

**Vahnea Student Residences, 18-20
London Road, Bognor Regis**

Drainage Strategy

For
Harwood Savin Project
Number: 12634
January 2022

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1.0 INTRODUCTION

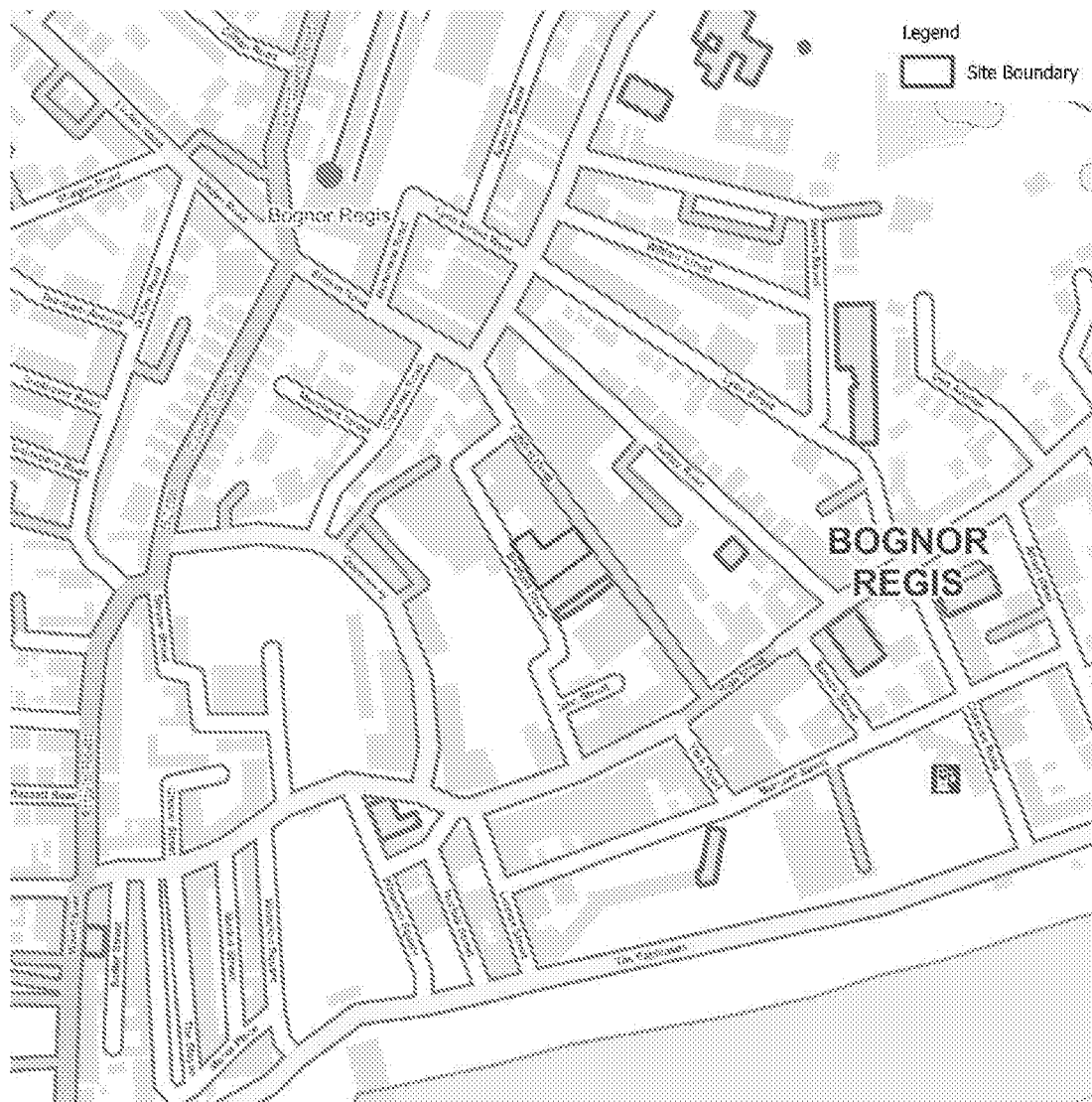
1.1. Brief

1.1.1 CampbellReith have been commissioned by Harewood Savin Limited to prepare a Drainage Strategy for the proposed development of student residences above the Wilkinsons store, London Road, Bognor Regis, herein referred to as the 'site'. The National Grid Reference for the site is 493561 E and 099159 N. The nearest postcode to the site is PO21 1PY. The site location and existing site plan is shown in **Appendix A**.

