

Confidential

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

Drainage Strategy Report

For

Cover Storey Architects

Project Number:

12634

February 2018

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Document History and Status

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1.0 INTRODUCTION

1.1. Brief

1.1.1. CampbellReith has been commissioned on behalf of Vahnea Marolda Investments LLP to prepare a Drainage Strategy Report to support the planning application for the development proposal above the Wilkinsons Store, London Road, Bognor Regis, herein referred to as "the Site".

1.1.2. This report has been prepared in accordance with the National Planning Policy Framework (NPPF), West Sussex County Council's Policy for the Management of Surface Water, and current best practices (CIRIA C753). The strategy has been designed based on readily available information from Cover Storey Architects LLP. Documents used in this report include:

- West Sussex LLFA Policy for the Management of Surface Water by WSCC
- West Sussex Preliminary Flood Risk Assessment (May 2011)
- National Planning Policy Framework (March 2012)
- Topographic Survey by P Stubbington Land Surveys Ltd (June 2017)
- Services Trace by Aworth Survey Consultants (January 2018)
- Architects Layouts by Cover Storey Architects LLP (November 2017)
- Southern Water Asset Records, 272911_Site off, London Road, (December 2017)

CampbellReith has endeavoured to assess all information provided to them during this assessment. The report is based on information from a number of external sources and cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon.

1.2. Site Location

1.2.1. The Site is located at 18-20 London Road, Bognor Regis, West Sussex, PO21 1PY. The Site lies within the jurisdiction of Arun District Council, and West Sussex County Council. The grid reference for the approximate centre of the Site is at grid reference SZ9356 9915, see Figure 1.

1.2.2. The Site is rectangular in shape and comprises a Wilkinson Store on the ground floor, and storage and staff offices on the first floor. It is bordered by London Road to the north east and Bedford Street to the south west, and by two other commercial buildings to the north west and south east. The site area is approximately 0.12 hectares (ha).



Figure 1: Site Boundary and Location Plan, Ordnance Survey excerpt (Cover Storey Architects LLP, Drainage and Access Statement)

1.3. Proposed Site Context

- 1.3.1. 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.
- 1.3.2. There is to be no expansion of the building footprint as the building encompasses the entire site.
- 1.3.3. The Site access will be pedestrian and cycle only, through lifts and stairs, from the re-developed existing entrance situated off Bedford Street.
- 1.3.4. The proposed site layouts can be seen on the architect's layout in Appendix A.

2.0 ASSESSMENT OF THE EXISTING DRAINAGE

2.1. Existing Drainage

- 2.1.1. The local sewerage network is operated by Southern Water, and a copy of their sewer records have been provided in Appendix B of this report. The records show 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.

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.

- 2.1.2. 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 can be seen in 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.

2.2. Existing Discharge Rates

- 2.2.1. Based on the existing impermeable site area of 0.12ha (100% of the total site area), and there being no evidence of surface water storage or flow control measures on site, the peak existing surface water run-off rates have been calculated as shown below. Calculations can be found in Appendix D. They are based on MicroDrainage calculations using FSR data (suitability is to be confirmed by the local authority).

Q1yr = 15.0 l/s

Q30yr = 36.3 l/s

Q100yr = 45.0 l/s

- 2.2.2. 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 Table 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 1.

Table 1: 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 1.86l/s.

3.0 DRAINAGE REQUIREMENTS

3.1. West Sussex Preliminary Flood Risk Assessment (May 2011)

- 3.1.1. 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,"

3.2. West Sussex Lead Local Flood Authority Policy for Management of Surface Water

- 3.2.1. 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.

3.3. Drainage Requirements

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

- BS EN 12056 - Drains and Sewer 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 (k_s) = 0.6
- M5-60 value = 19.000mm (ratio (r) = 0.350)

3.3.2. 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 C539 Guidance on the Design of Rainwater Reuse Systems (2004)
- CIRIA C635 Designing for Exceedance in Urban Drainage Good Practice (2006)

4.0 PROPOSED DRAINAGE STRATEGY

4.1. Proposed Impermeable/Permeable Areas

- 4.1.1. 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.

4.2. Proposed Peak Surface Water Discharge Flow Rates

- 4.2.1. Due to the constraints of the site (the footprint of the building defines the extent of the site boundary); 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 E. Therefore surface water discharge from site will be limited to the existing brownfield surface water discharge rates (as shown in Section 2.2.1 of this report).

