HJH Civil Engineering Ltd

Sustainable Drainage Statement

104 - 106 Brighton Road, Lancing

Project number: 2220100
Status: Preliminary
Revision: P2
Date: 30/10/2023

Document Control

		Remarks:	Preliminary Issue
Revision:	P1	Prepared by:	Harry Hunter BEng (Hons)
Date:	19/07/2023	Signature:	HH
Revision:	P2	Prepared by:	Harry Hunter BEng (Hons)
Date:	30/10/2023	Signature:	HH

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1.0 Introduction

1.1 This report has been prepared to discharge planning conditions 4 & 5 of the Adur District Council approved planning application reference AWDM/1541/20, relating the proposed redevelopment of the site located at 104-106 Brighton Road, Lancing, West Sussex.

1.2 The development proposals comprises the demolition of two existing detached buildings of converted self-contained flats, and the construction of a terrace of five dwellings with balconies, roof terraces and integral garages.

1.3 This report assesses the existing drainage arrangement of the site. It also considers the proposed surface water drainage strategy for the developed site along with the proposed maintenance of the sustainable drainage features.

1.4 This report is for the private and confidential use of the client and its agents and may not be copied in whole or in part without the written permission of HJH Civil Engineering Ltd.

2.0 Existing Site Conditions

2.1 The development site is located at 104 – 106 Brighton Road, Lancing, West Sussex. The site eastings and northings are 519379 E; 104019 N. The site location plan can be found in Figure 1, below.



***Figure 1**: Site Location Plan*

2.2 The existing site comprises two existing detached buildings of converted self-contained flats with associated hard and soft landscaping.

2.3 A topographic survey of the existing site has been undertaken to local coordinates and datum. The survey shows the front of the site to be broadly level, gradually sloping to Brighton Road to the north, with levels falling from 20.20m to 20.00m. Levels rise to the south via tiered planters and steps where levels rise to broadly 22.60m. The levels then drop within the landscaping in the rear gardens to the south, and mimic the levels to the front of the site at approximately 20.00m. The topographic survey is set to a localised datum which is approximately 17.6m higher than the global datum. The topographic survey is located in **Appendix A**.

2.4 The development site is bound to the east and west by residential dwellings. To the north of the site is Brighton Road where the site is accessed. To the south of the site is Widewater Lagoon with Lancing Beach and the English Channel beyond. The town of South Lancing is approximately 1200m to the west.

2.5 Vehicular access is achieved from Brighton Road which is located on the northern boundary of the site.

2.6 The overall impermeable area of the existing site is 469m^2, comprising concrete vehicular hardstanding, patios and roof areas.

2.7 The nearest significant watercourse to the site is the River Adur which is located approximately 2000m beyond the eastern boundary of the site. Widewater Lagoon is located beyond the southern boundary of the site with the English Channel beyond.

2.8 The existing drainage network is picked up on the topographic survey and CCTV survey and shows a private gravity network which discharges to a public foul water sewer network on site via a number of direct and lateral connections. The CCTV survey highlights a number of mis-connections, with surface water runoff also discharged to the public foul water sewer network.

2.9 British Geological Survey maps indicate the site to be underlain by the Newhaven Chalk Formation Alluvium superficial deposits comprising clay, silt sand and peat. On this basis it is likely that drainage by infiltration techniques would be feasible. A review of historical borehole logs within the vicinity of the site show the ground conditions to comprise of sand, shingle, clay, chalk and flints.

2.10 The Environment Agency online groundwater mapping uses the same BGS mapping base information and classifies the site as a Principal Aquifer, which is described as “These are layers of rock or drift deposits that have high interangular and/or fracture permeability – meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.”

3.1 Proposed Site

3.1 The proposed development proposals comprises the demolition of two existing detached buildings of converted self-contained flats, and the construction of a terrace of five dwellings with balconies, roof terraces and integral garages. A copy of the proposed site layout is located in **Appendix B**.

3.2 The development site has a total area of 0.077ha and its development would increase the construction impermeable areas and result in an increase of surface water run-off.

The overall proposed impermeable area of the development site is 547m^2, comprising the following breakdown of areas: -

- Proposed Dwelling Roofs = 364m^2
- Driveways = 69m^2
- Rear Terrace= 114m^2

3.3 The greenfield runoff rates are therefore as follows:-

1 in 1 year flow = 0.0055 l/s
1 in 30 year flows = 0.022 l/s
1 in 100 year flows = 0.033 l/s

Runoff rates can be found in **Appendix C**.

3.3 In order to limit runoff from the site and mitigate flood risks to areas downstream, offsite flow rates should be limited to greenfield rates and SuDS should be used. The DEFRA Non-statutory technical standards for sustainable drainage systems document prepared in 2015 notes that where a drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g the sea or large estuary) the peak flow control standards and volume control standards need not apply.

3.4 Infiltration testing in accordance with BRE 365 has been undertaken to confirm that infiltration techniques are feasible. The infiltration test results proved that discharge of surface water runoff via infiltration techniques is suitable. The test results showed infiltration rates to vary between 4.96x10^{-4} and 2.35x10^{-4} m/s and so the infiltration rate of 2.35x10^{-4} m/s is to be used for the design of the permeable paving features.

The infiltration test results can be found in **Appendix D**.

3.5 It is proposed for all hardstanding areas to be constructed utilising permeable surfacing and discharge surface water runoff to the ground through infiltration. The use of permeable pavement provides attenuation storage for surface water, as well as dealing with runoff at source, providing treatment to surface water runoff though filtration, absorption, biodegradation and sedimentation and reduces the volume and frequency of runoff. The design of the permeable pavements ensures that no flooding will occur in any modelled storm events up to and including the 1:100yr + 45% CC.

3.6 Widewater Lagoon is a landlocked tidal Lagoon which naturally fills and empties with the tides. On this basis the Lagoon is considered a surface water body which can take uncontrolled flows. It is therefore proposed to discharge surface water runoff to Widewater Lagoon on the southern boundary of the site via a gravity network with an uncontrolled outfall. The surface water runoff discharging to the lagoon will come from the low polluted areas of the site, including the roof and rear terraced areas.

The outfall to the lagoon will be in the form of a precast concrete headwall. Due to the level difference between the surface water network and the outfall, it is not proposed to introduce a flap valve as this could potentially cause a blockage risk, increasing the upstream flood risk. The conveying pipework has been designed to accommodate surface water runoff from all modelled storm events up to and including the 1:100yr + 45%CC.

Calculations for the permeable pavements can be found in **Appendix E**.

3.7 To validate the use of permeable paving, winter groundwater monitoring was undertaken by Ashdown Site Investigation Ltd to establish the highest annual groundwater levels. The groundwater monitoring was undertaken between 6th October 2022 to 6th April 2023. The results of the monitoring showed that the groundwater table fluctuated between 0.4m and 2.95mBGL, with a peak groundwater level recorded on 23rd of December 2022.

On review of the groundwater levels, it is evident that that the fluctuation in groundwater levels coincide with the daily high and low tides. Whilst it is best practice to construct infiltration devices to be a minimum of 1.00m above the peak groundwater table, the levels across the development site do not allow for raising of the permeable pavement to a level which is above this. As a result, the permeable paving has been designed with a half drain time of no greater than 6 hours, a betterment over the 24 hour period for which is standard for the design of infiltration solutions. This will therefore ensure there is sufficient capacity in the subbase to the paving to accommodate the 1:100yr + 45%CC peak storm event when groundwater levels are higher as a result of high tides.

The groundwater monitoring results can be found in **Appendix F**.

3.8 The proposed foul water network is proposed to discharge via a gravity piped network and discharge to the Southern Water foul water sewer located within the northern boundary of the site. Due to the shallow depth of the public sewer, it is proposed to discharge to the public sewer via two separate connections. Non-return valves are to be fitted to the proposed private foul water demarcation chambers to prevent flooding occurring to the ground floor as a result of sewer surcharge.

The proposed drainage strategy can be found in **Appendix G**.

3.9 To ensure drainage elements are maintained, maintenance of drainage should be covered by a suitable management company and subject to a regular maintenance regime. Maintenance of SuDS to be in accordance with CIRIA SuDS manual C753 where specific intervals are advised within the document as per element type. Refer to section 4 of this report for additional information.

4.0 Maintenance

4.1 This section sets out the inspection and maintenance requirements for long term management of the developments surface water drainage strategy. This work is to be undertaken by a private maintenance company.

4.2 All those responsible for maintenance should take appropriate health, safety and welfare precautions for all activities including lone working, if relevant, and risk assessments should always be undertaken. The sites infrastructure Health and Safety File should be consulted before carrying out any works either inside or outside of the developments boundary and information regarding the location of existing utilities passed on to operatives.

4.3 The requirements of the Health and Safety at Work Act 1974 and The Construction (Design and Management) Regulations 2015 should be adhered to and any residual risks identified in the Health and Safety File should be managed and information passed on the maintenance operatives through task specific risk assessments.

4.4 There are three types of maintenance activities associated with surface water drainage systems.

The SuDS Manual, CIRIA C753, defines these as:

- Regular Maintenance – 'basic tasks undertaken on a frequent and predictable schedule' including vegetation management, litter and debris removal, and inspections.'
- Occasional Maintenance – 'tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).'
- Remedial Maintenance – 'intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site specific characteristics or unforeseen events, and as such timings are difficult to predict.'

4.5 Piped Networks/Chambers

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required take remedial action	Monthly for three months, then six monthly
	Debris removal from catchment surface / gratings (where may cause risks to performance)	Monthly (and after large storms)
	Remove sediment from trapped sumps, manholes and catchpits.	Annually or as required
Remedial Actions	Repair / rehabilitation of gratings, inlets and outlets	As required
Monitoring	Inspect / check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed	Annually and after large storm events
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of features or pipework is required.	As required

4.6 Permeable Pavements

4.6.1 Regular inspection and maintenance is important for the effective operation of pervious pavements. Maintenance responsibility for a pervious pavement and its surrounding area should be placed with an appropriate responsible organisation. The facility should be inspected regularly, preferably during and after heavy rainfall to check effective operation and to identify any areas of ponding.

Pervious surfaces need to be regularly cleaned of silt and other sediments to preserve their infiltration capability. Experience in the UK is limited, but advice issued with permeable precast concrete paving has suggested a minimum of three surface sweepings per year. Manufacturers' recommendations should always be followed.

A brush and suction cleaner, which can be a lorry-mounted device or a smaller precinct sweeper, should be used and the sweeping regime should be as follows:

- End of winter (April) – to collect winter debris.
- Mid-summer (July/August) – to collect dust, flower and grass-type deposits.
- After autumn leaf fall (November).

Care should be taken in adjusting vacuuming equipment to avoid removal of jointing material. Any lost material should be replaced.

Operation and maintenance requirements for permeable paving are described below.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Brushing and vacuuming.	Three times/year at end of winter, mid-summer, after autumn leaf fall, or as required based on site-specific observations of clogging or manufacturers' recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weeds.	As required.
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving.	As required.
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users.	As required.
	Rehabilitation of surface and upper sub-structure.	As required (if infiltration performance is reduced as a result of significant clogging).
Monitoring	Initial inspection.	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth. If required take remedial action.	3-monthly, 48 h after large storms.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.
	Monitor inspection chambers.	Annually.

5.0 Summary and Conclusions

5.1 Surface water runoff from the proposed parking areas discharge to the ground via infiltration through the use of permeable pavements. Permeable pavements will provide treatment of runoff through filtration, biodegradation, adsorption and sedimentation.

5.2 The proposed roof area and rear terraces are to discharge to Widewater Lagoon via a gravity network with an uncontrolled discharge. Widewater Lagoon is a landlocked tidal Lagoon which naturally fills and empties with the tides. On this basis the Lagoon is considered a surface water body which can take uncontrolled flows**.** The proposed surface water network will accommodate runoff from all modelled storm events up to and including the 1:100yr storm event + 45% climate change.