1.1.2 This Drainage Strategy has been prepared in support of a full Planning Application.

1.2. Site Location

1.2.1 The extract below shows the extent of the proposed site boundary.



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Figure 1.1: Site Boundary

1.3. **Proposed Development**

- 1.3.1 The Client received full Planning Permission (ref: BR/270/18/PL) for the Proposed Development on 24/06/2019 however, the client wishes to resubmit to gain a new Planning Permission as the extent of permission is due to lapse.
- 1.3.2 It is proposed to provide 92 units of student accommodation (as per Cover Storey Architect drawings) above the existing store with associated kitchens, living spaces and ancillary supporting spaces. No major changes to the ground floor plan are proposed, for all amendments are considered minor, and are required to structurally support and enable access to the proposed upper floors.
- 1.3.3 There is to be no expansion of the building footprint as the building encompasses the entire site.
- 1.3.4 The Site access will be pedestrian and cycle only, through lifts and stairs, from the re-developed existing entrance situated off Bedford Street.
- 1.3.5 The proposed development plan is contained in **Appendix B**.

2.0 DESIGN CRITERIA

2.1. Surface Water Drainage Strategy

2.1.1 The surface water drainage system has been designed in accordance with the National Planning Policy Framework (NPPF) and the accompanying Guidance and Technical Standards for SuDS. It also complies with the requirements under Building Regulations Part H.

2.1.2 In accordance with CIRIA SuDS Manual 2015 (Report C753), Building Regulations Part H and in line with the SuDS hierarchy under paragraph 80 of the Planning Policy Guidance underpinning the NPPF, surface water should be managed by:

- 1.) Infiltration to the maximum extent that is practical – where it is safe and acceptable to do so
- 2.) Discharge to watercourses
- 3.) Discharge to surface water sewer, highway drain or another drainage system
- 4.) Discharge to combined sewers (last resort)

2.2. West Sussex LLFA (May 2011) Preliminary Flood Risk Assessment (PFRA)

2.2.3 The Preliminary Flood Risk Assessment outlines the key flood risks, as well as the obligations of developers with regards to mitigation and avoidance of flood risk. The guidance and information set out in the report should be considered at all stages of the design. In particular this report aims to “ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding,”

2.3. West Sussex LLFA (November 2018) Policy for the Management of Surface Water

2.3.4 West Sussex, as the LLFA, provides policy on the application of SuDS for developments. These should be considered at all stages of the development. Refer to **Appendix F**.

2.4. Drainage Requirements

2.4.5 The pipe network will be designed to conform with the following criteria:

- BS EN 12056 – Gravity Drainage Systems Inside Buildings
- BS EN 752 - Drains and Sewer Systems Outside Buildings
- Building Regulations Part 'H' - Drainage and Waste Disposal
- 1 in 2 year design storm (no pipe surcharge)
- 1 in 30 year, no flooding or failure of the pipe network.
- 1 in 100 year, controlled flooding, no flooding off site.
- Accommodate a predicted climate change increase of 20%, while considering and mitigating the implications of climate change resulting in a 40% increase in rainfall intensities.
- Minimum pipe velocity at full flow = 1.00m/s for surface water pipes
- Minimum pipe velocity at full flow = 0.75m/s for foul water pipes
- Pipe roughness value (ks) = 0.6
- M5-60 value = 19.000mm (ratio (r) = 0.350)

2.4.6 In addition to the above the following Best Management Practices (BMPs) are also to be considered at the detailed design stage of the surface water management strategy:

- CIRIA C753 The SuDS Manual (2015)
- DEFRA/ EA Preliminary Rainfall Run Off Management for Developments (2013)
- CIRIA Interim Code of Practice for Sustainable Drainage (2004)
- CIRIA C609 suds, Hydraulic, Structural and Water Quality Advice (2004)
- Environment Agency Rainfall Run Off Management for Development Interim Procedure
- CIRIA C635 Designing for Exceedance in Urban Drainage Good Practice (2006)

2.5. **Foul Water Drainage Strategy**

2.5.1 The foul drainage system has been designed to Sewerage Sector Guidance: Design and constriction Guidance.

3.0 SITE CONTEXT

3.1. Site Description

3.1.1 The total site boundary covers an area approximately 0.12 hectares (ha).

3.1.2 The existing site comprises a Wilkinson Store on the ground floor, and storage and staff offices on the first floor. The site is located on a high street and is bound to the north west and south east by other commercial buildings, it is bound by London road to the north east and Bedford Street to the south west.