4.3. Proposed 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.

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

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.

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 2. Refer to Appendix F for an extract of the WSCC SuDS policies.

Table 2: WSCC LLFA SuDS Policy and CR response

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 Mimic natural flows	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 Appendix 6. However the use of blue/green roofs shall be considered at

and drainage flow paths	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. Proposed Foul Water Drainage Strategy

- 4.5. 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.

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. 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.

Table 3: Proposed foul water flow rates

Appliance	DU	Number	$\sum DU$
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Existing systems as per Table 1	-	-	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

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

- 4.5.1. This results in an increase in peak flow rate of 7.67l/s.
- 4.5.2. 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.

5.0 CONCLUSION

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.

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.

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.

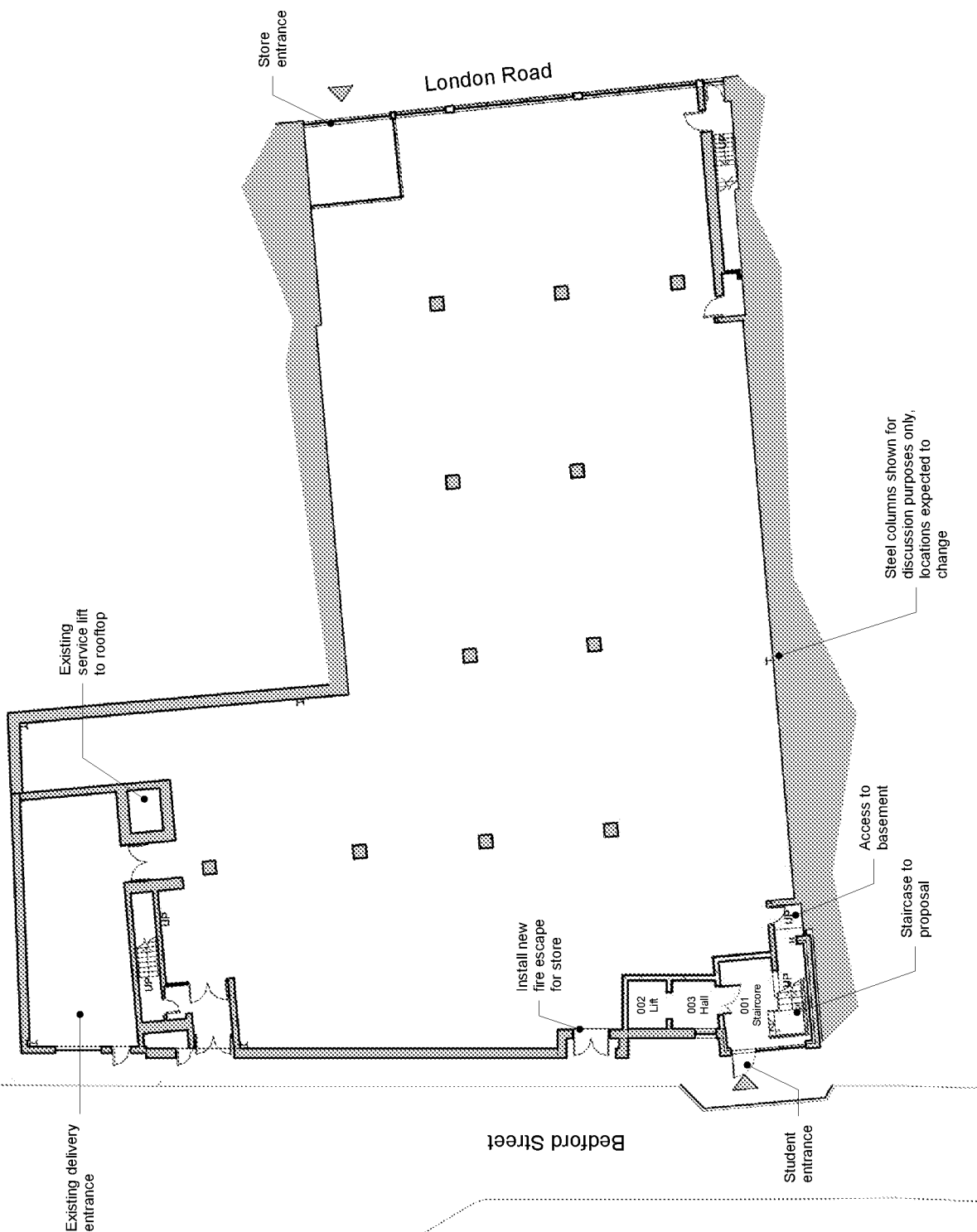
Due to the constraints of the site, the lack of external areas for the provision of surface water attenuation, and because there is to be no increase in impermeable area, the existing maximum surface water discharge rates are to be maintained. However, within these site constraints, the drainage design 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.

