



COLE EASDON
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Technical Note - 7792/01

Project Title:	Proposed Redevelopment, Southgate Farm, Cuckfield Lane, Warninglid, West Sussex				
Client:	Mr Matthew Allen				
Project No.:	7792	Date:	February 2021	Issue No.:	2
Title:	Drainage Statement Technical Note				
Written By:	L. Smith BSc	Checked By:	N. Parajuli MEng	Authorised By:	R. Bowley BSc CEng MCIWEM

1.0 Background

- 1.1 This *Drainage Statement* has been prepared on behalf of Mr M Allen in relation to Mid Sussex District Council's request for a Foul and Surface Water assessment for the proposed redevelopment at Southgate Farm, Cuckfield Lane, Warninglid. This study will advise on appropriate surface water and foul drainage disposal means for the development site in line with the national guidance, namely *National Planning Policy Framework (NPPF)* and its accompanying *Planning Practice Guidance (PPG)* and to the Environment Agency (EA) and Lead Local Flood Authority (LLFA), i.e. West Sussex County Council's, requirements.
- 1.2 The application site occupies approximately 1,275m² (c. 0.13ha) of land currently comprising 2 no. existing agricultural buildings and hardstanding area. Refer to Drawing number 162/2020/1 [*Site and Location Plans*] prepared by WPS Planning enclosed with this report.
- 1.3 The proposal comprises the conversion of an existing stable building to a residential dwelling with associated landscaping, and the demolition of a second smaller agricultural building. Access to the site will be via the unnamed track off Cuckfield Lane as existing. Refer to Drawing No. 162/2020/1 [*Site and Location Plans*] prepared by WPS Planning enclosed with this report.

2.0 Drainage Proposals

- 2.1 The drainage proposals for the site have been guided by the following national and local guidance:
- *Building Regulations 2010 - Approved Document H (Drainage and Waste Disposal)*; and *C753 The SuDS Manual (CIRIA, November 2015)*;
 - *Environment Agency Climate Change Allowances 2016*;

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- *National Planning Policy Framework (Department for Communities and Local Government, February 2019);*
- *Non-Statutory Technical Standards for SuDS (March 2015);*
- *Planning Practice Guidance (Department for Communities & Local Government, March 2014); and*
- Policy DP41 of the Mid Sussex District Plan 2014-2031.

Surface Water Drainage Proposal

- 2.2 The site as existing is entirely hard paved, comprising 230m² hard area in the form of building roofs, with the remaining 1,045m² in the form of access and hardstanding area. Runoff from the existing site drains into a ditch line to the south of the site via an existing manhole and drain located in the neighbouring field to the site which is under the applicant's ownership.
- 2.3 The development proposal will comprise a total of 1,035m² (0.10ha) hard area (including the access to be retained as it is), which is therefore a 240m² reduction in hard area compared to the existing site. Surface water runoff will be managed within the site to ensure no increase in runoff or flood risk, as discussed below.
- 2.4 The EA's flood map indicates the site lies within Flood Zone 1 (low risk) with less than a 1 in 1000 (0.1%) annual probability of fluvial or tidal flooding in any year. The site is not at risk of surface water flooding. Refer to CEC Plan 7792/500/Figure 2 [*Flood Map*] and EA Surface Water Flood Map enclosed with this report.
- 2.5 The *NPPF* and *PPG* classify the proposed site usage '*Residential*' as '*More Vulnerable*' development. '*More Vulnerable*' development is considered suitable in Flood Zone 1.
- 2.6 Drainage proposals for the site will be developed in line with the national and local guidance, SuDS (Sustainable Drainage Systems) principles and building regulations guidelines. Opportunity for surface water runoff disposal via infiltration will therefore be investigated before seeking to discharge into any alternative watercourses or sewers following the drainage hierarchy from CIRIA The SuDS Manual.
- 2.7 Based on the BGS records, the area is on the boundary between underlying Upper Tunbridge Wells Sand - Sandstone and Siltstone, and Upper Tunbridge Wells Sand - Mudstone, with no superficial head deposits. Refer to BGS Data enclosed with this report. The site owner has however confirmed the site is locally underlain by impermeable mudstone. As such, infiltration will not be feasible onsite.