3.1.3 The boundary of the site is the extent of the current building therefore solely brownfield.

3.2. Topography

3.2.1 A topographical survey was undertaken by P Stubbington Land Surveys LTP in June 2017 (ref: 6116/01) and is contained in **Appendix C**.

3.2.2 Available data indicates the Finished Floor Level (FFL) of the commercial premises on the ground floor is 6.41 mAOD with two additional floors above of FFL 10.34 mAOD and 13.19 mAOD respectively. The floorplan of the second floor is significantly reduced and only runs along the frontage of the building on the north eastern boundary of the building. Roof FFL levels therefore vary across the building with a level of 16.10 mAOD above the second floor and 13.10 mAOD across the south east portion of the building.

3.3. Geology

3.3.1 The British Geological Survey (BGS) Online Geology Viewer¹ notes the underlain bedrock for the site as London Clay Formation - Clay, Silt and Sand and notes the superficial deposits as River Terrace Deposits (undifferentiated) - Sand, Silt and Clay.

3.4. Hydrology

3.4.1. A desk-study review of ordnance survey mapping notes no surface water bodies on-site. The closest main river to the site is Aldingbourne Rife and is located approximately 900m to the north east of the site. With the coastal outfall 1100m to the east of the site.

3.5. Hydrogeology

3.5.1 The site is not located within a Source Protection Zone (SPZ).

3.5.2 The site is situated above an Unproductive Aquifer. The superficial deposits are classified as a Secondary Aquifer A. The groundwater vulnerability for the site is Medium to Low with a soluble rock risk.

3.5.3 The groundwater levels beneath the site are currently unknown.

3.6. Existing Drainage

3.6.4 Southern Water are the incumbent sewerage utility provider for the area. A review of the Southern Water's Records, contained in **Appendix D**, confirms a 225mm diameter surface water sewer in Bedford Road (diameter taken from utilities trace), and a surface water sewer in London Road of unknown diameter. In both cases these surface water sewers run south and discharge directly into the sea, 0.33km south of the site.

¹ British Geological Survey (BGS) Online Geology (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>)

- 3.6.5 The Southern Water records also show a single 225mm diameter foul water sewer in Bedford Road (diameter taken from utilities trace). The sewer runs north to London Road and turns south, passing the site along the north east boundary. The size of the sewer within London Road is not confirmed.
- 3.6.6 Details of the internal surface and foul water drainage systems are largely unknown. A topographic survey of the existing site was carried out by P Stubbington Land Surveys Ltd in June 2017, and a services trace was carried out by Aworth Survey Consultants in January 2018 (Both contained within **Appendix C**). However, neither is conclusive; it is believed that both surface and foul water currently discharge to the sewers along the Bedford Street boundary and/or the sewers along the London Road boundary. It is recommended that a CCTV survey is carried out and all existing drainage connections confirmed. If the CCTV survey proves there is no connection to the public sewer, a new connection to the public sewer shall be made via a blind connection or manhole as required by Southern Water.
- 3.7. **Existing Discharge Rates**
- 3.7.1 The proposed construction is situated directly on top of the existing structure. Therefore, there is no change in impermeable area, resulting in a proposed impermeable area of 0.12ha. As the site is 100% impermeable area Greenfield runoff is not applicable.
- 3.7.2 The brownfield runoff rates for the site have been calculated based on the existing impermeable areas using the method presented in **Appendix E** and are presented in **Table 3.1** below. The calculations are based on a Micro Drainage model using up to date FEH data.

Table 3.1: Brownfield Runoff Rates

Return Period	Brownfield Runoff Rate (litres/second/hectare)
1 in 2 year	12.3
1 in 30 year	29.7
1 in 100 year	43.6

- 3.7.3 The existing foul water flow rate can be calculated as set out in BS EN 12056-2:2000 Gravity Drainage Systems inside buildings, where the foul water flow rate Q_{ww} (l/s) is given by:

$$Q_{ww \text{ existing}} = K \sqrt{\sum DU}$$

Where K is the frequency factor, and DU is the discharge units, as per Table 2 and 3 respectively from BS EN 12056-2:2000. For intermittent use (dwelling, guesthouse, office, etc. K = 0.5). Therefore $\sum DU$ can be calculated as shown in **Table 3.2**.

