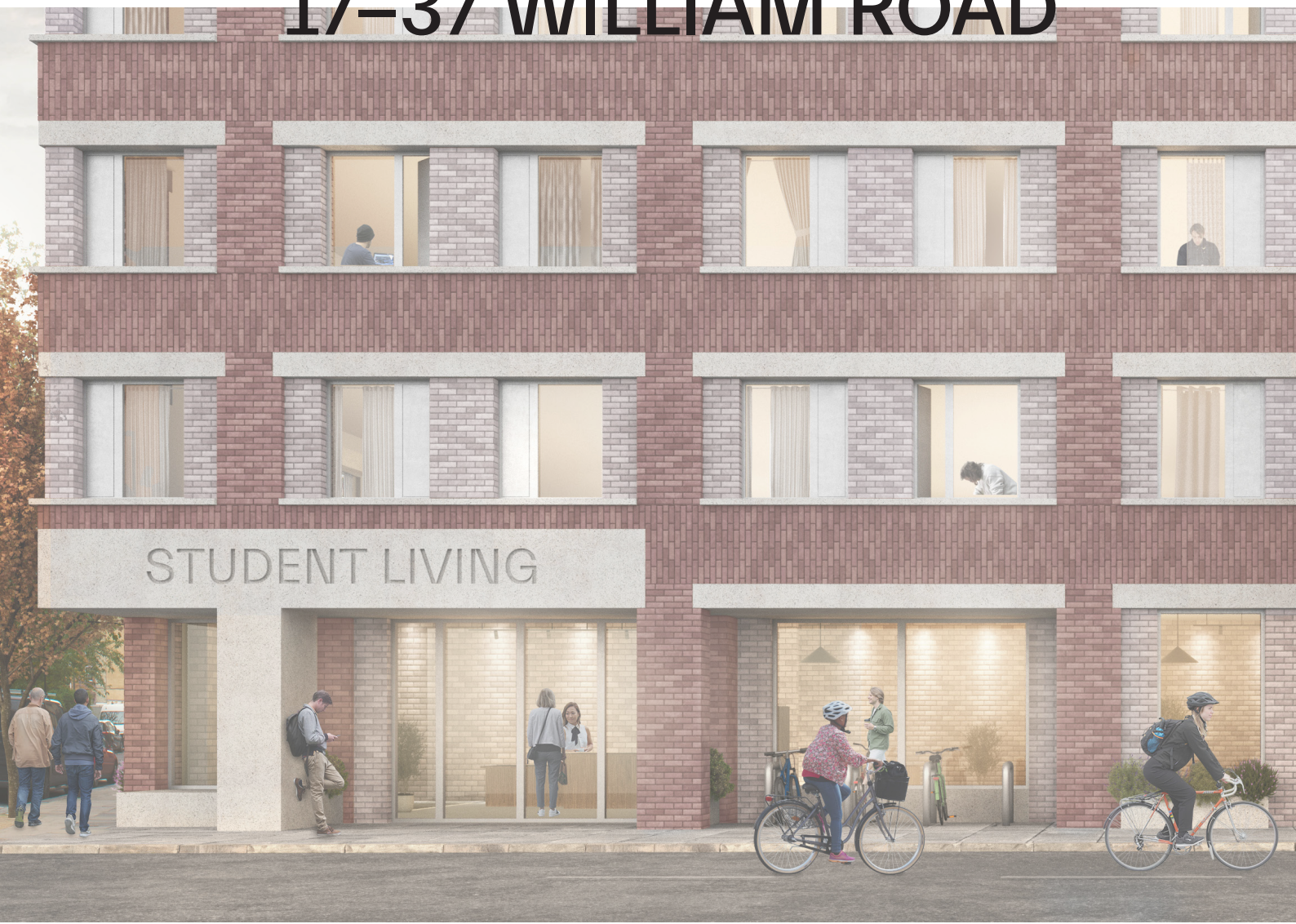
Flood Risk Assessment,
Drainage Strategy and SuDS Assessment
November 2020
Iesis Group

17–37 WILLIAM ROAD



FLOOD RISK ASSESSMENT, DRAINAGE STRATEGY AND SUDS ASSESSMENT

SE1714-ISS-XX-XX-RP-C-0001

IESISSTRUCTURES

REPORT ISSUE

Revision	Date	Notes
P01	09/11/2020	First Issue

PREPARED BY

John Pakenham November 2020

REVIEWED BY

Martin Roberts November 2020
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DISCLAIMER

CONTENTS

1 INTRODUCTION

1.1 COMMISSION

1.1.1 This Flood Risk Assessment, Drainage Strategy and SuDS Assessment has been prepared by Iesis Structures on behalf of Euston One Limited ('the Applicant') in support of an application for full planning permission for the redevelopment of 17-37 William Road, London, NW1 3ER ('the Site').

1.2 OBJECTIVE

1.2.1 This Flood Risk Assessment, Drainage Strategy and SuDs Assessment (FRADSSA) provides an overview of the site, the development proposal and an assessment of the flood risk and drainage strategy for the site as part of a full planning application submission. The FRADDSA is structured as follows:

Section 2 – Planning Policies

Section 3 – Existing Site and Current Flood Conditions

Section 4 – Proposed Development & Mitigation

Section 5 – Proposed SuDS & Foul Drainage Strategy

Section 6 – Summary & Conclusions

Appendices A to E – supporting data including plans and calculations

2 PLANNING POLICIES

2.1 NATIONAL PLANNING POLICY FRAMEWORK (NPPF) (FEBRUARY 2019)

2.1.1 The NPPF sets out the government's national planning policies to protect people and property from flooding which all Local Planning Authorities are expected to follow.

2.1.2 The NPPF recommends new developments adopt a sequential, flood risk-based approach, considering climate change both now and in the future to avoid potential flood risks. The sequential test compares the proposed development site with other available sites to steer development towards locations with the lowest flood risk.

2.1.3 If there are no other practical locations for the development then the exception test typically is required to show that it will provide wider sustainability benefits to the community that outweigh flood risk, and that it will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall.

2.1.4 The NPPF states that major developments should incorporate sustainable drainage systems (SuDS) unless there is clear evidence that this would be inappropriate.

2.2 PLANNING PRACTICE GUIDANCE (PPG)

2.2.1 The accompanying PPG to the NPPF, "Flood risk and coastal change", provides additional guidance for the Lead Local Flood Authority (LLFA – London Borough of Camden for this site) which includes the Application of the Sequential Test.

2.2.2 The PPG sets out flood risk vulnerability classifications (Paragraph 066, Table 2). The proposed mixed residential and commercial development is classed as **"More Vulnerable".**

2.2.3 Paragraph 067, Table 3, of the PPG sets out flood risk vulnerability classifications against flood zone categories to determine when an Exception Test is required. An Exception Test is required when More Vulnerable development is sited in Flood Zone 3.

2.3 THE LONDON PLAN 2016

2.3.1 The London Plan guides strategic development in Greater London. The current version includes Policy 5.12 Flood risk management which closely reflects the NPPF and PPG. The Plan also includes Policy 5.13 Sustainable drainage. Policy 5.13 states that development should aim to achieve greenfield run-off rates and sets out a drainage hierarchy for managing surface water run-off as follows:

1 store rainwater for later use

2 use infiltration techniques, such as porous surfaces in non-clay areas

3 attenuate rainwater in ponds or open water features for gradual release

4 attenuate rainwater by storing in tanks or sealed water features for gradual release

5 discharge rainwater direct to a watercourse

6 discharge rainwater to a surface water sewer/drain

7 discharge rainwater to a combined sewer.

2.4 THE DRAFT NEW LONDON PLAN

2.4.1 A new London Plan is moving through the process to adoption and is a material consideration in planning decisions alongside the current London Plan. The significance given to the new Plan by the decision maker gains more weight as it nears adoption. At the time of writing, the Mayor of London is considering the Secretary of State's response to the draft new Plan and taking the statutory steps to finalise the Plan.

2.4.2 The London Plan – Intend to Publish version includes Policy SI 12 Flood risk management which is essentially unchanged from the current Plan Policy 5.12.

2.4.3 Policy SI 13 Sustainable drainage has refined the surface water management hierarchy as follows:

1) rainwater use as a resource

2) rainwater infiltration to ground at or close to source

3) rainwater attenuation in green infrastructure features for gradual release

4) rainwater discharge direct to a watercourse

5) controlled rainwater discharge to a surface water sewer or drain

6) controlled rainwater discharge to a combined sewer.

2.4.4 Policy SI 13 also outlines that:

- Preference should be given to 'green' over 'grey' drainage features.
- Proposals for impermeable surfacing should normally be resisted unless they can be shown to be unavoidable.
- Drainage design should promote multiple benefits including increased water use efficiency, improved water quality, and enhanced biodiversity, urban greening, amenity and recreation.

2.5 THE LONDON BOROUGH OF CAMDEN LOCAL PLAN

2.5.1 The LBCC Local Plan is supported by a suite of evidence base documents including the North London Strategic Flood Risk Assessment (SFRA) and LBC's Surface Water Management Plan (SWMP). The SFRA is discussed later in this report.

2.5.2 The SWMP shows several zones within the Borough designated as Critical Drainage Areas (CDA) which are vulnerable to surface water flood risk and where more stringent surface water controls are required. The proposed development lies at the SW edge of a CDA with the SW half of the building outside it.

3 EXISTING SITE AND CURRENT FLOOD CONDITIONS

3.1 LOCATION AND CONTEXT

3.1.1 The application site lies in Euston, which is administered by London Borough of Camden Council. No. 35-37 ('Plot A') comprises a dated part two-storey, part six-storey office building with basement level, situated on the corner of William Road and Stanhope Street. No. 17-33 ('Plot B') comprises a seven-storey building with ancillary office accommodation at ground floor level and residential units above. There is a tarmac car parking area to the east, accessed from William Road. Site location maps and an aerial view are shown in Appendix A of this report.

3.1.2 Hydrology: The nearest Main River to the site is the River Thames, which is approximately 2.4km at its closest, to the southeast. The Regents Canal is approximately 1.2km to the north of this site. There is a boating lake in The Regents Park which is located approximately 850m to the west.

3.1.3 Topography: the topographic survey of the site is contained within Appendix B. The external levels along the buildings' frontage on William Road rises from 26.39m AOD at the NE corner to 27.72m AOD at the NW corner (Stanhope Street). At the southwest corner the level is highest, at 28.24m AOD. There is only limited external space within the site. The ambient levels of the parking area range between 27.36m AOD and 27.31m AOD approximately. The threshold level of the building varies – refer to the elevations and sections in Appendix D.

3.2 EXISTING DRAINAGE

3.2.1 Thames Water's sewer records are shown in Appendix B. There is an egg-profiled combined sewer within William Road that flows eastwards. Its dimensions vary with the final stretch 1397mm high.

3.2.2 The utilities and CCTV drainage survey shows the building's combined network discharging into this sewer – refer to Appendix B. The sewer outfall is of 150mm diameter and contains an interceptor trap, which prevented the CCTV equipment from entering the outfall. It is recommended that the interceptor trap is removed (and later reinstated) to enable the outfall to be CCTV surveyed with a view to assessing its condition for reuse.

3.2.3 The green field runoff rate (Qbar) has been calculated. The contributing area is, effectively, the site area of 658m^2. The calculation sheet is shown in Appendix E. The Qbar rate is 0.4l/s.

3.3 GEOLOGY AND GROUNDWATER

3.3.1 Geology: according to the BGS's online map, the site's solid geology is London Clay Formation (clay, silt and sand). The superficial drift deposit overlaying this is Langley Silt Member (clay and silt).

