SURFACE WATER AND FOUL WATER

DRAINAGE STRATEGY

for

Mr J & Mrs K BAILEY

WHARF FARM

GREEN LANE, CHIPPING, PR3 2QE

JULY 2021

REFORD

Consulting Engineers Limited

7 Hall Road, Fulwood, Preston, PR2 9QD

Mobile: 07970 265334 Email: r.e.ford@virginmedia.com

Company number: 09620365 VAT Reg. 215 5638 12

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1. INTRODUCTION

1.1 This surface water and foul water drainage strategy has been produced on behalf of Mr J & Mrs K Bailey in support of a planning application for the modernization of agricultural buildings, replacing existing housing with a complete dairy unit at Wharf Farm, Green Lane, Chipping, PR3 2QE. A location plan is included within Appendix A.

1.2 This drainage strategy describes the existing site conditions and proposed development. It assesses the potential impact of proposals on existing drainage and includes a proposed strategy for the provision of new drainage to serve the proposed development.

2. BASE INFORMATION

Existing site

2.1 The site is located within the farm yard of the existing Wharf Farm, that comprises a total 61.5 hectares, and lies on the eastern boundary of the village of Chipping, Lancashire.

2.2 Access to the farm yard is from Green Lane.

2.3 Part of the site contains an existing cow accommodation buidling that is to be removed as the proposed building is to be sited over the existing footprint.

2.4 The site is generally level.

Understanding of existing drainage local to the site

2.5 The Chipping Brook flows through the centre of Chipping village and lies approx. 100m to the southwest of the site.

2.6 A culverted watercourse lies immediately alongside the western boundary of the farm yard. The watercourse is in open ditch to the north of the farmyard and is maintained within culvert to the south of the farmyard to discharge into Chipping Brook.

2.7 A surface water drain runs along Green Lane to the east and discharges into the existing dyke system and the Townley Brook. Surface water runoff from the farmyard discharges into the drain.

2.8 United Utilities sewer mapping identifies the head of a 150mm diameter combined sewer lying within the junction of Green Lane, Talbot Road and a country lane. The sewer flows to the west along Talbot Road. The sewer records are included within Appendix B.

2.9 Dirty water from the existing buildings is drained into an existing covered slurry store building that is emptied on a regular basis.

Proposed development

2.10 The proposed building is a conventional layout for a complete dairy unit housing a nominal 70no. dairy cows. The building layout is shown on the drawings accompanying the planning application.

2.11 Dirty water from the proposed building will be collected and stored within the existing site facilities.

2.12 Access will be maintained through the existing farmyard from Green Lane.

Site geology

2.13 The online Soilscapes Viewer has identified that the geology that may be encountered as slowly permeable seasonally wet acid loamy and clayey soils with impeded drainage.

2.14 As such, based upon the ground conditions identified, infiltration is unlikely to provide a viable drainage solution for surface water runoff generated by the site.

3. PROPOSED DRAINAGE STRATEGY

Surface water drainage

3.1 In accordance with the National Standards for Sustainable Drainage, the drainage strategy should incorporate the use of Sustainable Drainage (SUDS) where possible. The approach promotes the use infiltration features in the first instance. If drainage cannot be achieved solely through infiltration due to site conditions or contamination risks, the preferred options are (in order of preference):

(i) a controlled discharge to a local waterbody or watercourse, or

(ii) a controlled discharge into the public sewer network (depending on availability and capacity).

3.2 The rates and volume of discharge should be restricted to the pre-development values as far as practicable.

3.3 The nature of the geology of the site means that infiltration is unlikely to provide a viable drainage solution for surface water runoff generated by the site.

3.4 A surface water drain runs along Green Lane to the east and discharges into the existing dyke system and the Townley Brook. Surface water runoff from the farmyard discharges into the drain.

3.5 The area of the proposed building roofs from which surface water runoff is to be collected has been measured as 1600m^2.

3.6 To determine the restricted surface water discharge rates from the developed site, the pre-development Greenfield runoff rates have been calculated as follows using the 'Causeway Flow' programme. The calculations are based upon the developed area of the site of 0.16ha and are included within Appendix C.