Table 3.2: Existing Foul Water Flow Rate

Appliance	DU	Number	$\sum DU$
Wash Basin	0.5	7	3.5
WC with 7.5l Cistern	2.0	4	8
Kitchen Sink	0.8	3	2.4

$\sum DU$	13.9
-----------	------

The total foul water flow rate for the existing building is 1.86 l/s.

4.0 SURFACE WATER

4.1. Site Constraints

4.1.1 A review of the site characteristics has informed the following site constraints:

- Footprint of building defines the extent of the site boundary

4.2. Proposed Surface Water Runoff Rates

4.2.1 Due to the constraints of the site (the footprint of the building defines the extent of the site boundary) in addition to the impermeable area of 0.12ha not being increased by the proposed development; it has not been deemed feasible to provide betterment on the existing surface water flow rate, as agreed with representatives of Arun District Council. Refer to communications in **Appendix G**. Therefore, surface water discharge from site will be limited to the existing brownfield surface water discharge rates (as shown in Section 3.7.5 of this report).

4.3. Surface Water Drainage Strategy

4.3.1 It is proposed to retain the existing surface water drainage outfall into the Southern Water surface water system.

4.3.2 The private system on site will be altered to extend the existing rainwater pipes, providing an outfall for the proposed roof areas and terrace.

4.3.3 The use of blue/green roofs is to be considered at detailed design to determine if their inclusion is viable as a method of both attenuating and/or providing water quality control and biodiversity. This must be coordinated with the architect's design, as well as the structural assessment of the existing building and the design of the proposed structure.

4.3.4 Overall, the drainage design must aim to meet all of the WSCC SuDS policies where appropriate. A summary of these can be seen in **Table 4.1**. Refer to **Appendix F** for an extract of the WSCC SuDS policies.

Table 4.1: WSCC LLFA SuDS Policy and CR responses

WSCC SuDS Policy	Response:
Policy 1 Follow the drainage hierarchy	It is not proposed to collect surface run-off for use. Furthermore, it is not possible to discharge to ground, due to the site constraints within the built environment, and there are no surface water bodies present on site. Therefore, according to the drainage hierarchy, surface water run-off is to be discharged to a surface water sewer.
Policy 2 Manage flood risk through design	The site is located within Flood Zone 1, and therefore at minimal risk of flooding from rivers or sea. SuDS are to be used where practical to ensure surface water is discharged into the existing surface water sewer system at, or at less than, the existing discharge rate, as discussed with the LLFA. This will manage all surface water incident, mitigate flood risk on site and avoid creating additional risk in the remainder of the catchment.
Policy 3	Due to the constraints on site (the lack of external areas for SuDS systems), it has not been deemed feasible to mimic natural flows, as agreed in

Mimic natural flows and drainage flow paths	Appendix 6. However the use of blue/green roofs shall be considered at detailed design, and the discharge rates should be as close to the greenfield discharge rates as is feasible.
Policy 4 Seek to reduce existing flood risk	There is no significant flood risk identified on site. The design will aim to further minimise flood risk through the management of surface water using blue/green roofs to reduce discharge rates, as per policy 3.
Policy 5 Maximise resilience	If deemed a viable option, blue/green roofs should be used to mitigate the effects of climate change before attempting to further reduce discharge rates from site. The attenuation should be designed for a 20% climate change, while considering the effects of 40% climate change.
Policy 6 Design to be maintainable	At detailed design, an Operations and Maintenance Manual should be provided for all elements of the drainage system.
Policy 7 Safeguard water quality	At present there is no management of water quality for the surface water run-off, and none proposed unless the use of green roofs is viable. However, the pollution hazard index for residential roofs/commercial roofs is very low/low. The removal of pollutants and quality of the surface water run-off from site must be considered at detailed design.
Policy 8 Design for amenity and multi-functionality	The current drainage design occupies roof space, then connected into the existing Southern Water sewers via internal pipework. At present, due to the constraints of the site, only the introduction of green roofs may provide areas of biodiversity or multi-functionality.
Policy 9 Enhance biodiversity	The current drainage design occupies roof space, then connected into the existing Southern Water sewers via internal pipework. At present, due to the constraints of the site, this does not provide opportunities to enhance biodiversity.
Policy 10 Link to wider landscape objectives	The current drainage design occupies roof space, and therefore, due to its significant elevation compared to the surrounding areas, is detached from the surrounding landscape.

