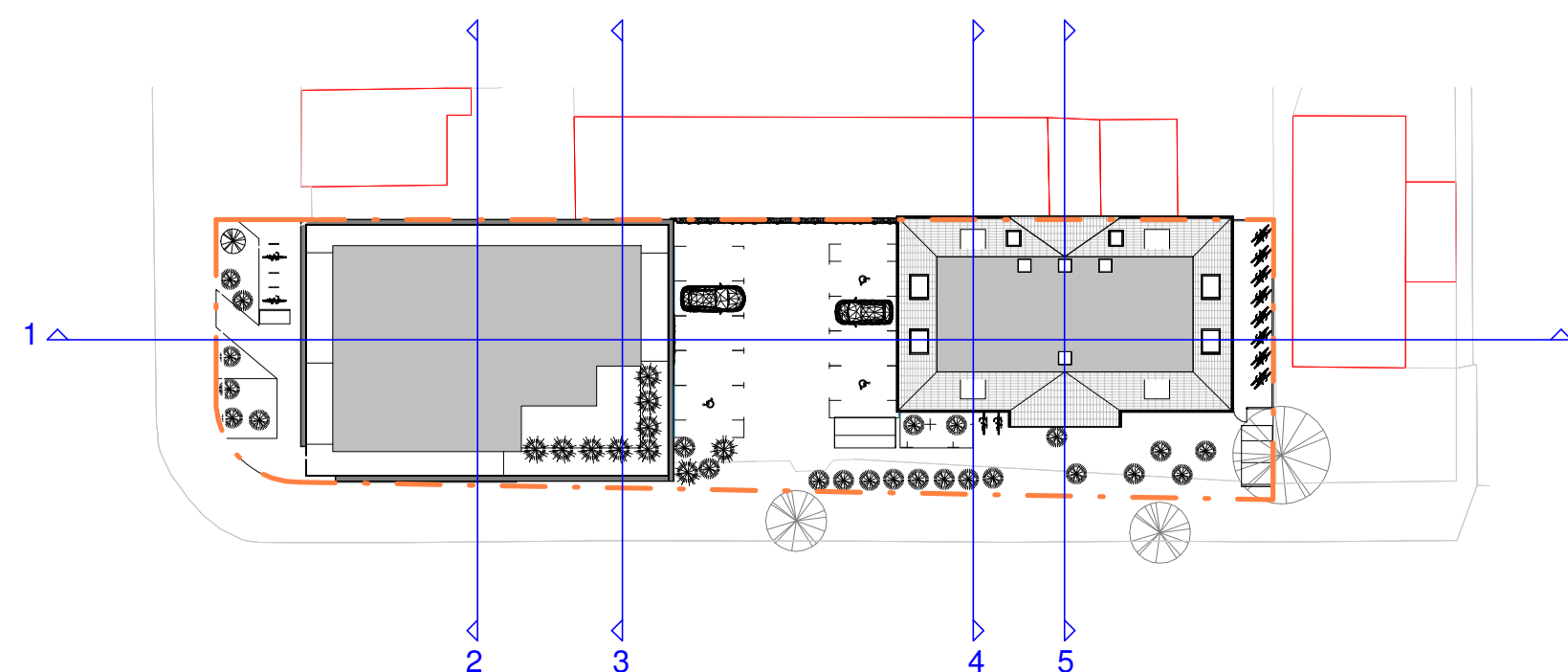
BUILDING B_SECTION 4
1 : 100



BUILDING A_SECTION 3
1 : 100



BUILDING B_SECTION 5
1 : 100



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<input checked="" type="checkbox"/> planning	<input type="checkbox"/> tender	<input type="checkbox"/> record

LINDEN HILL			
drawn by	checked by	date	scale @ A1
DM	-	17/07/19	As indicated
HANWORTH ROAD WHITTON			

BOWMAN RILEY
ARCHITECTS

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PROPOSED SECTIONS		
project number	drawing number	revision
8129	(000) 009	E

Appendix B Existing Site Drainage

62 Highcross Street
Leicester
LE1 4NN



Date 06/03/2019 09:40

Designed by Calum.Bodell

File FW1677 EXISTING DISCHARGE.MDX

Checked by

Innovyze

Network 2018.1.1

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes Private Manhole Sizes Private

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	20.500	Add Flow / Climate Change (%)	0
Ratio R	0.437	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