3.3.2 It is unlikely that the Clay and Silt soils will accommodate infiltration drainage. There is insufficient external space for infiltration features, in any case.

3.4 FLUVIAL FLOOD RISK

3.4.1 Fluvial flooding: According to the Environment Agency's Rivers and Seas Flood Map (see Appendix C),

the site has an annual probability of <0.1% (1 in 1000 years) of flooding from the Thames. This places the site in Flood Zone 1, Low Probability (FZ1.)

3.5 SURFACE WATER FLOOD RISK

3.5.1 Surface water flooding: According to the EA's online Surface Water Flood Map – Low Risk ('1 in 1000 years' storm) in Appendix C, the site is clear of this source of flooding.

3.6 OTHER SOURCES

3.6.1 Artificial Sources: flooding from reservoirs, canals and docks. The EA's Reservoirs Flood Map in Appendix C shows that the site is clear of this source of flooding.

3.6.2 Groundwater: While the north half of the site overlies an 'Unproductive' Aquifer, the south overlies a 'Low' Aquifer. The site is removed from all Source Protection Zones. Appendix C contains both Groundwater maps referred to here.

3.6.3 Historic records: the EA's online map in Appendix C shows that this site is removed from the nearest recorded area of flooding.

3.6.4 In conclusion: the site's flood risk profile is Low. It is removed from all the known sources of flooding.

4 PROPOSED DEVELOPMENT & MITIGATION

4.1 FLOOD ZONE COMPATIBILITY

4.1.1 The planning application is for the redevelopment of No. 35-37 to provide a 15-storey building with basement level to contain 168 units of student accommodation alongside shared amenity spaces, and the retention of No. 17-33 with affordable workspace at ground floor level together with improvements to ground floor façade, public realm, servicing, cycle storage and facilities, refuse storage and other ancillary and associated works. The 'as proposed' site layout is shown in Appendix D.

4.1.2 Vulnerability and mitigation: Table 2 of the NPPF's TG document classes dwellings as 'More Vulnerable' and commercial use 'Less Vulnerable'. The NPPF states that both Less Vulnerable and More Vulnerable uses are 'appropriate development' in FZ1.

4.1.3 No flood mitigation is needed or proposed.

5 PROPOSED SuDS & FOUL DRAINAGE STRATEGY

5.1 SUDS HIERARCHY

5.1.1 With the new London Plan to be adopted it is appropriate to use the drainage hierarchy from Policy SI 13 to identify the development SuDS strategy. The steps are discussed in turn as follows.

5.2 STEP 1: RAINWATER RE-USE

5.2.1 The viability of using rainwater harvesting systems will be explored through the next stage. Such systems help to reduce runoff entering the drainage systems generally but may offer only small benefits during extreme rainfall events. Overflows are required to the drainage system in any case and so the drainage calculations exclude rainwater harvesting at this stage.

5.3 STEP 2: INFILTRATION

5.3.1 Infiltration drainage will not be feasible due to there being no external area (as well as Clay soil type), meaning that off-site discharges will be required.

5.4 STEP 3: ATTENUATION IN GREEN SUDS

5.4.1 The viability of using green roofs will be explored through the next stage. Such systems help to reduce runoff entering the drainage systems generally but may offer only small benefits during extreme rainfall events. The drainage calculations exclude green roofs at this stage.

5.5 STEP 4: DISCHARGE DIRECT TO WATERCOURSE

5.5.1 There are no watercourses at or close to the site, so this step is not an option.

5.6 STEP 5: CONTROLLED DISCHARGE TO SURFACE WATER SEWER OR DRAIN

5.6.1 There are no surface water sewers in this area.

5.7 STEP 6: CONTROLLED DISCHARGE TO COMBINED SEWER

5.7.1 This step will provide the solution for the development surface water management. Runoff will be attenuated for gradual release with storage in underground tanks. Attenuated discharges will outfall via the existing connections to Thames Water's combined sewer in William Road.

5.8 PROPOSED DISCHARGE RATES

5.8.1 Developments on brownfield sites should limit runoff rates as close to greenfield as reasonably practicable. The proposed strategy is to limit development runoff to the practical minimum limit of protected vortex or similar devices, namely 1.0l/s – as the greenfield Qbar rate is 0.4l/s – in events up to the 1% (1 in 100) AEP storm events with a 40% allowance included for predicted climate change.

5.8.2 A preliminary calculation has been made indicating that 35.1m³ of attenuation storage volume will be required for the contributing area of 650m² (see Appendix E). Space for open SuDS features is limited at the site, so the volume will be provided in 1No underground tank, positioned under the ground floor slab at the main building entrance. See Appendix D for the drainage strategy layout.

5.8.3 Runoff Treatment: the courtyard area will be in permeable paving providing filtration as required in CIRIA's guidelines.

5.8.4 Foul drainage strategy: the development's foul drainage will be routed via the existing outfall manhole near to the NE corner – into the TWU combined sewer. This is subject to Thames Water's permission by means of an application under Section 106 of the Water Industry Act.

6 SUMMARY & CONCLUSIONS

- The application site lies in Flood Zone 1 and is appropriate for the proposed residential and commercial use.

- The site's flood risk profile is Low from all known flood sources. Although half of the site lies in a critical drainage area (CDA), it is clear that this end of William Road is at the far extreme edge of this very large CDA.

- Infiltration drainage is precluded by impermeable geology and lack of external space. The development's surface water runoff will be discharged to the existing TWU combined sewer in William Road.

- Off-site discharges will be restricted to 1.0 l/s, this being the practical minimum limit of protected vortex/orifices. The Greenfield Qbar rate is 0.4l/s.

- Sufficient storage volume for the critical storm event (1% AEP + 40%) will be provided in 1No underground cellular tank. Permeable pavings overlying the courtyard area will provide filtration treatment.

- This development will not increase the flood risk, either on this site or to neighbouring properties, and so complies fully with national and local planning policies.