4.4. SuDS Strategy

- 4.4.5 SuDS features have been considered within the drainage strategy design but have ultimately been deemed not practical due to the constraints of the site. However, the use of green roofs is to be considered at detailed design stage to determine if their inclusion is viable as a method of both attenuating and/or providing water quality control and biodiversity.

5.0 FOUL WATER

5.1. Foul Water Drainage Strategy

- 5.1.1 It is proposed to re-use the existing foul water outfall into the Southern Water sewer via an indirect connection. This will need Southern Water's approval prior to connection.
- 5.1.2 Using the method outlined in the existing foul flow calculations, the total discharge units for the proposed building can be calculated as shown in **Table 3.2**. It is assumed that all en-suite bathrooms include a WC, shower, and washbasin, and that all kitchens include a sink, dishwasher and washing machine.
- 5.1.3 The tables below detail the designed foul flow rates based upon the above assumptions.

Table 5.1: Proposed Foul Water Flow Rates

Appliance	DU	Number	$\sum DU$
Existing System as per Table ...	-	-	13.9
Wash Basin	0.5	97	48.5
WC with 7.5l Cistern	2.0	97	194
Shower without Plug	0.6	96	57.6
Kitchen Sink	0.8	16	12.8
Washing Machine up to 12kg	1.5	16	24
Dishwasher	0.8	16	12.8
$\sum DU$			363.6

The gives a total foul water flow rate for the proposed building of 9.53l/s.

- 5.1.4 This results in an increase in peak flow rate of 7.67l/s.
- 5.1.5 As a result of this assessment it is further recommended to submit a capacity check request to Southern Water to confirm whether this increase can be accommodated within their network. In the event that capacity is not available within the sewer for the increased foul flows, off-site reinforcement may be required to provide capacity.

6.0 CONCLUSION

- 6.1.6 CampbellReith have prepared this drainage strategy to support reapplication of the proposed development.
- 6.1.7 The Proposed Development, located at 18-20 London Road, Bognor Regis, West Sussex, PO21 1PY lies within Arun District Council, in West Sussex, and occupies a total area of 0.12ha, 100% of which is impermeable surfacing.
- 6.1.8 The local sewerage network is operated by Southern Water with separate surface and foul networks located on the Site's south west and north east boundary. Further CCTV surveys of the onsite surface and foul drains are required to confirm if they discharge to the public network, although based on completed site inspections, it is reasonable to believe this is true.
- 6.1.9 In order to accommodate the constraints of the site and the drainage requirements, it is proposed to maintain the existing systems and the connections to the public sewers. If the CCTV survey proves there is no connection to the public sewer, a new connection to the public sewer is to be made via a blind connection or manhole as required by Southern Water.
- 6.1.10 Due to the constraints of the site, the lack of external areas for the provision of surface water attenuation, and because there is to be no increase in impermeable area, the existing maximum surface water discharge rates are to be maintained. However, within these site constraints, the drainage design should aim to meet best practice guidelines, including the WSCC LLFA SuDS Policies. Therefore the use of blue/green roofs is to be evaluated at detailed design, and utilised as deemed feasible to attenuate water and provide a more sustainable system.
- 6.1.11 There is to be an increase in foul water discharge from 1.86l/s to 9.53l/s. This will require Southern Water's approval prior to connection. It is recommended that a capacity check is submitted to determine if the southern water sewer can accommodate the increased flow rate. A S106 application will be required prior to construction.
- 6.1.12 Overall it is believed that, if the guidance outlined in this report is carried forward, it is possible to provide a robust drainage system that meets statutory requirements and best practice guidance.

