



40 - 68 SILVER STREET, READING, RG1 2ST



SILVER STREET DEVELOPMENTS LTD

DRAINAGE STRATEGY

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1 Introduction

1.1 Project Background

- 1.1.1 Westlakes Engineering Ltd. has been commissioned by Silver Street Developments to prepare a Drainage Strategy for a development site at 40 - 68 Silver Street, Reading.

1.2 Site Description

- 1.2.1 The site, which is located at 40-68 Silver Street, Reading, Berkshire, RG1 2SU near National Grid ref 471896, 172730, currently comprises two disused commercial buildings with surrounding hardstanding and vegetation. The approximate total area of the site is 0.135 ha which is currently 100% impermeable.
- 1.2.2 The site is accessed from Silver Street, which is adjacent to the eastern boundary of the site.
- 1.2.3 The site is located within a mix of commercial and residential property in an area lying south east of the Centre of Reading.
- 1.2.4 The nearest surface water feature is the River Kennet which is located approximately 450m west of the site.

1.3 Proposed Future Use

- 1.3.1 The site is intended to be developed with a multi-story building for a combination of 1-bedroom and 2-bedroom apartments.
- 1.3.2 Post-development there will be a basement car park at -1 Level. See drawings in Appendix 1 and 2.

1.4 Topography

- 1.4.1 It is assumed that post-development external site surface levels will be similar to those pre-development.

1.5 Geology

- 1.5.1 For details of ground conditions refer to the Combined Phase 1 & 2 Ground Investigation Report by Westlakes Environmental dated February 2019 (reference 1227-003-001).
- 1.5.2 Made Ground is present beneath previously developed areas of the site. The site is underlain by Taplow Gravel (sand and gravel) superficial deposits over bedrock of the Lambeth Group (clay, silt and sand). There are also bedrock outcrops of the London Clay Formation and the Seaford/Newhaven Chalk Formation within the surrounding area, which depending on the local geology may also underlie the site at depth. There are no known records of faults within at least 500m of the site.
- 1.5.3 Groundwater level monitoring was undertaken as part of the GI works. Following six visits groundwater was recorded in BH1 between 11.2m to 11.6m bgl. BH1 has a maximum drilled depth of 13m bgl.



2 Managing Surface Water

2.1 Surface Water Runoff

2.1.1 In accordance with the National Planning Policy Framework (NPPF) (Achieving sustainable development – Section 10, Meeting the challenge of climate change), the Environment Agency Report ref SC030219 – Rainfall runoff management for Developments, and the local Strategic Flood Risk Assessment (SFRA) issued by Jacobs in 2009, consideration should be given to natural water flows at the site. The development should not adversely affect flow or increase flood risk elsewhere, including increasing run-off rates. The disposal of surface water should be dealt with in a sustainable way and climate change should also be accounted for. The site drainage strategy is discussed in Section 3.

2.2 Climate Change

2.2.1 There is evidence to suggest that the climate is changing with sea levels predicted to continue to rise along with more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall. The NPPF recommends that the effects of climate change be accounted for in FRA, with consideration of the EA flood maps and local authority SFRA. Increased rainfall or higher intensity short-duration rainfall may increase as a result of climate change. Technical guidance published in March 2012 by the NPPF (Para 13 Table 5) recommends that for developments with a design life beyond 2085, a 30% increase in peak rainfall intensity should be accommodated.

2.2.2 A 30% increase is therefore being allowed for within the new surface water drainage design to take account of climate change. Climate change may also lead to variations in groundwater level which will also be considered during the drainage design.

2.3 Critical Drainage Area

2.3.1 Critical Drainage Areas have been delineated within the SFRA, using a combination of natural catchments, areas with historical sewer flooding and areas susceptible to surface water flooding greater than 0.3 m (as defined by the 1 in 200 chance of occurring in a year Flood Map for Surface Water (FMfSW) map). Specific drainage requirements are recommended in these areas to help reduce local flood risk. The site is located within Character Area 3 Reading South, close to the boundary with Reading Central. The site lies in an area which is identified as Flood Zone 1, having a less than a 1:1000 annual probability of flooding from watercourses or the sea.