APPENDIX A: SITE LOCATION MAPS

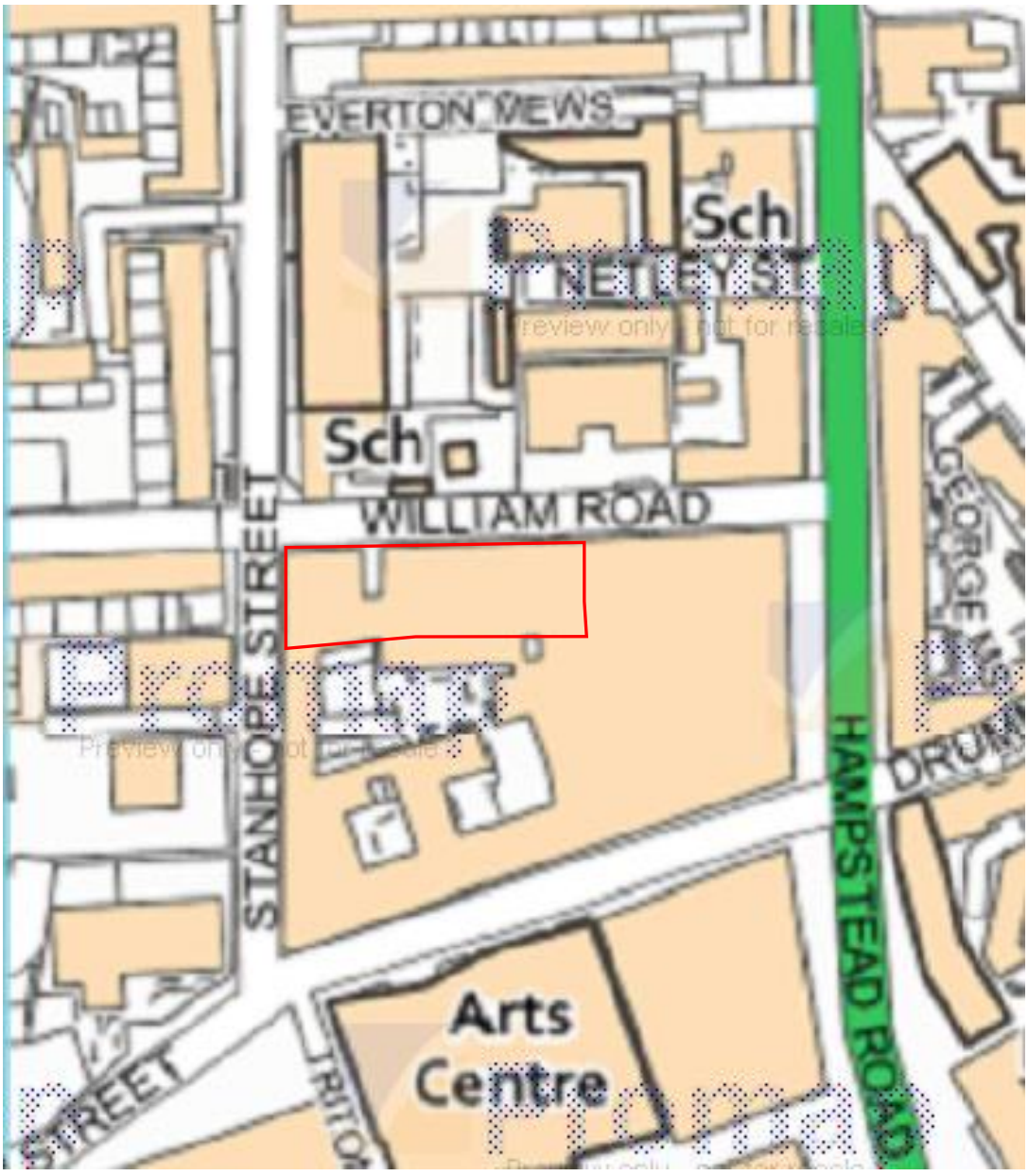


Figure A1: Site Location

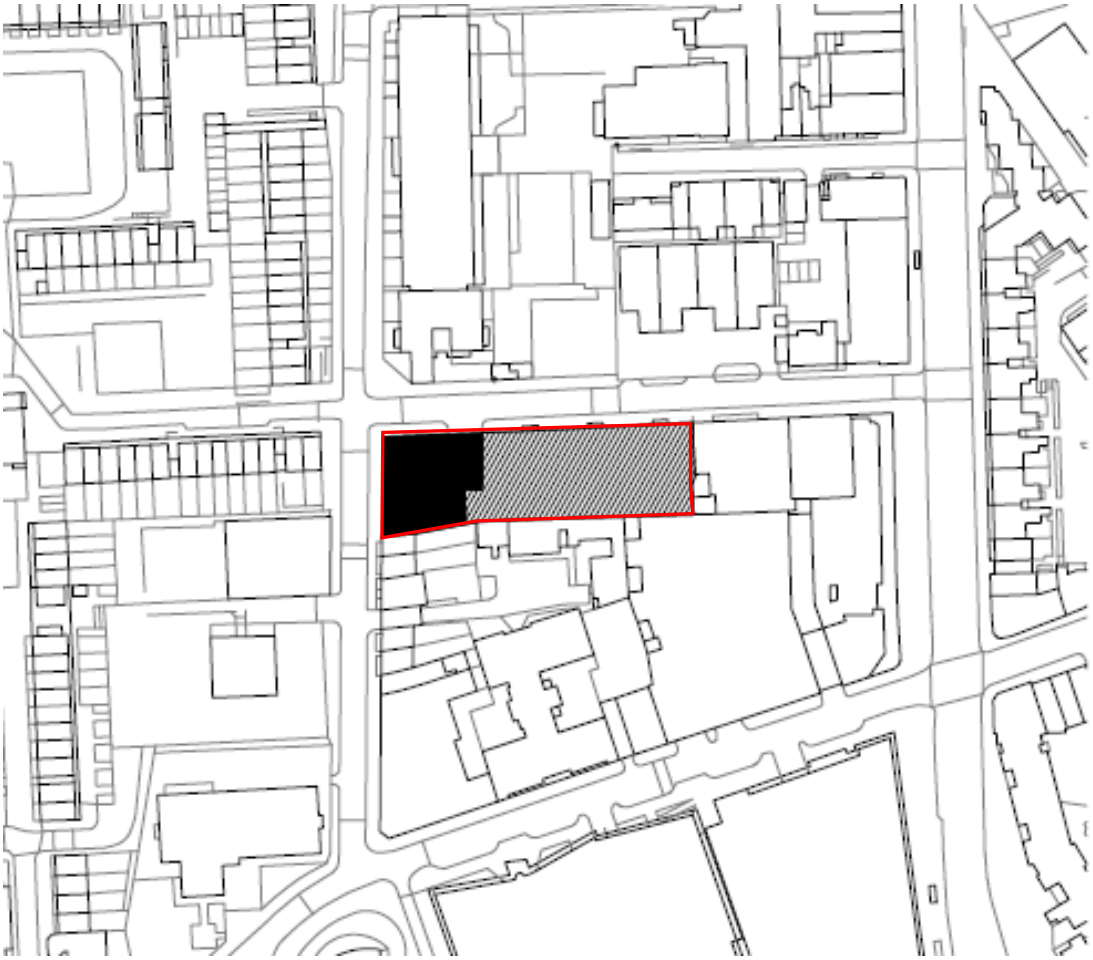
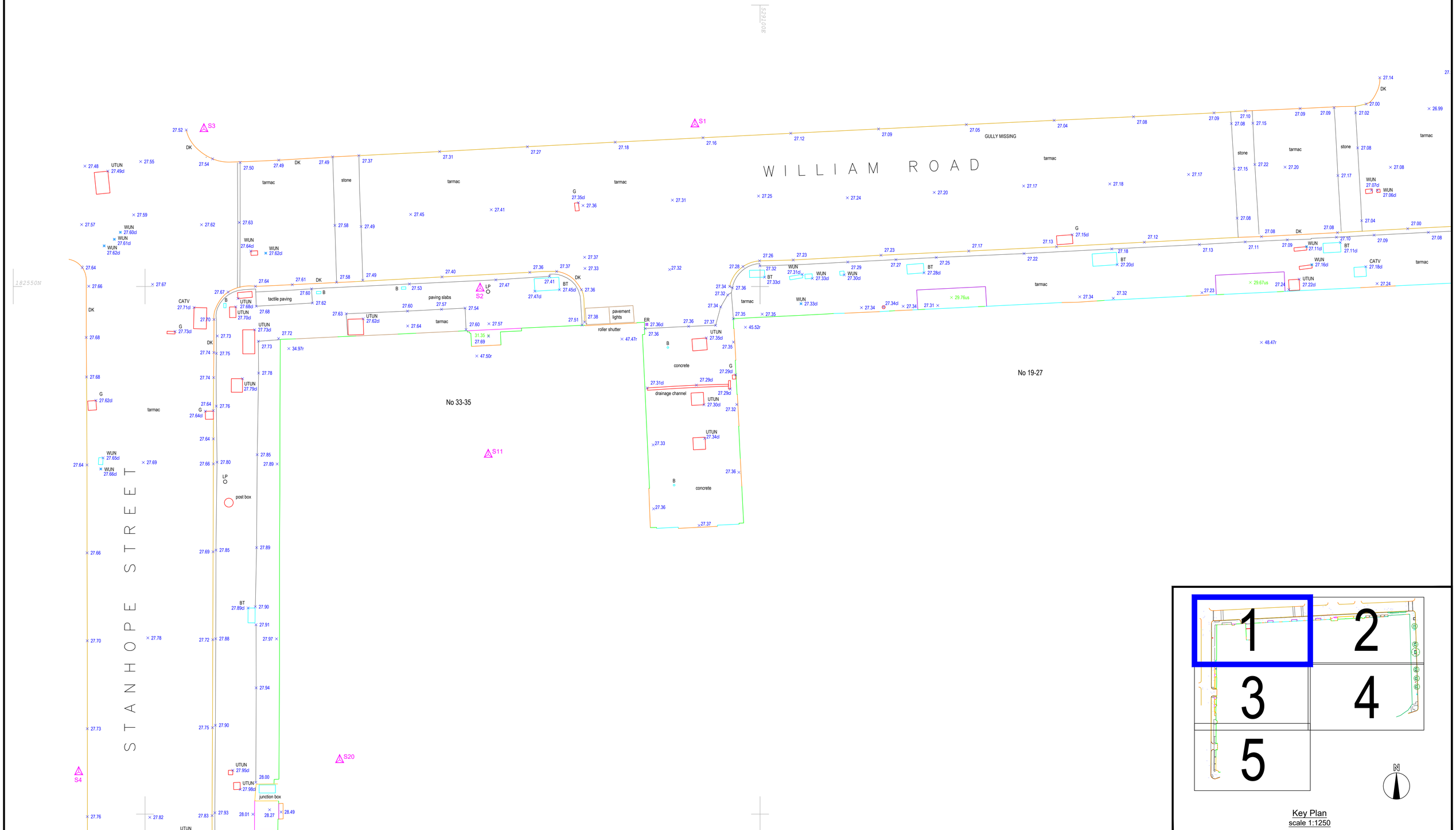


Figure A2: Site Block Plan

APPENDIX B: TOPOGRAPHIC SURVEY, DRAINAGE RECORDS/SURVEYS



Key Plan
scale 1:1250

NOTES

Grid origin and orientation are related to OS taken from existing site control stations SES01, SES02, SES04.

Levels are related to existing survey station.

SES survey information shown in colour.

SES survey information has been extracted from 3D point cloud data. Accuracy typically ±5mm.

Only elements visible from safe instrument setups are shown.

SURVEY STATION SCHEDULE

Stn	Easting	Northing	Level
SES01	529173.208	182461.785	27.028
SES02	529209.490	182472.399	26.942
SES04	529213.908	182497.791	26.605
SES08	529212.842	182528.922	26.394
S1	529096.290	182559.226	27.306
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S6	529060.498	182441.877	27.957
S7	529107.991	182437.418	27.470
S8	529209.405	182563.880	26.240
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S11	529084.531	182540.438	27.690
S20	529076.074	182523.076	28.163

LEGEND

B ..... Bollard
BB ..... Belisha Beacon
BS ..... Bus Stop
BT ..... British Telecom Cover
CATV ..... Cable Television
DK ..... Drop Kerb
DP ..... Down Pipe
EC ..... Electrical Inspection Cover
ER ..... Earthing Rod
FH ..... Fire Hydrant
G ..... Gully
GV ..... Gas Valve
IC ..... Inspection Cover
LP ..... Lamp Post
MH ..... Manhole
Mkr ..... Marker Post
O/H ..... Overhang
PB ..... Post Box
RE ..... Rodding Eye
RWP ..... Rain Water Pipe
SC ..... Stop Cock
SP ..... Soil Pipe
TCB ..... Telephone Call Box
TL ..... Traffic Light
TP ..... Telegraph Pole
UTUN..... Unidentified Utility
WM ..... Water Meter
WUN ..... Water Unidentified
WV ..... Water Valve

Trees
xx/xx/xx.... Trunk(Ø)/Spread(r)/Height

LEVELS
cl ..... Cover Level
il ..... Invert Level
us ..... Underside
t ..... Top
r ..... Roof

01	Issued for information.	20/01/2020	DK
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SITE ENGINEERING SURVEYS LTD
16 Tiller Court
Tiller Road
London E14 8PX
Tel: 020 7538 0870
Fax: 020 7537 4355
Email: office@sesltd.uk.com

CLIENT: MBU CAPITAL

PROJECT TITLE: 35-37 William Rd & 17-33 William Rd

TITLE: 2D Topographic Survey (sheet 1 of 5)

SURVEYED	DRAWN	CHECKED	DATE	SCALE @ A1
PC	DK	NP	02/01/2020	1:100

JOB No	DRAWING No	REV
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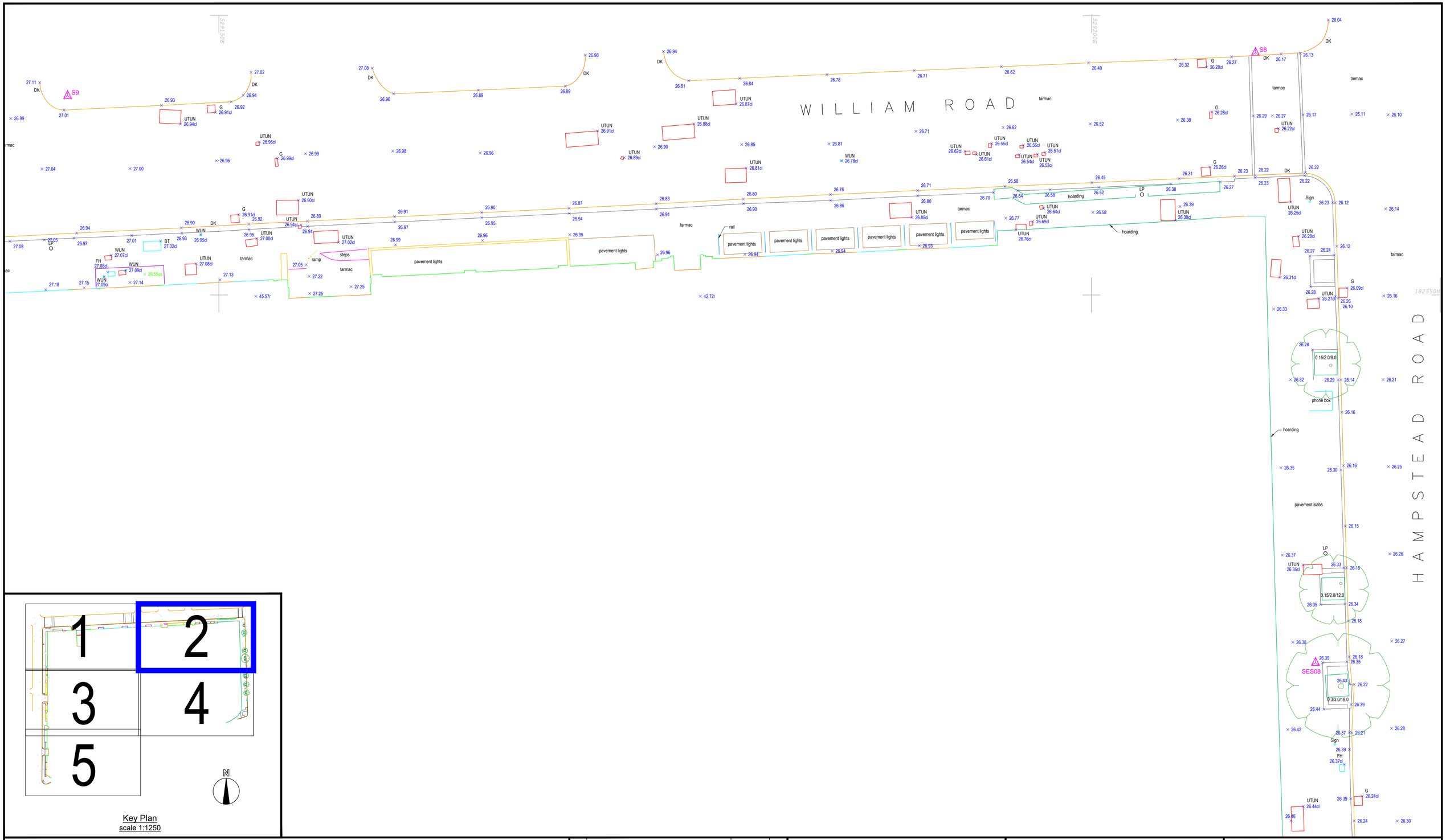