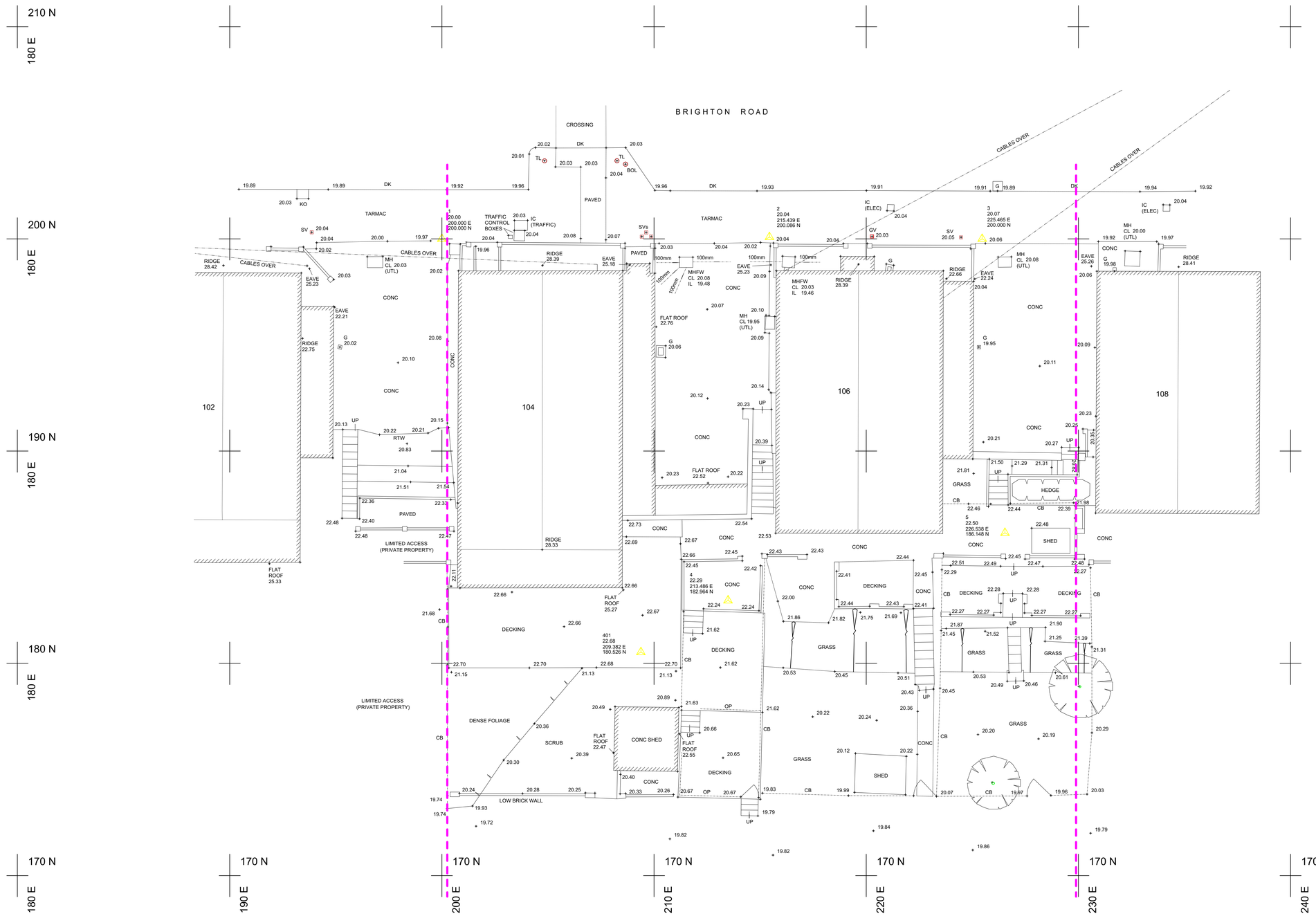
5.3 Groundwater levels fluctuate between 0.4m and 2.95mBGL and is understood to vary in line with high and low tides. The proposed infiltration solution comprising the permeable paving have therefore been designed with a half drain time of no greater than 6 hours, ensuring that there is sufficient capacity within the respective features to attenuate runoff during high tides.

5.5 The proposed surface water drainage strategy will reduce the flood risk to the site and will ensure there is no increase in flood risk downstream.

5.4 On the basis of the above, it can be considered that conditions 4 and 5 of the approved application reference AWDM/1541/20 can be discharged.

Appendices

Appendix A



210 N
180 E

200 N
180 E

190 N
180 E

180 N
180 E

170 N
180 E

170 N
190 E

170 N
200 E

170 N
210 E

170 N
220 E

170 N
230 E

170 N
240 E

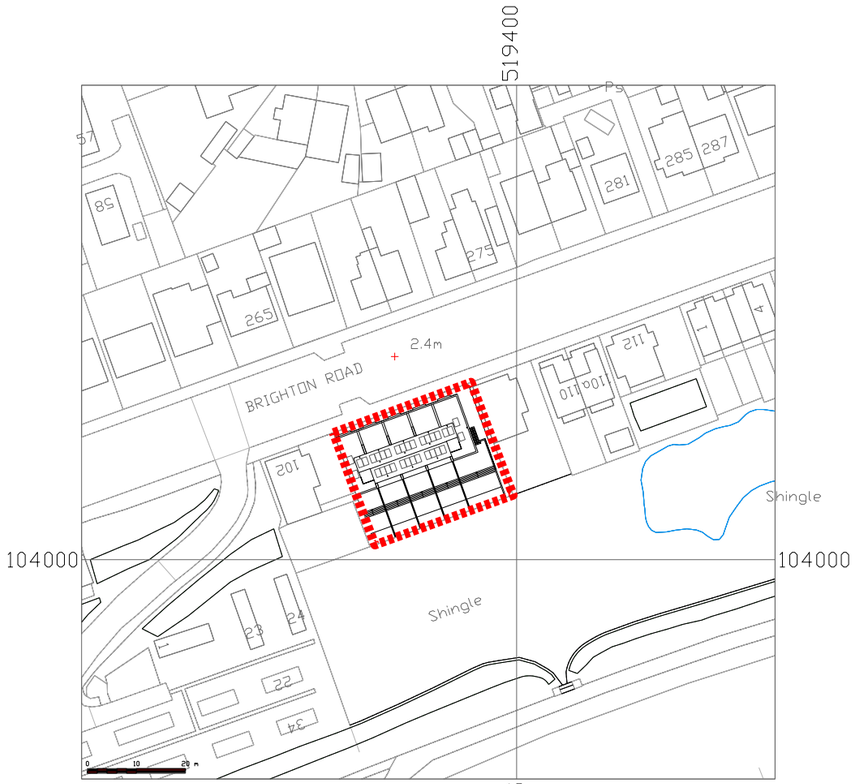
01 Existing - Survey
Scale 1:100

0 4 5 6 7 8 9 10 M

HAPA ARCHITECTS

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Date: JAN '20	Scale: 1:100 @ A1
Job Ref: 0192	
Drawing Number: L-100a	

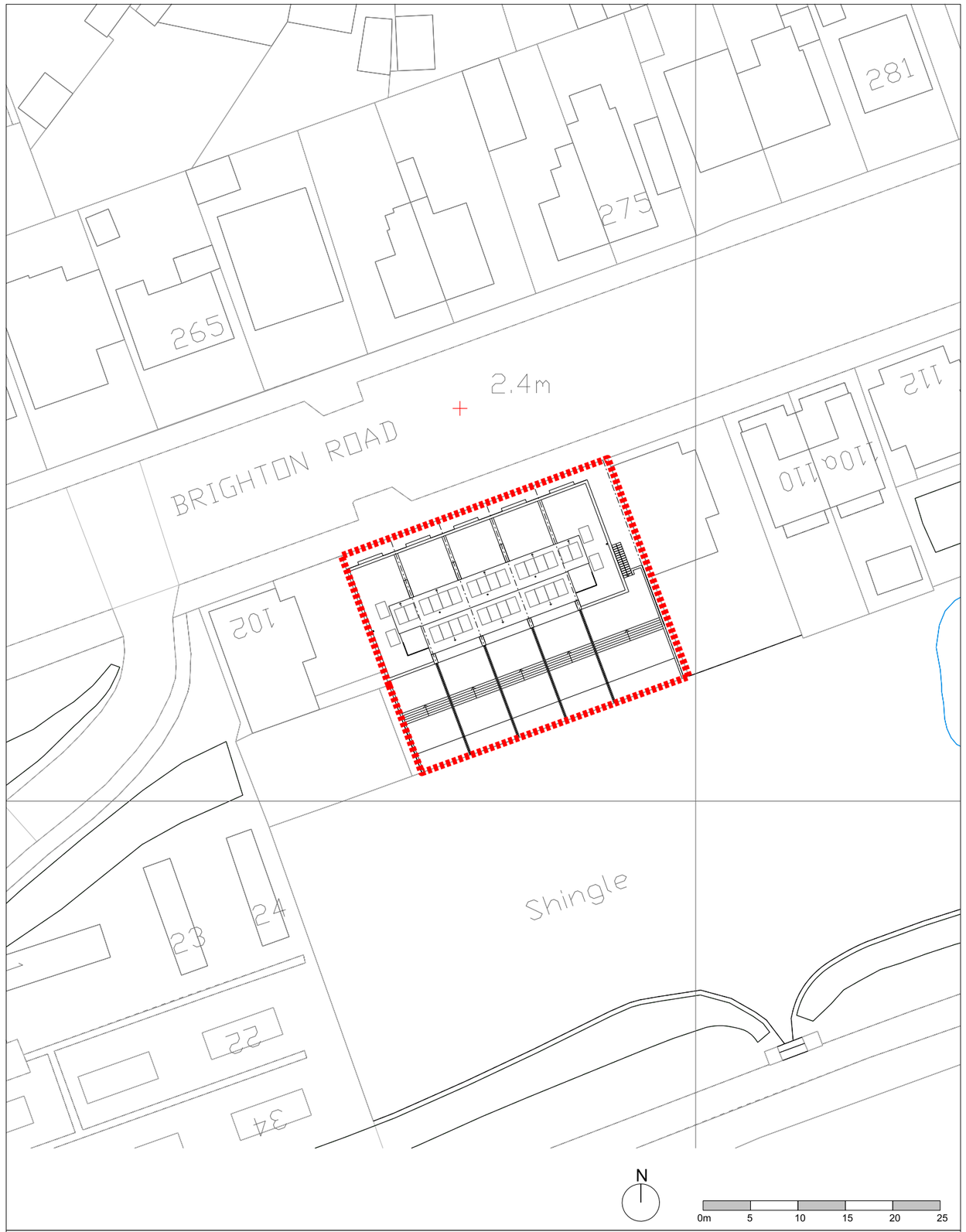
Appendix B



N

0m 10 20 30 40 50

SITE PLAN 1:1250



N

0m 5 10 15 20 25

BLOCK PLAN 1:500

Rev:

Notes: Unless stated otherwise, all dimensions are in millimetres. All dimensions to be checked and confirmed on site by contractor and as such are to be his responsibility. Any errors, omissions or discrepancies on this drawing are to be reported to the architect.