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- 2.8 Following the drainage hierarchy, the next drainage option would be discharge to surface waters. An existing ditch line is located approximately 45m south of the site, with an existing outfall from the field adjoining the site. As such, it is proposed that surface water from the 165m² roof area discharges into the existing ditch line at a restricted rate via the existing drain outfall. Surface water from the gravel driveway will be self draining, with the access track draining as existing.
- 2.9 Discharge will be restricted to a rate of equivalent 100yr greenfield runoff of 2.1l/s using a hydrobrake flow control and attenuation tank. The proposal offers reduction in discharge rate from the currently brownfield site, in accordance with Local Plan Policy DP41. The infiltration system (or devices) will be designed for the 1:100 year event plus 40% to allow for climate change in line with the NPPF/EA requirements. Therefore, an attenuation tank with 4m³ volume will be required. Refer to CEC Plan 7792/501(A) [*Drainage Strategy*] and calculations enclosed with this report.

Design Exceedance

- 2.10 Should the drainage system and SuDS fail under extreme events or blockages, floodwaters should be contained within the garden area. The potential flood flow routes towards the existing ditch line are indicated within CEC Plan 7792/501(A) [*Drainage Strategy*] enclosed with this Report.

Water Quality

- 2.11 Runoff from the roof area is relatively uncontaminated and does not pose a significant pollution risk given the small residential nature of the development. Runoff will enter a catchpit before entering SuDS devices. SuDS devices such as attenuation tanks with appropriate pre-treatment devices (catchpit) offer water quality improvement opportunities via silt separation and pollutant trapping.
- 2.12 Consequently, the development will not increase surface water runoff or associated flood risk in the locality, and will not adversely affect water quality of the receiving ditch line.

Adoption/Maintenance

- 2.13 Onsite drainage and SuDS components will remain private and be the maintenance responsibility of the property owner.
- 2.14 Regular inspection and maintenance is important for the effective operation of SuDS systems as designed. The regular maintenance of SuDS should be carried out in line with the C753 *The SUDS*

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Manual (CIRIA, November 2015) or as per manufacturer's specification, and is outlined in Tables 2.1 and 2.2 below.

Cellular Attenuation Storage

- 2.15 A suitable maintenance regime for the system will comprise of routine inspection and silt removal (as necessary). A suitable maintenance regime is as follows.

Table 2.1: Maintenance Schedule for Cellular Attenuation Storage

Schedule	Maintenance Requirement	Frequency
Regular	Inspect and identify any areas that are not operating correctly	Monthly for 3 months then annually
	Remove debris from the catchment surface	Monthly
	Remove sediment from pre-treatment structures and internal forebays	Annually or as required
Remedial	Repair and rehabilitate inlets, outlets, overflows and vents	As required
Monitoring	Inspect inlets, outlets, overflows and vents to ensure they are operating as designed	Annually
	Survey inside of tank for sediment build-up and remove as necessary	Every 5 years or as required

Pipework, Catchpits and Hydrobrake Flow Control

- 2.16 It is not envisaged that silt build up within the pipework systems will require a rigorous maintenance regime. Notwithstanding this, a suitable maintenance regime for the systems will comprise of routine inspection (every six months) and silt removal (as necessary).

Table 2.2: Maintenance Schedule for Pipework and Catchpits

Schedule	Maintenance Requirement	Frequency
Regular	- Inspect for accumulation of silt - Inspect for debris and litter - Inspect inlets and outlets for blockages	Every six months
Occasional	- Remove debris and litter - Remove silt	As required

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Foul Drainage Proposal

- 2.17 As existing, the site discharges into a package sewage treatment plant with treated effluent outfalling into the existing ditch line to the south of the site. Accordingly, it is proposed that foul flows from the development discharge into the existing sewage treatment plant with treated effluent outfalling into the ditch as existing. Refer to CEC Plan 7792/501(A) [*Drainage Strategy*] enclosed.

Adoption/Maintenance

- 2.18 The STP and foul drainage components will remain private and be the maintenance responsibility of the property owner.

Cole Easdon Consultants Limited
February 2021

Enclosures

CEC Figure 7792/500/Figure2 Flood Map
CEC Plan 7792/501(A) Drainage Strategy
Drawing No. 162/2020/1 Site and Location Plans (by WPS Planning)
BGS and EA Maps
Calculations