2.3.2 The SFRA describes developments in areas close to Reading Central as being heavily constrained by the availability of green field sites and due to this it is anticipated that most developments will take place as infill and/or on brownfield sites. However, the SFRA also states that special considerations will be given to the proposed Green Park Village development which lies in zone 2, 3A and 3B flood zones.

2.3.3 Due to limited potential for development, the site does not appear to be within a Critical Drainage area. The site is a brownfield site and the SFRA states:

- *Development should aim for a minimum reduction in surface water runoff rates of 30% for Brownfield sites, with an aim of reducing runoff to Greenfield rates up to a 1 in 100 year (1% AEP) storm event, considering climate change.*
- *Development should be designed so that there is no flooding to the development in a 1 in 30 year (3.33% AEP) event and so that there is no property flooding in a 1 in 100 year (1% AEP) plus climate change event.*
- *Wherever possible, reductions in surface water should be achieved through the implementation of SUDS with source control considered firstly. There may be opportunities to deliver SUDS through integrated solutions for collections of strategic sites”.*



2.4 Sustainable Urban Drainage Systems (SUDS)

- 2.4.1 SUDS are a desirable way to manage surface water disposal within new developments and SUDS methods for surface water drainage management are discussed further within the CIRIA 753 SUDS Manual, published in 2015. When designing surface water drainage strategies priority should be given to disposal of surface water via infiltration drainage systems over first watercourses and then sewers.
- 2.4.2 Soakaways may be appropriate for the disposal of surface water at the site. However, this depends on several factors: -
- Underlying ground. The site is underlain by a mix of granular deposits, clays and chalk. The granular Taplow Gravel deposits may support the use of soakaways however they also appear to have some fines content and are intermixed with cohesive Taplow Gravel which may hinder use as good infiltration medium. Clays are likely to exhibit poor infiltration rates and therefore soakaway drainage into the superficial clays or the Lambeth clays is likely to be inefficient. Chalk bedrock may support soakaway drainage although it is noted that chalk is vulnerable to dissolution. This potential risk should be considered when designing the site drainage strategy. In principle, soakaways might be feasible, but their success would be location (ground type) dependant.
 - Infiltration rates. The rate of infiltration will need to be considered for the strata into which surface waters would discharge (e.g. granular deposits) and should be considered alongside development of the future site layout and drainage strategy.
 - Space restrictions. The proposed development includes a courtyard at ground level and car parking at basement. Based on the current proposals for future site layout there would not be sufficient space on site to comply with BRE365 guidelines which recommend that soakaways should be placed at least 5m away from building foundations.
- 2.4.3 it is therefore concluded that, due to space restrictions, surface water run-off from the proposed development would need to be connected in a new pipe network and discharged at an attenuated rate to the public sewer network.



3 Proposed Drainage Strategy

3.1 Site details

- 3.1.1 Westlakes have obtained details of Thames Water sewer assets in the area local to the site. The proposed strategy is set out below and is also shown on Drawing WL_1227_100_P3 included as Appendix 4.
- 3.1.2 It is proposed that a CCTV survey is undertaken along the existing drainage networks to not only establish the current point of discharge from the site but to also confirm the condition of the existing network for reuse.

3.2 Existing Site Drainage and Connections to the Public Sewer

- 3.2.1 Assessment of the existing topographical survey has revealed the presence of several chambers across the site, with their individual discharge points anticipated at this time to be the separate surface water and combined networks that reside within Silver Street.

3.3 Existing Flows from Site

- 3.3.1 The site is approximately 0.13 ha in area and is 100% impermeable in its pre-development state.
- 3.3.2 In order to define the existing flows originating from the current car park, a 2-pipe network has been formed following the guidance contained within Microdrainage modelling software to represent the pre-development impermeable area and simulating the 1 in 100-year storm 360minute duration with results shown below in Figure 1.
- 3.3.3 The current Brownfield run off rate for the critical 1 in 100 year storm of 360min duration has been calculated as 10.6 l/s.
- 3.3.4 In order to provide a significant betterment over the existing discharge rate currently experienced from the site, the generally accepted minimum practical peak discharge rate of 5 l/s is proposed. This represents a 53% reduction from the current brownfield rate.



