SURFACE WATER AND FOUL WATER

DRAINAGE STRATEGY

for

Mr J & Mrs K BAILEY

WHARF FARM

GREEN LANE, CHIPPING, PR3 2QE

OCTOBER 2021 – Revision A

REFORD

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CONTENTS

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. The Townley Brook discharges into the Chipping Brook approx. 1500m from the site.

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

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 discharged into the Chipping Brook that lies approx. 100m to the southwest of the site. The additional 40% is to allow for climate change and has been included in the surface water volume.

3.8 Access to the Chipping Brook is through the adjacent fields that lie to the south of the development site that lie within the applicant's ownership.

3.9 Attenuation will be provided by creating a pond within the adjacent field. The pond is to be able to accommodate a volume of $80m^3$ to cater for the 100 year plus 40% added for climate change event.

3.10 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. The surface water drainage design, layout and section are included within Appendix C.

3.11 Any exceedance flows will run off the site to the southwest and the Chipping Brook.

Foul Water Drainage

3.12 There is no foul water associated with the application.

Dirty water

3.13 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.

SURFACE WATER DRAINAGE	
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.
POND	
Regular maintenance	**Frequency**
Visually inspect pond to ensure it is kept reasonably clear of leaves and debris etc. at surface. Inspection of inlet and outlet structures.	Annually. No triggers other than maintenance to be taken on regular schedule.
Cutting of vegetation around the perimeter of the pond so that the pond doesn't become overgrown.	Frequency varies, vegetation will require cutting more often in summer / spring months than autumn / winter months. To be cut as required. No triggers other than maintenance to be taken on regular schedule.
Remedial work	**Frequency**
Maintenance of pond profile should scour or erosion or build-up of silt occur. Repair of inlets and outlets.	As required. Indicator of problem / trigger for maintenance when significant pond scour and erosion or build-up of silt has occurred.

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 to discharge into the Chipping 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.