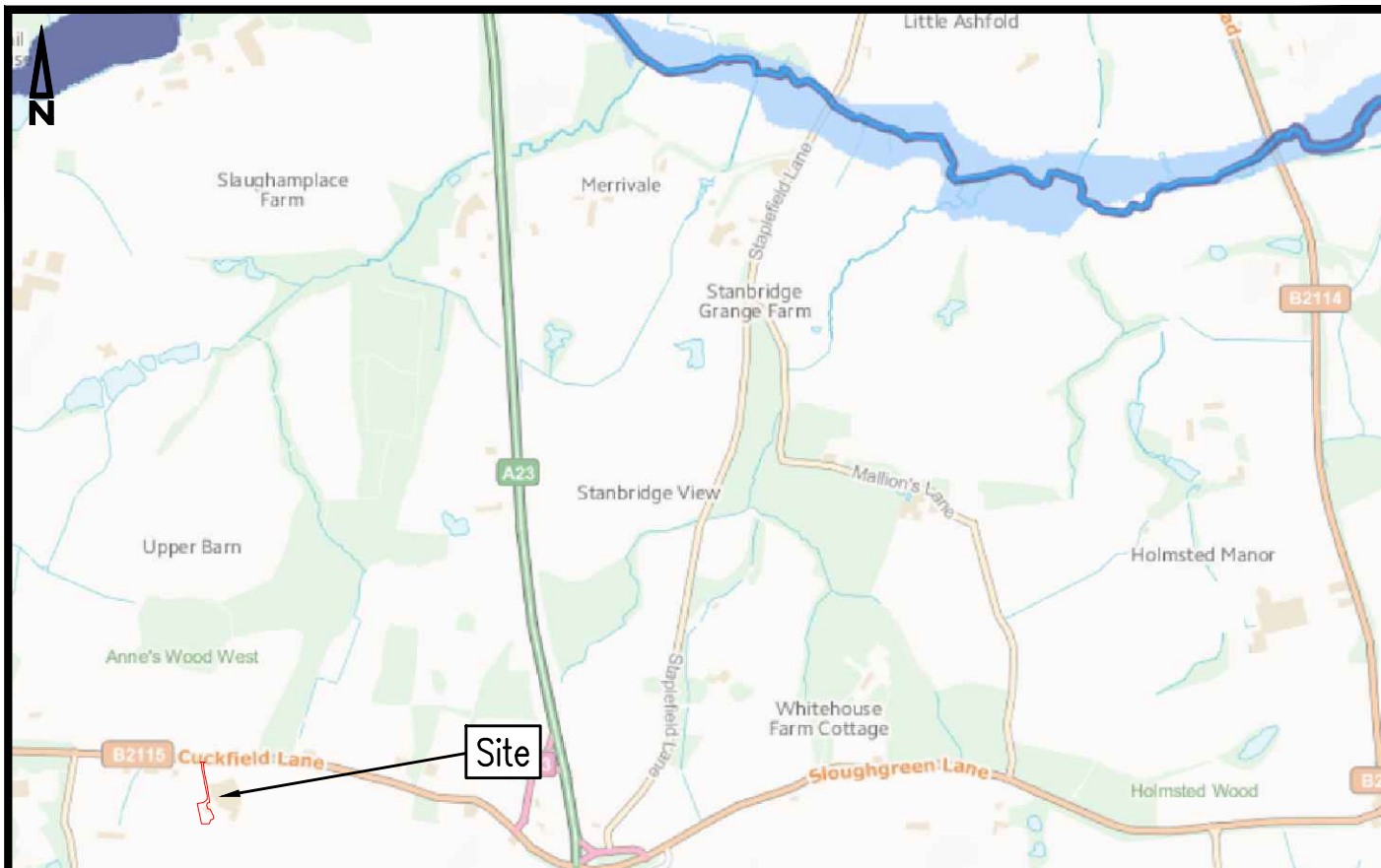
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Enclosures