62 Highcross Street
Leicester
LE1 4NN



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Summary Wizard of 15 minute 1 year Winter I+0% for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.500 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.437 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

Profile(s) Winter
 Duration(s) (mins) 15
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm Rank	Water Surcharged Flooded			Pipe		Status
			Level (m)	Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	Overflow Flow (l/s)	
1.000	ex1	4	9.215	0.065	0.000	1.23	19.3	SURCHARGED
1.001	ex2	4	9.114	0.027	0.000	1.24	19.4	SURCHARGED

62 Highcross Street
Leicester
LE1 4NN



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Summary Wizard of 15 minute 2 year Winter I+0% for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.500 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.437 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

Profile(s) Winter
 Duration(s) (mins) 15
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm Rank	Water Surcharged Flooded			Pipe		Status
			Level (m)	Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	Overflow Flow (l/s)	
1.000	ex1	3	9.325	0.175	0.000	1.54	24.3	SURCHARGED
1.001	ex2	3	9.168	0.081	0.000	1.55	24.3	SURCHARGED

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Date 06/03/2019 09:40

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File FW1677 EXISTING DISCHARGE.MDX

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Network 2018.1.1

Summary Wizard of 15 minute 30 year Winter I+0% for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.500 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.437 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

Profile(s) Winter
 Duration(s) (mins) 15
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm Rank	Water Surcharged Flooded			Pipe		Status
			Level (m)	Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	Overflow Flow (l/s)	
1.000	ex1	2	9.920	0.770	0.000	2.66	41.8	FLOOD RISK
1.001	ex2	2	9.466	0.379	0.000	2.66	41.7	SURCHARGED

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Date 06/03/2019 09:40

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File FW1677 EXISTING DISCHARGE.MDX

Checked by

Innovyze

Network 2018.1.1

Summary Wizard of 15 minute 100 year Winter I+0% for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

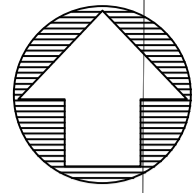
Rainfall Model FSR M5-60 (mm) 20.500 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.437 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

Profile(s) Winter
 Duration(s) (mins) 15
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm Rank	Water Surcharged Flooded			Pipe		Status
			Level (m)	Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	Overflow Flow (l/s)	
1.000	ex1	1	10.003	0.853	2.550	2.80	44.0	FLOOD
1.001	ex2	1	9.510	0.423	0.000	2.81	44.0	SURCHARGED

Appendix C Drainage Strategy



Storm Event	Existing Brownfield Discharge Rate
Q _{BAR}	24.30 l/s
1 in 1 year	19.30 l/s
1 in 30 year	41.80 l/s
1 in 100 year	44.00 l/s

Storm Event	Proposed Max. Discharge Rate
1 in 2 year	5.0 l/s
1 in 30 year	5.0 l/s
1 in 100+40%CC	5.0 l/s

Site Details

1,326m² / 0.132ha : Development area
 1,326m² / 0.132ha : Existing impermeable area
 1,115m² / 0.112ha : Proposed impermeable area
 19.30 l/s : Existing Q1 storm discharge rate to sewer
 41.80 l/s : Existing Q30 storm discharge rate to sewer
 44.00 l/s : Existing Q100 storm discharge rate to sewer
 5.00 l/s : Proposed Q100+40% climate change storm discharge rate to existing sewer (subject to Thames Water / LLFA approval)

Development impermeable areas to be drained into the storm sewers via cellular tanks with minimum SUDs treatment to Cirra753, via gravity sewers.

- General Notes
- DO NOT SCALE.
 - This drawing is to be read in conjunction with all other relevant drawings and details.
 - Should there be any conflict between the details indicated on this drawing and those on other drawings the Engineer should be informed PRIOR to construction on site.
 - Until technical approval has been obtained from the relevant Authority, it should be understood that all drawings issued are Preliminary and NOT for construction. Should the Contractor commence site work prior to such approval being given it is entirely at their own risk.
 - Sketch proposals are for illustrative purposes only and as such are subject to detailed site investigation including ground conditions / contaminants, drainage, design and planning / density negotiations.
 - All dimensions are in millimetres unless otherwise stated.
 - The Farrow Walsh Consulting Designers Risk Assessments for this project must be reviewed PRIOR to the commencement of any works on site.