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Project: 104-106 Brighton Road, Lancing, BN15 8LW
Construction of five terraced houses on brownfield site

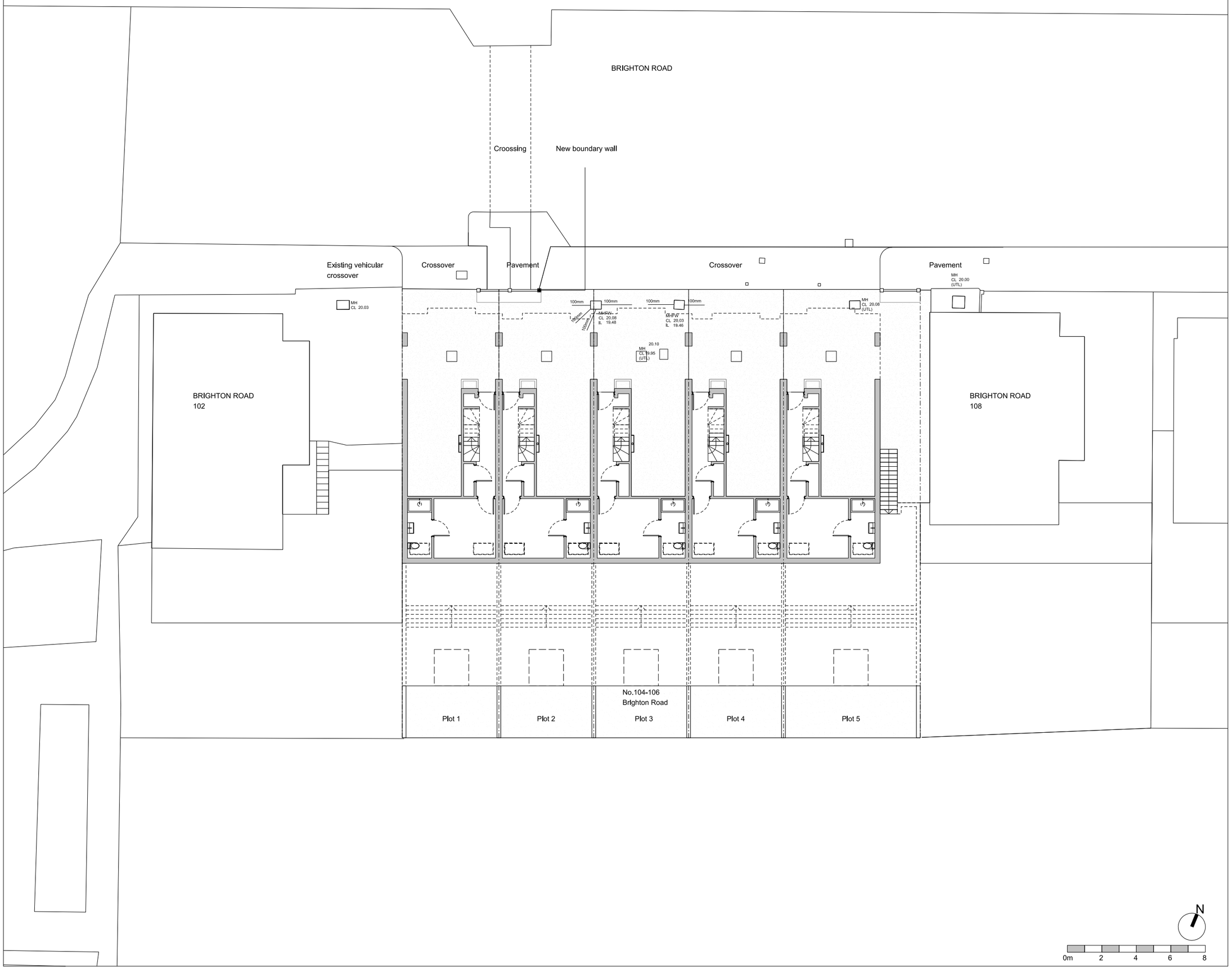
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Date: 28.02.23

Drawing Title: Proposed Drawing
Site and Block Plans

Drwg No: 2209-01_PL_100

Rev: A



Notes:

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Rev:

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Project:	104-106 Brighton Road, Lancing, BN15 8LW Construction of five terraced houses on brownfield site	
Drawing Title:	Proposed Drawings Lower Ground Floor Plot Plan	
Scale:	1:200 @ A3	Date: 22.12.22
Drwg No:	2209-01_PL_101	Rev: /

BRIGHTON ROAD

BRIGHTON ROAD
102

BRIGHTON ROAD
108

No.104-106
Brighton Road

Plot 1 | Plot 2 | Plot 3 | Plot 4 | Plot 5

20.24

20.03

N

0m 2 4 6 8

Notes:

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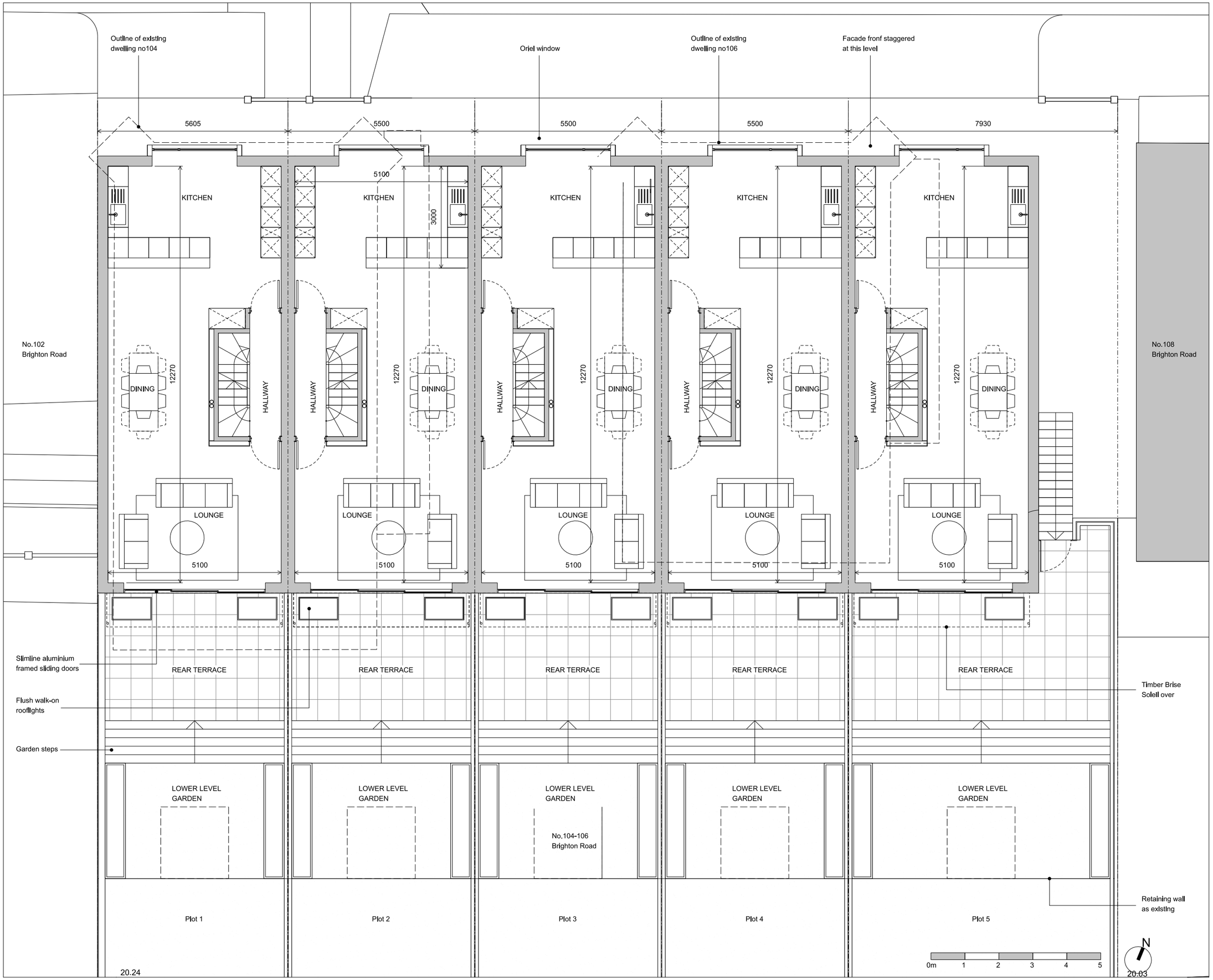
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Project:	104-106 Brighton Road, Lancing, BN15 8LW Construction of five terraced houses on brownfield site
Drawing Title:	Proposed Drawings Upper Ground Floor Plot Plan
Scale: 1:200 @ A3	Date: 13.02.23
Drwg No: 2209-01_PL_102	Rev: A



Notes:

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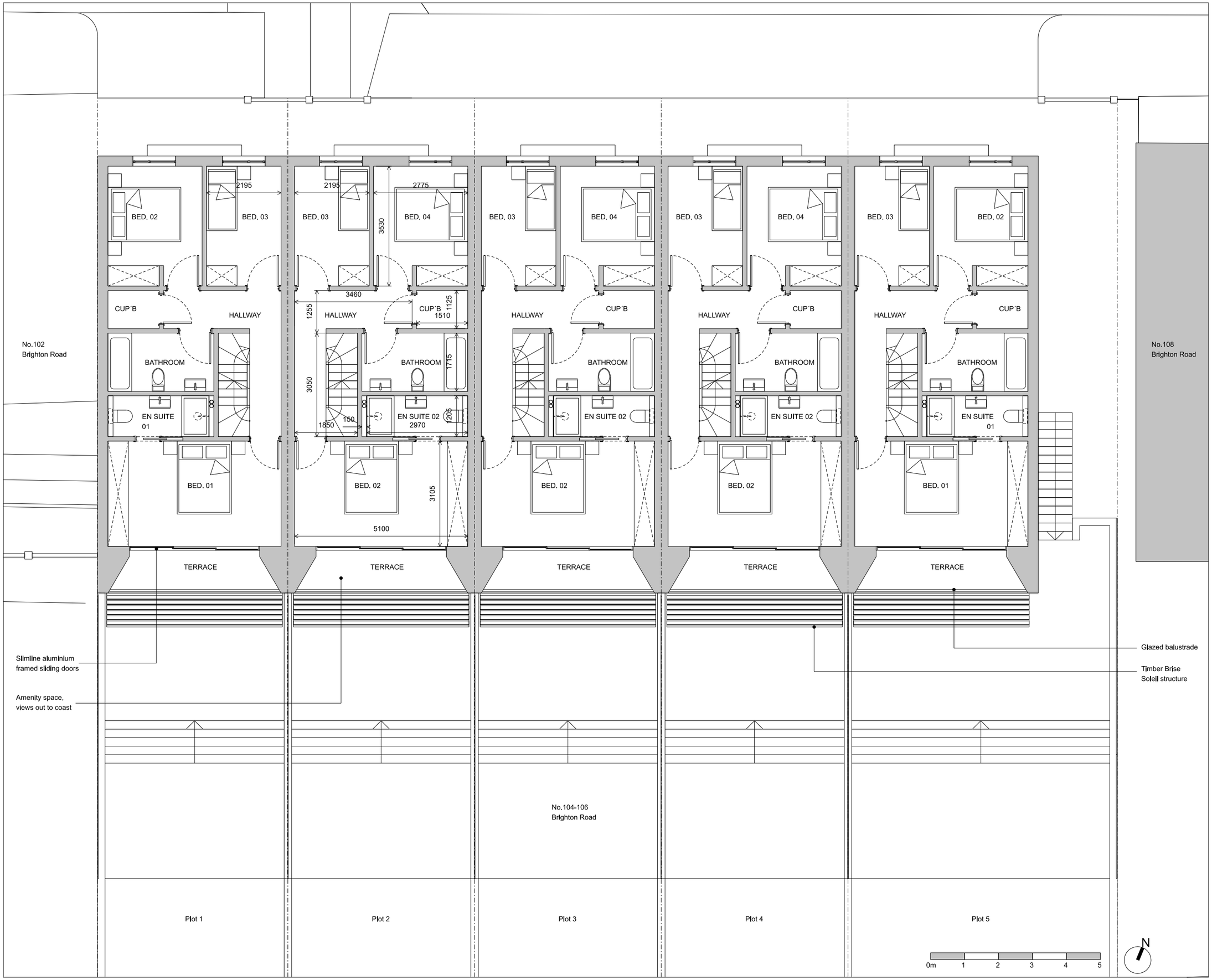
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Project:	104-106 Brighton Road, Lancing, BN15 8LW Construction of five terraced houses on brownfield site
Drawing Title:	Proposed Drawings Upper Ground Floor Plan
Scale:	1:100 @ A3
Date:	13.02.23
Drwg No:	2209-01_PL_104
Rev:	A



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Project:	104-106 Brighton Road, Lancing, BN15 8LW Construction of five terraced houses on brownfield site
Drawing Title:	Proposed Drawings First Floor Plan
Scale:	1:100 @ A3
Date:	28.02.23
Drwg No:	2209-01_PL_105
Rev:	B

Parapet

Area for roof maintenance access only

Air Source Heat Pump

Air Source Heat Pump

Air Source Heat Pump

Air Source Heat Pump

Air Source Heat Pump

Glazed stairwell

No.102 Brighton Road

Solar Panel

Solar Panel

Solar Panel

Solar Panel

RWP

RWP

RWP

RWP

RWP

SVP

SVP

HALLWAY

HALLWAY

HALLWAY

HALLWAY

HALLWAY

EN SUITE 01

EN SUITE 01

EN SUITE 01

BED. 01

BED. 01

BED. 01

EXTERNAL TERRACE

EXTERNAL TERRACE

EXTERNAL TERRACE

EXTERNAL TERRACE

EXTERNAL TERRACE

RWP

RWP

RWP

No.108 Brighton Road

Small rooftop terrace

Glazed balustrade

Slimline aluminium framed sliding doors

Timber Brise Soleil structure

Small rooftop terrace

Glazed balustrade

No.104-106 Brighton Road

Plot 1

Plot 2

Plot 3

Plot 4

Plot 5

0m 1 2 3 4 5

N

Notes:

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Project:	104-106 Brighton Road, Lancing, BN15 8LW Construction of five terraced houses on brownfield site
Drawing Title:	Proposed Drawings Roof Terrace Plan
Scale:	1:100 @ A3
Date:	13.02.23
Drwg No:	2209-01_PL_106
Rev:	A

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No.102
Brighton Road

No.108
Brighton Road

SVP

SVP

Solar Panels

Solar Panels

Solar Panels

Solar Panels

Solar Panels

Solar Panels

Solar Panels

Solar Panels

Timber brise soleil structure

Timber brise soleil

Timber Brise Soleil structure

No.104-106
Brighton Road

Plot 1

Plot 2

Plot 3

Plot 4

Plot 5

0m 1 2 3 4 5

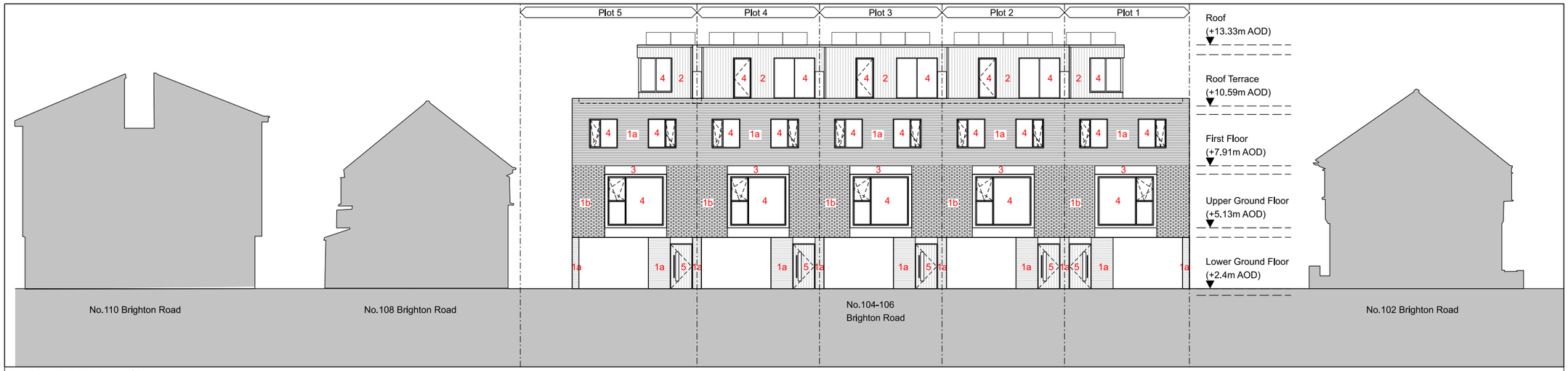
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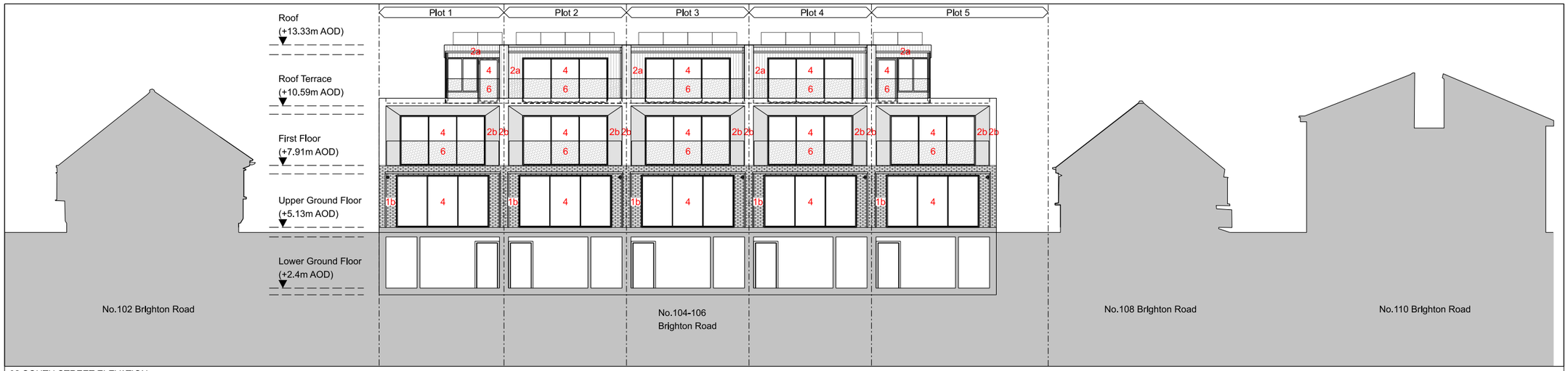
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Project:	104-106 Brighton Road, Lancing, BN15 8LW Construction of five terraced houses on brownfield site
Drawing	Proposed Drawings
Title:	Roof Plan
Scale:	1:100 @ A3
Date:	13.02.23
Drwg No:	2209-01_PL_107
Rev:	A



01 NORTH STREET ELEVATION



02 SOUTH STREET ELEVATION

External walls:

1. Brick finish.

1a_ Brick finish to external walls. Pale grey mixed-tone brick finish

1b_ Brick finish in projecting pattern - angular profile creating a textured shadow pattern to these bands. Bricks to be the same type as 1a above - ie colour/tone.

2. Vertical western red cedar tounge and groove timber boards to second floor.

3. Anthracite grey powder coated aluminium panels to the projecting north facing oriel windows to the upper ground floors surrounds.

Windows and terrace doors:

4. Anthracite grey aluminium framed windows with triple glazing.

Front doors:

5. Anthracite grey aluminium faced front doors with vision panel.

Glass to guardings to terraces:

6. Low iron toughed and laminated clear glass panels topped with a stainless steel handrail.

ELEVATION MATERIAL KEY

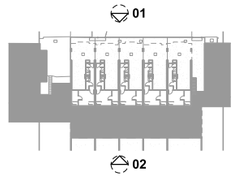
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BRIGHTON ROAD





KEY PLAN



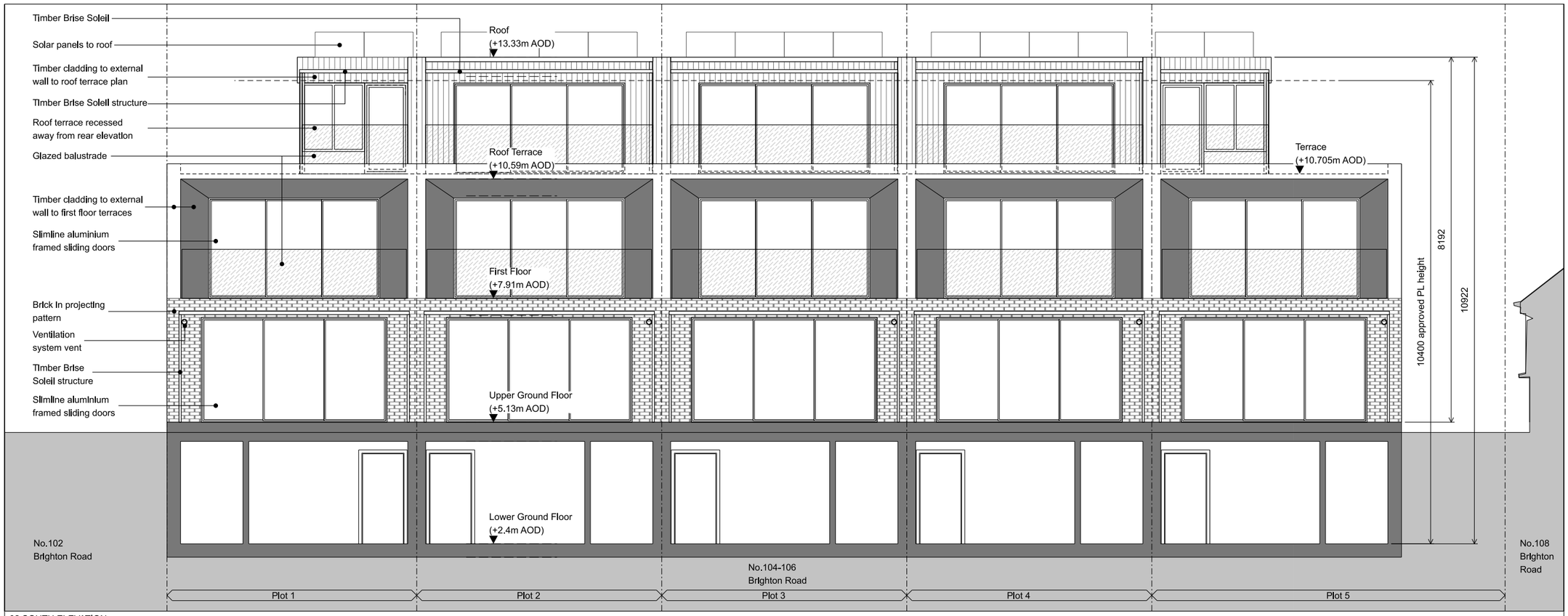
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Project:	104-106 Brighton Road, Lancing, BN15 8LW Construction of five terraced houses on brownfield site
Drawing Title:	Proposed drawing Street elevation
Scale:	1:200 @ A3
Date:	15.05.23
Drwg No:	2209-01_108
Rev:	D



01 NORTH ELEVATION



02 SOUTH ELEVATION

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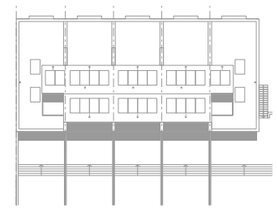
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BRIGHTON ROAD