Flood Zone 1
– Low Risk



Flood Zone 2
– Medium Risk



Flood Zone 3
– High Risk



Main Rivers

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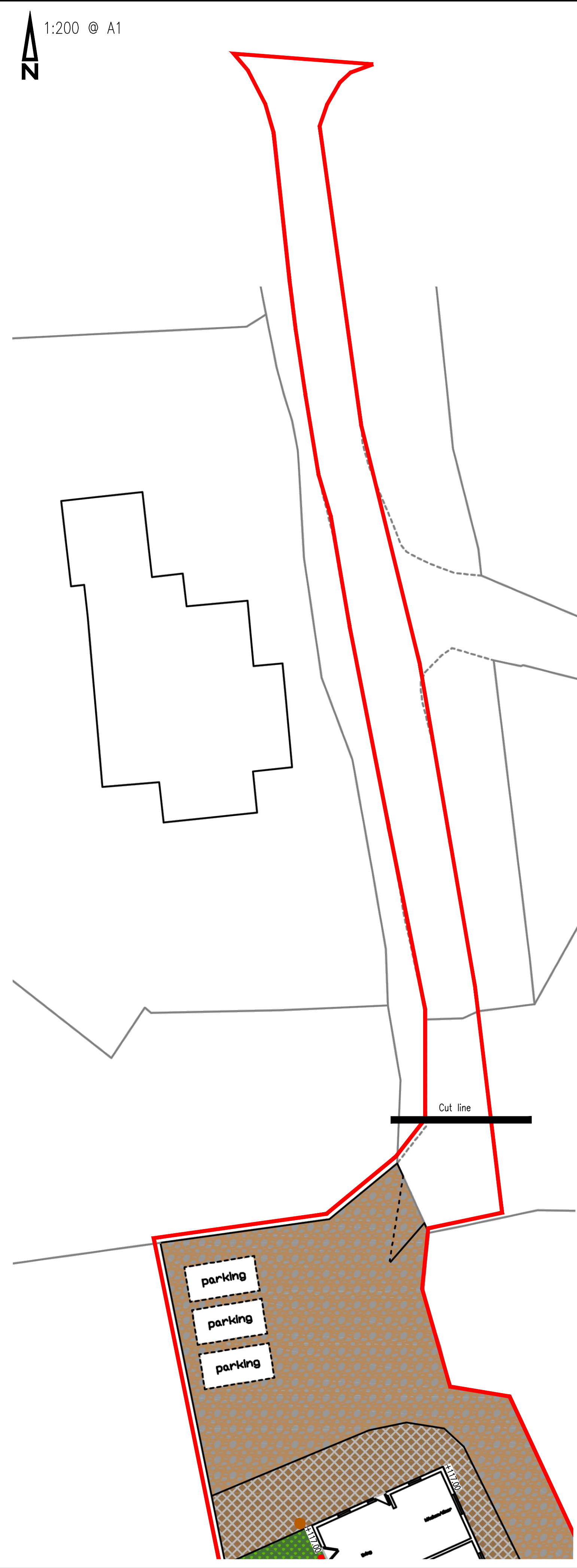
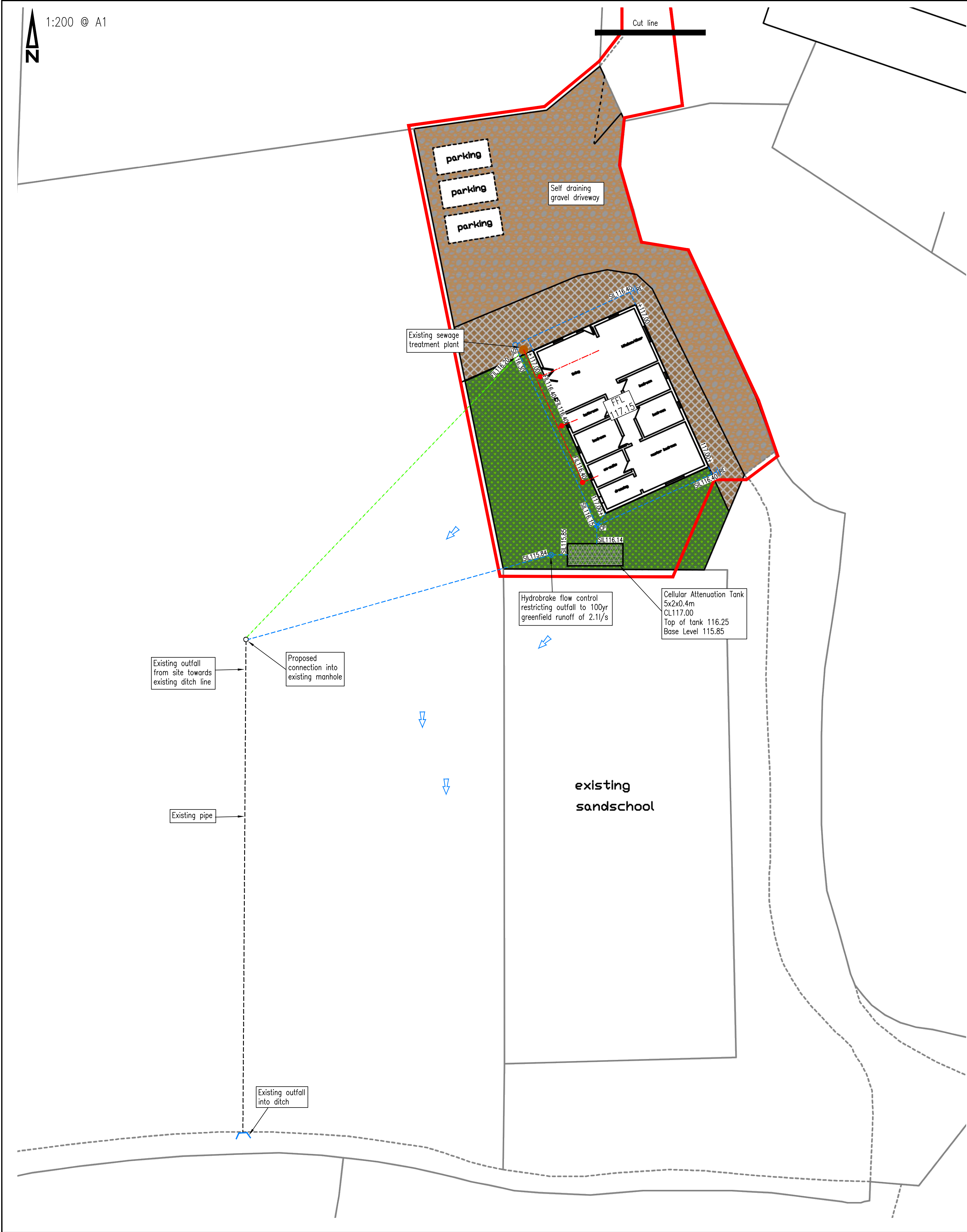
Job Title:

Southgate Farm
Cuckfield Lane
Warninglid
RH17 5UE

Drawing Title:

Flood Map

No.	By	Date	Revision Details		
Client: Mr M Allen			Drawing Status:		
			CONSTRUCTION AT CLIENT AND/OR CONTRACTOR RISK	FOR COMMENT	
				FOR PLANNING	
				FOR TENDER	
				FOR APPROVAL	
				FOR CONSTRUCTION	
		AS BUILT			
Drawn By		Date Drawn	Scale		
LS		January 2021	Not to Scale		
Checked By		Drawing No.	Revision		
NP		7792/500/Figure2	-		



REFERENCE DRAWINGS:

Drawing No.	Drawing Title	Revision	Date	Company
162/2020/1	Site and Location Plans	-		WPS Planning

KEY

- Site Boundary
- Proposed Private Surface Water Drain, Manhole and Invert Level
- Proposed Private Foul Water Drain, Manhole and Invert Level
- Proposed Rodding Eye
- Proposed Catchpit
- Proposed Hydrobrake Flow Control
- Proposed Private Cellular Attenuation Tank
- Exceedance Flow Route
- Proposed Finished Floor Level
- Proposed External Level
- Existing Package Sewage Treatment Plant
- Existing Treated Effluent Outfall
- Existing Private Drain and Manhole

Notes:

- Surface water from the roof area to discharge into existing manhole and drain in the neighbouring field, under the applicant's ownership, which outfall to an existing ditch line to the south of the site. Discharge into the existing drain will be at a restricted rate using a hydrobrake flow control and attenuation tank. The hydrobrake will restrict outfall to 100yr greenfield runoff of 2.1l/s.
- Drainage designed for the 100yr + 40% event.
- The gravel driveway will be self draining as existing.
- Foul water to discharge into the existing package sewage treatment plant onsite, with treated effluent outfalling into the ditch line to the south of the site as existing.
- Drainage subject to detailed design.

A | LS | 08.02.21 | STP location amended

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Client
Mr M Allen

Job Title
Southgate Farm
Cuckfield Lane
Warninglid

Drawing Title
Drainage Strategy

Drawing Status:

FOR COMMENT	FOR PLANNING	FOR TENDER	FOR APPROVAL	FOR CONSTRUCTION	AS BUILT

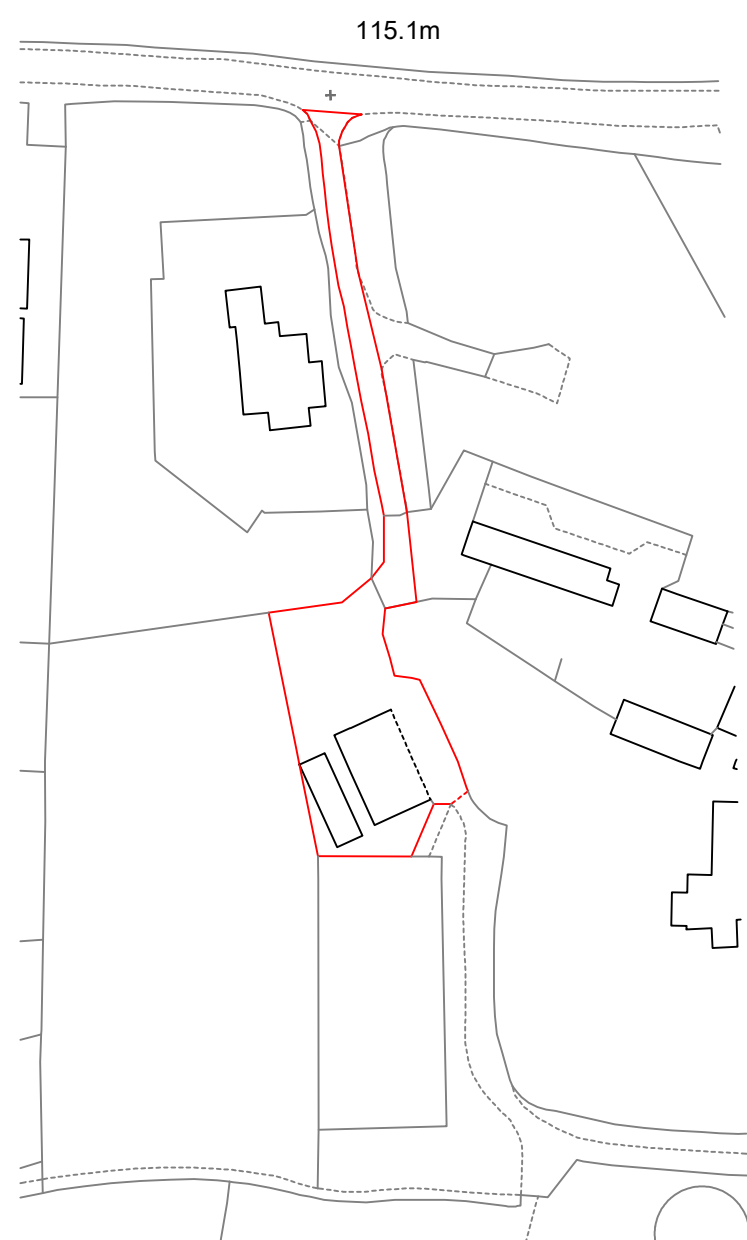
CONSTRUCTION AT CLIENT / CONTRACTOR RISK