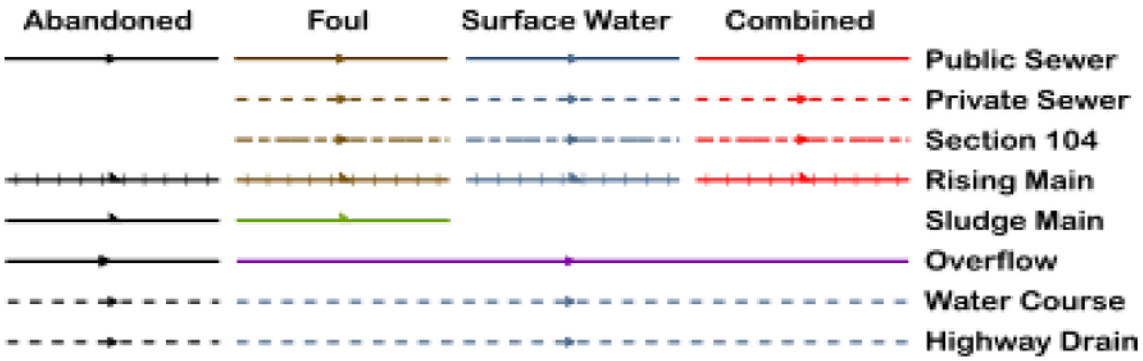
APPENDIX A

LOCATION PLAN

APPENDIX B

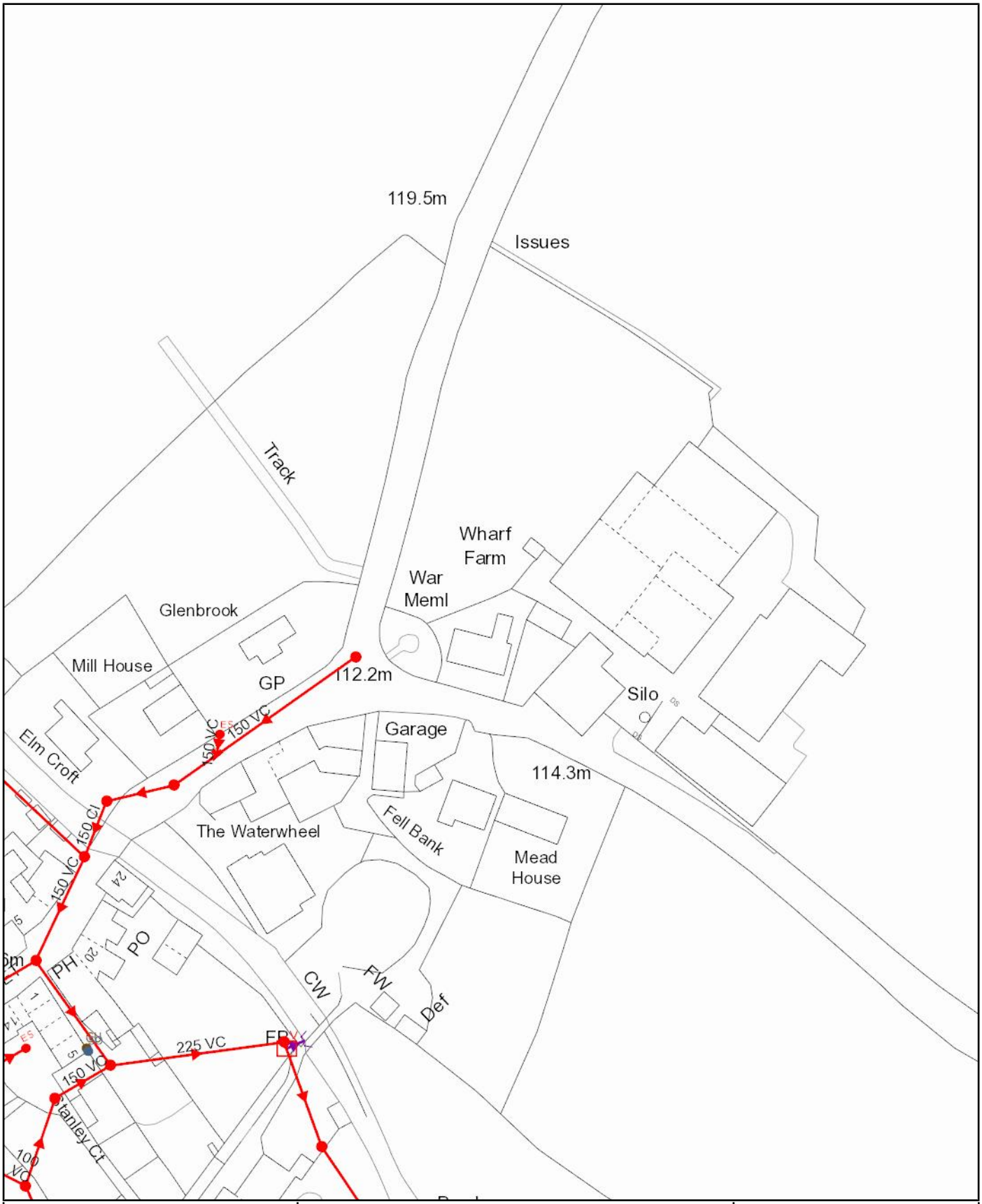
United Utilities
Water for the North West