Appendix A: Site Location



Students Residences, London Road,
Bognor Regis
Client: Cover Storey Architects

Site Location Plan

Scale: 1:5000@A4
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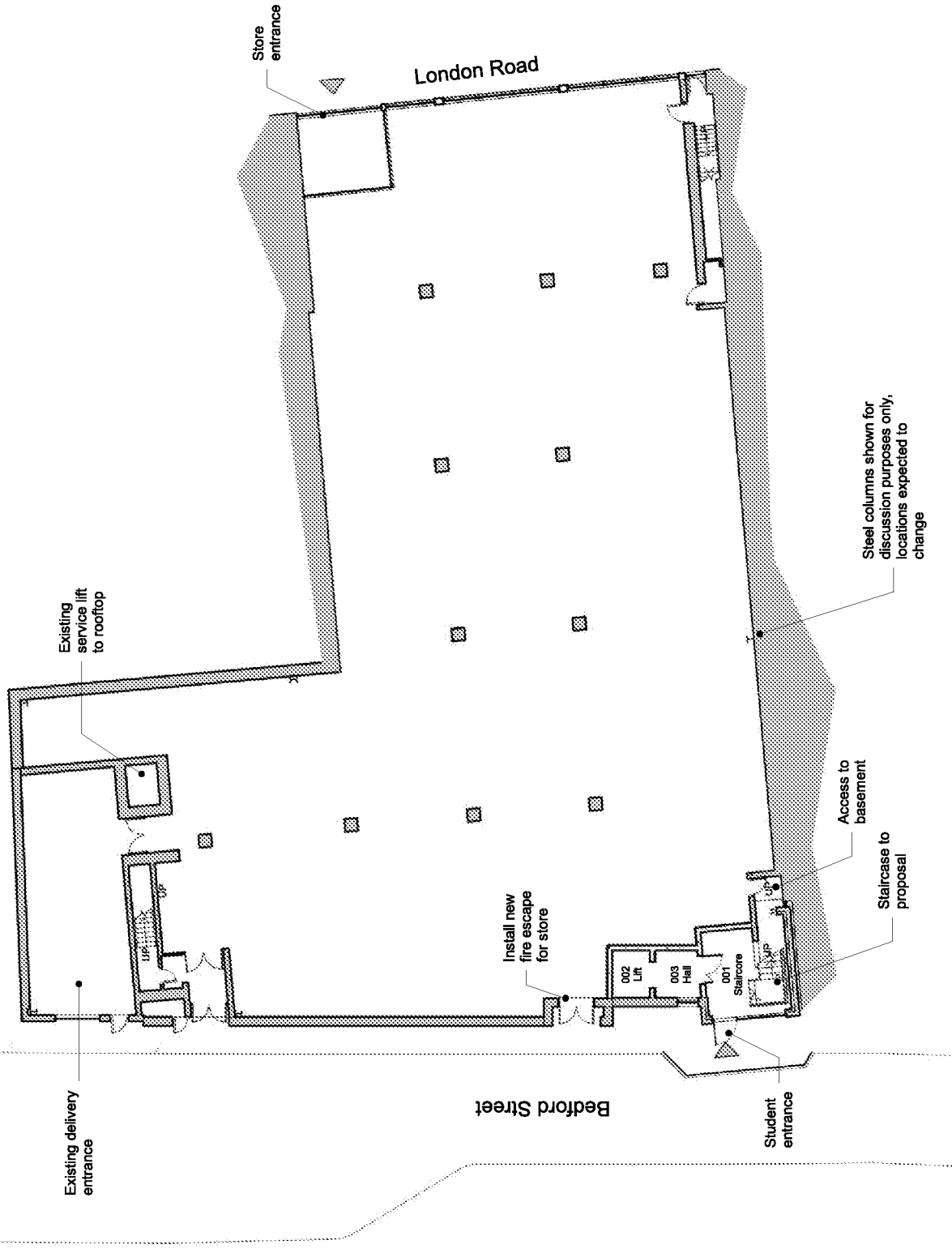
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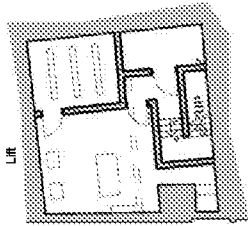
Appendix B: Proposed Layout