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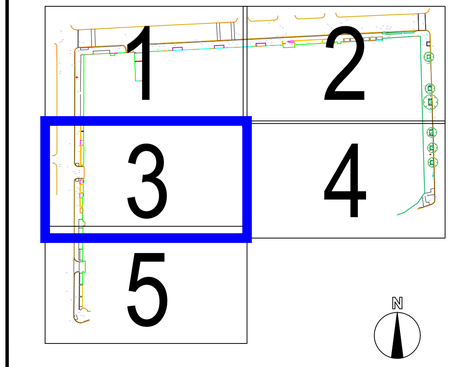

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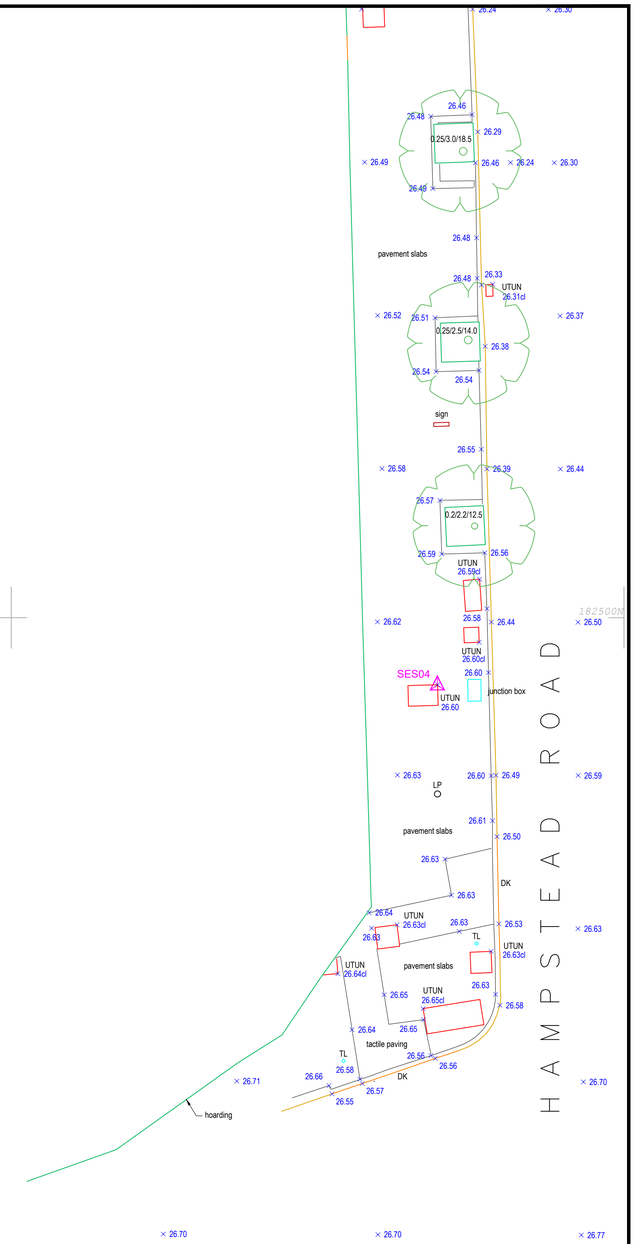

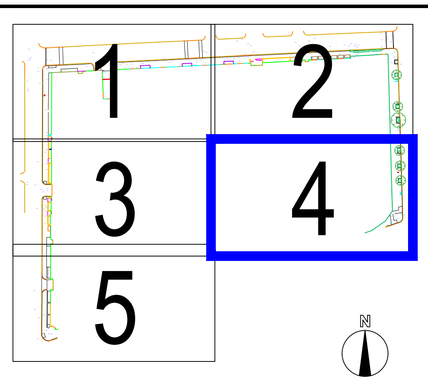

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BB	.....	Belisha Beacon	RE	.....	Rodding Eye	xx/xx/xx....	Trunk(Ø)/Spread(r)/Height
BS	.....	Bus Stop	RWP	.....	Rain Water Pipe		
BT	.....	British Telecom Cover	SC	.....	Stop Cock	LEVELS	
CATV	.....	Cable Television	SP	.....	Soil Pipe		
DK	.....	Drop Kerb	TCB	.....	Telephone Call Box	cl	..... Cover Level
DP	.....	Down Pipe	TL	.....	Traffic Light	il	..... Invert Level
EC	.....	Electrical Inspection Cover	TP	.....	Telegraph Pole	us	..... Underside
ER	.....	Earthing Rod	UTUN	.....	Unidentified Utility	t	..... Top
FH	.....	Fire Hydrant	WM	.....	Water Meter	r	..... Roof
G	.....	Gully	WUN	.....	Water Unidentified		
GV	.....	Gas Valve	WV	.....	Water Valve		
IC	.....	Inspection Cover					
LP	.....	Lamp Post					
MH	.....	Manhole					
Mkr	.....	Marker Post					
O/H	.....	Overhang					

01	Issued for information.	20/01/2020	DK
PRE	Preliminary issue for utility survey.	16/01/2020	DK
	REVISIONS	DATE	BY

SITE ENGINEERING SURVEYS LTD
16 Tiller Court
Tiller Road
London E14 8PX
Tel: 020 7538 0870
Fax: 020 7537 4355
Email: office@sesltd.uk.com

CLIENT

MBU Capital Limited

PROJECT TITLE

35-37 William Rd & 17-33 William Rd

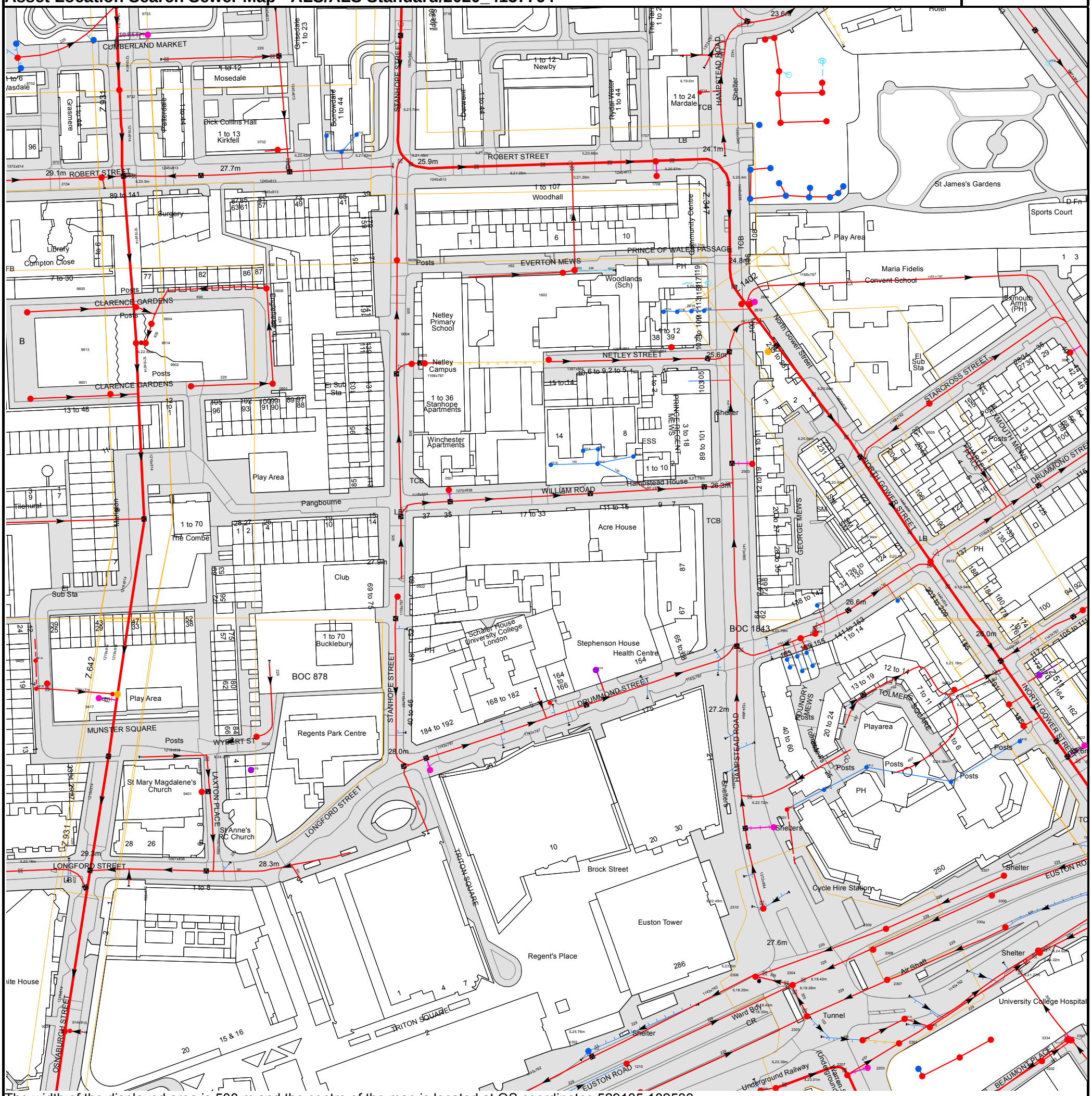
TITLE

2D Topographic Survey
(sheet 4 of 5)

SURVEYED	DRAWN	CHECKED	DATE	SCALE @ A1
PC	DK	NP	02/01/2020	1:100

JOB No	DRAWING No	REV
10989	SES-10989-001	01

Asset Location Search Sewer Map - ALS/ALS Standard/2020_4137764



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 529135,182533

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
27CE	n/a	n/a
271A	n/a	n/a
27CD	n/a	n/a
27CJ	n/a	n/a
27BF	n/a	n/a
371B	n/a	n/a
27CH	n/a	n/a
27CI	n/a	n/a
27BI	n/a	n/a
27BG	n/a	n/a
1707	24.5	20.73
1708	24.56	n/a
161A	n/a	n/a
16BA	n/a	n/a
161B	n/a	n/a
261A	n/a	n/a
261B	n/a	n/a
26BI	n/a	n/a
2615	n/a	n/a
26CF	n/a	n/a
2616	n/a	n/a
27CA	n/a	n/a
2604	n/a	20.15
27CF	n/a	n/a
27BJ	n/a	n/a
27BE	n/a	n/a
27CB	n/a	n/a
27BD	n/a	n/a
26CE	n/a	n/a
26CD	n/a	n/a
26CH	n/a	n/a
27CC	n/a	n/a
26CC	n/a	n/a
26CB	n/a	n/a
26CA	n/a	n/a
3505	25.36	20.44
3601	n/a	n/a
241J	n/a	n/a
2308	20.78	18.64
2309	26.97	24.83
2307	20.78	18.64
251A	n/a	n/a
3513	26.14	19.95
341C	n/a	n/a
3403	27.64	n/a
3306	23.78	21.81
3307	26.3	25.26
3304	23.78	21.81
3426	n/a	n/a
341B	n/a	n/a
3425	n/a	n/a
331A	n/a	n/a
341A	n/a	n/a
3303	26.27	n/a
3502	25.1	19.82
3422	25.42	n/a
1209	24.63	22.45
2205	27.43	26.12
2206	27.5	25.5
2207	27.68	23.11
1210	24.63	22.45
2303	20.54	18.43
2304	20.54	n/a
2306	27.85	18.18
2310	27.22	25.74
2401	n/a	n/a
241H	n/a	n/a
241G	n/a	n/a
241F	n/a	n/a
241I	n/a	n/a
241K	n/a	n/a
241E	n/a	n/a
241C	n/a	n/a
241A	n/a	n/a
241B	n/a	n/a
2402	n/a	n/a
2405	26.62	n/a
251B	n/a	n/a
2503	n/a	n/a
151D	n/a	n/a
2302	27.65	26.37
2203	n/a	n/a
2301	27.15	22.66
231A	n/a	n/a
32BA	n/a	n/a
32BB	n/a	n/a
3302	26.91	25.05
32BC	n/a	n/a
33DE	n/a	n/a
3202	24.09	22.39
3334	27.3	24.02