01



02

KEY PLAN



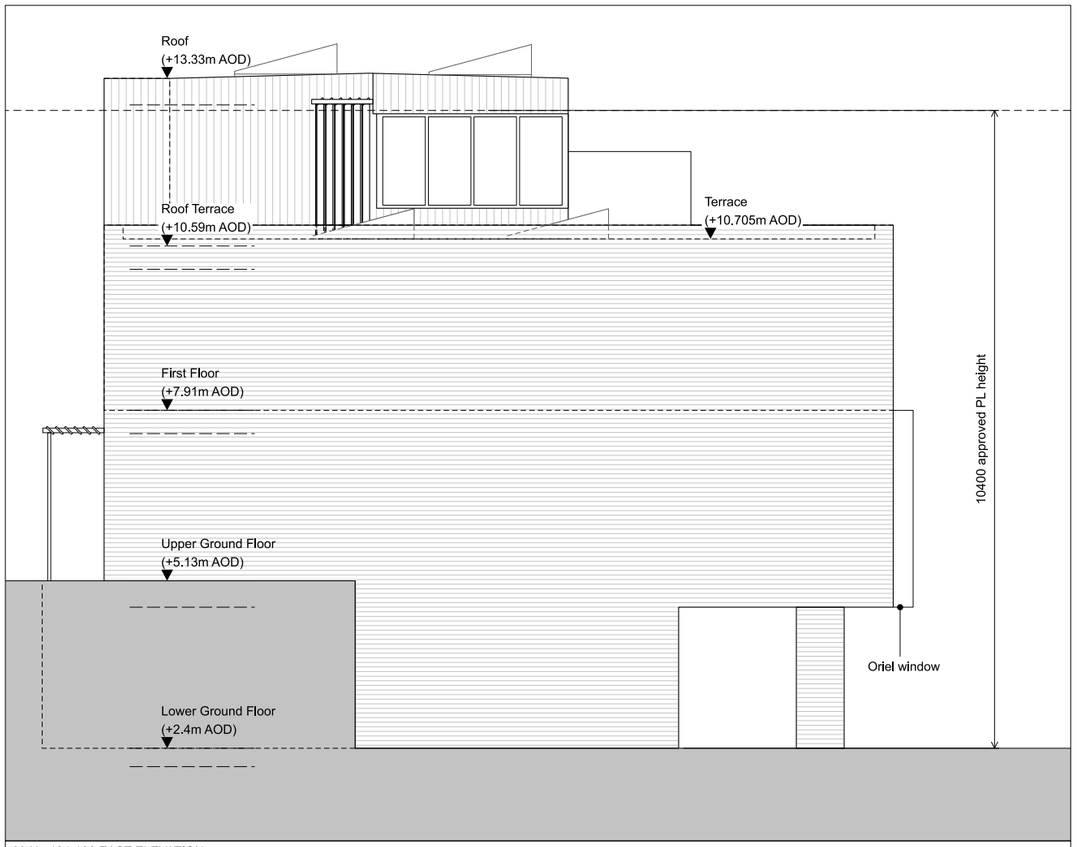
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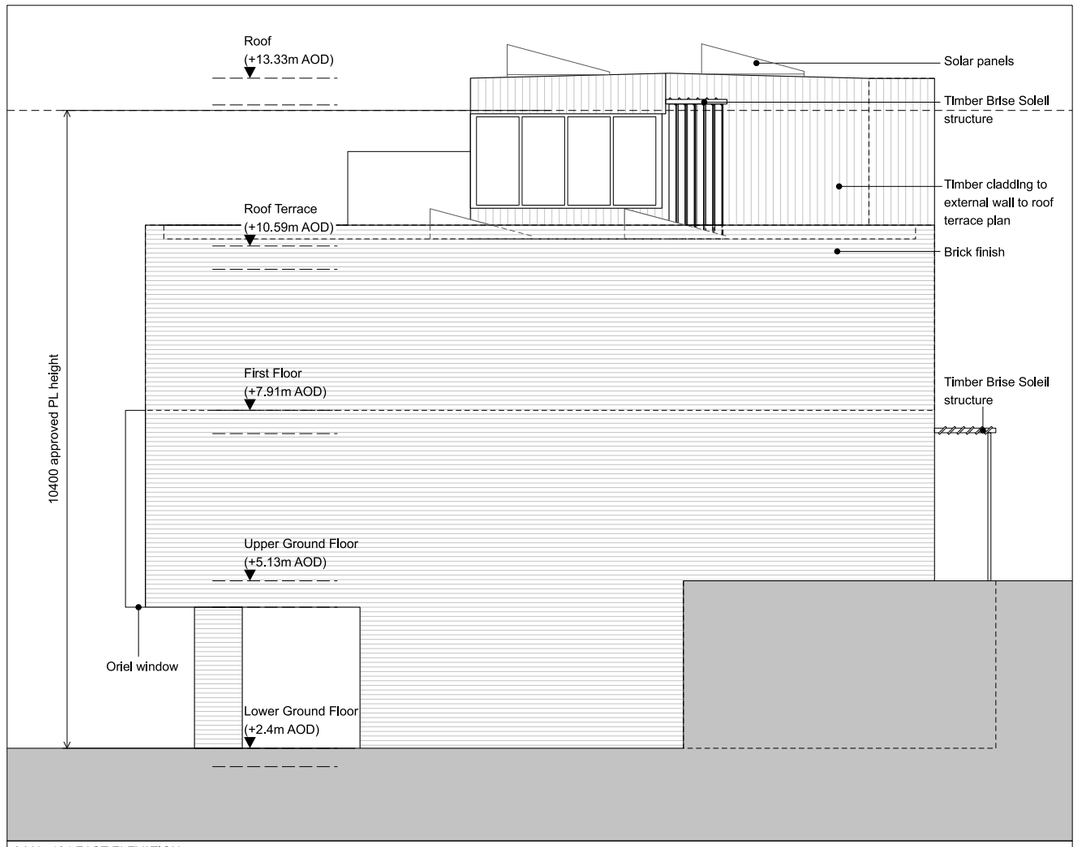
JOE WRIGHT ARCHITECTS

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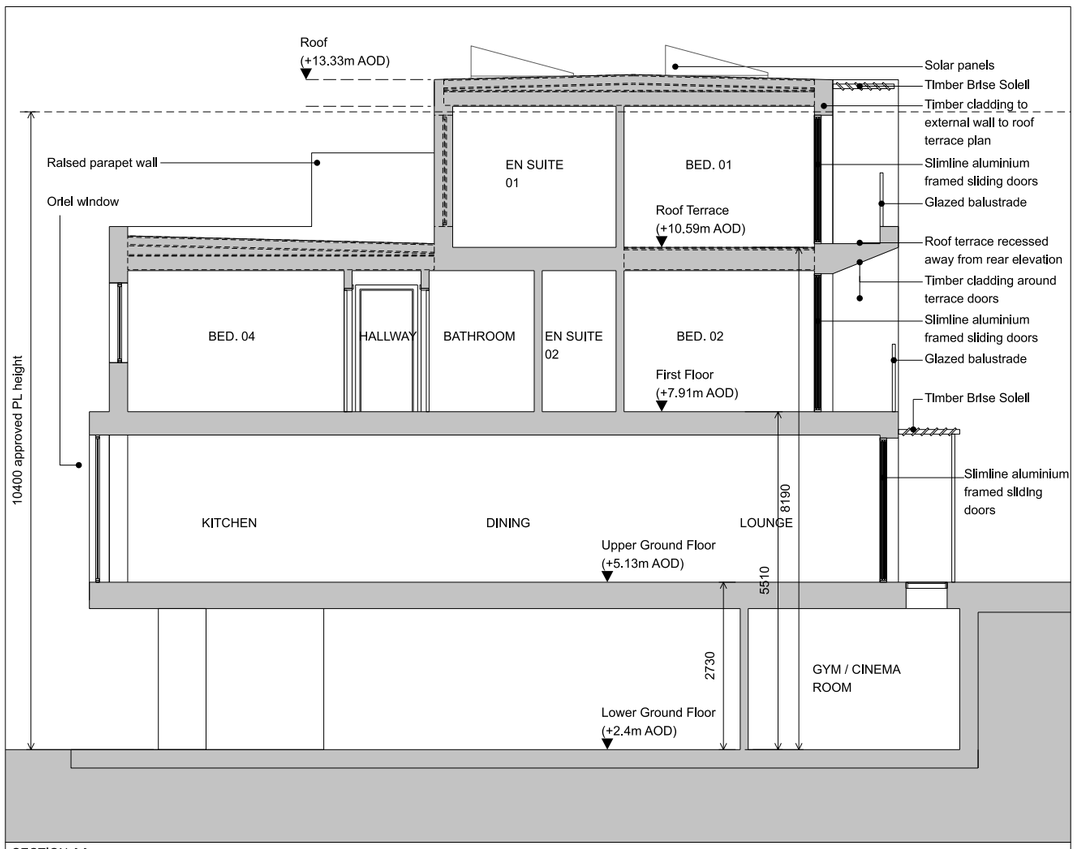
Project:	104-106 Brighton Road, Lancing, BN15 8LW Construction of five terraced houses on brownfield site
Drawing	Proposed Drawings
Title:	Elevations
Scale: 1:100 @ A3	Date: 15.05.23
Drwg No: 2209-01_PL_109	Rev: D



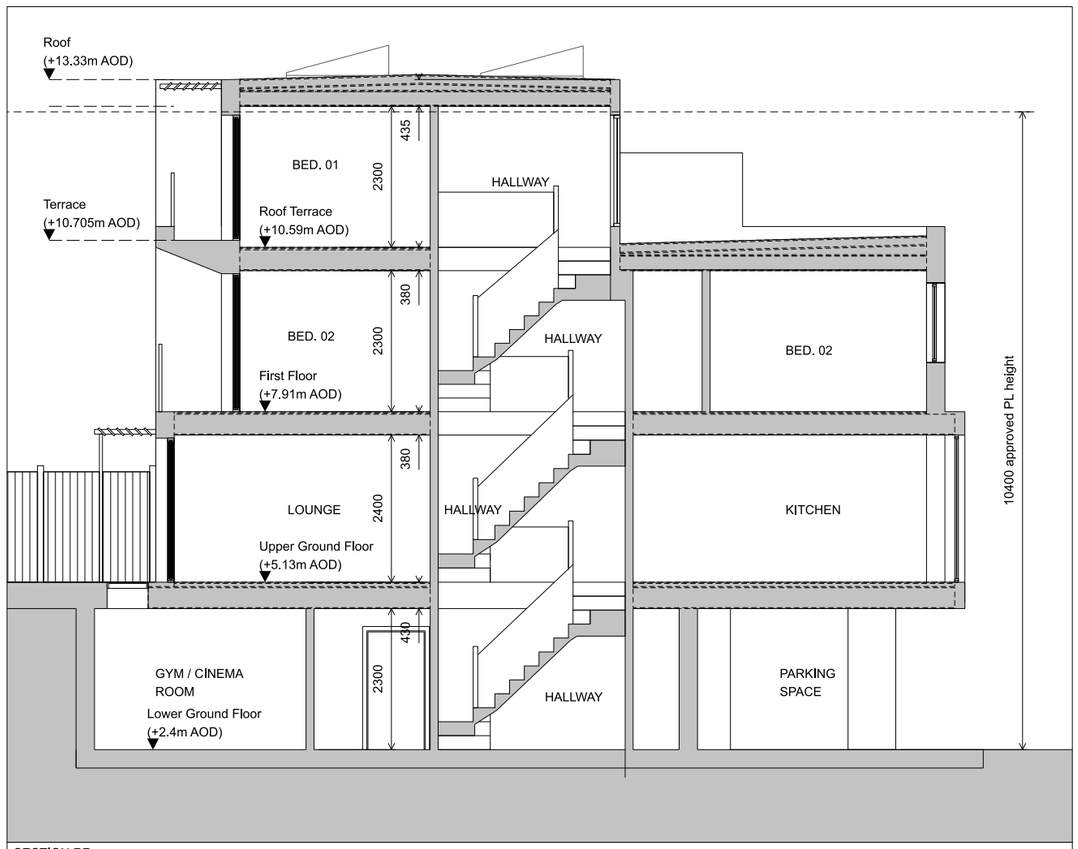
03 No.104-106 EAST ELEVATION



04 No.104 EAST ELEVATION



SECTION **AA**



SECTION **BB**

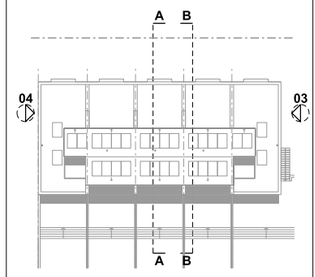
Notes:

Unless stated otherwise, all dimensions are in millimetres.

All dimensions to be checked and confirmed on site by contractor and as such are to be his responsibility.

Any errors, omissions or discrepancies on this drawing are to be reported to the architect.

BRIGHTON ROAD



KEY PLAN





Rev:

JOE WRIGHT ARCHITECTS

t: www.joewrightarchitects.co.uk e: info@joewrightarchitects.co.uk

Project:	104-106 Brighton Road, Lancing, BN15 8LW Construction of five terraced houses on brownfield site
Drawing Title:	Proposed Drawings Elevations and Sections
Scale:	1:100 @ A3
Date:	15.05.23
Drwg No:	2209-01_PL_110
Rev:	D

A: Beds along Brighton Road:
a. Shrub hydrangeas - 'paniculata', 'strong Annabel', 'Ilmellght'.
Planting April to May, or September to October.
b. Cornus stolonifera - 'winter fire'
Planting mid-March to April, or mid September to October

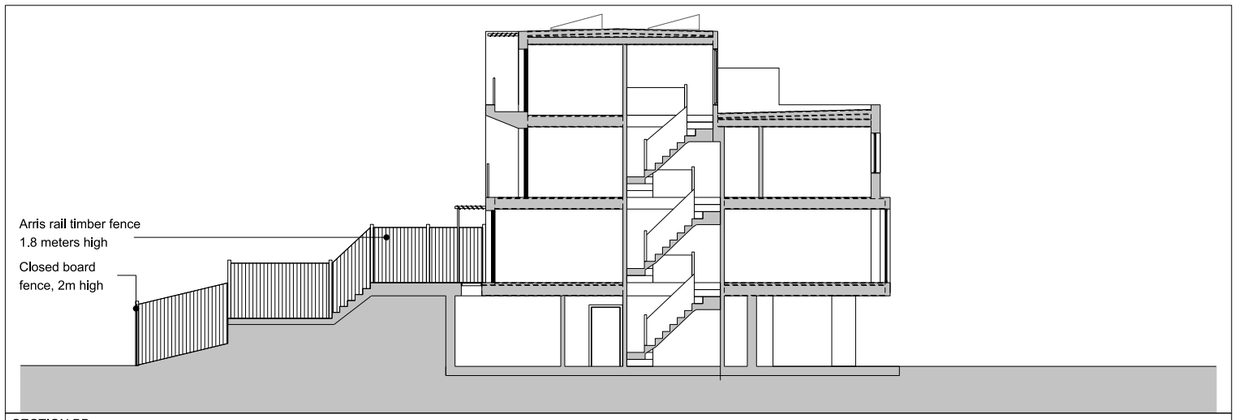
a	b	a	a	b	a
a	b	b	b	a	

B: Beds to south facing rear gardens:
c. Berberis thunbergii f. atropurpurea 'Rose glow'.
Planting mid-March to April, or mid September to October
d. Rosa rubiginosa (sweet briar),
Planting October to mid-March
e. Anemone x hybrida
Planting mid-March to April, or mid September to October