Scale Bar 1:200@A3



B2-Store Level
1 : 200

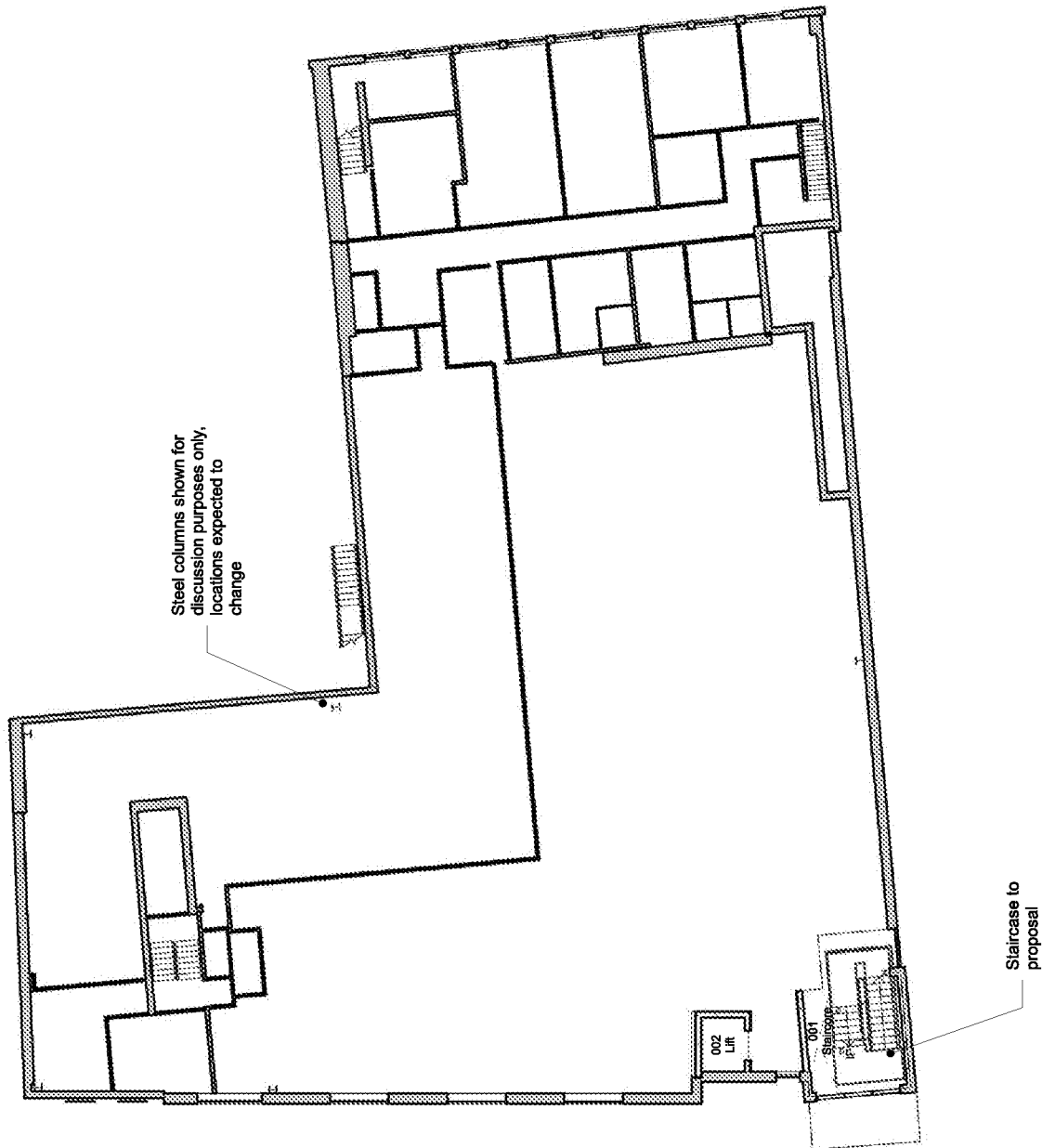


B3-Store Basement
1 : 200

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01	JAH	Initial design and dimensions noted	JAH	DJS	16.08.2017
02	JAH	Minor revisions and additional notes	JAH	DJS	16.08.2017
03	JAH	Revisions to single storey layout	JAH	DJS	16.08.2017

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Drawing name: Street Level Plan As Proposed					

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B1-Store First Floor
1 : 200

B1-Store First Floor 1 : 200	Project name: Vahnea Student Residences, Bognor Regis Drawing name: Store First Floor As Proposed	Project No: 16102	Drawing No: P202	Revision: P3	Status: PRELIMINARY	This drawing is the copyright of Cover Storey Architects LLP All dimensions must be verified on site prior to construction Do not scale this drawing except for planning application purposes	Staircase to proposal												
		Scale @ A3: 1 : 200	Drawn By: JAH	Checked By: DJS	Date JULY 2017														
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Room Key	
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	Kitchen
	Support