Manhole Reference	Manhole Cover Level	Manhole Invert Level
3301	27.23	22
9613	28.4	19.31
9614	n/a	n/a
9733	n/a	n/a
9604	28.56	23.02
9602	28.25	26.76
0606	27.93	23.82
0601	27.87	24.26
0702	n/a	n/a
071D	n/a	n/a
071F	n/a	n/a
071E	n/a	n/a
0608	26.17	22.37
0604	26.47	23.67
0605	n/a	n/a
1601	26.06	n/a
1602	23.76	22.3
1603	23.78	22.2
161C	n/a	n/a
841A	n/a	n/a
841B	n/a	n/a
9405	28.33	n/a
9324	28.72	17.73
9417	n/a	n/a
9401	27.98	24.1
941B	n/a	n/a
0403	27.49	24.69
0502	27.89	23.7
0401	n/a	n/a
0501	n/a	n/a
141B	n/a	n/a
151E	n/a	n/a
151A	n/a	n/a
1302	27.54	18
141A	n/a	n/a
151C	n/a	n/a
151B	n/a	n/a
8601	28.6	26.55
9601	28.62	n/a
8603	28.49	26.66
9605	28.43	24.25
9701	28.65	23.39
9732	28.79	20.21
87CE	n/a	n/a
8702	29.71	26.26
87CF	n/a	n/a
97DB	n/a	n/a

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Trunk Surface Water
- Trunk Foul
- Storm Relief
- Trunk Combined
- Vent Pipe
- Bio-solids (Sludge)
- Proposed Thames Surface Water Sewer
- Proposed Thames Water Foul Sewer
- Gallery
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Sludge Rising Main
- Proposed Thames Water Rising Main
- Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve
- Dam Chase
- Fitting
- Meter
- Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

- Control Valve
- Drop Pipe
- Ancillary
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Outfall
- Undefined End
- Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

- Public/Private Pumping Station
- Change of characteristic indicator (C.O.C.I.)
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Operational Site
- Chamber
- Tunnel
- Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

- Foul Sewer
- Surface Water Sewer
- Combined Sewer
- Gulley
- Culverted Watercourse
- Proposed
- Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plans are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole level indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

APPENDIX C: EA FLOOD & GROUNDWATER MAPS

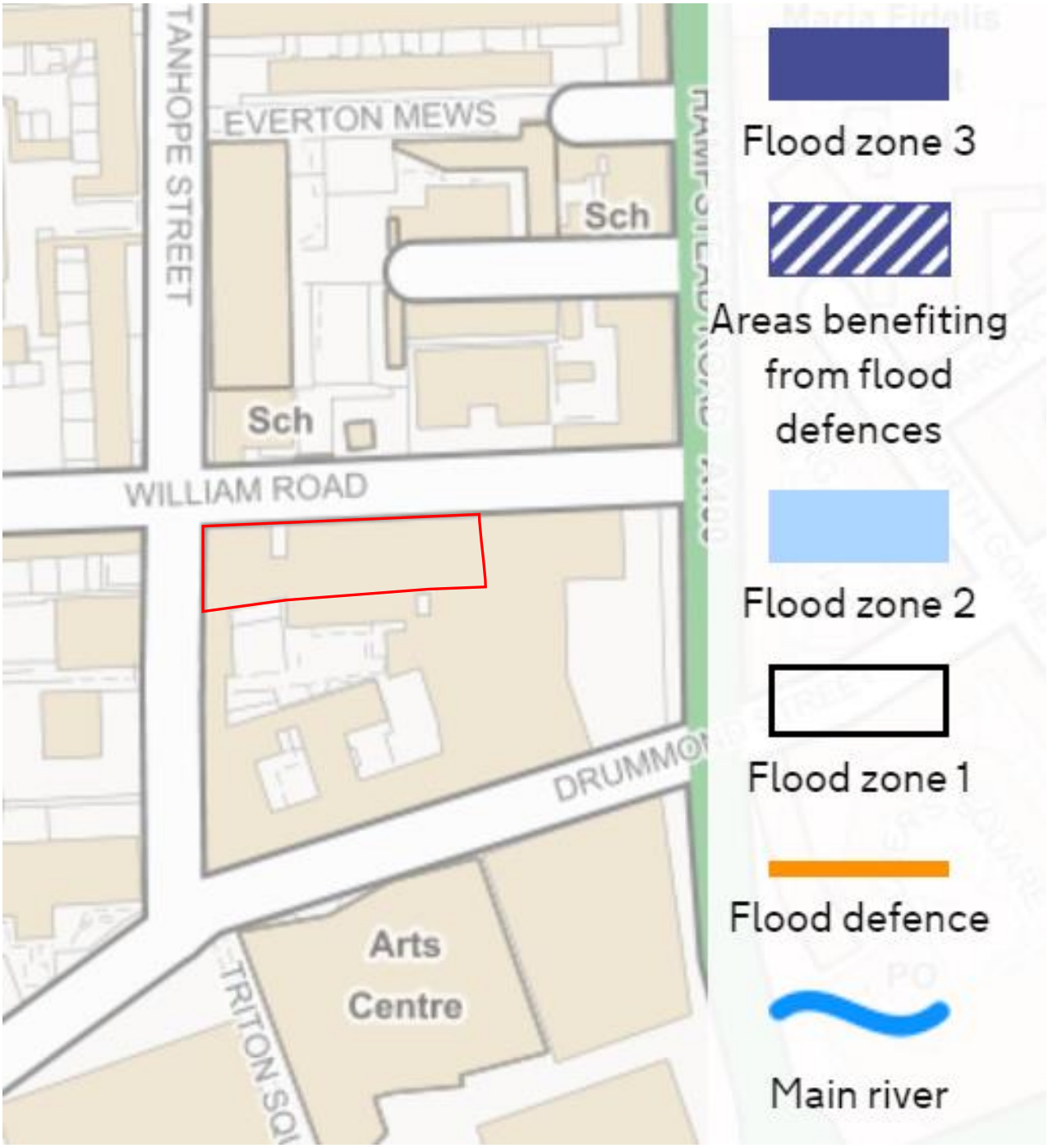


Figure C1: EA's Online Flood Map for Planning (Rivers and Seas)

The site is in fluvial Flood Zone 1

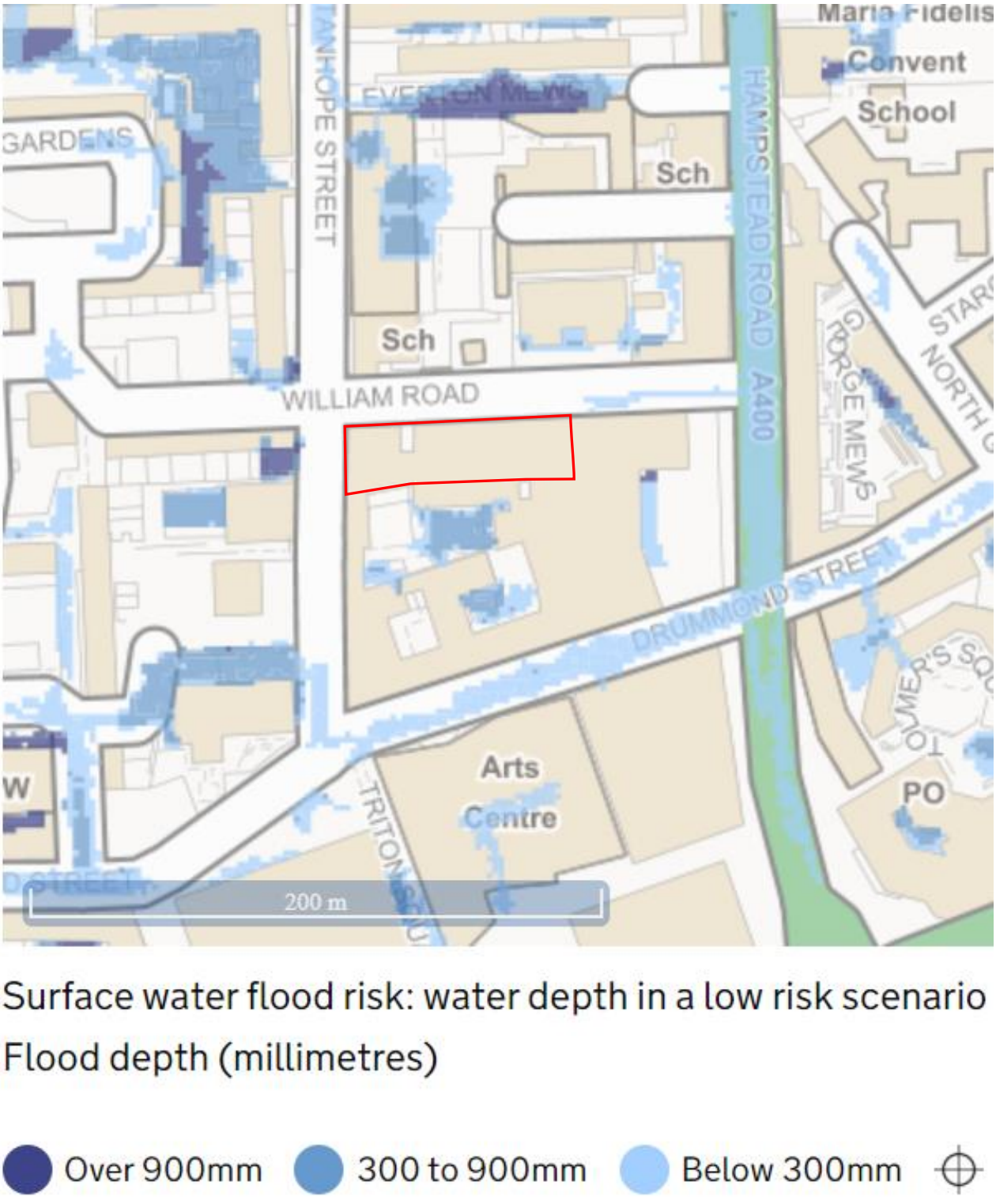


Figure C2: EA's Online Surface Water Flood Depth Map in the 'Low Risk Scenario' (1 in 1000 years storm event)