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.

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: Architects Site Layouts

Scale Bar 1:200@A3



B2-Street Level
1 : 200

B3-Store Basement
1 : 200

REVISIONS				
No	Revisions	By	On	Date
1	Extracted and disassembled	SAH	0-02	11-08-2017
2	Revised	SAH	0-02	11-08-2017
3	Revised	SAH	0-02	23-11-2017
4	Revised to change stamp mark.	SAH	0-02	23-11-2017

Project name:
Vanheea Student Residences, Bognor Regis

Drawing name:
Street Level Plan As Proposed

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STATUS: PRELIMINARY

Date: JULY 2017

Revision: P3
Checked By: DJS

Drawing No:
P201

Drawn By:
JAH

Project No:	16102
Scale	A3: 1 : 200

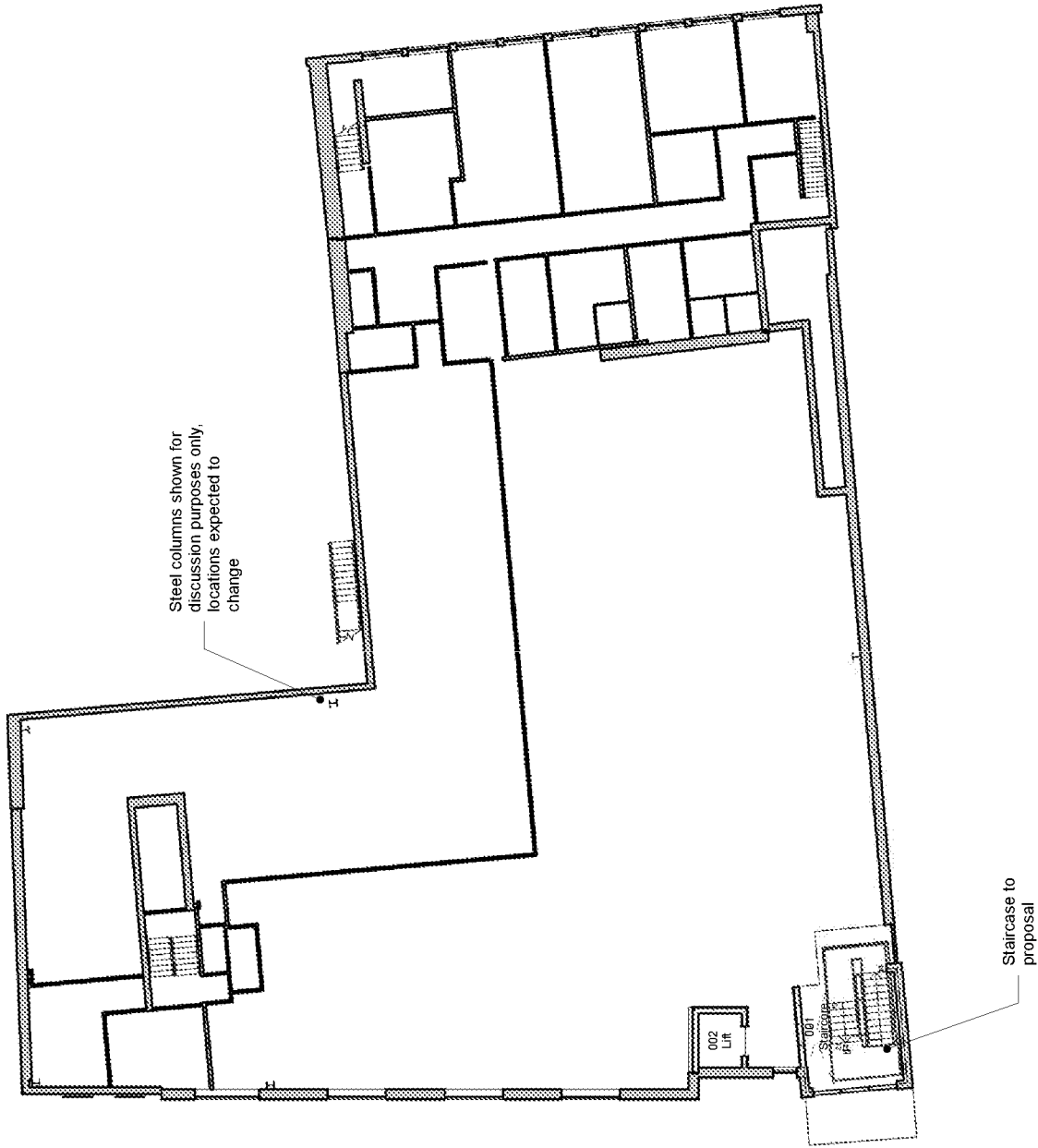
Project name:
Vahnea Student Residences, Bognor Regis