Wastewater Symbology



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

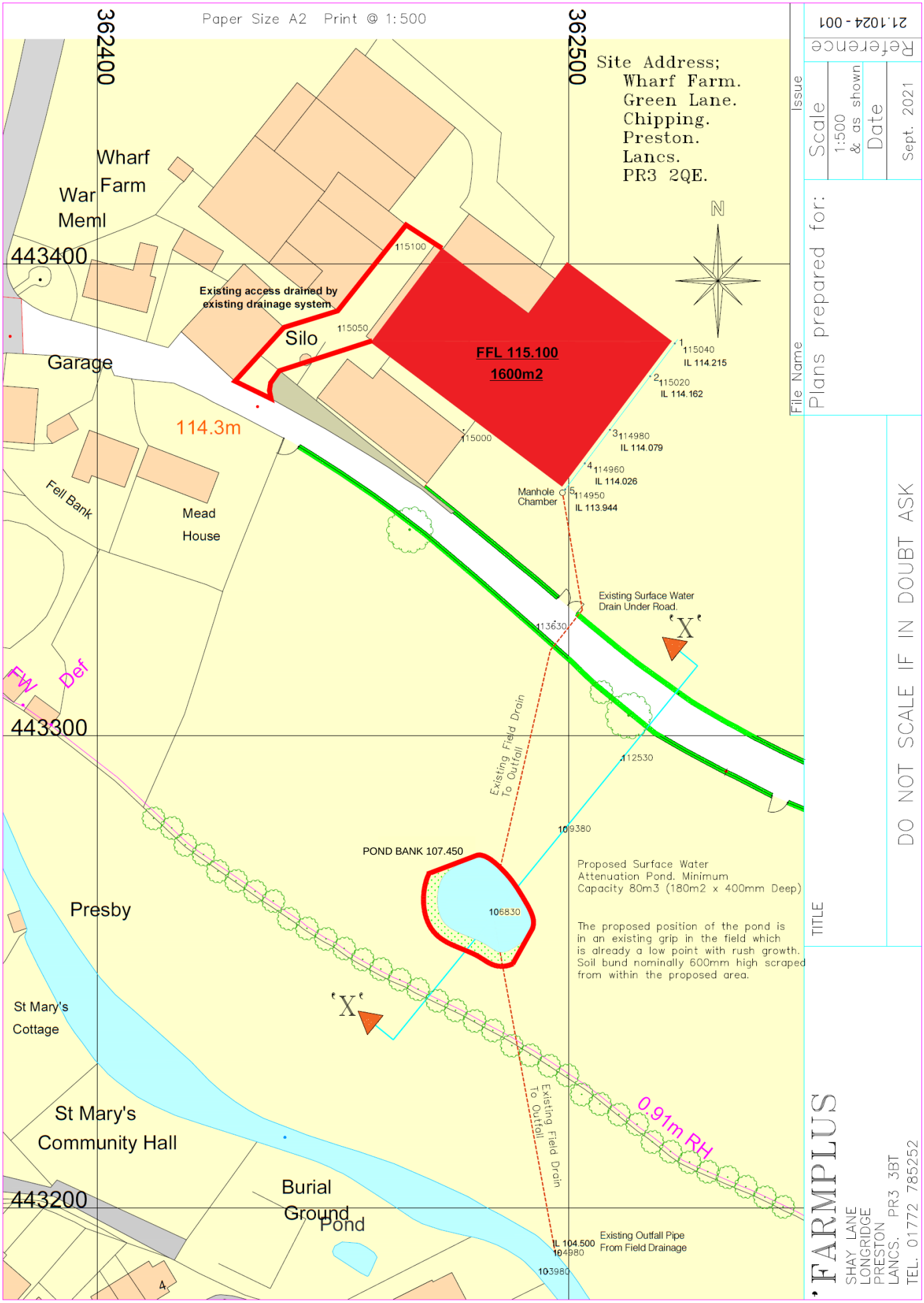
- Manhole
- HS Head of System
- ES Extent of Survey
- RE Rodding Eye
- IN Inlet
- DP Discharge Point
- HY Vortex
- PE Penstock
- WO Washout Chamber
- VA Valve
- AV Air Valve
- NRV Non Return Valve
- SO Soakaway
- GU Gully
- CA Cascade
- FM Flow Meter
- HA Hatch Box
- OI Oil Interceptor
- SM Summit
- DS Drop Shaft
- OP Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- CA Catchpit
- VC Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- V Sewer Overflow
- WwTW Ww Treatment Works
- Ww Pumping Station
- ST Septic Tank
- CK Control Kiosk
- Change of Characteristic

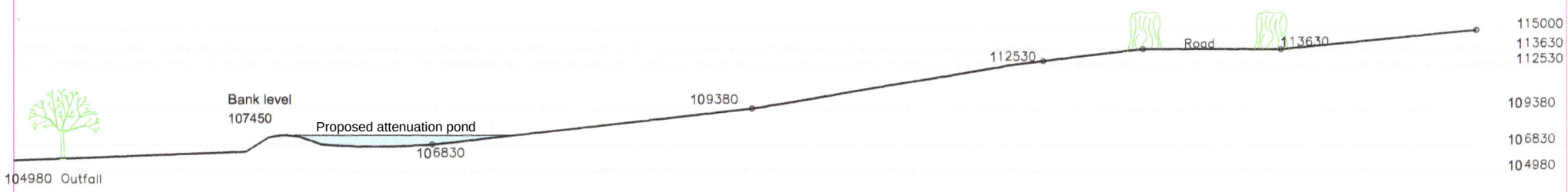


Scale:	1:1264	**SEWER RECORDS**	United Utilities Water for the North West
Date:	01/07/2021		
Address or Site Reference:	wharf farm		
Printed by:	Property Searches		