Figure 1 – Brownfield Flow Rate

Westlakes Engineering Ltd			Page 1						
20 Dale Street									
Manchester									
M1 1EZ									
Date 25/02/2019 15:49			Designed by hammp						
File BROWNFIELD 2 PIPE NETWORK...			Checked by						
Micro Drainage			Network 2017.1.2						
<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>									
<u>Simulation Criteria</u>									
Area Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000									
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000									
Hot Start Level (mm) 0 Inlet Coefficient 0.800									
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000									
Foul Sewage per hectare (l/s) 0.000									
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0									
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0									
<u>Synthetic Rainfall Details</u>									
Rainfall Model FSR Ratio R 0.400									
Region England and Wales Cv (Summer) 0.750									
M5-60 (mm) 18.800 Cv (Winter) 0.840									
Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF									
Analysis Timestep Fine Inertia Status OFF									
DTS Status ON									
<u>Profile(s) Summer and Winter</u>									
Duration(s) (mins) 360									
Return Period(s) (years) 100									
Climate Change (%) 0									
<u>Water Level</u>									
PN	US/MH	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
1.000	MH1	360 Summer	100	+0%					98.090
1.001	MH2	360 Summer	100	+0%					97.915
<u>Surcharged Flooded</u>						<u>Pipe</u>			
PN	US/MH	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded	
1.000	MH1	-0.060	0.000	0.67		10.6	OK		
1.001	MH2	-0.060	0.000	0.67		10.6	OK		
©1982-2017 XP Solutions									



3.4 Surface Water Drainage Strategy

- 3.4.1 It is proposed that surface water from the site is attenuated and discharged into the 300mm diameter dedicated surface water sewer in Silver Street at the reduced brownfield rate of 5 l/s. The rate of discharge will however need to be confirmed by the local drainage authority and Thames Water who will take into account the capacity of the sewer and check their records for history of surcharging or flooding in the network.
- 3.4.2 The site surface water drainage will be designed in accordance with current best practice to provide adequate capacity not to flood for a 1 in 30year storm event and such that flood water generated from a 1 in 100 year plus climate change storm event (+30%) shall be constrained within the site boundary so not to cause off-site flooding. The risk of flooding elsewhere should therefore not be increased as a result of the development proposals.
- 3.4.3 All redundant drains, sewers and manholes within the site will be removed or filled as part of the site remediation demolition strategy.

3.5 Foul Flows

- 3.5.1 The peak flow rate for the development has been calculated using the discharge unit method. The peak foul discharge is estimated as 7.7 l/s based on the assumed development of 33 apartments.
- 3.5.2 The foul water drainage flows generated by the proposed development will be collected in a private foul water network before discharging to the existing 375mm diameter combined sewer located within Silver Street. The flow will be pumped in a rising main from below the basement level to the demarcation manhole on the site boundary before discharging to the public foul sewer by gravity. The proposed foul drainage strategy is shown on drawing WL_1227_100_P3 attached as Appendix 4.

3.6 Access and Egress

- 3.6.1 The site has pedestrian access from Silver Street which is located in EA Flood Zone 1 and is therefore at low risk of flooding from rivers and the sea. There may be localized areas of surface water flooding of gullies during heavy rainfall, however this is not considered to be likely to represent a threat to accessibility for vehicles or pedestrians.
- 3.6.2 Safe access and egress should therefore be maintained post-development.



Appendix 1 Proposed Basement Floor Plan (Level -1) & Proposed Foul Drainage Network overlaid

Notes:

All dimensions are in millimetres unless stated otherwise. No dimensions to be scaled from drawings. All dimensions to be checked on site prior to manufacture.