Drawing name:
Street Level Plan As Proposed

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Scale Bar 1:200@A3



B1-Store First Floor
1 : 200

REVISIONS		Date	By	Description
P1	Initial design and discussion	18.08.17	JAH	
P2	Minor revisions and additional notes	21.08.2017	JAH	
P3	Revisions to steel column data	25.11.2017	JAH	

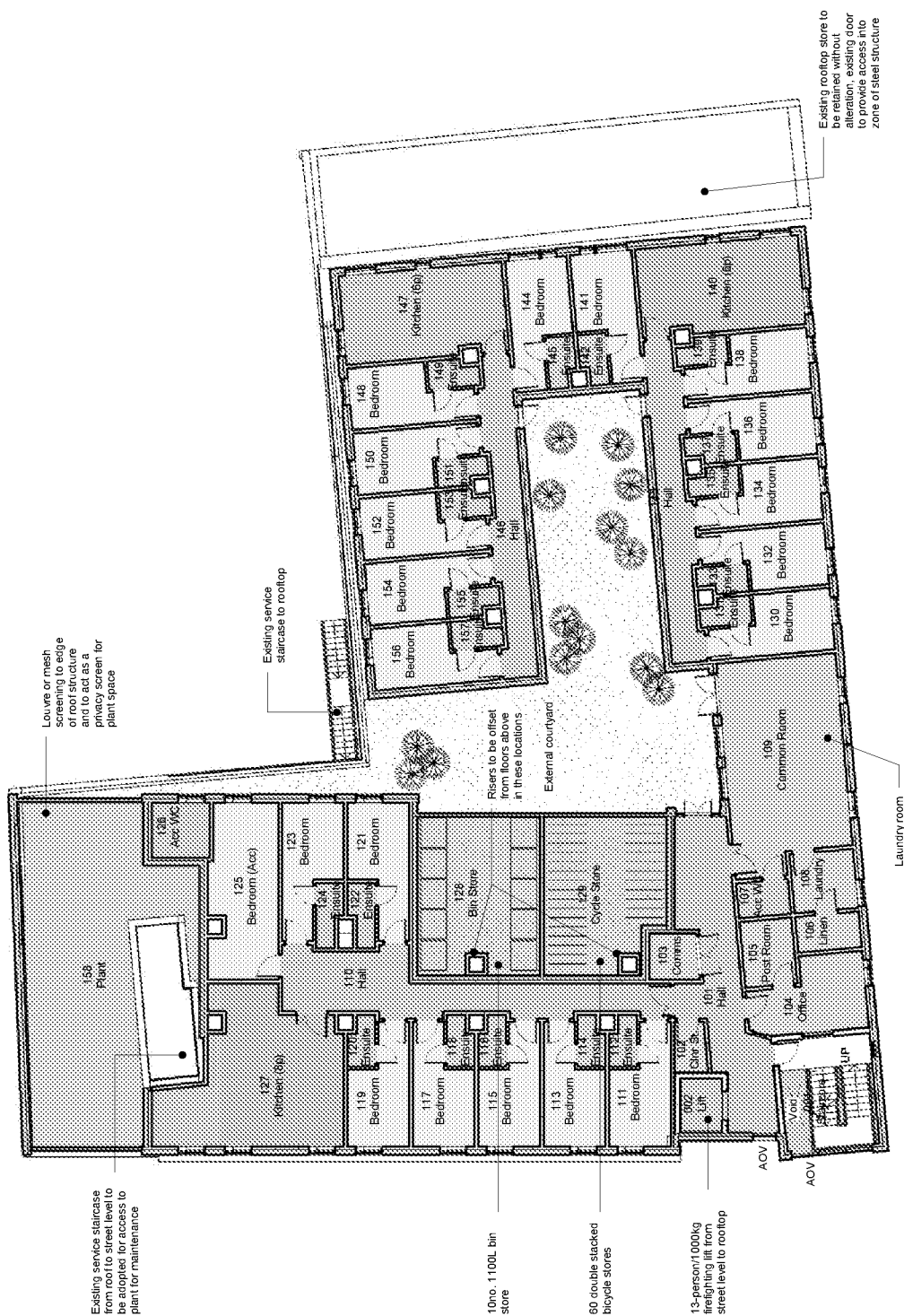
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Drawing name: Store First Floor As Proposed		Scale @ A3: 1 : 200		Drawn by: JAH		Checked by: DJS		Date: JULY 2017		Cover Storey Architects LLP 18 St Georges Avenue, Hoveport Hove BN1 9JH Tel: 01323 896396 info@coverstoreyarchitects.co.uk www.coverstorey.co.uk		Cover Storey Architects LLP	