Minimum pipe cover to soffits to be as per The Building Regulations 2010 Part H for thermoplastic pipes:

- 0.6m in pedestrian or landscaped areas
- 0.9m in vehicle accessible areas

Any pipes with cover to soffit less than those stated above are to have a Class Z concrete pipe bed & surround

Internal foul drain pipe minimum gradients:

- 1:80 from SVP & WC to IC
- 1:40 from Basin & Sink to IC

Refer to Architect's/M&E drawings for pipe sizes and setting-out information.

All drainage to be constructed in accordance with Sewers for Adoption 6th Edition and Building Regulations Part H.

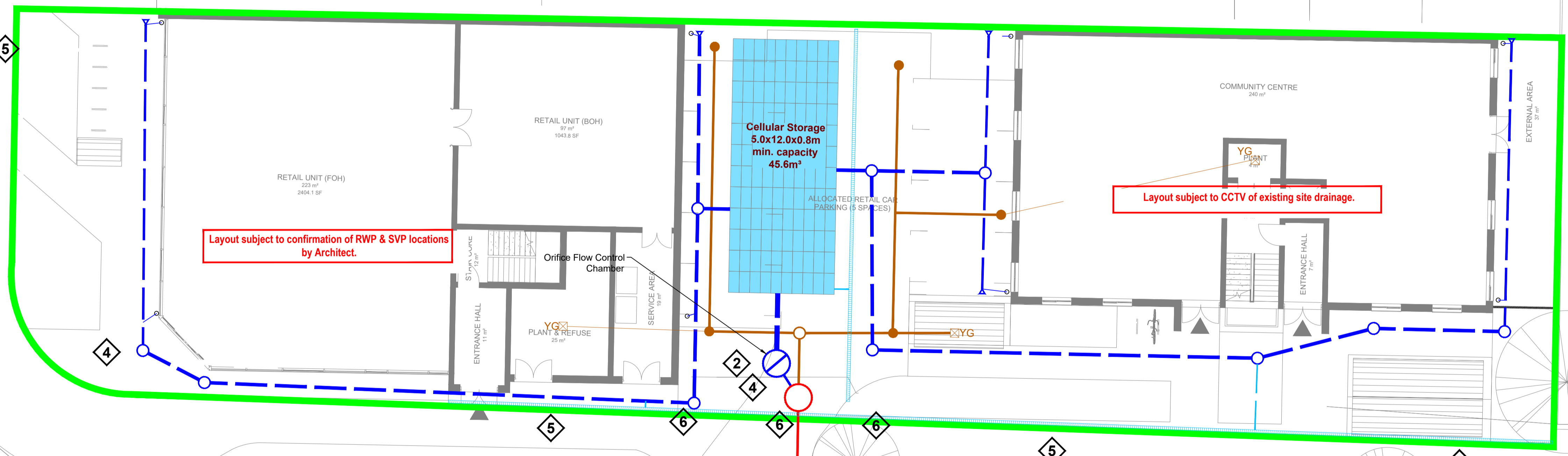
A CCTV survey of the as-built drainage is to be undertaken by the Contractor and provided to the Engineer for final approval

Sewer details shown have been taken from Thames Water sewer records and are to be confirmed by Contractor prior to commencement of the works.

LAYOUT IS SHOWN AS INDICATIVE ONLY AND IS SUBJECT TO DETAILED DESIGN

- LEGEND**
- Site Ownership Boundary
 - Undercroft Extents
 - Foul water drain
 - Surface water drain
 - Water trap (surface water only)
 - Flow Control Chamber
 - Rodding eye (surface water only)
 - Access Plate (underslung surface water only)
 - 2 x cellular storage tanks providing a minimum combined 36.0m³ storage volume
 - YG Yard Gully (located within refuse areas)
 - Filter Drain (Surface Only)

- 1 Existing Sewer**
Assumed existing sewer within Powder Mill Lane. Exact Location to be confirmed by Thames Water
- 2 U Trap**
U Trap connection where surface water and foul combine within lateral chamber
- 3 Section 106 Connection**
Proposed new Q1200 PC Manhole constructed on line of existing Thames Water sewer (exact location to be confirmed) to be confirmed by Thames Water
- 4 Flow control**
Control chamber to restrict flows to 5.00l/s (control manholes acting as demarcation of the site boundary)
- 5 Linear drains**
Linear drain to collect surface water runoff within undercroft car parking area, retail unit entrance & rear courtyard and prevent runoff onto highway.
- 6 Car park ingress**
Car park entrance to be raised above footway levels to prevent surface water ingress from the highway



Layout subject to confirmation of RWP & SVP locations by Architect.