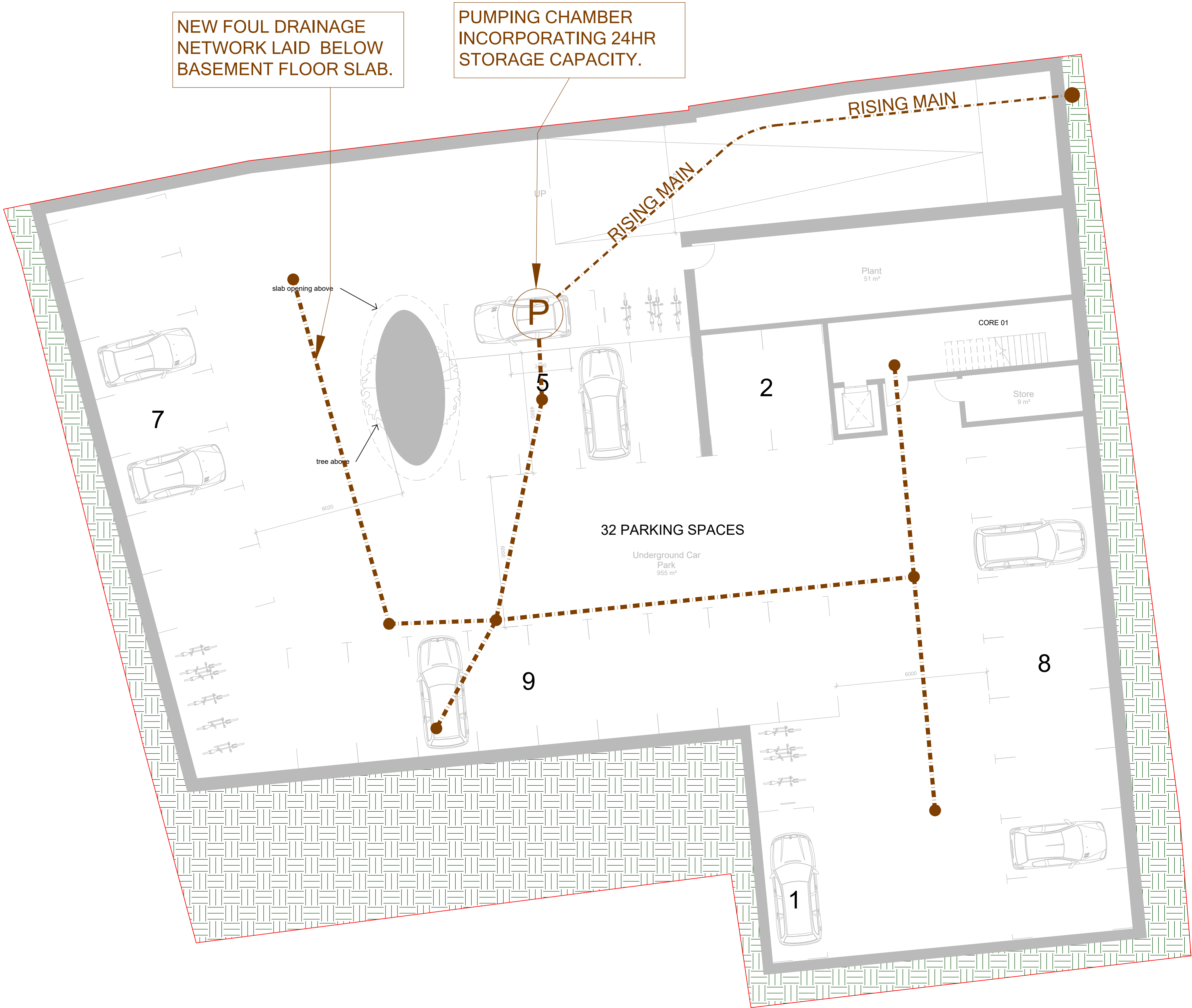
Any discrepancies between drawings and site conditions are to be reported to the contract manager.

This drawing is to be read in conjunction with all relevant Structural Engineers and Mechanical & Electrical Engineers drawings and specification.

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VISUAL SCALE 1:100 @ A1



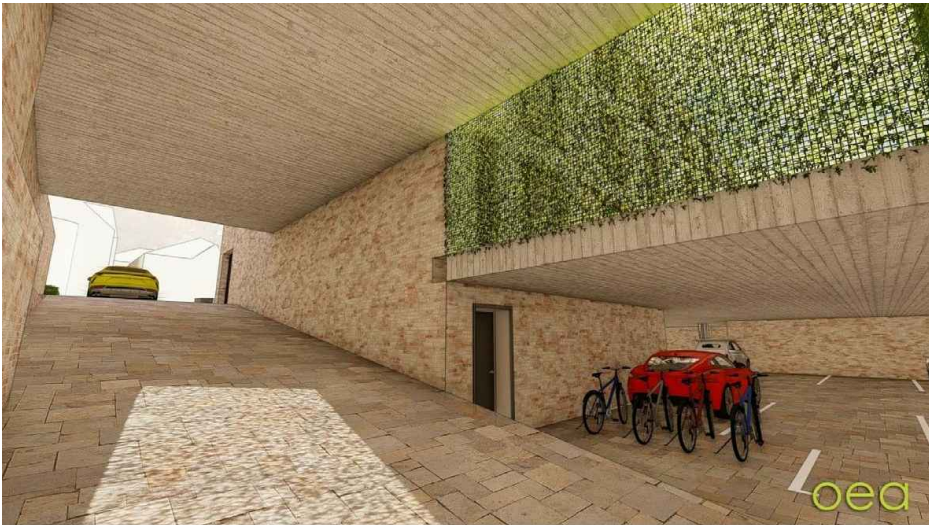
dwg status:

PLANNING

Rev	Description	Date	By	Chk
F	Planning Issue	03/02/20	BL	
E	Underground car park / Mix of studios and 1 Bed Flats	28/11/19	BL	
D	Studios on Link Block removed, Block B relocated	11/09/19	AH	
C	Northern boundary wall reduced in height	10/09/19	AH	
B	North studios of Block A removed, parking spaces added, student warden studio removed	19/08/19	AH	
A	Block B relocated, second floor studio removed, chamber in Block A	01/07/19	AH	
A	Internal reconfiguration/revised massing	01/07/19	AH	

oconnell east architects
43 Newton Street, Manchester, M1 1ET
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dwg title:	Underground Car Park		
job title:	40-68 Silver Street, Reading		
scale:	1 : 100	@ A1	drawn: PO
date:	20/05/19		job no: 1717
dwg no:	PL_200	rev:	F





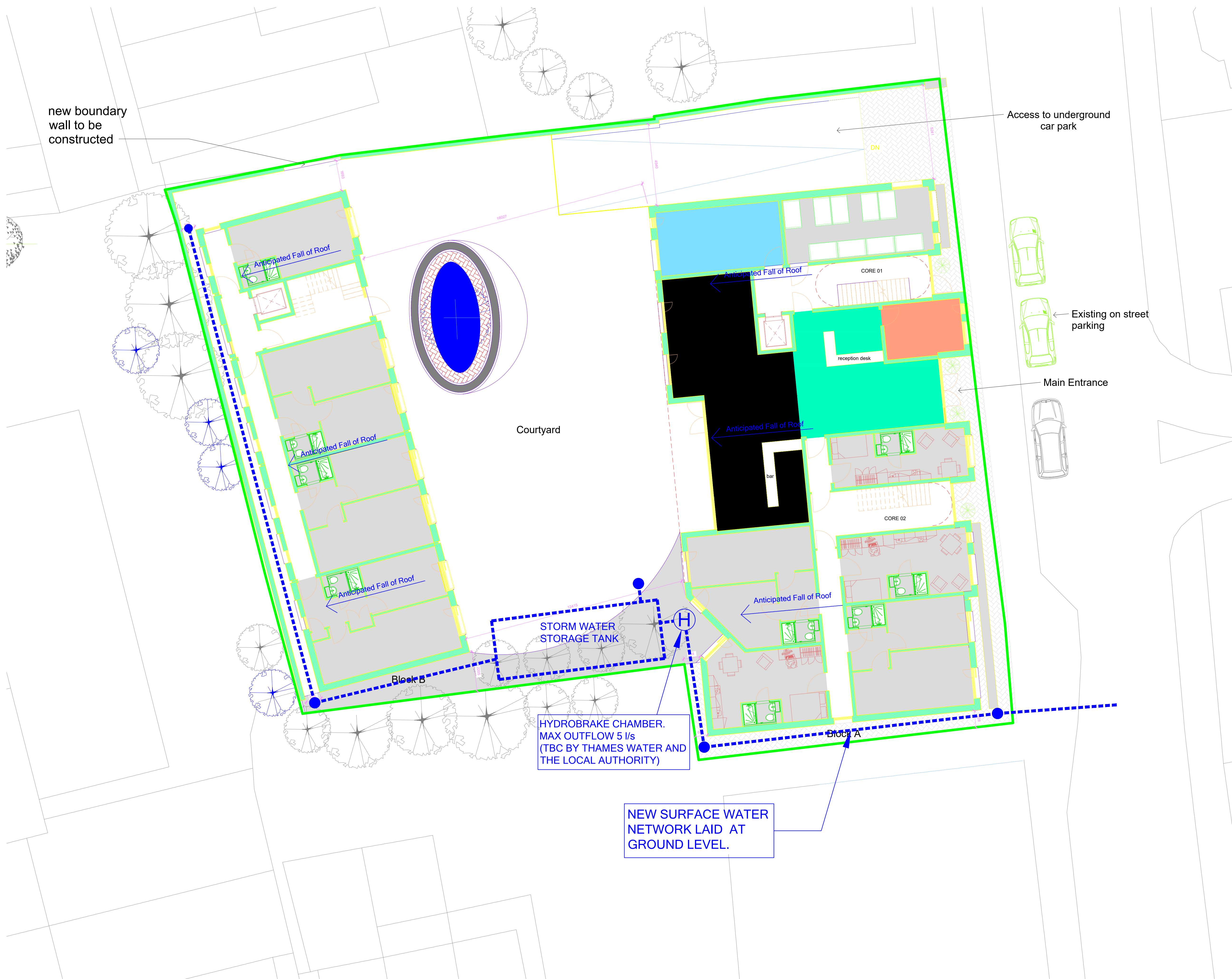
Appendix 2 Proposed Ground Floor Plan (Level 0) & Proposed Surface Water Network overlaid