The site is clear of this source of flooding

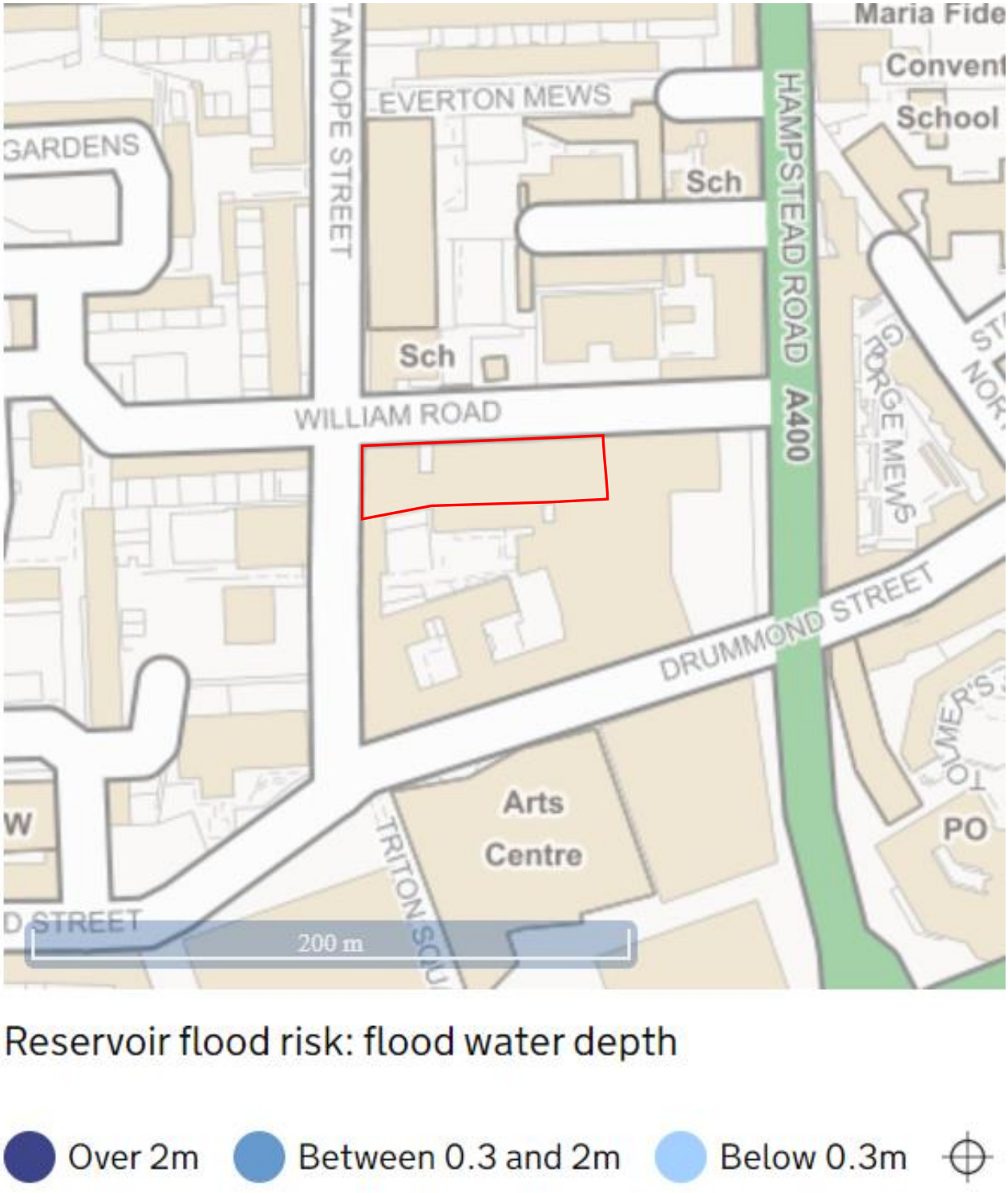


Figure C3: EA's Online 'Risk of Flooding from Reservoirs' Map

The site is clear of this source of flooding

Figure C4: EA's Historic Flood Map

This site is removed from the nearest flood record

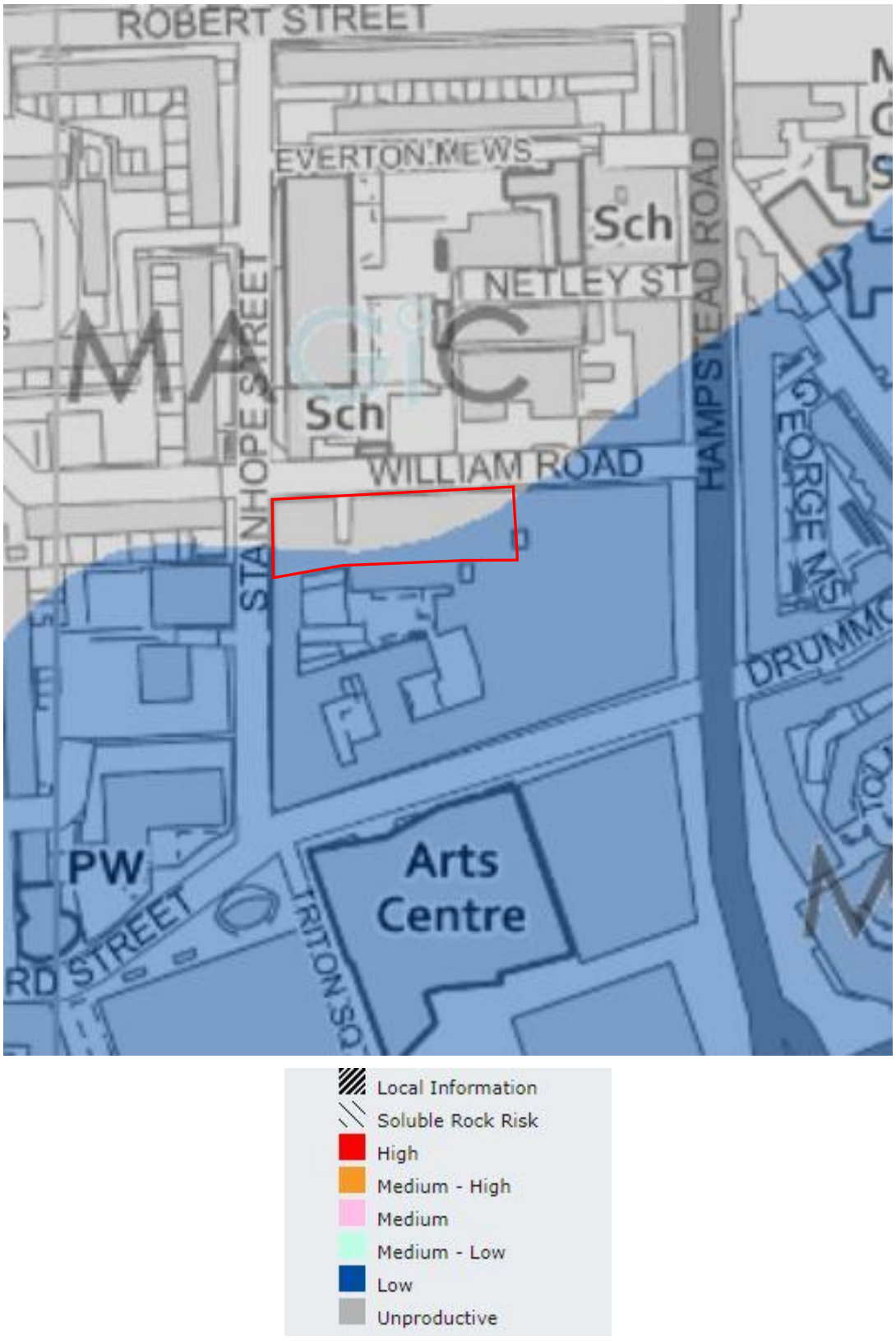


Figure C5: EA's Groundwater Vulnerability Map

The south half of the site overlies a 'Low' Aquifer, while the north half is over an 'Unproductive' Aquifer

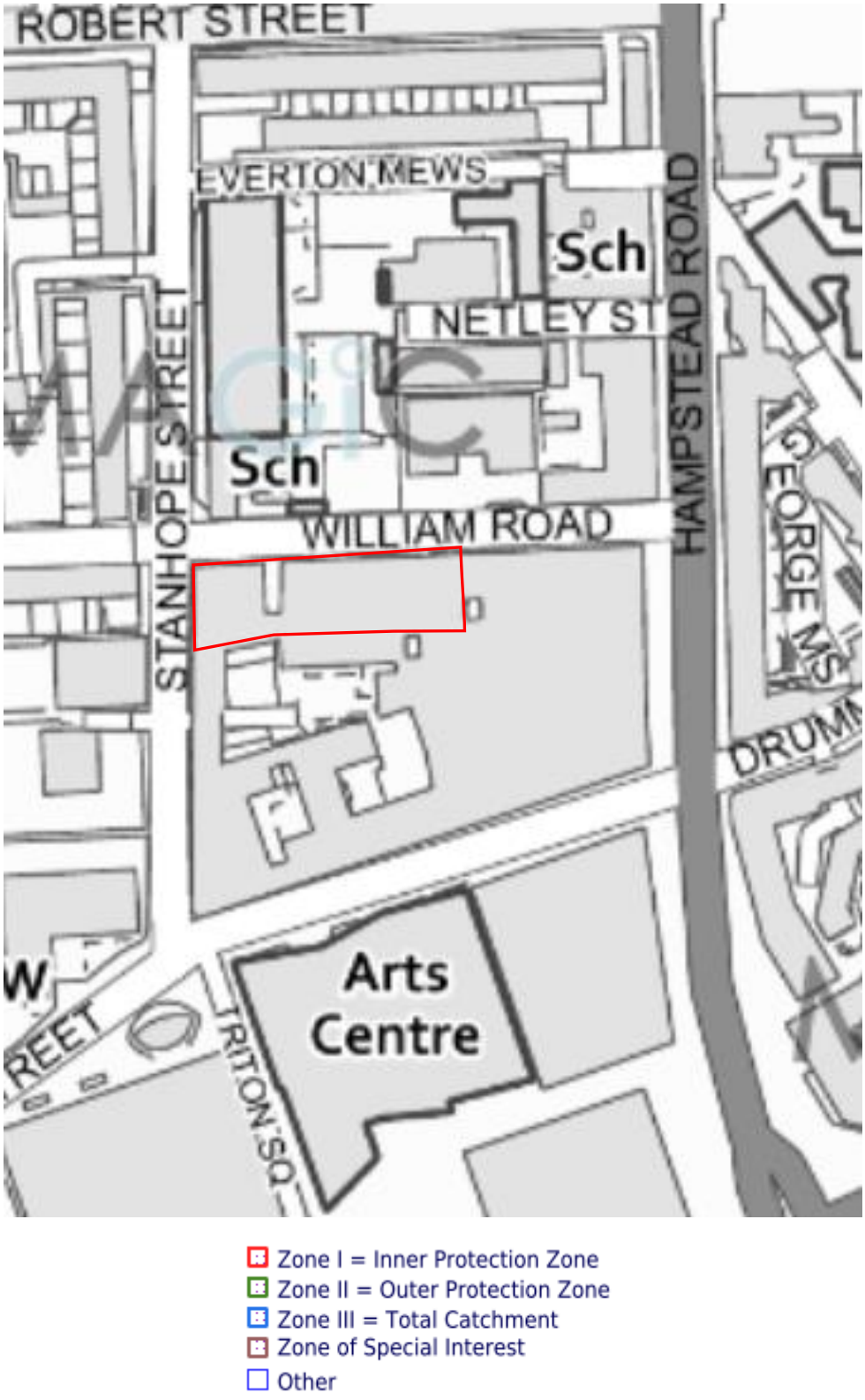
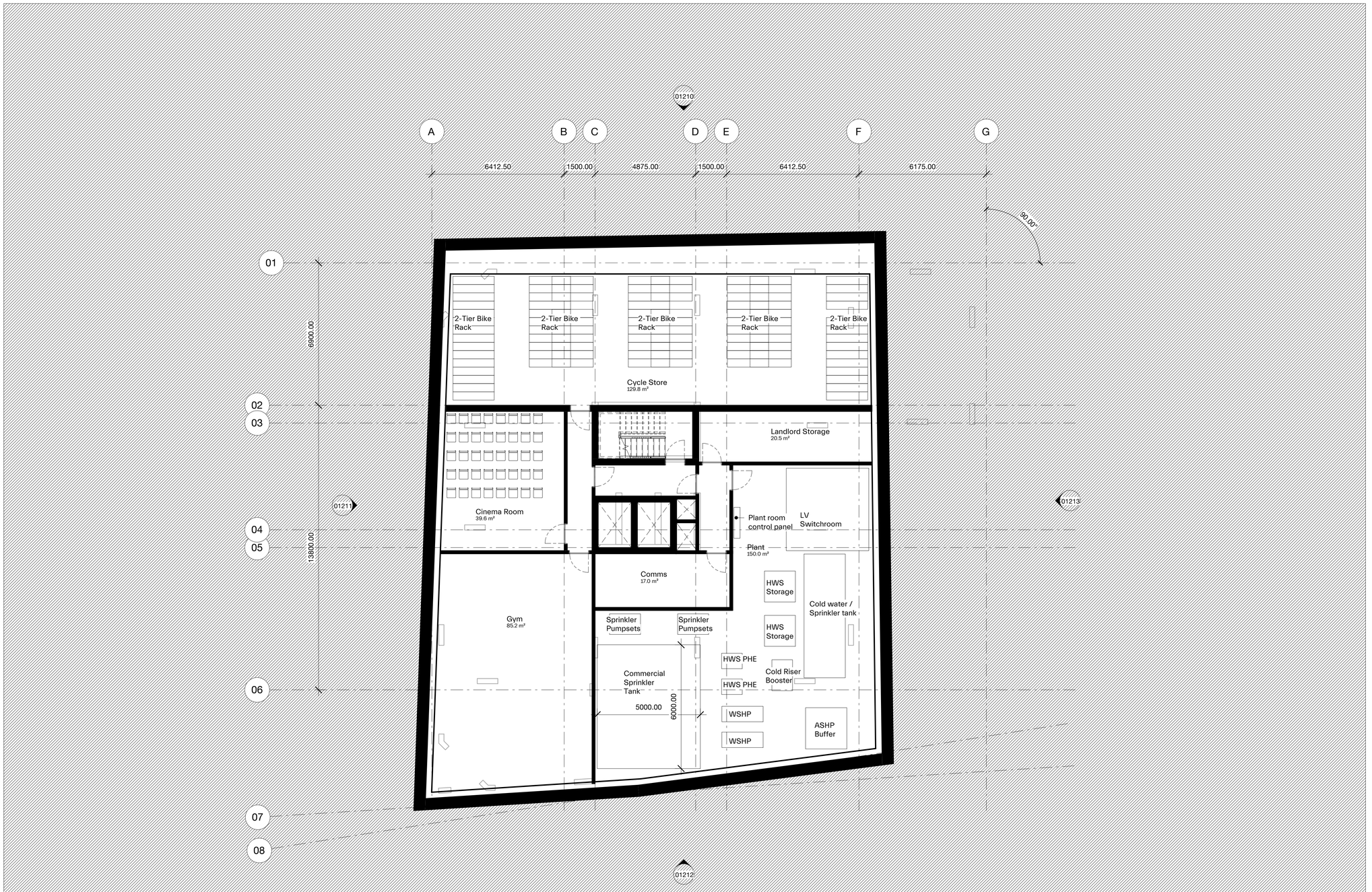