- Qbar 2.3 l/s
- Q1 2.0 l/s
- Q30 3.9 l/s
- Q100 4.7 l/s

3.7 Due to the size of the site, it is intended that surface water runoff will be attenuated to 5 l/s allowing surface water runoff generated by all rainfall events up to the 100 year critical rain storm plus 40% on stored volumes, and discharge into the surface water drain that runs along Green Lane and the Townley Brook. The additional 40% is to allow for climate change and has been included in the surface water volume.

3.8 A surface water drainage design has been carried out for the proposed development for all rainfall events up to the 100 year critical rain storm plus 40% included for climate change on stored volumes. Attenuation will be provided using underground storage within the adjacent field to the east that lies within the applicant ownership.

3.9 Any exceedance flows will run off the site to the southeast and the local dyke system.

3.10 The surface water drainage design is included within Appendix C.

Foul Water Drainage

3.11 There is no foul water associated with the application.

Dirty water

3.12 Dirty water from the proposed building will be collected and stored within the existing site facilities.

4. MANAGEMENT AND MAINTENANCE RESPONSIBILITIES AND SPECIFICATION

4.1 The maintenance responsibilities for the various drainage features of the scheme will lie with the building owner.

4.2 The table below lists the various drainage features utilised within the proposed drainage design, along with the maintenance regime that should be followed.

Regular maintenance	**Frequency**
Visually inspect gutters to ensure they are kept clear of leaves, debris etc. Lift covers of drainage to inspect chambers for debris and build-up of silts. Check drainage pipes are operating as expected.	Annually. No triggers other than maintenance to be taken on regular schedule.
Occasional tasks	**Frequency**
Remove leaves and debris from gutters. Remove debris from chambers to ensure outlets are kept clear of debris to ensure adequate drainage.	As required. Indicator of problem / trigger for maintenance when surcharging or flooding of drains occurs or gutters and chambers full of debris and leaves etc.
Remedial work	**Frequency**
Should drains be heavily blocked or damaged contact drainage maintenance company for unblocking / repair works.	As required. Indicator of problem / trigger for maintenance when drainage not functioning and unblocking pipes and chambers etc. not effective.

5. SUMMARY AND CONCLUSIONS

5.1 This surface water and foul water drainage strategy has been produced on behalf of Mr J & Mrs K Bailey in support of a planning application for the modernization of agricultural buildings, replacing existing housing with a complete dairy unit at Wharf Farm, Green Lane, Chipping, PR3 2QE.

5.2 The nature of the geology of the site means that infiltration is unlikely to provide a viable drainage solution for surface water runoff generated by the site.

5.3 It is intended that surface water runoff will be attenuated to 5 l/s allowing surface water runoff generated by all rainfall events up to the 100 year critical rain storm plus 40% on stored volumes and discharge into the surface water drain that runs along Green Lane and the Townley Brook.