- 1 Bed Flat
- Bin Store
- Laundry
- Lounge
- Management Suite
- Reception
- Studio

dwg status:

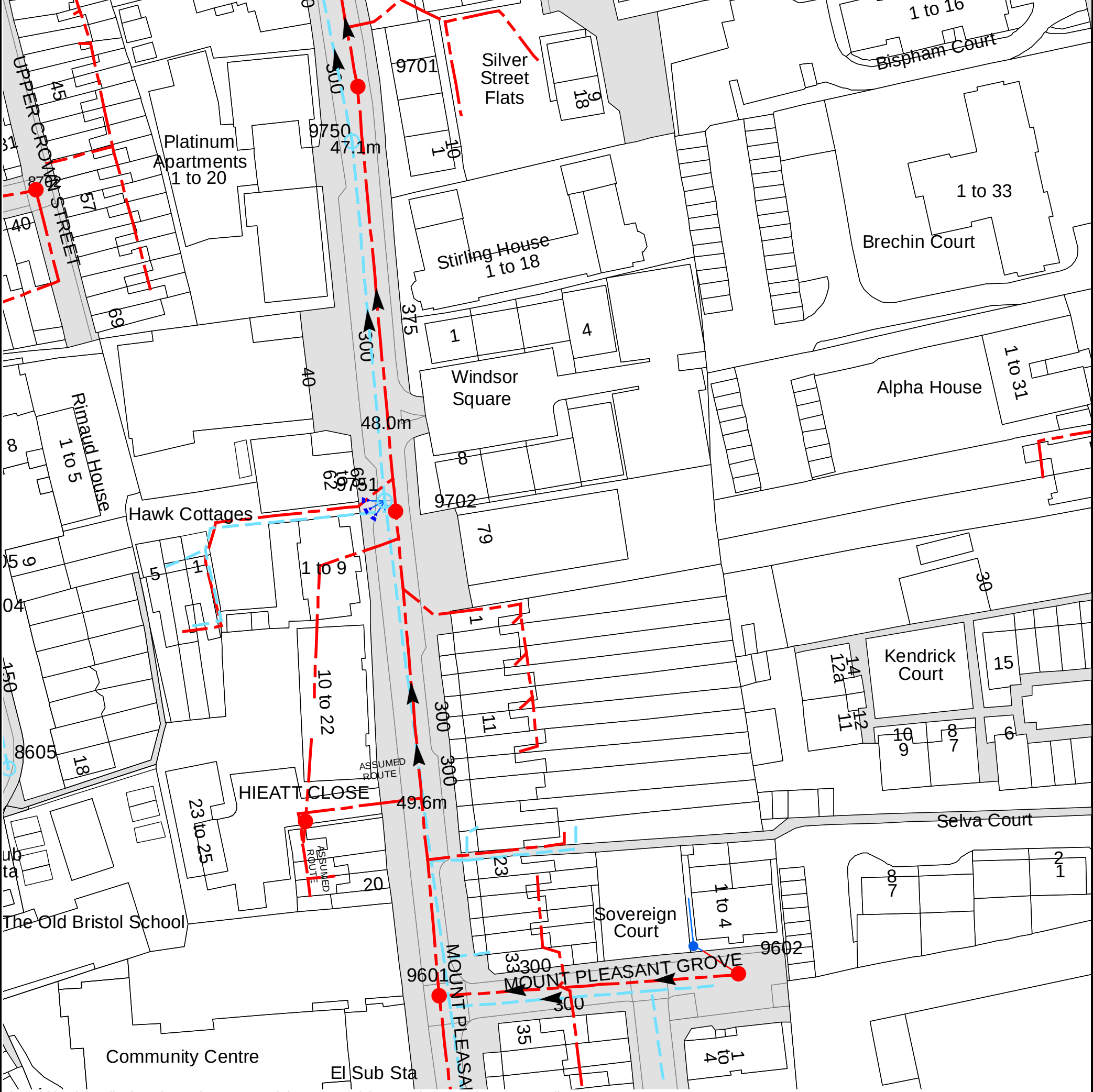
	Rev	Description	Date	By	Chk
F		Planning Issue	03/02/20	BL	
E		Underground car park / Mix of studios and 1 bed flats	28/11/19	BL	
D		Studios on Link Block removed, Block B relocated	11/09/19	AH	
		Northern boundary wall reduced in height			
C		North studio of Block A removed parking spaces added, student warden studio removed.	10/09/19	AH	
B		Block B relocated, second floor studio removed, chamber in Block A	19/08/19	AH	
A		Internal reconfiguration/revised massing	01/07/19	AH	

