HOLLOWAY
JENNINGS

Bm/5055/Drainstrat

Drainage Strategy, Land of Lancaster Lane, Brockholes

Report Date:
13 November 2020

Engineer:
Brian Menmuir

HJ Consulting Engineers Ltd
Connaught House
Park View
Lofthouse Gate
Wakefield
WF3 3HA

T:01924 280061
F:0871 900 4243
admin@hjce.co.uk

Registered in England and Wales No. 06689016

Introduction

Purpose of the Assessment

Holloway Jennings have been commissioned to undertake a Sustainable Drainage Strategy to support the planning application in respect of proposed residential development located off Lancaster Lane, Brockholes.

Site location and Description

The proposed development site is a greenfield site within an existing residential area, located to the east of Brockholes town centre. The existing site area covers approximately 0.33 ha. The site is all green space. Existing site access is via Lancaster Lane.

The existing site is roughly square shaped bounded by A616 to the west, Lancaster Lane to the east, potential development site to the north and open space to the south. The surrounding area is mainly residential uses with light industry to the north.

No drainage systems are currently installed on site, however, a main public surface water sewer runs through the open space directly south.

Development Proposals

The proposed development is for eight new residential units to be constructed along with associated access roads/paths. See attached drawings 5055 -\701 for locations and size of proposed developments.

Existing access to the site will be off Lancaster Lane. The entrance to Lancaster Lane off River Holme View will be upgraded to allow access to the development.

HJ Consulting Engineers Ltd
Connaught House
Park View
Lofthouse Gate
Wakefield
WF3 3HA

T:01924 280061
F:0871 900 4243
admin@hjce.co.uk

Registered in England and Wales No. 06689016

Drainage Management

See attached drawings 5055 -\601 for proposed drainage layout.

Surface Water

Due to the space restrictions on site a SUDs system capable of attenuating the surface water is unpractical. As such it is proposed to attenuate on site via a private drainage system and discharge into the existing sewer network via a flow regulated manhole. The proposals show new surface water discharges connecting into the existing public sewer on River Holme Road. The existing manhole on River Holme View will be relocated to allow the surface water connection. Where existing pipes are now redundant, they should be fully removed or grouted.

The new drainage system will be privately maintained and has been designed to accommodate the run-off rates for the 1:30 and 1:100+40% climate events within storage tanks under the non-adopted highway. The run-off is discharged to the existing sewer through a hydro-brake limiting discharge to 3.0l/s.

There are no alterations to the layout/fall of any existing drains which would affect discharge rates.

Foul Water

New private foul network is connected to the existing via a repositioned manhole on River Holme View. The extra volume of foul waste is not considered as excessive and will not impact on the existing system.

Highway Drainage

Highway drainage servicing the adopted highway has been designed to store run-off from 1:30 and 1:100+40% climate events. It is discharged into a relocated manhole on River Holme View via a hydro-brake limiting flow to 5.0l/s. This is not part of this application.

Maintenance

An on-going maintenance scheme will be agreed in regard to private systems. Scheme will be implemented and maintained by owners management company.

Inspection Chambers and Gully Traps

It is recommended that the chambers/traps be inspected monthly for the first three months and thereafter at six monthly intervals. Emptying to be determined on site subject to silt collection rate.

HJ Consulting Engineers Ltd
Connaught House
Park View
Lofthouse Gate
Wakefield
WF3 3HA