5.4 There is no foul water associated with the application.

5.5 Dirty water from the proposed building will be collected and stored within the existing site facilities.

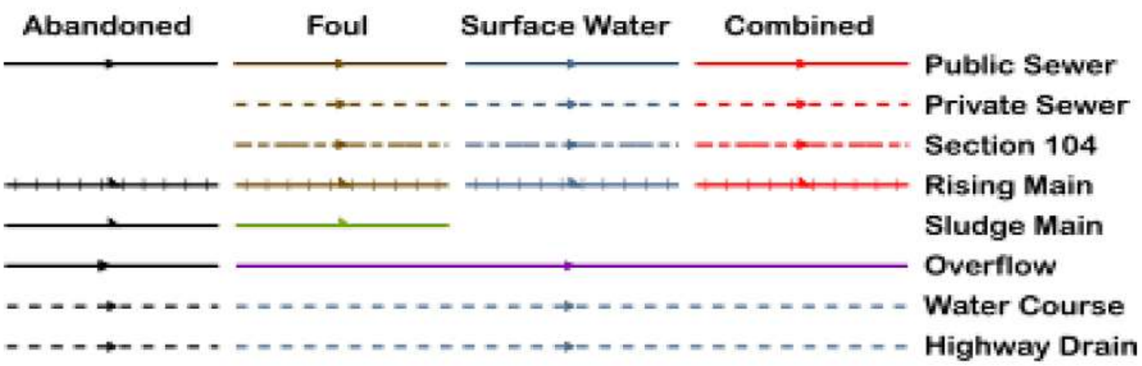
APPENDIX A

LOCATION PLAN

APPENDIX B

United Utilities
Water for the North West

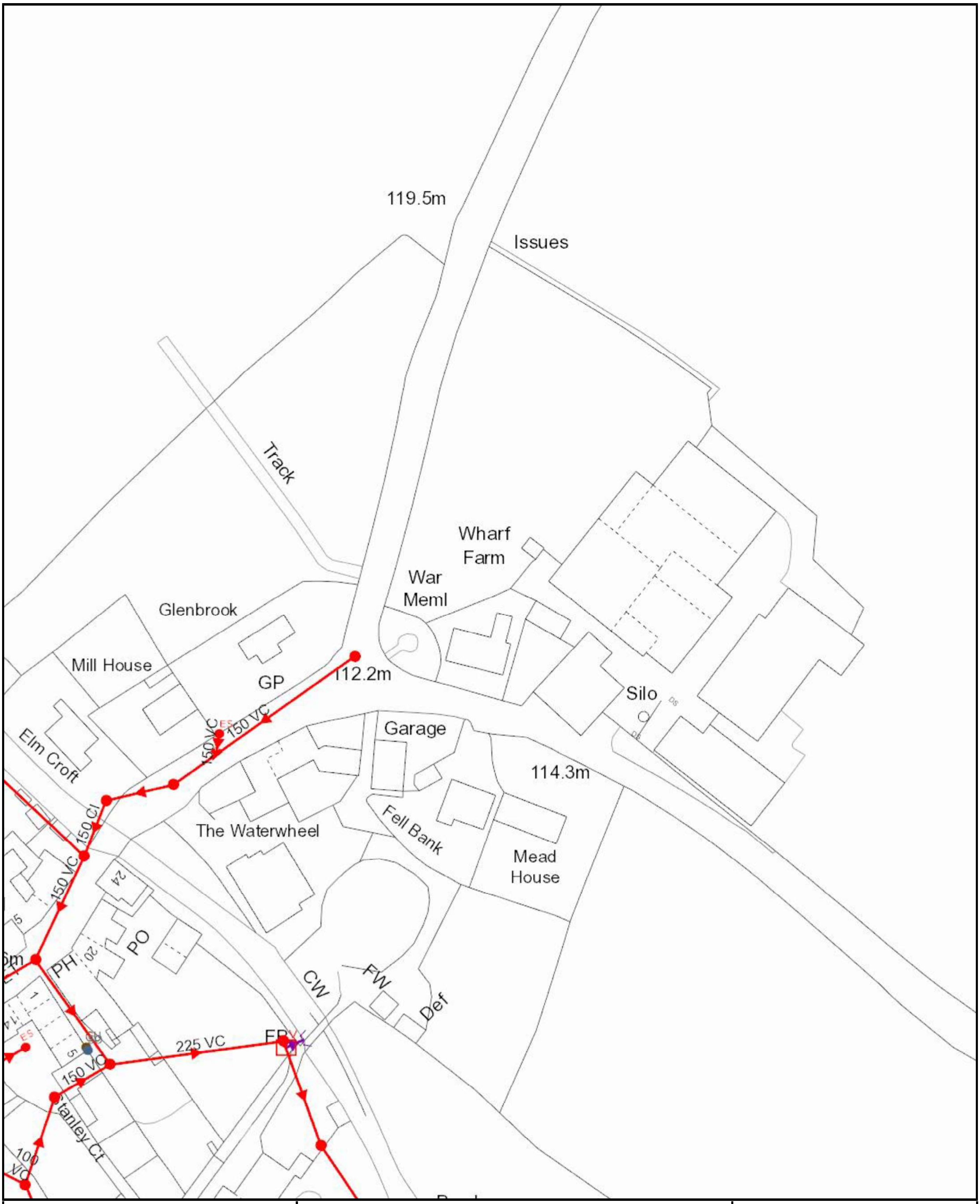
Wastewater Symbology



All point assets follow the standard colour convention: red – combined; brown - foul; blue – surface water; purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate

- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic



Scale:	1:1264	**SEWER RECORDS**	United Utilities Water for the North West
Date:	01/07/2021		

Address or Site Reference: wharf farm

Printed by: Property Searches

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

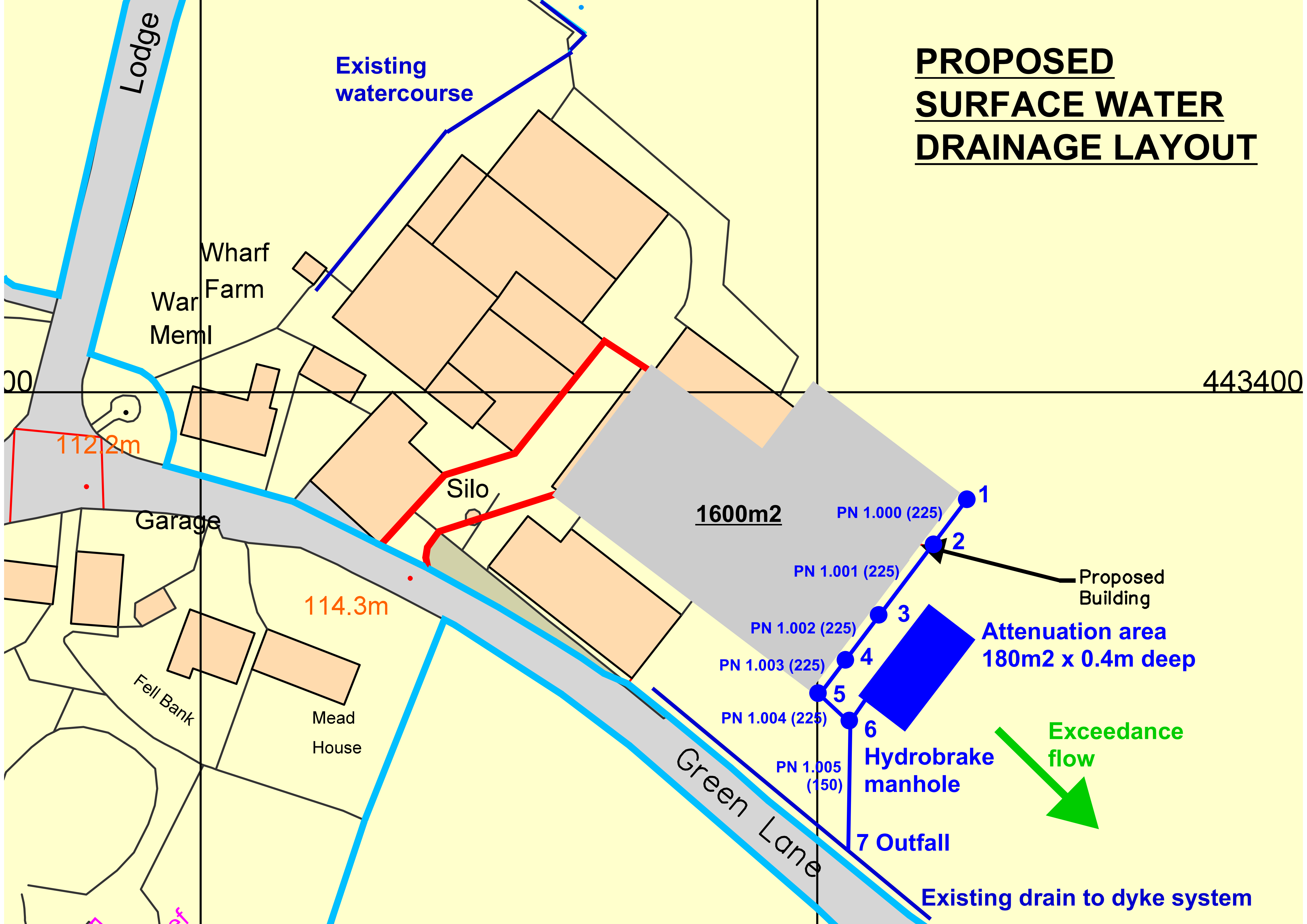
APPENDIX C

PRE-DEVELOPMENT RUNOFF RATES

Pre-development discharge

Site Makeup	Greenfield
Greenfield Method	IH124
Positively Drained Area (ha)	0.160
SAAR (mm)	1414
Soil Index	5
SPR	0.53
Region	10
Betterment (%)	0
	Calc
QBar (l/s)	2.3