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


Paper Size A2 Print @ 1:500
362400
362500
Site Address;
Wharf Farm.
Green Lane.
Chipping.
Preston.
Lancs.
PR3 2QE.
Wharf Farm
War Meml
443400
Existing access drained by existing drainage system
Silo
Garage
FFL 115.100
1600m2
115100
115050
115040
IL 114.215
115020
IL 114.162
115000
114980
IL 114.079
114960
IL 114.026
114950
IL 113.944
Manhole Chamber
114.3m
Fell Bank
Mead House
Existing Surface Water Drain Under Road.
113630
FW
Def
443300
Existing Field Drain To Outfall
112530
109380
POND BANK 107.450
106830
Proposed Surface Water Attenuation Pond. Minimum Capacity 80m3 (180m2 x 400mm Deep)
The proposed position of the pond is in an existing grip in the field which is already a low point with rush growth. Soil bund nominally 600mm high scraped from within the proposed area.
Presby
St Mary's Cottage
St Mary's Community Hall
Existing Field Drain To Outfall
0.91m RH
443200
Burial Ground
Pond
IL 104.500
104980
Existing Outfall Pipe From Field Drainage
103980
N
Issue
File Name
Plans prepared for:
Scale
1:500 & as shown
Date
Sept. 2021
Reference
21.1024 - 001
TITLE
DO NOT SCALE IF IN DOUBT ASK
FARMPLUS
SHAY LANE
LONGRIDGE
PRESTON
LANCS. PR3 3BT
TEL. 01772 785252



Section 'X–X'

Site Address;
Wharf Farm.
Green Lane.
Chipping.
Preston.
Lancs.
PR3 2QE.

Paper Size A2 Print @ 1:200

File Name BaileyWharfFarmChippingPlanning2021 Issue

FARMPLUS
SHAY LANE
LONGRIDGE
PRESTON
LANCS. PR3 3BT
TEL. 01772 785252

TITLE

DO NOT SCALE IF IN DOUBT ASK

Plans prepared for:

Scale
1:200
& as shown

Date
Sept. 2021

Reference
21.1024-002

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

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)	0.600
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	115.040	1050	0.825
2	0.032	5.00	115.020	1050	0.858
3	0.057	5.00	114.980	1050	0.901
4	0.040	5.00	114.960	1050	0.934
5	0.018	5.00	114.950	1050	1.006
6			107.450	1200	0.600
7			104.500	600	0.750

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	114.215	114.162	0.053	169.8	225	5.15	52.1
1.001	2	3	14.000	0.600	114.162	114.079	0.083	168.7	225	5.38	51.3
1.002	3	4	9.000	0.600	114.079	114.026	0.053	169.8	225	5.53	50.8
1.003	4	5	7.000	0.600	114.026	113.944	0.082	85.4	225	5.61	50.5
1.004	5	6	75.000	0.600	113.944	106.850	7.094	10.6	225	5.92	49.5
1.005	6	7	40.000	0.600	106.850	103.750	3.100	12.9	150	6.16	48.8

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.000	39.8	1.8	0.600	0.633	0.013	0.0	33	0.513
1.001	1.004	39.9	6.3	0.633	0.676	0.045	0.0	60	0.736
1.002	1.000	39.8	14.0	0.676	0.709	0.102	0.0	92	0.914
1.003	1.416	56.3	19.4	0.709	0.781	0.142	0.0	91	1.288
1.004	4.047	160.9	21.5	0.781	0.375	0.160	0.0	55	2.829
1.005	2.819	49.8	21.1	0.450	0.600	0.160	0.0	68	2.707

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)	106.850	Product Number	CTL-SHE-0111-5000-0600-5000
Design Depth (m)	0.600	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)	106.850
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	228