T:01924 280061
F:0871 900 4243
admin@hjce.co.uk

Registered in England and Wales No. 06689016

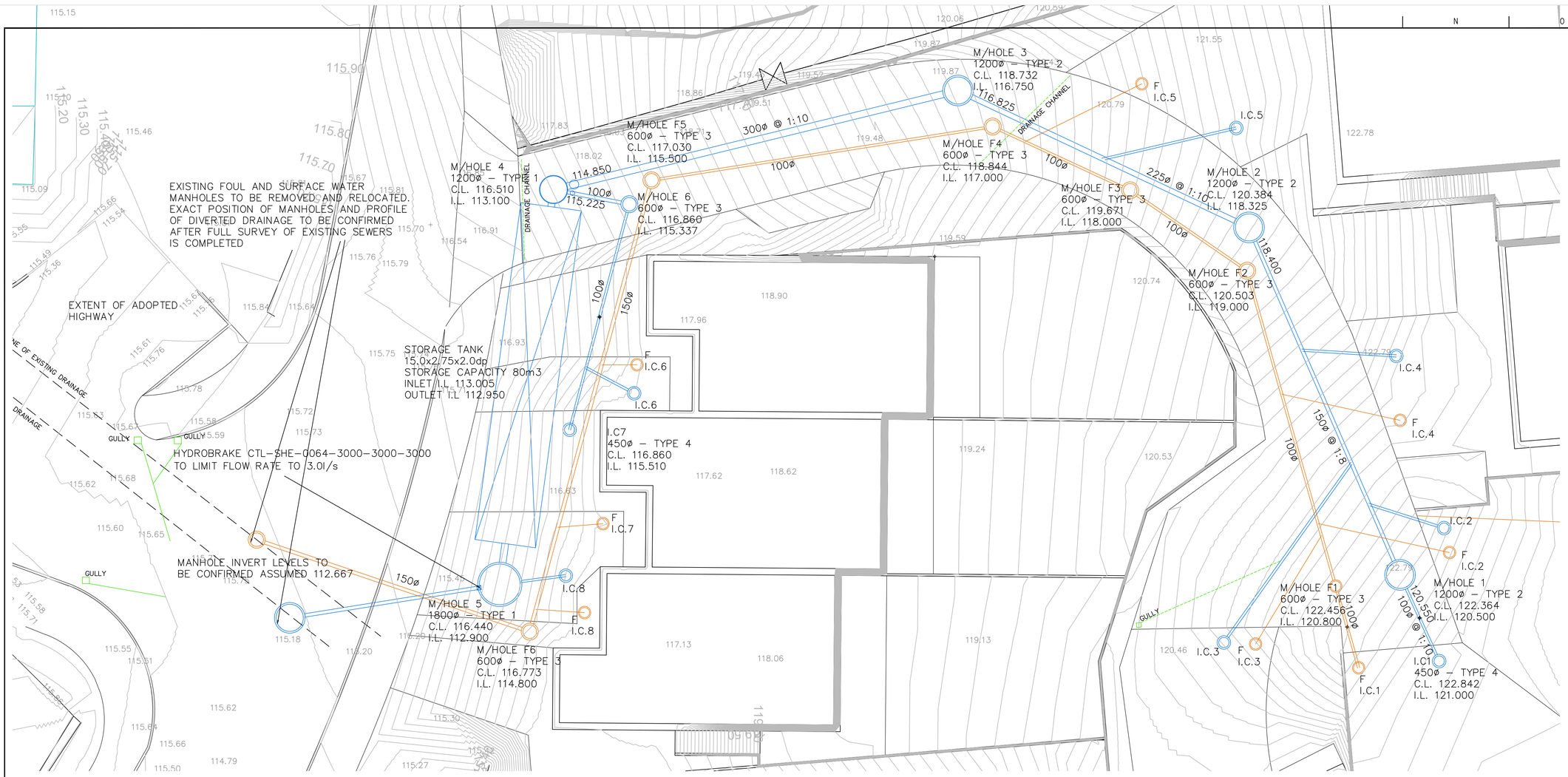
Geo cellular Units

The major aim of the maintenance regime for this type of storage system is to prevent siltation of the throughflow / distribution pipes or of the modular storage system itself. A catch pit chamber upstream of the tank is recommended and its sump would require regular cleaning so it is not allowed to overfill and let silt enter the distribution pipes. The frequency at which the catch pit should be emptied needs to be determined on site. It is recommended that the system be inspected monthly for the first three months and thereafter at six monthly intervals. In addition, it is suggested that the installation should be inspected immediately following the first major storm event after installation.

HJ Consulting Engineers Ltd
Connaught House
Park View
Lofthouse Gate
Wakefield
WF3 3HA

T:01924 280061
F:0871 900 4243
admin@hjce.co.uk

Registered in England and Wales No. 06689016



MANHOLE SCHEDULE

Sheet 1 of 1

Manhole Number / Coordinates	Cover Level / Depth To Soffit	Connections	Pipe: Code	Pipe: Inverts	Pipe: Diams	Manhole Size	Types: Manhole	Types: Cover
1 E. 1089.908 N. 962.1347	122.364 1.714	1 / 0	1 1.000 0 1.001	120.550 120.500	100 150	1200	2	D400
2 E. 1083.2398 N. 977.4666	120.384 1.834	1 / 0	1 1.001 0 1.002	118.400 118.325	150 225	1200	2	D400
3 E. 1070.3973 N. 983.5051	118.732 1.682	1 / 0	1 1.002 0 1.003	116.825 116.750	225 300	1200	2	D400
4 E. 1052.548 N. 979.138	116.510 3.110	1 / 0	1 1.003 0 1.004	114.850 113.100	300 300	1200	1	D400
5 E. 1050.1748 N. 961.7176	116.440 3.240	1 / 0	1 1.003 0 1.004	112.900 112.900	300 150	1800	1	D400
EXISTING ALL INFO TO BE CONFIRMED E. 1040.9054 N. 960.2410	10.64 112.667	1 / 0	1 1.004 0 1.004	109.627 109.627	150 EXISTING	1200	1	D400