Return Period (years)	Growth Factor	Q (l/s)
1	0.87	2.0
30	1.70	3.9
100	2.08	4.7


PROPOSED
SURFACE WATER
DRAINAGE LAYOUT
443400
Existing
watercourse
Lodge
Wharf
Farm
War
Meml
112.2m
Silo
Garage
1600m2
114.3m
Fell Bank
Mead
House
Green Lane
1
2
3
4
5
6
PN 1.000 (225)
PN 1.001 (225)
PN 1.002 (225)
PN 1.003 (225)
PN 1.004 (225)
PN 1.005
(150)
Proposed
Building
Attenuation area
180m2 x 0.4m deep
Hydrobrake
manhole
7 Outfall
Exceedance
flow
Existing drain to dyke system

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	75.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.100	Minimum Backdrop Height (m)	1.000
Ratio-R	0.250	Preferred Cover Depth (m)	0.450
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
1	0.013	5.00	111.500	1050	0.675
2	0.032	5.00	111.500	1050	0.728
3	0.057	5.00	111.500	1050	0.811
4	0.040	5.00	111.500	1050	0.864
5	0.018	5.00	111.500	1050	0.906
6			111.500	1200	0.942
7			111.000	600	0.675

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	9.000	0.600	110.825	110.772	0.053	169.8	225	5.15	52.1
1.001	2	3	14.000	0.600	110.772	110.689	0.083	168.7	225	5.38	51.3
1.002	3	4	9.000	0.600	110.689	110.636	0.053	169.8	225	5.53	50.8
1.003	4	5	7.000	0.600	110.636	110.594	0.042	166.7	225	5.65	50.4
1.004	5	6	6.000	0.600	110.594	110.558	0.036	166.7	225	5.75	50.1
1.005	6	7	20.000	0.600	110.558	110.325	0.233	85.8	150	6.05	49.1

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	1.000	39.8	1.8	0.450	0.503	0.013	0.0
1.001	1.004	39.9	6.3	0.503	0.586	0.045	0.0
1.002	1.000	39.8	14.0	0.586	0.639	0.102	0.0
1.003	1.010	40.1	19.4	0.639	0.681	0.142	0.0
1.004	1.010	40.1	21.7	0.681	0.717	0.160	0.0
1.005	1.085	19.2	21.3	0.792	0.525	0.160	0.0

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	9.000	169.8	225	Circular	111.500	110.825	0.450	111.500	110.772	0.503
1.001	14.000	168.7	225	Circular	111.500	110.772	0.503	111.500	110.689	0.586
1.002	9.000	169.8	225	Circular	111.500	110.689	0.586	111.500	110.636	0.639
1.003	7.000	166.7	225	Circular	111.500	110.636	0.639	111.500	110.594	0.681
1.004	6.000	166.7	225	Circular	111.500	110.594	0.681	111.500	110.558	0.717
1.005	20.000	85.8	150	Circular	111.500	110.558	0.792	111.000	110.325	0.525

Link
1.000
1.001
1.002
1.003
1.004
1.005

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	19.100	Drain Down Time (mins)	240
Ratio-R	0.250	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node 6 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	110.558	Product Number	CTL-SHE-0107-5000-0940-5000
Design Depth (m)	0.940	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node 6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	110.558
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	212