Layout subject to CCTV of existing site drainage.

Location of existing services within the highway to be confirmed by contractor to engineer prior to commencement of works

Rev	Description of updates	Drawn	Checked	App'd	Date
A2	Updated to latest site layout	JD	CB	BM	31.07.19
A1	Preliminary issue.	CC	CB	JD	14.03.19

farrow walsh CONSULTANTS

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PRELIMINARY

Client: Linden Hill Capital

Project: 672 Hanworth Road Whitton

Title: Drainage Strategy

Drawn: CC	Checked: CB	Approved: JD	Date: Mar 2019	Scale: 1:125 @ A1
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Drawing No. **FW1677-D-400** Revision: **A2**

Appendix D SUDS Storage Calculations

SUDS Storage Calculations

Global Variables

Location	= England and Wales
SAAR	= 688 mm/yr
WRAP	= 4
M5-60	= 19.00 mm
r Ratio	= 0.40
Soil index	= 0.45

Input Data

Contributing area	= 0.136 ha
Allowable discharge	= 5 lps
Maximum possible storm duration	= 1440 min
Storm duration time step	= 60 min
Storm return period	= 100 years

Calculated Data

Time to max. storage = 60 mins

Rainfall at max. storage = 38.4 mm/hr

Storage volume = 31.630 m³

Adjustments to Result for Climate Change

Volume + 10% for normal discharge (W5-074) : Storage volume = 34.793 m³

Volume + 20% for discharge into river flows (DEFRA): Storage volume = 37.956 m³

Volume + 40% for EA residential requirements : Storage volume = 44.282 m³

Volume + 50% for other residential requirements : Storage volume = 47.445 m³

Output Data

Time	Rainfall	Inflow	Outflow
Balance			
	Intensity		
mins	mm/hr	m ³	m ³
m ³			

60.0 31.630 Maximum	38.41	49.630	18.000
120.0 24.161	23.28	60.161	36.000
180.0 12.479	17.15	66.479	54.000
240.0 0.000	13.73	70.964	72.000
300.0 0.000	11.52	74.400	90.000
360.0 0.000	9.97	77.265	108.000
420.0 0.000	8.83	79.847	126.000
480.0 0.000	7.95	82.132	144.000
540.0 0.000	7.24	84.185	162.000
600.0 0.000	6.66	86.053	180.000
660.0 0.000	6.18	87.769	198.000
720.0 0.000	5.76	89.357	216.000
780.0 0.000	5.41	90.836	234.000
840.0 0.000	5.10	92.221	252.000
900.0 0.000	4.83	93.525	270.000
960.0 0.000	4.58	94.757	288.000

1020.0 0.000	4.37	95.925	306.000
1080.0 0.000	4.17	97.036	324.000
1140.0 0.000	4.00	98.096	342.000
1200.0 0.000	3.84	99.109	360.000
1260.0 0.000	3.69	100.081	378.000
1320.0 0.000	3.55	101.013	396.000
1380.0 0.000	3.43	101.910	414.000
1440.0 0.000	3.31	102.774	432.000

Appendix E BGS Mapping Extract

FW1677 672 Hanworth Rd



Contains OS data © Crown Copyright and database right 2018

GeoIndex Onshore Data Sources: NERC, Natural England, English Heritage and Ordnance Survey

Map Key

Bedrock geology 1:50,000 scale

 [LONDON CLAY FORMATION - CLAY AND SILT](#)

 [CLAYGATE MEMBER - SAND, SILT AND CLAY](#)

Superficial deposits 1:50,000 scale

 [KEMPTON PARK GRAVEL MEMBER - SAND AND GRAVEL](#)

 [BOYN HILL GRAVEL MEMBER - SAND AND GRAVEL](#)

 [ALLUVIUM - CLAY, SILT, SAND AND PEAT](#)

 [TAPLOW GRAVEL MEMBER - SAND AND GRAVEL](#)

 [BLACK PARK GRAVEL MEMBER - SAND AND GRAVEL](#)

 [HEAD - CLAY, SILT, SAND AND GRAVEL](#)

 [LANGLEY SILT MEMBER - CLAY AND SILT](#)

 [SUPERFICIAL THEME NOT MAPPED \[FOR DIGITAL MAP USE ONLY\] - WATER, TYPE UNSPECIFIED](#)

Selection Results