Scale Bar 1:200@A3

Room Key

- Circulation
Bedroom
Ensuite
Kitchen
Support



00-Ground Floor

1 : 200

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Project name: Vahnea Student Residences, Bognor Regis	Project No: 16102	Drawing No: P204	Revision: P3	Status: PRELIMINARY
Drawing name: Ground Floor Plan Proposed	Scale @ A3: 1 : 200	Drawn by: JAH	Checked by: DJS	Date: JULY 2017



Scale Bar 1:200@A3

Room Key

- Circulation
- Bedroom
- Ensuite
- Kitchen
- Support



01-First Floor
1 : 200

REVISIONS		Revised By	Revised Date	Description
1	Revise	JAH	18.08.17	Initial design
2	Revise	JAH	21.08.2017	Minor revisions and additional notes
3	Revise	JAH	25.11.2017	Revisions to single storey block

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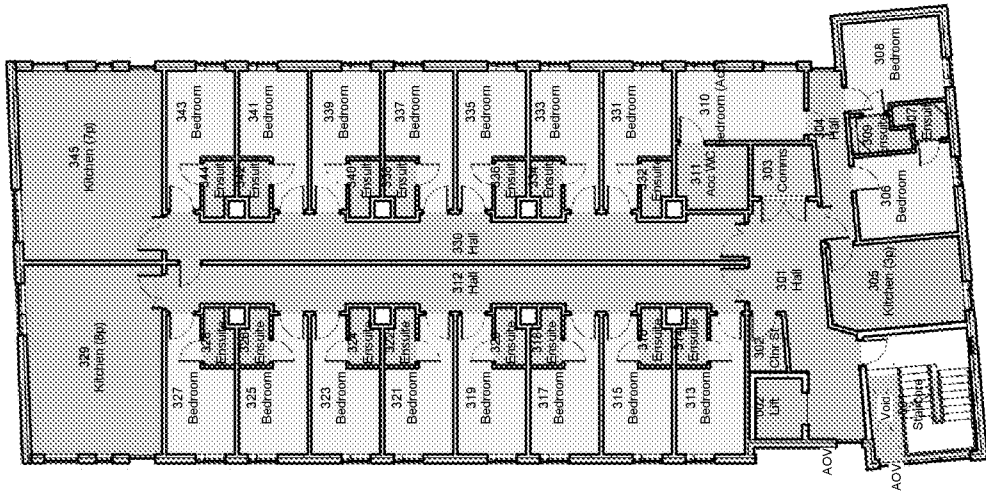
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Drawing name: First Floor Plan Proposed		Scale @ A3: 1 : 200	Drawn by: JAH	Checked by: DJS	Date: JULY 2017		



Scale Bar 1:200@A3

Room Key

- Circulation
- Bedroom
- Ensuite
- Kitchen
- Support



02-Second Floor
1 : 200

REVISIONS		Revised By	Revised Date	Description
1	Rev	JAH	15.08.17	Issue for construction
2	Rev	JAH	21.08.2017	Minor revisions and additional notes
3	Rev	JAH	25.11.2017	Revising to final design data