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	180.0	0.0	0.400	180.0	0.0	0.401	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	110.874	0.049	1.5	0.0617	0.0000	OK
15 minute summer	2	10	110.866	0.094	5.5	0.1646	0.0000	OK
15 minute winter	3	10	110.864	0.175	15.6	0.3969	0.0000	OK
15 minute winter	4	10	110.858	0.222	22.5	0.3985	0.0000	OK
15 minute winter	5	10	110.847	0.253	26.7	0.3189	0.0000	SURCHARGED
360 minute winter	6	240	110.666	0.107	4.1	18.4996	0.0000	OK
360 minute winter	7	240	110.360	0.035	2.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	2.0	0.274	0.049	0.0972	
15 minute summer	2	1.001	3	7.1	0.398	0.178	0.3350	
15 minute winter	3	1.002	4	18.2	0.627	0.457	0.3274	
15 minute winter	4	1.003	5	24.8	0.777	0.619	0.2780	
15 minute winter	5	1.004	6	28.7	1.751	0.714	0.1211	
360 minute winter	6	1.005	7	2.3	0.729	0.121	0.0635	30.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	111.029	0.204	5.6	0.2551	0.0000	OK
15 minute winter	2	10	111.027	0.255	13.7	0.4453	0.0000	SURCHARGED
15 minute winter	3	10	111.013	0.324	30.7	0.7358	0.0000	SURCHARGED
15 minute winter	4	9	110.980	0.344	43.2	0.6156	0.0000	SURCHARGED
15 minute winter	5	9	110.927	0.333	49.6	0.4202	0.0000	SURCHARGED
240 minute winter	6	168	110.768	0.210	11.3	36.0829	0.0000	SURCHARGED
240 minute winter	7	168	110.376	0.051	4.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	5.3	0.349	0.132	0.3493	
15 minute winter	2	1.001	3	16.6	0.532	0.415	0.5568	
15 minute winter	3	1.002	4	32.6	0.820	0.820	0.3579	
15 minute winter	4	1.003	5	44.8	1.128	1.117	0.2784	
15 minute winter	5	1.004	6	50.9	1.950	1.267	0.1413	
240 minute winter	6	1.005	7	4.7	0.889	0.247	0.1064	58.3

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	111.146	0.321	4.7	0.4018	0.0000	SURCHARGED
15 minute winter	2	10	111.143	0.371	16.8	0.6477	0.0000	SURCHARGED
15 minute winter	3	10	111.124	0.435	37.2	0.9885	0.0000	SURCHARGED
15 minute winter	4	9	111.056	0.420	52.6	0.7523	0.0000	SURCHARGED
15 minute winter	5	9	110.971	0.377	60.2	0.4761	0.0000	SURCHARGED
240 minute winter	6	176	110.840	0.282	14.5	48.6077	0.0000	SURCHARGED
240 minute winter	7	176	110.377	0.052	5.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	6.2	0.363	0.155	0.3579	
15 minute winter	2	1.001	3	18.4	0.541	0.461	0.5568	
15 minute winter	3	1.002	4	39.0	0.981	0.981	0.3579	
15 minute winter	4	1.003	5	54.1	1.359	1.346	0.2784	
15 minute winter	5	1.004	6	61.4	2.142	1.528	0.1657	
240 minute winter	6	1.005	7	5.0	0.900	0.259	0.1103	76.4

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	1	188	111.462	0.637	1.7	0.7968	0.0000	FLOOD RISK
240 minute winter	2	188	111.462	0.690	5.9	1.2039	0.0000	FLOOD RISK
240 minute winter	3	188	111.462	0.773	13.0	1.7558	0.0000	FLOOD RISK
240 minute winter	4	188	111.461	0.825	17.7	1.4790	0.0000	FLOOD RISK
240 minute winter	5	188	111.461	0.867	19.6	1.0944	0.0000	FLOOD RISK
240 minute winter	6	188	111.460	0.902	19.5	69.5053	0.0000	FLOOD RISK
720 minute summer	7	420	110.377	0.052	5.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	1	1.000	2	1.7	0.305	0.043	0.3579	
240 minute winter	2	1.001	3	5.7	0.444	0.142	0.5568	
240 minute winter	3	1.002	4	12.6	0.608	0.316	0.3579	
240 minute winter	4	1.003	5	17.3	0.653	0.432	0.2784	
240 minute winter	5	1.004	6	19.5	1.037	0.485	0.2386	
240 minute winter	6	1.005	7	5.0	0.902	0.261	0.1109	103.7