Figure C6: EA's Source Protection Zones Map

The site is removed from all Source Protection Zones

APPENDIX D: PROPOSED SCHEME DRAWINGS & DRAINAGE STRATEGY



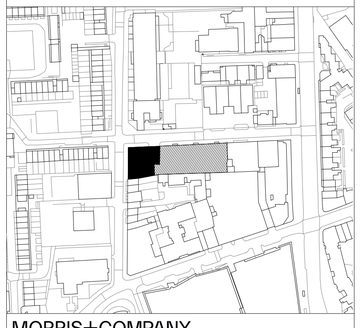
NOTES:

revision date amendment

N

SCALE BAR

0 1000 2000 5000 10000 mm



MORRIS+COMPANY
Unit 7, 16-24 Underwood Street, London N1 7JQ
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www.morrisand.company

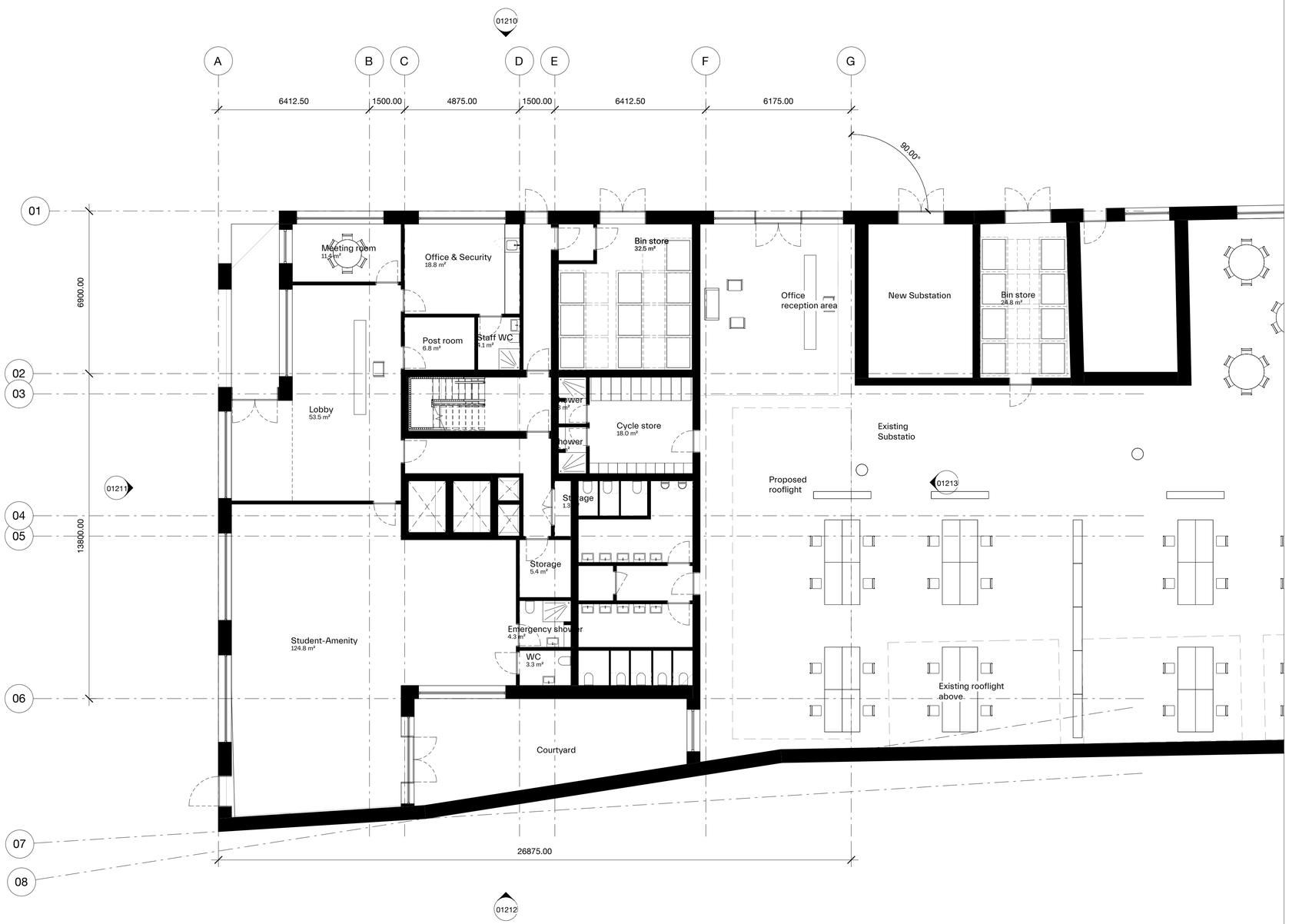
- Do not scale from this drawing
- All dimensions to be checked on site by the Contractor
- And such dimensions to be their responsibility
- Report all drawing errors and omissions to the Architect
- All dimensions in millimeters unless noted otherwise
- If in doubt ask Contract Administrator

DRAFT

job title
WILLIAM ROAD

drawing title / location
BASEMENT PLAN

status	FOR INFORMATION							
date	17/08/20							
scale	1 : 100 @ A1				1:200 @ A3			
project	originator	zone	level	type	role	number	status - revision	
A295	MCO	BA	B0	DR	A	01098		



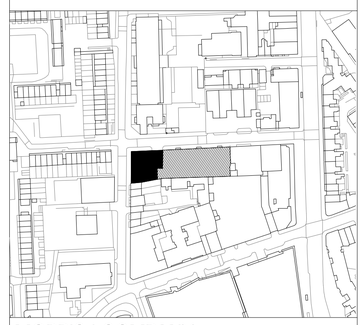
NOTES:

revision date amendment

N

SCALE BAR

0 1000 2000 5000 10000 mm



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www.morrisand.company

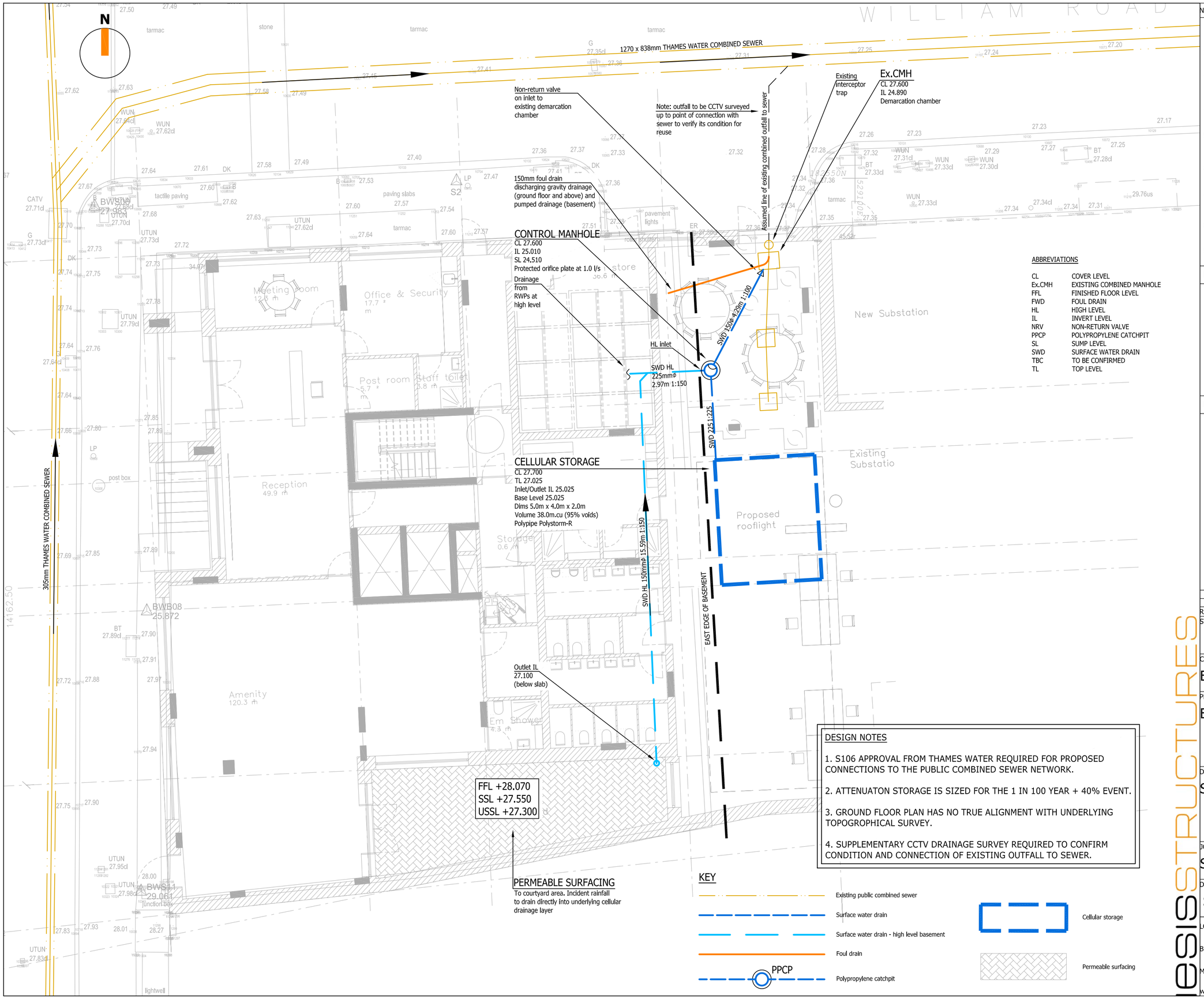
- Do not scale from this drawing
- All dimensions to be checked on site by the Contractor
- And such dimensions to be their responsibility
- Report all drawing errors and omissions to the Architect
- All dimensions in millimeters unless noted otherwise
- If in doubt ask Contract Administrator