dwg title:	Ground Floor Plan		
job title:	40-68 Silver Street, Reading		
scale:	1 : 100	@ A1	drawn: PO
date:	20/05/19	job no:	1717
dwg no:	PL_201	rev:	F





Appendix 3 Thames Water Sewer Records



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 471953,172701
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.

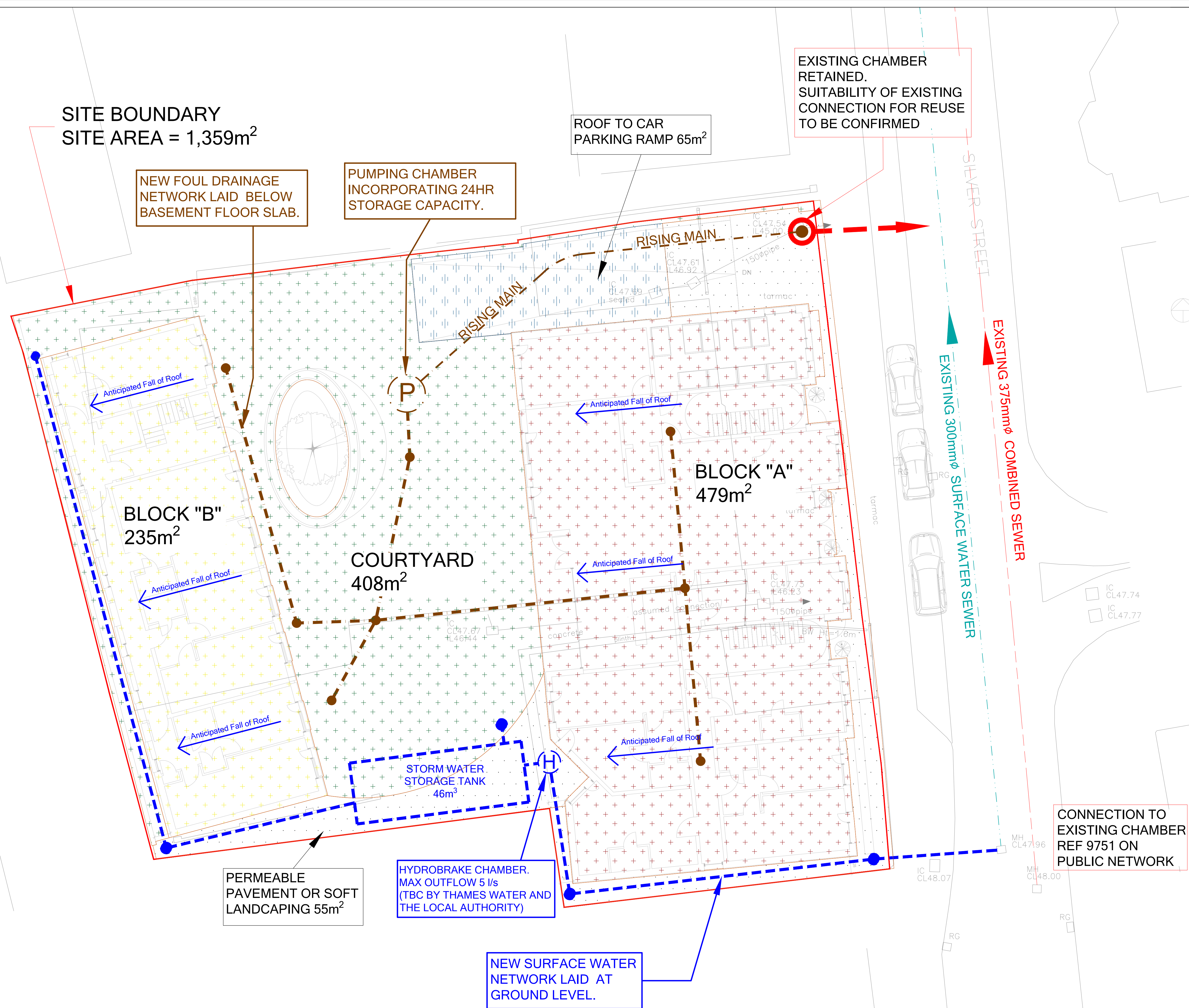
Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