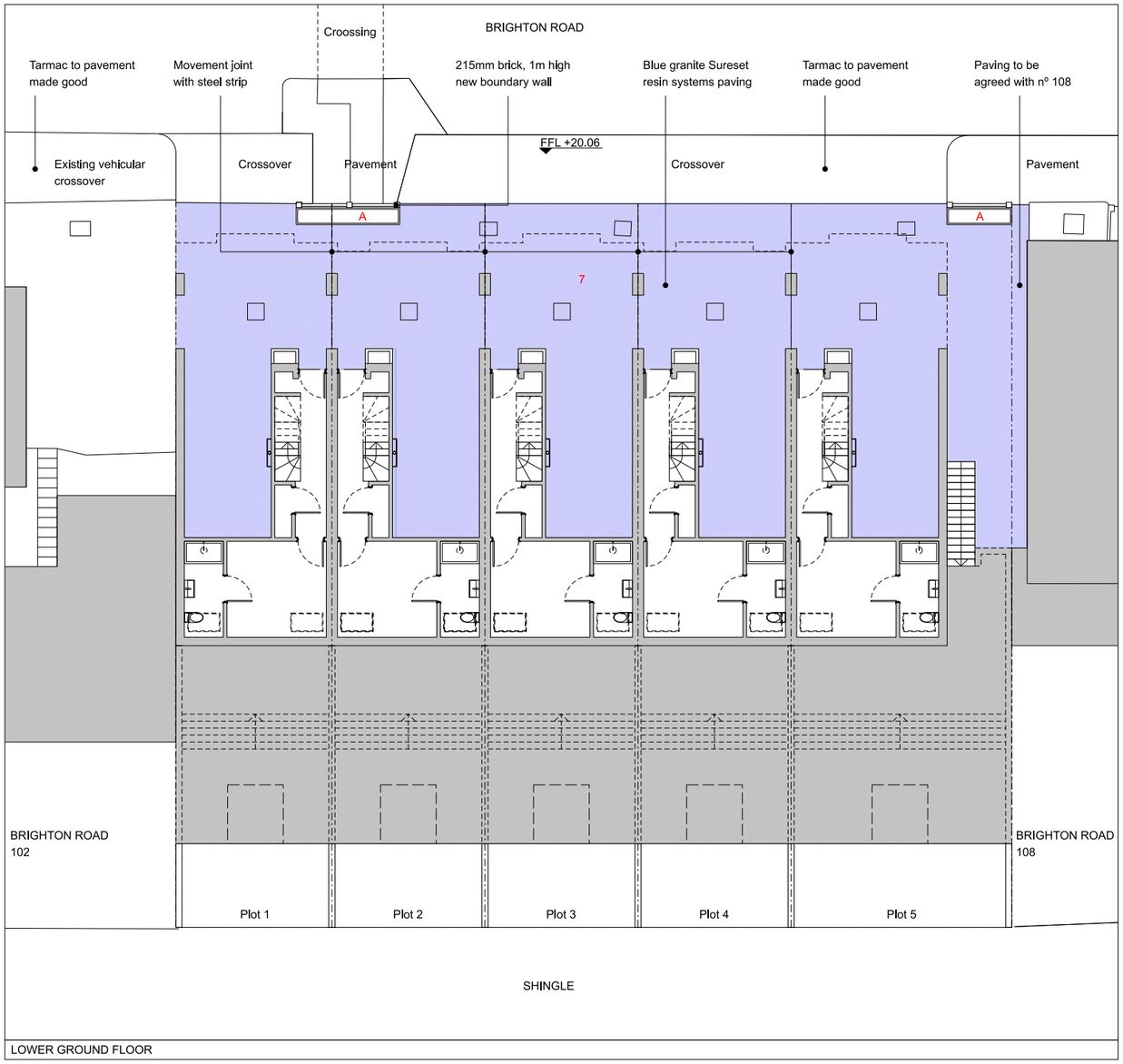
	c	c	c	c	c	
d	e	d	e	d	e	d

Hard landscaping:
7. Finish to parking area at lower ground floor - permeable resin bound gravel system - Sureset. Colour Blue Granite.
8. Finish to rear patios and terraces - Marshels Arrento Vitried paving, beige.

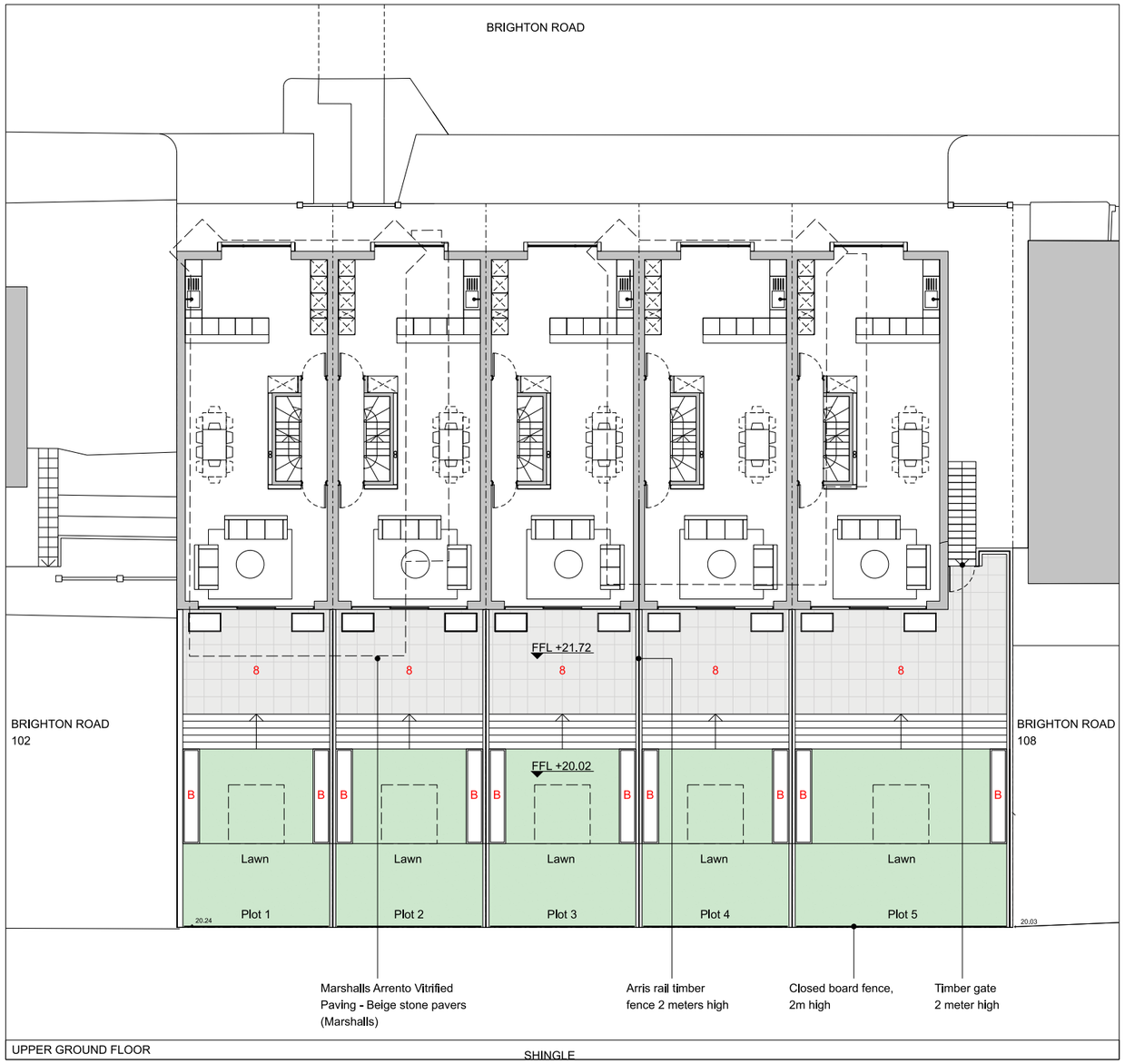
LANDSCAPE KEY



SECTION BB



LOWER GROUND FLOOR



UPPER GROUND FLOOR

Rev:

N

0m 2 4 6 8

Notes: Unless stated otherwise, all dimensions are in millimetres. All dimensions to be checked and confirmed on site by contractor and as such are to be his responsibility. Any errors, omissions or discrepancies on this drawing are to be reported to the architect.

JOE WRIGHT ARCHITECTS

t: www.joewrightarchitects.co.uk e: info@joewrightarchitects.co.uk

Project:	104-106 Brighton Road, Lancing, BN15 8LW Construction of five terraced houses on brownfield site	Scale: 1:200 @ A3	Date: 13.02.23
Drawing Title:	Proposed Drawings Proposed soft/hard landscaping plan	Drwg No: 2209-01_PL_120	Rev: A

Appendix C

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Harry Hunter
Site name:	Brighton Road, Lancing
Site location:	Lancing

Site Details

Latitude:	50.82347° N
Longitude:	0.30633° W
Reference:	665757092

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

IH124

Site characteristics

Total site area (ha): .1

Methodology

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

Soil characteristics

	Default	Edited
SOIL type:	1	1
HOST class:	N/A	N/A
SPR/SPRHOST:	0.1	0.1

Hydrological characteristics

	Default	Edited
SAAR (mm):	718	718
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

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):	0.02	0.02
1 in 1 year (l/s):	0.01	0.01
1 in 30 years (l/s):	0.04	0.04
1 in 100 year (l/s):	0.06	0.06
1 in 200 years (l/s):	0.06	0.06

Pro-Rata GFRRs for Site Area of 0.055 Ha

Qbar = 0.011 l/s
1 in 1 year = 0.0055 l/s
1 in 30 year = 0.022 l/s
1 in 100 year = 0.033 l/s
1 in 200 year = 0.033 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.

Appendix D

Site	Brighton Road, Lancing
Trial Pit	1

Depth	0.81
Width	1.5
Length	3.6

Test	
1	
Time	Depth
0	810
2	795
4	790
8	780
12	770
20	770
25	760
32	750
55	730
142	695
144	670
152	665
162	655
172	648
182	645
192	640

Vp	0.2295
Tp	131
Ap	7.4655
f	0.000235
	2.35x10-4

Test	
2	
Time	Depth
0	810
5	800
10	790
15	785
20	780
25	780
32	772
38	760
42	755
50	753
60	748
70	740
80	735
90	725
100	720
110	710
120	698
137	685
173	670
247	625

Vp	0.3861
Tp	141
Ap	7.4655
f	0.000367
	3.67x10-4

Test	
3	
Time	Depth
0	810
2	800
4	795
6	790
8	785
10	782
15	777
20	770
26	765
33	755
43	753
53	745
66	735
76	720
86	710
96	699
106	687
117	676
128	663

Vp	0.2997
Tp	81
Ap	7.4655
f	0.000496
	4.96x10-4

Appendix E

	104-106 Brighton Road, Lancing Permeable Paving Calcs B	
Date 30/10/2023 20:31 File	Designed by Checked by	
Innovyze	Source Control 2020.1.3	

Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 1 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	0.009	0.009	3.3	0.4	O K
30 min Summer	0.010	0.010	3.7	0.5	O K
60 min Summer	0.008	0.008	3.1	0.4	O K
120 min Summer	0.006	0.006	2.2	0.3	O K
180 min Summer	0.005	0.005	1.8	0.2	O K
240 min Summer	0.004	0.004	1.4	0.2	O K
360 min Summer	0.003	0.003	1.0	0.1	O K
480 min Summer	0.002	0.002	0.8	0.1	O K
600 min Summer	0.002	0.002	0.7	0.1	O K
720 min Summer	0.002	0.002	0.7	0.1	O K
960 min Summer	0.001	0.001	0.5	0.1	O K
1440 min Summer	0.001	0.001	0.5	0.1	O K
2160 min Summer	0.001	0.001	0.3	0.0	O K
2880 min Summer	0.001	0.001	0.3	0.0	O K
4320 min Summer	0.001	0.001	0.3	0.0	O K
5760 min Summer	0.001	0.001	0.3	0.0	O K
7200 min Summer	0.000	0.000	0.0	0.0	O K
8640 min Summer	0.000	0.000	0.0	0.0	O K
10080 min Summer	0.000	0.000	0.0	0.0	O K
15 min Winter	0.012	0.012	4.6	0.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	158.407	0.0	12
30 min Summer	106.463	0.0	19
60 min Summer	68.368	0.0	34
120 min Summer	41.443	0.0	64
180 min Summer	30.616	0.0	92
240 min Summer	24.574	0.0	124
360 min Summer	17.882	0.0	180
480 min Summer	14.211	0.0	242
600 min Summer	11.863	0.0	306
720 min Summer	10.220	0.0	368
960 min Summer	8.053	0.0	476
1440 min Summer	5.738	0.0	730
2160 min Summer	4.105	0.0	1080
2880 min Summer	3.251	0.0	1628
4320 min Summer	2.357	0.0	2216
5760 min Summer	1.891	0.0	2912
7200 min Summer	1.605	0.0	0
8640 min Summer	1.411	0.0	0
10080 min Summer	1.271	0.0	0
15 min Winter	158.407	0.0	12

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	104-106 Brighton Road, Lancing Permeable Paving Calcs B	
Date 30/10/2023 20:31 File	Designed by Checked by	
Innovyze	Source Control 2020.1.3	

Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.012	0.012	4.4	0.6	O K
60 min Winter	0.008	0.008	3.1	0.4	O K
120 min Winter	0.005	0.005	2.0	0.3	O K
180 min Winter	0.004	0.004	1.6	0.2	O K
240 min Winter	0.003	0.003	1.2	0.2	O K
360 min Winter	0.002	0.002	0.8	0.1	O K
480 min Winter	0.002	0.002	0.8	0.1	O K
600 min Winter	0.002	0.002	0.7	0.1	O K
720 min Winter	0.002	0.002	0.7	0.1	O K
960 min Winter	0.001	0.001	0.5	0.1	O K
1440 min Winter	0.001	0.001	0.3	0.0	O K
2160 min Winter	0.001	0.001	0.3	0.0	O K
2880 min Winter	0.001	0.001	0.3	0.0	O K
4320 min Winter	0.001	0.001	0.3	0.0	O K
5760 min Winter	0.000	0.000	0.0	0.0	O K
7200 min Winter	0.000	0.000	0.0	0.0	O K
8640 min Winter	0.000	0.000	0.0	0.0	O K
10080 min Winter	0.000	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	106.463	0.0	19
60 min Winter	68.368	0.0	34
120 min Winter	41.443	0.0	64
180 min Winter	30.616	0.0	92
240 min Winter	24.574	0.0	118
360 min Winter	17.882	0.0	190
480 min Winter	14.211	0.0	242
600 min Winter	11.863	0.0	314
720 min Winter	10.220	0.0	356
960 min Winter	8.053	0.0	492
1440 min Winter	5.738	0.0	742
2160 min Winter	4.105	0.0	1100
2880 min Winter	3.251	0.0	1332
4320 min Winter	2.357	0.0	2308
5760 min Winter	1.891	0.0	0
7200 min Winter	1.605	0.0	0
8640 min Winter	1.411	0.0	0
10080 min Winter	1.271	0.0	0

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	104-106 Brighton Road, Lancing Permeable Paving Calcs B	
Date 30/10/2023 20:31	Designed by	
File	Checked by	
Innovyze	Source Control 2020.1.3	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 519395 104031 TQ 19395 04031
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.007

Time (mins) From:	To:	Area (ha)
0	4	0.007

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	104-106 Brighton Road, Lancing Permeable Paving Calcs B	
Date 30/10/2023 20:31 File	Designed by Checked by	
Innovyze	Source Control 2020.1.3	

Model Details

Storage is Online Cover Level (m) 2.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.84600	Width (m)	16.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	44.4	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

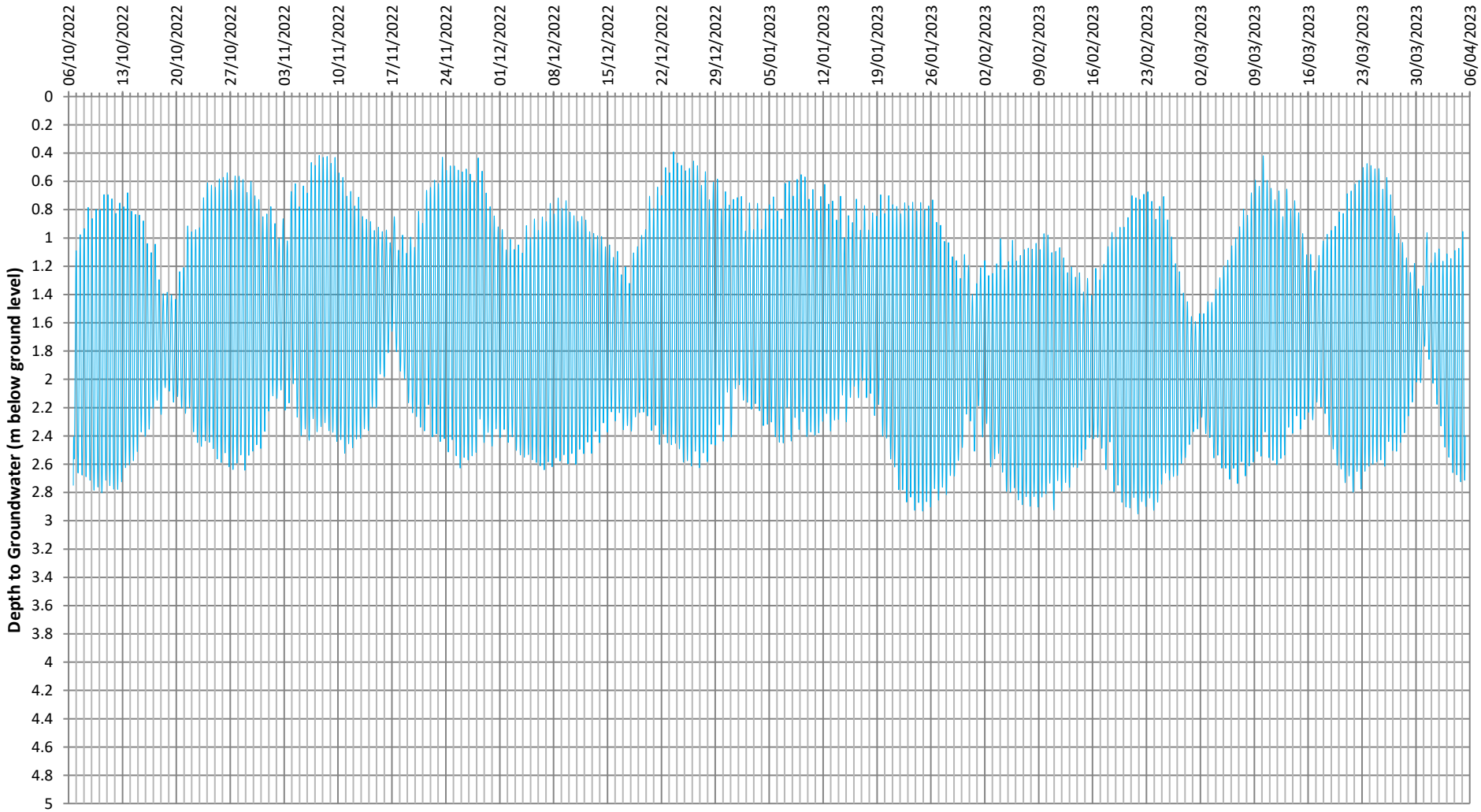
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Appendix F

Ashdown Site Investigation Limited

Site: 104-106 Brighton Road, Lancing, West Sussex	Project No. P15821

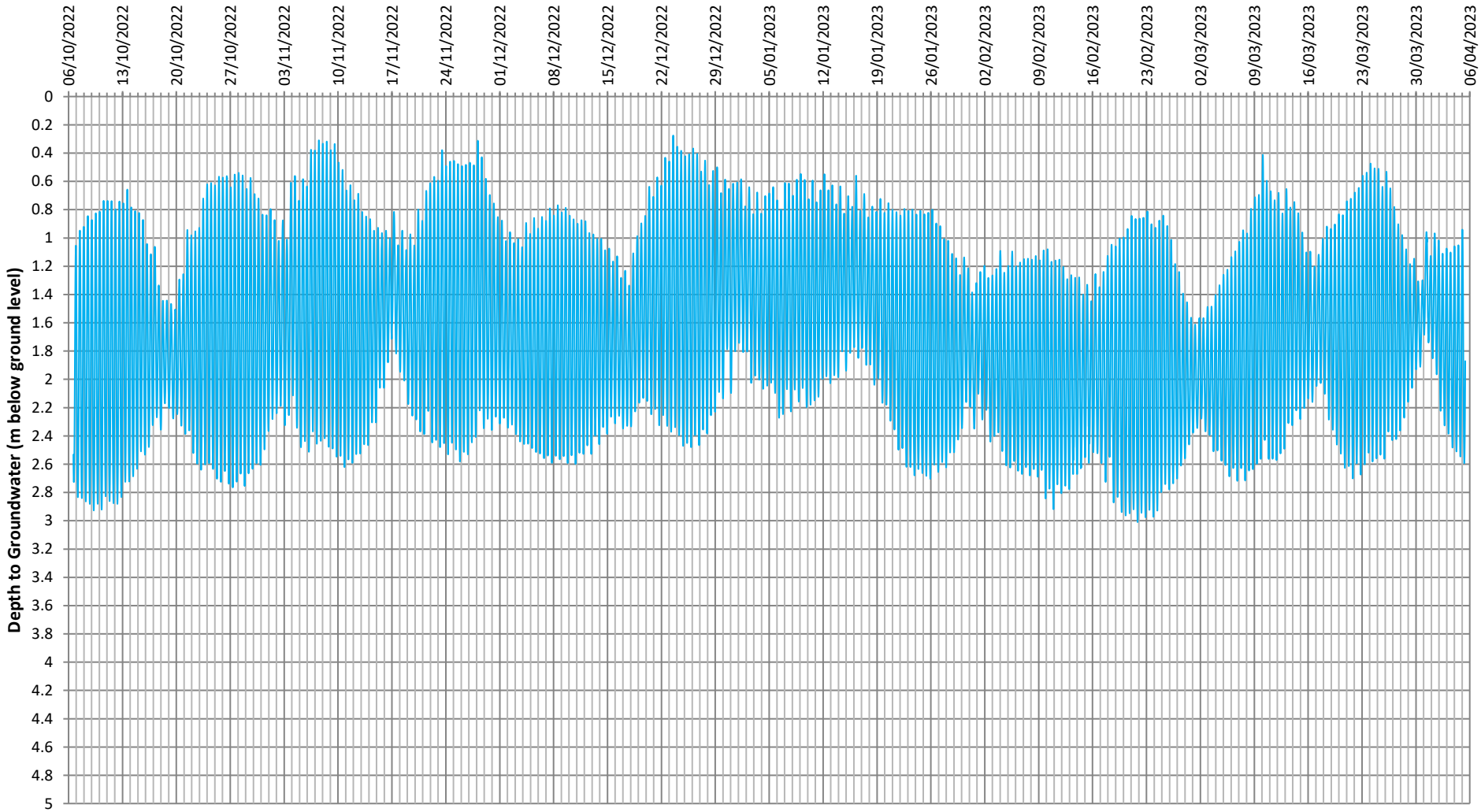
Groundwater Monitoring Results - WS01



Ashdown Site Investigation Limited

Site: 104-106 Brighton Road, Lancing, West Sussex	Project No. P15821

Groundwater Monitoring Results - WS04





N

ASHDOWN SITE INVESTIGATION
L • I • M • I • T • E • D

Unit 3
The Old Grain Store
Ditchling Common Business Park
Ditchling
East Sussex
BN6 8SG
01273 483119
contact@ashdownsi.co.uk

Site:

104-106 Brighton Road
Lancing
West Sussex

Project Ref:

P15821

Figure No.