Designed by: LS
Date: January 2021

Drawn by: LS
Scale: As Shown @ A1

Checked by: NP

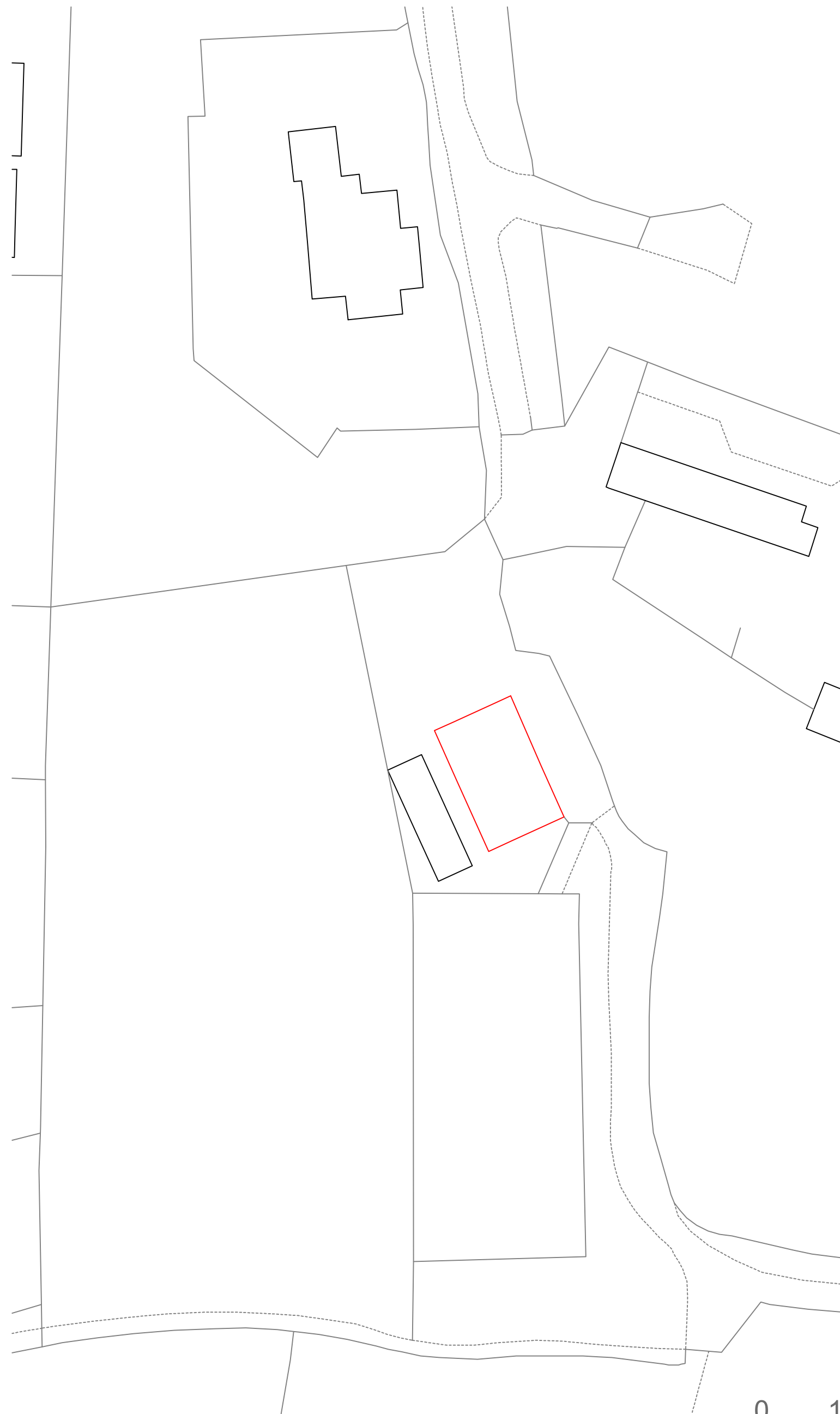
Dwg. No.: 7792/501
Rev.: A



0 10 20
metres



location plan



existing site plan

0 10 20
metres



proposed site plan



Surface Geology

3D Models

Borehole Scans

Earthquake Timeline

Surface Geology

- ☐ Superficial only
- ☒ Bedrock only
- ☐ Bedrock and Superficial

Visible geology:
1:50 000 scale

Geology Key

[More on digital geology](#)

↑

←

→

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+

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Go to Location

Switch Basemap

100% 0%

Geology Transparency

Grid Ref: 521074, 127806

Bedrock geology

1:50 000 scale bedrock geology description:

Upper Tunbridge Wells Sand - Sandstone And Siltstone, Interbedded. Sedimentary Bedrock formed approximately 134 to 139 million years ago in the Cretaceous Period. Local environment previously dominated by swamps, estuaries and deltas.

Setting: swamps, estuaries and deltas. These sedimentary rocks are fluvial, palustrine and shallow-marine in origin. They are detrital, forming deposits reflecting the channels, floodplains and deltas of a river in a coastal setting (with periodic inundation from the sea).

[Further details](#)

[What is Bedrock Geology?](#)

[To purchase detailed geological reports for this area, try our GeoReports service](#)

0 0.3 0.6km

Surface
Geology

3D
Models

Borehole
Scans

Earthquake
Timeline

Surface Geology

- ☐ Superficial only
- ☒ Bedrock only
- ☐ Bedrock and Superficial

Visible geology:
1:50 000 scale

Geology
Key

[More on digital geology](#)

Go to
Location

Switch
Basemap

100% 0%

Geology Transparency

Grid Ref: 521075, 127764

Bedrock geology

1:50 000 scale bedrock geology description:

Upper Tunbridge Wells Sand - Mudstone. Sedimentary Bedrock formed approximately 134 to 139 million years ago in the Cretaceous Period. Local environment previously dominated by swamps, estuaries and deltas.

Setting: swamps, estuaries and deltas. These sedimentary rocks are fluvial, palustrine and shallow-marine in origin. They are detrital, forming deposits reflecting the channels, floodplains and deltas of a river in a coastal setting (with periodic inundation from the sea).