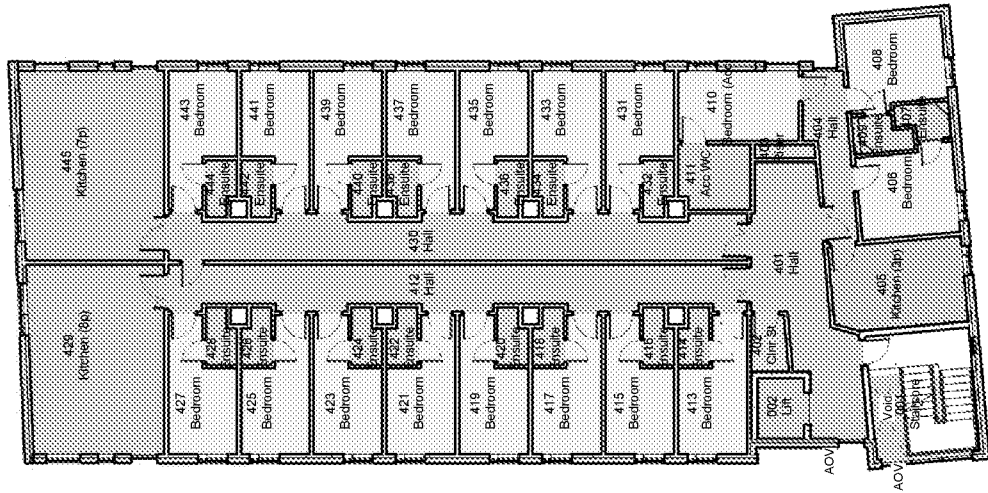
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Drawing name: Second Floor Plan Proposed	Scale @ A3: 1 : 200	Drawn By: JAH	Checked By: DJS	Date: JULY 2017		



Scale Bar 1:200@A3

Room Key

- Circulation
- Bedroom
- Ensuite
- Kitchen
- Support



03-Third Floor

1 : 200

Project name: Valnea Student Residences, Bognor Regis	Project No: 16102	Drawing No: P207	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	
					Date JULY 2017	

REVISIONS		Revised By	Description
1	03/07/17	JAH	Issue for planning
2	03/07/17	JAH	Issue for planning
3	03/07/17	JAH	Issue for planning
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Affordable

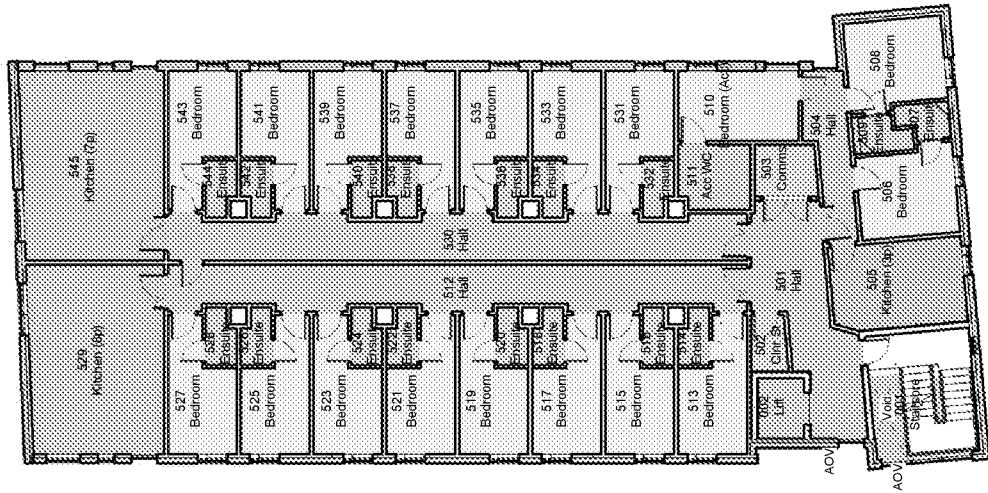
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Scale Bar 1:200@A3

Room Key

- Circulation
- Bedroom
- Ensuite
- Kitchen
- Support



04-Fourth Floor

1 : 200

REVISIONS		Revised By	Revised Date
1	Initial	JAH	18.08.17
2	Minor revisions and additional notes	JAH	21.08.2017
3	Revisions to suite entry data	JAH	25.11.2017

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All dimensions must be verified on site prior to construction
Do not scale this drawing except for planning application purposes

Status:
PRELIMINARY

Revision:
P3

Drawing No:
P208

Project No:
16102

Scale @ A3:
1 : 200

Project name:
Valnea Student Residences, Bognor Regis

Drawing name:
Fourth Floor Plan Proposed

Drawn by:
JAH

Checked by:
DJS

Date:
JULY 2017

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