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	120.0	0.0	0.600	180.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	114.244	0.029	1.5	0.0348	0.0000	OK
15 minute winter	2	10	114.216	0.054	5.2	0.0866	0.0000	OK
15 minute winter	3	10	114.169	0.090	11.6	0.1915	0.0000	OK
15 minute winter	4	11	114.116	0.090	16.0	0.1550	0.0000	OK
15 minute winter	5	10	114.002	0.058	17.8	0.0705	0.0000	OK
180 minute winter	6	124	106.960	0.110	6.1	13.9817	0.0000	OK
180 minute winter	7	124	103.775	0.025	3.1	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	1.5	0.292	0.037	0.0463	
15 minute winter	2	1.001	3	5.1	0.464	0.127	0.1542	
15 minute winter	3	1.002	4	11.4	0.774	0.287	0.1331	
15 minute winter	4	1.003	5	15.8	1.421	0.281	0.0798	
15 minute winter	5	1.004	6	18.2	3.745	0.113	0.4311	
180 minute winter	6	1.005	7	3.1	1.565	0.062	0.0795	23.7

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	114.261	0.046	3.7	0.0540	0.0000	OK
15 minute winter	2	10	114.251	0.089	12.6	0.1432	0.0000	OK
15 minute winter	3	10	114.238	0.159	28.2	0.3396	0.0000	OK
15 minute winter	4	11	114.179	0.153	38.8	0.2626	0.0000	OK
15 minute winter	5	10	114.029	0.085	43.5	0.1044	0.0000	OK
180 minute winter	6	132	107.087	0.237	13.7	31.5244	0.0000	SURCHARGED
120 minute winter	7	116	103.782	0.032	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	3.6	0.367	0.091	0.0914	
15 minute winter	2	1.001	3	12.3	0.549	0.307	0.3125	
15 minute winter	3	1.002	4	27.7	0.946	0.697	0.2642	
15 minute winter	4	1.003	5	38.5	1.849	0.685	0.1485	
15 minute winter	5	1.004	6	44.3	4.227	0.276	1.1263	
180 minute winter	6	1.005	7	5.0	1.799	0.100	0.1111	55.8

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	114.288	0.072	4.7	0.0856	0.0000	OK
15 minute winter	2	11	114.286	0.124	15.9	0.1998	0.0000	OK
15 minute winter	3	11	114.274	0.195	35.2	0.4153	0.0000	OK
15 minute winter	4	11	114.206	0.180	48.8	0.3105	0.0000	OK
15 minute summer	5	10	114.039	0.095	53.0	0.1160	0.0000	OK
180 minute winter	6	140	107.178	0.328	18.0	45.0606	0.0000	FLOOD RISK
720 minute summer	7	405	103.782	0.032	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	4.6	0.376	0.115	0.1504	
15 minute winter	2	1.001	3	15.6	0.563	0.391	0.4127	
15 minute winter	3	1.002	4	35.2	0.995	0.886	0.3180	
15 minute winter	4	1.003	5	49.0	1.962	0.870	0.1737	
15 minute summer	5	1.004	6	54.0	4.387	0.335	1.3191	
180 minute winter	6	1.005	7	5.0	1.799	0.100	0.1111	73.1

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	114.451	0.236	6.6	0.2789	0.0000	SURCHARGED
15 minute winter	2	11	114.448	0.286	21.1	0.4613	0.0000	SURCHARGED
15 minute winter	3	11	114.418	0.339	47.8	0.7222	0.0000	SURCHARGED
15 minute winter	4	11	114.303	0.277	66.5	0.4767	0.0000	SURCHARGED
15 minute summer	5	9	114.051	0.107	71.1	0.1310	0.0000	OK
240 minute winter	6	192	107.342	0.492	20.7	71.7432	0.0000	FLOOD RISK
30 minute summer	7	71	103.782	0.032	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	7.1	0.378	0.179	0.3579	
15 minute winter	2	1.001	3	21.9	0.600	0.548	0.5568	
15 minute winter	3	1.002	4	47.4	1.191	1.191	0.3579	
15 minute winter	4	1.003	5	66.2	2.016	1.175	0.2043	
15 minute summer	5	1.004	6	70.9	4.514	0.441	1.8255	
240 minute winter	6	1.005	7	5.0	1.799	0.100	0.1111	109.2