[Further details](#)

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0 0.3 0.6km



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160 Aztec, Aztec West Almondsbury Bristol, BS32 4TU	Cuckfield Lane Warninglid Greenfield Runoff	
Date 01/02/2021	Designed by LS	
File	Checked by	
Innovyze		Source Control 2018.1.1

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 800 Urban 0.000
Area (ha) 0.128 Soil 0.450 Region Number Region 7

Results 1/s

QBAR Rural 0.7
QBAR Urban 0.7

Q100 years 2.1

Q1 year 0.6
Q30 years 1.5
Q100 years 2.1

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160 Aztec, Aztec West Almondsbury Bristol, BS32 4TU	Cuckfield Lane Warninglid Attenuation Tank	
Date 01/02/2021	Designed by LS	
File 7792 - Attenuation Tank....	Checked by	
Innovyze	Source Control 2018.1.1	

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

Half Drain Time : 16 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	116.154	0.304	0.0	2.1	2.1	2.9	O K
30 min Summer	116.198	0.348	0.0	2.1	2.1	3.3	O K
60 min Summer	116.195	0.345	0.0	2.1	2.1	3.3	O K
120 min Summer	116.127	0.277	0.0	2.1	2.1	2.6	O K
180 min Summer	116.049	0.199	0.0	2.1	2.1	1.9	O K
240 min Summer	115.991	0.141	0.0	2.1	2.1	1.3	O K
360 min Summer	115.940	0.090	0.0	2.0	2.0	0.9	O K
480 min Summer	115.925	0.075	0.0	1.7	1.7	0.7	O K
600 min Summer	115.916	0.066	0.0	1.4	1.4	0.6	O K
720 min Summer	115.910	0.060	0.0	1.3	1.3	0.6	O K
960 min Summer	115.902	0.052	0.0	1.0	1.0	0.5	O K
1440 min Summer	115.893	0.043	0.0	0.7	0.7	0.4	O K
2160 min Summer	115.886	0.036	0.0	0.5	0.5	0.3	O K
2880 min Summer	115.882	0.032	0.0	0.4	0.4	0.3	O K
4320 min Summer	115.877	0.027	0.0	0.3	0.3	0.3	O K
5760 min Summer	115.874	0.024	0.0	0.3	0.3	0.2	O K
7200 min Summer	115.872	0.022	0.0	0.2	0.2	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	130.251	0.0	4.1	15
30 min Summer	88.014	0.0	5.6	24
60 min Summer	56.713	0.0	7.2	42
120 min Summer	35.203	0.0	9.0	74
180 min Summer	26.188	0.0	10.0	104
240 min Summer	21.099	0.0	10.8	132
360 min Summer	15.575	0.0	11.9	186
480 min Summer	12.535	0.0	12.8	246
600 min Summer	10.582	0.0	13.5	306
720 min Summer	9.209	0.0	14.1	368
960 min Summer	7.388	0.0	15.1	488
1440 min Summer	5.405	0.0	16.5	734
2160 min Summer	3.945	0.0	18.1	1100
2880 min Summer	3.151	0.0	19.3	1428
4320 min Summer	2.291	0.0	21.0	2176
5760 min Summer	1.826	0.0	22.4	2888
7200 min Summer	1.533	0.0	23.5	3576

[illegible]

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160 Aztec, Aztec West Almondsbury Bristol, BS32 4TU	Cuckfield Lane Warninglid Attenuation Tank	
Date 01/02/2021	Designed by LS	
File 7792 - Attenuation Tank....	Checked by	
Innovyze		Source Control 2018.1.1

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.338	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.017

Time (mins)	Area
From:	To: (ha)
0	4 0.017

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160 Aztec, Aztec West Almondsbury Bristol, BS32 4TU	Cuckfield Lane Warninglid Attenuation Tank	
Date 01/02/2021	Designed by LS	
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Innovyze		Source Control 2018.1.1

Model Details

Storage is Online Cover Level (m) 117.000

Cellular Storage Structure

Invert Level (m) 115.850 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	10.0	10.0	0.400	10.0	15.1

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0077-2100-0400-2100
Design Head (m) 0.400
Design Flow (l/s) 2.1
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 77
Invert Level (m) 115.850
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	2.1	Kick-Flo®	0.287	1.8
Flush-Flo™	0.126	2.1	Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.1	1.200	3.5	3.000	5.3	7.000	8.0
0.200	2.0	1.400	3.7	3.500	5.7	7.500	8.3
0.300	1.8	1.600	4.0	4.000	6.1	8.000	8.6
0.400	2.1	1.800	4.2	4.500	6.4	8.500	8.9
0.500	2.3	2.000	4.4	5.000	6.8	9.000	9.1
0.600	2.5	2.200	4.6	5.500	7.1	9.500	9.4
0.800	2.9	2.400	4.8	6.000	7.4		
1.000	3.2	2.600	5.0	6.500	7.7		

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