DRAFT

job title
WILLIAM ROAD

drawing title / location
GROUND FLOOR PLAN - PLOT A

status	FOR INFORMATION							
date	17/08/20							
scale	1 : 100 @ A1				1:200 @ A3			
project	originator	zone	level	type	role	number	status - revision	
A295	MCO	BA	G0	DR	A	01100		



ABBREVIATIONS

CL	COVER LEVEL
Ex.CMH	EXISTING COMBINED MANHOLE
FFL	FINISHED FLOOR LEVEL
FWD	FOUL DRAIN
HL	HIGH LEVEL
IL	INVERT LEVEL
NRV	NON-RETURN VALVE
PPCP	POLYPROPYLENE CATCHPIT
SL	SUMP LEVEL
SWD	SURFACE WATER DRAIN
TBC	TO BE CONFIRMED
TL	TOP LEVEL

DESIGN NOTES

1. S106 APPROVAL FROM THAMES WATER REQUIRED FOR PROPOSED CONNECTIONS TO THE PUBLIC COMBINED SEWER NETWORK.
2. ATTENUATON STORAGE IS SIZED FOR THE 1 IN 100 YEAR + 40% EVENT.
3. GROUND FLOOR PLAN HAS NO TRUE ALIGNMENT WITH UNDERLYING TOPOGROPHICAL SURVEY.
4. SUPPLEMENTARY CCTV DRAINAGE SURVEY REQUIRED TO CONFIRM CONDITION AND CONNECTION OF EXISTING OUTFALL TO SEWER.

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS (mm) ALL LEVELS ARE IN METERS (m).
2. DO NOT SCALE FROM DRAWINGS, WORK TO FIGURED DIMENSIONS ONLY.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS, THE SPECIFICATION AND THE CONTRACT DOCUMENTS.
4. ALL WORK IS TO COMPLY WITH THE RELEVANT EUROCODES, CODES OF PRACTICE AND THE BUILDING REGULATIONS.
5. ANY DISCREPANCIES BETWEEN THE ARCHITECTS AND THE ENGINEERS DRAWINGS TO BE BROUGHT TO THE ATTENTION OF THE DESIGN TEAM.
6. ALL SETTING OUT TO BE VERIFIED WITH THE ARCHITECT PRIOR TO COMMENCEMENT OF SITE CONSTRUCTION.
7. WORKS TO ENSURE THE STRUCTURAL STABILITY OF ALL ELEMENTS IN THEIR TEMPORARY STATE DURING CONSTRUCTION TO BE THE RESPONSIBILITY OF THE CONTRACTOR.
8. ALL FOUNDATION WORKS ARE TO BE UNDERTAKEN IN ACCORDANCE WITH PARTY WALL AWARDS.
9. FOR FULL DESIGN NOTES REFER TO IESIS DRAWING: XXX-ISS-XX-XX-DR-S-7000.

KEY:

N

LEGEND:

REV	DATE	DRAWN/CHK	REVISION INFO
P02	15.10.20	JR/MR	REVISED TO LATEST GA
P01	07.09.20	JR/MR	INITIAL PRELIMINARY ISSUE

STATUS: PRELIMINARY

CLIENT: EUSTON ONE LIMITED

PROJECT: EUSTON ONE

DRAWING TITLE: SITE DRAINAGE STRATEGY

JOB NUMBER:	SCALE AT A1:	REV. STATUS:
SE1714	1:100	S3

DRAWING NUMBER: SE1714-ISS-XX-00-DR-C-3000 REVISION: P02

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www.iesisgroup.com

APPENDIX E: DRAINAGE CALCULATIONS

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.300
Area (ha)	0.066	Urban	0.750
SAAR (mm)	600	Region Number	Region 6

Results l/s

QBAR Rural	0.1
QBAR Urban	0.4
Q1 year	0.3
Q1 year	0.3
Q30 years	0.6
Q100 years	0.7

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 345 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	25.959	0.939	0.0	0.7	0.7	17.8	O K
30 min Summer	26.213	1.193	0.0	0.8	0.8	22.7	O K
60 min Summer	26.437	1.417	0.0	0.9	0.9	26.9	O K
120 min Summer	26.598	1.578	0.0	0.9	0.9	30.0	O K
180 min Summer	26.639	1.619	0.0	1.0	1.0	30.8	O K
240 min Summer	26.633	1.613	0.0	1.0	1.0	30.6	O K
360 min Summer	26.608	1.588	0.0	0.9	0.9	30.2	O K
480 min Summer	26.577	1.557	0.0	0.9	0.9	29.6	O K
600 min Summer	26.542	1.522	0.0	0.9	0.9	28.9	O K
720 min Summer	26.503	1.483	0.0	0.9	0.9	28.2	O K
960 min Summer	26.424	1.404	0.0	0.9	0.9	26.7	O K
1440 min Summer	26.273	1.253	0.0	0.8	0.8	23.8	O K
2160 min Summer	26.085	1.065	0.0	0.8	0.8	20.2	O K
2880 min Summer	25.938	0.918	0.0	0.7	0.7	17.4	O K
4320 min Summer	25.723	0.703	0.0	0.6	0.6	13.4	O K
5760 min Summer	25.576	0.556	0.0	0.6	0.6	10.6	O K
7200 min Summer	25.470	0.450	0.0	0.5	0.5	8.6	O K
8640 min Summer	25.393	0.373	0.0	0.5	0.5	7.1	O K
10080 min Summer	25.333	0.313	0.0	0.4	0.4	5.9	O K
15 min Winter	26.074	1.054	0.0	0.8	0.8	20.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	150.655	0.0	18.4	19
30 min Summer	97.196	0.0	23.7	33
60 min Summer	59.609	0.0	29.1	62
120 min Summer	35.301	0.0	34.4	122
180 min Summer	25.646	0.0	37.5	180
240 min Summer	20.332	0.0	39.6	228
360 min Summer	14.651	0.0	42.9	284
480 min Summer	11.604	0.0	45.3	348
600 min Summer	9.678	0.0	47.2	416
720 min Summer	8.341	0.0	48.8	484
960 min Summer	6.592	0.0	51.4	618
1440 min Summer	4.725	0.0	55.3	894
2160 min Summer	3.382	0.0	59.3	1296
2880 min Summer	2.666	0.0	62.4	1672
4320 min Summer	1.904	0.0	66.8	2420
5760 min Summer	1.498	0.0	70.1	3120
7200 min Summer	1.243	0.0	72.7	3824
8640 min Summer	1.067	0.0	74.9	4584
10080 min Summer	0.938	0.0	76.8	5248
15 min Winter	150.655	0.0	20.6	18

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	26.360	1.340	0.0	0.9	0.9	25.5	O K
60 min Winter	26.616	1.596	0.0	1.0	1.0	30.3	O K
120 min Winter	26.806	1.786	0.0	1.0	1.0	33.9	O K
180 min Winter	26.863	1.843	0.0	1.0	1.0	35.0	O K
240 min Winter	26.867	1.847	0.0	1.0	1.0	35.1	O K
360 min Winter	26.826	1.806	0.0	1.0	1.0	34.3	O K
480 min Winter	26.786	1.766	0.0	1.0	1.0	33.6	O K
600 min Winter	26.737	1.717	0.0	1.0	1.0	32.6	O K
720 min Winter	26.682	1.662	0.0	1.0	1.0	31.6	O K
960 min Winter	26.569	1.549	0.0	0.9	0.9	29.4	O K
1440 min Winter	26.356	1.336	0.0	0.9	0.9	25.4	O K
2160 min Winter	26.096	1.076	0.0	0.8	0.8	20.4	O K
2880 min Winter	25.899	0.879	0.0	0.7	0.7	16.7	O K
4320 min Winter	25.631	0.611	0.0	0.6	0.6	11.6	O K
5760 min Winter	25.465	0.445	0.0	0.5	0.5	8.4	O K
7200 min Winter	25.356	0.336	0.0	0.4	0.4	6.4	O K
8640 min Winter	25.282	0.262	0.0	0.4	0.4	5.0	O K
10080 min Winter	25.229	0.209	0.0	0.3	0.3	4.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	97.196	0.0	26.5	33
60 min Winter	59.609	0.0	32.5	62
120 min Winter	35.301	0.0	38.5	120
180 min Winter	25.646	0.0	42.0	176
240 min Winter	20.332	0.0	44.4	230
360 min Winter	14.651	0.0	48.0	298
480 min Winter	11.604	0.0	50.7	370
600 min Winter	9.678	0.0	52.8	446
720 min Winter	8.341	0.0	54.6	522
960 min Winter	6.592	0.0	57.6	672
1440 min Winter	4.725	0.0	61.9	954
2160 min Winter	3.382	0.0	66.5	1364
2880 min Winter	2.666	0.0	69.8	1756
4320 min Winter	1.904	0.0	74.8	2504
5760 min Winter	1.498	0.0	78.5	3224
7200 min Winter	1.243	0.0	81.5	3960
8640 min Winter	1.067	0.0	83.9	4664
10080 min Winter	0.938	0.0	86.0	5344

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Shortest Storm (mins)	15
Ratio R	0.440	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.065

Time (mins) From:	To:	Area (ha)
0	4	0.065

Model Details

Storage is Online Cover Level (m) 27.700

Cellular Storage Structure

Invert Level (m) 25.020 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	20.0	20.0	1.300	20.0	43.3
0.100	20.0	21.8	1.400	20.0	45.0
0.200	20.0	23.6	1.500	20.0	46.8
0.300	20.0	25.4	1.600	20.0	48.6
0.400	20.0	27.2	1.700	20.0	50.4
0.500	20.0	28.9	1.800	20.0	52.2
0.600	20.0	30.7	1.900	20.0	54.0
0.700	20.0	32.5	2.000	20.0	55.8
0.800	20.0	34.3	2.100	0.0	57.6
0.900	20.0	36.1	2.200	0.0	59.4
1.000	20.0	37.9	2.300	0.0	61.1
1.100	20.0	39.7	2.400	0.0	62.9
1.200	20.0	41.5	2.500	0.0	64.7

Orifice Outflow Control

Diameter (m) 0.019 Discharge Coefficient 0.600 Invert Level (m) 25.010