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
9601	47.81	44.79
9602	47.76	45.97
961A	n/a	n/a
9603	n/a	n/a
8605	51.106	49.346
9702	47.98	44.73
9751	47.95	45.33
8702	46.49	43.59
9750	46.93	44.53
9701	46.83	44.11
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.		



Appendix 4 WL_1227_100_P3_Indicative Drainage Layout



GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES.
3. SURVEY GRID IS BASED ON NATIONAL GRID COORDINATES. SURVEY INFORMATION SUPPLIED.
4. ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. ANY DISCREPANCIES SHOULD BE REPORTED TO THE ENGINEER IMMEDIATELY.
5. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE RELEVANT ENGINEERS AND SPECIALISTS DRAWINGS TOGETHER WITH THEIR SPECIFICATIONS.
6. DO NOT SCALE FROM THIS DRAWING. ONLY WRITTEN OR CALCULATED DIMENSIONS TO BE USED.
7. ATTENUATION VOLUME CALCULATED BY QUICK STORAGE METHOD(MICRODRAINAGE). EXACT DIMENSIONS TO BE CONFIRMED AT THE DETAILED DESIGN.

LEGEND

- | | |
|---|---|
|  | PROPOSED SITE BOUNDARY |
|  | PROPOSED FOUL DRAINAGE |
|  | PROPOSED SURFACE WATER SEWER |
|  | EXISTING COMBINED SEWER |
|  | EXISTING SURFACE WATER SEWER |
|  | PROPOSED FOUL WATER OUTFALL CHAMBER |
|  | PROPOSED SURFACE WATER HYDROBRAKE CHAMBER |
|  | PROPOSED SURFACE WATER INSPECTION CHAMBER/MANHOLE |
|  | PROPOSED FOUL WATER CHAMBER |
|  | EXISTING DRAINAGE CONNECTION FROM THE SITE, SUITABILITY FOR REUSE TO BE ESTABLISHED FOLLOWING COMPLETION OF DETAILED CCTV INVESTIGATION |

P3	17.02.19	AMENDED TO SUIT NEW LAYOUT	EZ	GE	CP
P2	19.02.19	SITE AREA INCREASED-LAYOUT AMENDED	PH	GE	CP
P1	22.11.17	PRELIMINARY ISSUE	GE	PH	CP
Rev	Date	Revision Details	By	Chkd	App



Client MORLET PROPERTIES

Project 40 - 68 SILVER STREET

Title	INDICATIVE DRAINAGE LAYOUT
-------	----------------------------

Drawing No. WL 1227 100

P3

Scale	1:100 @ A1	Date	17.02.2020
Drawn	EZ	Chk	GE
		App	CP

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