2

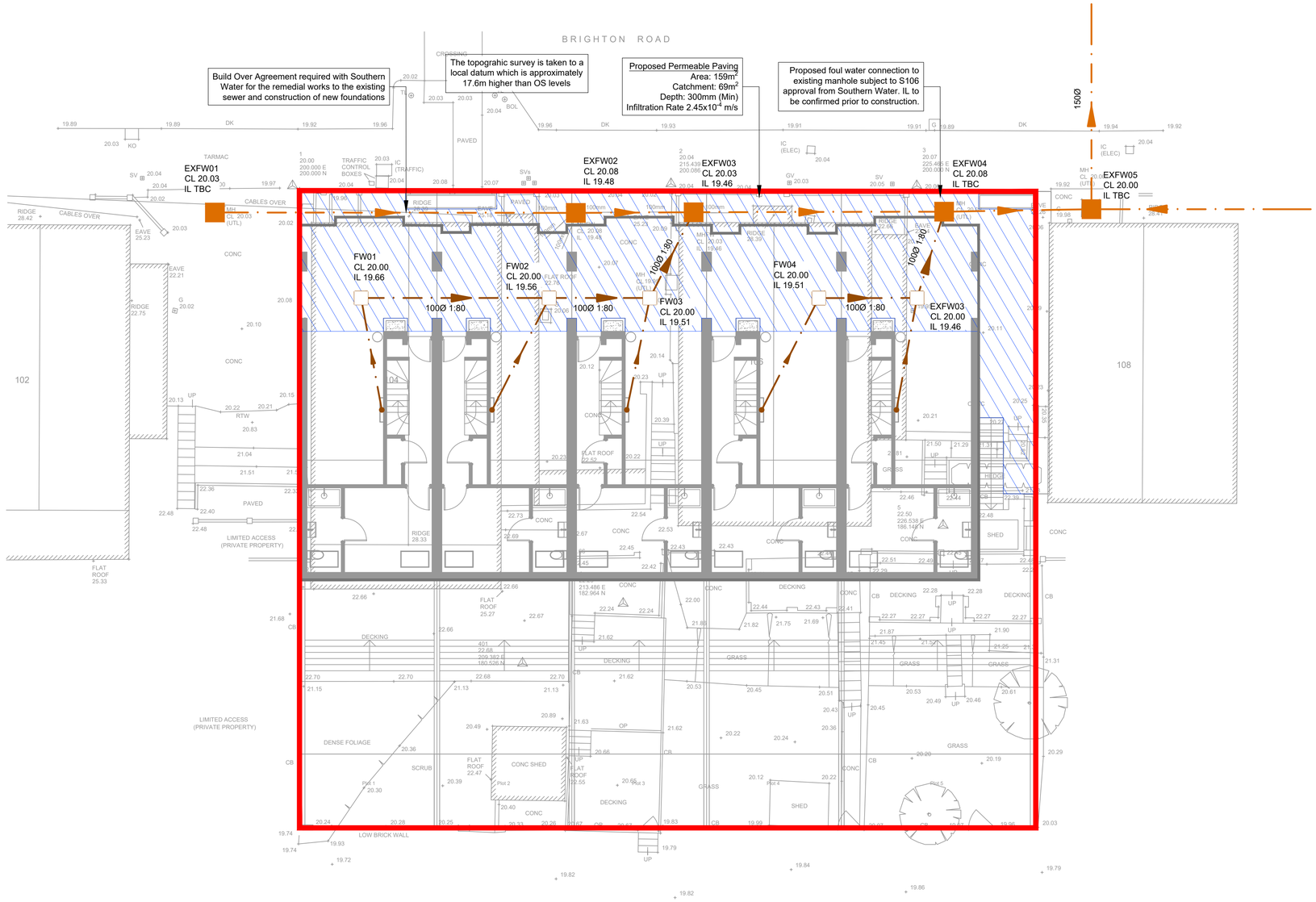
Drawing Title

Site Plan

Scale

NTS

Appendix G



GENERAL

- This drawing is to be read in conjunction with all relevant Engineers and Architects drawings and with the Specification.
- For setting out refer to Architects drawings.
- All dimensions are in millimetres and levels are in metres unless noted otherwise.
- Contractor to take all relevant dimensions on site. Any discrepancies to be advised to the Engineer.
- Contractor to check/scan for services prior to construction to avoid any damage during works.

DRAINAGE

- Any information given on this drawing regarding existing services is believed to be correct. The contractor must check this information and determine the nature and location of other existing services from the various statutory authorities before commencing all excavation works.
- Drainage works to be constructed in accordance with BS EN 752 and Approved Document H
- All soft spots and unacceptable material encountered in drainage excavations is to be removed and replaced with granular material to the requirements of the building control officer.
- Pipes to be installed to manufacturers recommendations.
- Pipes under buildings to be laid to a fall of 1:40 minimum unless noted otherwise.
- Plastic plain wall pipes to be PVC-U to BS EN 1401-1, class SN4, with flexible joints, Kitemark certified. Structured wall plastic pipes to be to WIS 04-35-01, Kitemark certified
- Clay pipes to be vitrified clay to BS EN 295-1, with flexible joints, Kitemark certified. Clayware pipes must be extra strength classification protected in accordance with the specified details.
- Bedding of pipes to be in accordance with approved document H1.
- Rocker pipes with flexible joints are to be provided at a distance of 150mm and 750mm from the face of construction to manholes, where pipes pass above, below or through ground beams or foundations; at gully connections and soil stack ends.
- Manhole access covers are to be located at the outgoing side of manholes.
- Cover levels are to be fixed on site to suit finished levels. Covers and frames to BS EN124, Grade D to be used in areas subject to heavy vehicular loading, Grade C in areas subject to light vehicular loading and Grade B to be used elsewhere.

Key

- Existing FW Sewer
- Proposed Private FW Sewer
- Existing FW Manhole
- Proposed SW/FW Manhole
- Proposed Permeable Paving
- Site Boundary

rev	sc	date	by	chk	description
P3	S2	01.07.23	HH	HJH	Preliminary Issue
P2	S2	14.06.23	HH	HJH	Preliminary Issue
P1	S2	04.11.22	HH	HJH	Draft Issue

HJH Civil Engineering Ltd

Project

104 - 106 Brighton Road, Lancing

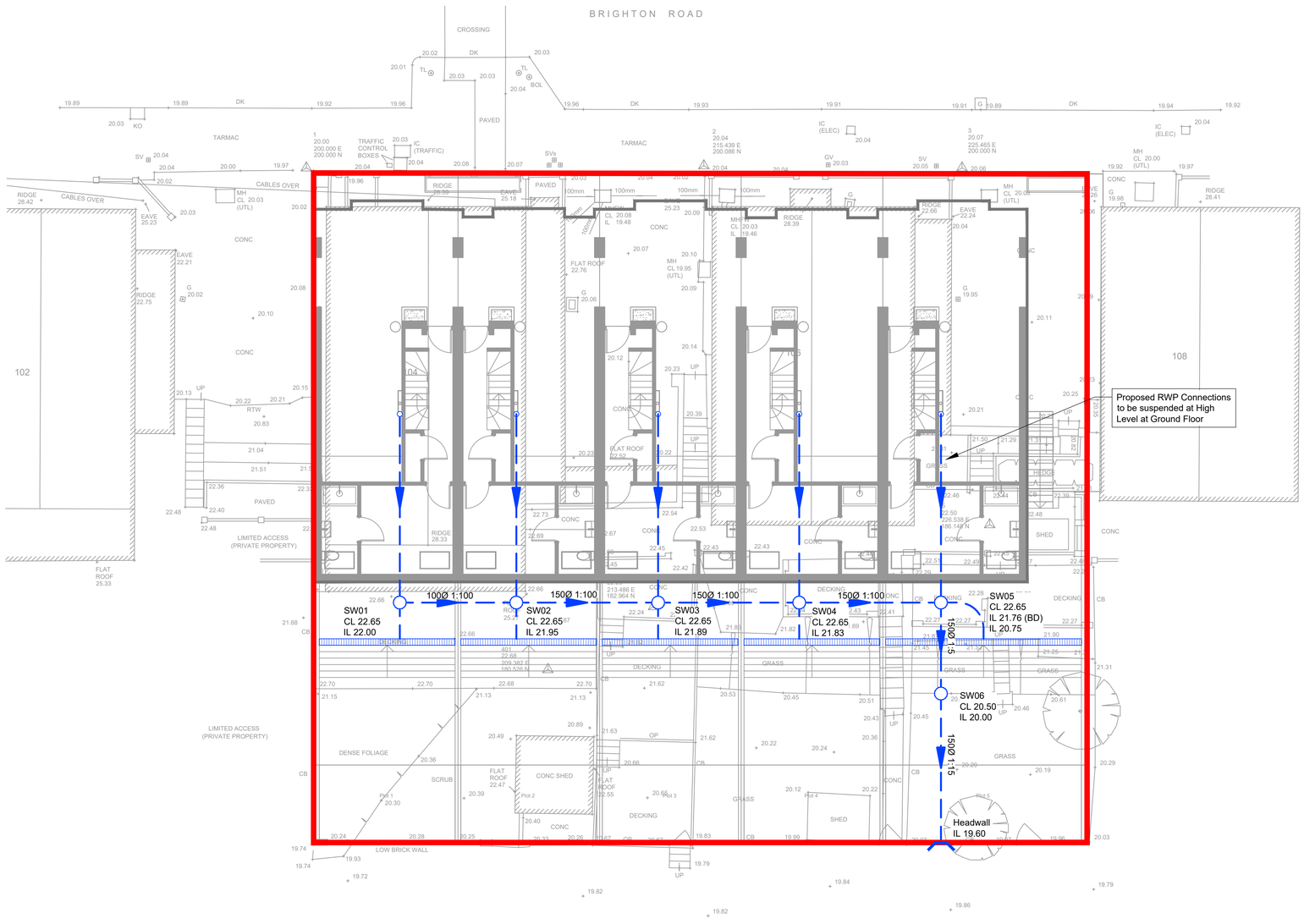
Drawing title

Proposed Below Ground Drainage Layout
Lower Ground Floor Level

Scale (s)	Date	Drawn
1:100@ A1; 1:200@ A3	November 2022	HH

Drawing status	Status	Revision
Preliminary	S2	P3

Project no.	Originator	Zone	Level	Type	Role	drg no.
2220100	HCE	XX	LG	DR	C	0500



GENERAL

- This drawing is to be read in conjunction with all relevant Engineers and Architects drawings and with the Specification.
- For setting out refer to Architects drawings.
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- Contractor to check/scan for services prior to construction to avoid any damage during works.

DRAINAGE

- Any information given on this drawing regarding existing services is believed to be correct. The contractor must check this information and determine the nature and location of other existing services from the various statutory authorities before commencing all excavation works.
- Drainage works to be constructed in accordance with BS EN 752 and Approved Document H
- All soft spots and unacceptable material encountered in drainage excavations is to be removed and replaced with granular material to the requirements of the building control officer.
- Pipes to be installed to manufacturers recommendations.
- Pipes under buildings to be laid to a fall of 1:40 minimum unless noted otherwise.
- Plastic plain wall pipes to be PVC-U to BS EN 1401-1, class SN4, with flexible joints, Kitemark certified. Structured wall plastic pipes to be to WIS 04-35-01, Kitemark certified
- Clay pipes to be vitrified clay to BS EN 295-1, with flexible joints, Kitemark certified. Clayware pipes must be extra strength classification protected in accordance with the specified details.
- Bedding of pipes to be in accordance with approved document H1.
- Rocker pipes with flexible joints are to be provided at a distance of 150mm and 750mm from the face of construction to manholes, where pipes pass above, below or through ground beams or foundations; at gully connections and soil stack ends.
- Manhole access covers are to be located at the outgoing side of manholes.
- Cover levels are to be fixed on site to suit finished levels. Covers and frames to BS EN124, Grade D to be used in areas subject to heavy vehicular loading, Grade C in areas subject to light vehicular loading and Grade B to be used elsewhere.

Key

- Proposed SW Sewer
- Existing FW Manhole
- Proposed SW/FW Manhole
- Proposed Channel Drain
- Site Boundary

P1	S2	19.07.23	HH	HJH	Preliminary Issue
rev	sc	date	by	chk	description

HJH Civil Engineering Ltd

Project
104 - 106 Brighton Road, Lancing

Drawing title
Proposed Below Ground Drainage Layout
Upper Ground Floor Level

Scale (s)	Date	Drawn
1:100@ A1; 1:200@ A3	July 2023	HH

Drawing status	Status	Revision
Preliminary	S2	P1

Project no.	Originator	Zone	Level	Type	Role	drg no.
2220100	HCE	XX	UG	DR	C	0503