FOUL MANHOLE SCHEDULE

Sheet 1 of 1

Manhole Number / Coordinates	Cover Level / Depth To Soffit	Connections	Pipe: Code	Pipe: Inverts	Pipe: Diams	Manhole Size	Types: Manhole	Types: Cover
F1 E. 1087.0691 N. 961.6402	122.456 1.556	0 / 1	1 1.000 0 1.001	120.800 120.800	100 100	600	3	D400
F2 E. 1083.1598 N. 975.5541	120.503 1.403	1 / 0	1 1.001 0 1.002	119.000 119.000	100 100	600	3	D400
F3 E. 1077.9934 N. 979.1018	119.671 1.571	0 / 1	1 1.002 0 1.003	118.000 118.000	100 100	600	3	D400
F4 E. 1071.9278 N. 981.9149	118.844 1.744	1 / 0	1 1.003 0 1.004	117.000 117.000	100 100	600	3	D400
F5 E. 1056.8709 N. 979.5491	117.030 1.380	1 / 0	1 1.004 0 1.005	115.450 115.500	100 150	600	3	D400
F6 E. 1051.4981 N. 959.630	116.773 1.380	1 / 0	1 1.005 0 1.006	114.800 114.800	150 150	600	3	D400
EXISTING ALL INFO TO BE CONFIRMED E. 1039.4453 N. 963.6886	115.687 2.85	1	1 1.006	112.667	150	1200	2	D400

Notes.

REV	COMMENT	DATE	DRAWN	CHECK
D	Foul manhole schedule added	16.04.2021		
C	Manhole schedule added	26.03.2021		
B	Adopted highway drainage removed	22.03.2021		
A	Adopted highway drainage added	16.11.2020		

Holloway Jennings

Consulting Engineers

Connaught House
Park View
Lofthouse
Wakefield
West Yorkshire
WF3 3HA

Telephone: 01924 824 433
Facsimile: 0871 900 4243
email: admin@hjce.co.uk

DRAWING STATUS: PRELIMINARY

CLIENT:

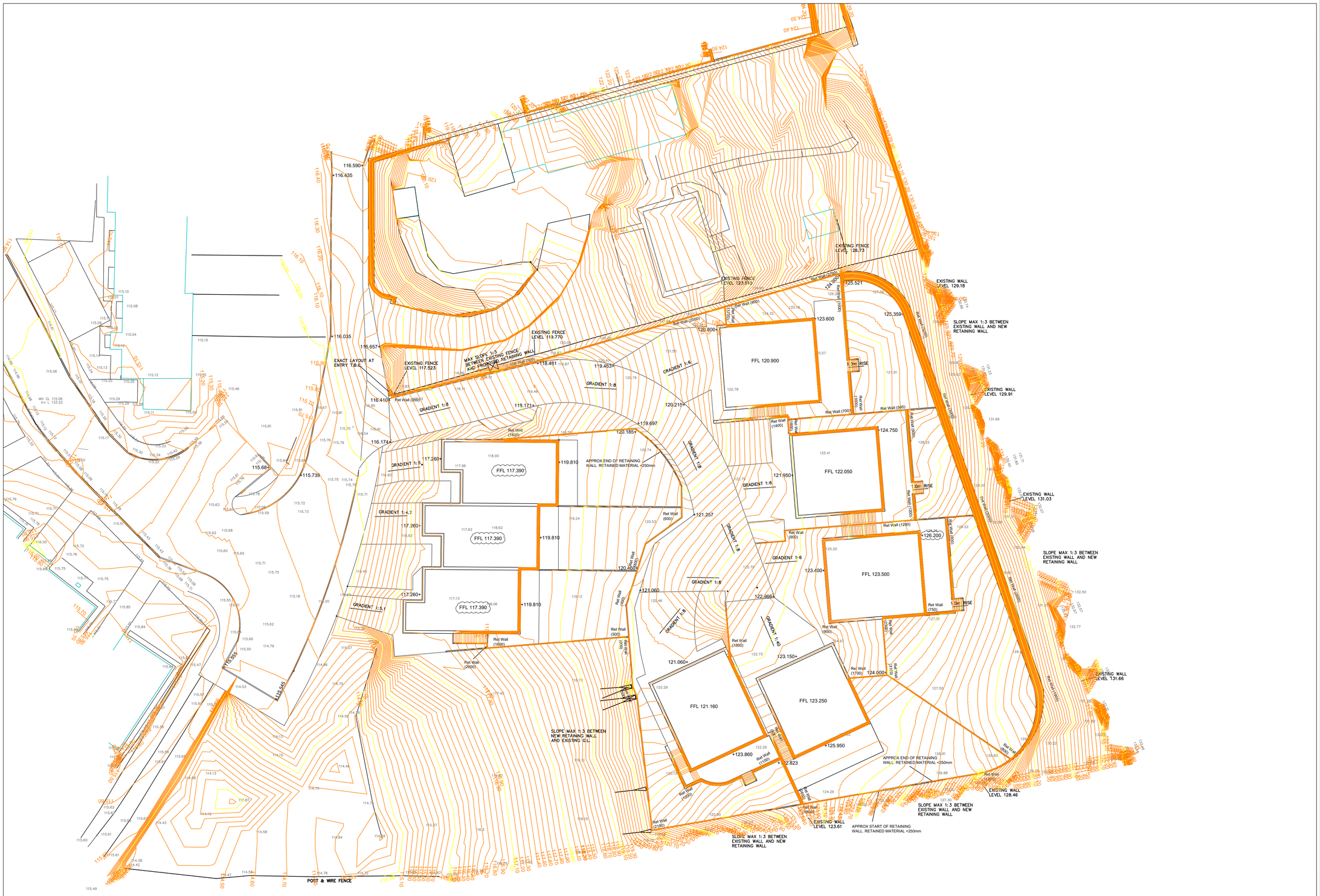
PROJECT: LANCASTER LANE SOUTH SITE BROCKHOLES

TITLE: PROPOSED DRAINAGE

DESIGNED:	CHECKED:	DRAWN:

SCALE @ SIZE:	DATE:
A1	SEP 2020

PROJECT No:	DRAWING No:	REV:
5055	601	D



Notes.

REV	COMMENT	DATE	DRAWN	CHECK
E	FFL Altered	25.11.20		
D	FFL Altered	16.09.20		
C	Driveways altered 1:6	17.07.20		
B	Road gradient altered to 1:8	09.07.20		
A	Plots 2&3 FFL altered	24.06.20		

Holloway Jennings

Consulting Engineers

Connaught House
Park View
Lofthouse
Wakefield
West Yorkshire
WF3 3HA

Telephone: 01924 824 433
Facsimile: 0871 900 4243
email: admin@hjce.co.uk

DRAWING STATUS:
PRELIMINARY

CLIENT:

PROJECT:
LANCASTER LANE
SOUTH SITE
BROCKHOLES

TITLE:
PROPOSED LEVELS

DESIGNED:	CHECKED:	DRAWN:

SCALE @ SIZE:	DATE:
A1	MAR 2020

PROJECT No:	DRAWING No:	REV:
5055	701 - ARCHLEV	E

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
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)	Easting (m)	Northing (m)	Depth (m)
IC1	0.021	5.00	122.842	450	1091.637	958.333	1.842
1	0.068	5.00	122.364	1200	1089.908	962.135	1.864
2	0.032	5.00	120.384	1200	1083.240	977.467	2.059
3			118.732	1200	1070.397	983.505	1.982
IC7	0.012	5.00	116.810	450	1053.257	968.539	1.300
6	0.014	5.00	116.860	600	1055.893	978.489	1.523
4	0.010	5.00	116.510	1200	1052.548	979.138	3.410
Tank			116.376		1051.794	971.570	3.376
5	0.015	5.00	116.440	1800	1050.175	961.718	3.540
Existing			115.688		1040.905	960.242	3.021

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	IC1	1	4.177	0.600	121.000	120.550	0.450	9.3	100	5.03	47.2
1.001	1	2	16.719	0.600	120.500	118.400	2.100	8.0	150	5.10	46.9
1.002	2	3	14.192	0.600	118.325	116.825	1.500	9.5	225	5.16	46.7
1.003	3	4	18.375	0.600	116.750	114.850	1.900	9.7	300	5.22	46.5
2.000	IC7	6	10.293	0.600	115.510	115.337	0.173	59.5	100	5.17	46.7
2.001	6	4	3.407	0.600	115.337	115.225	0.112	30.4	100	5.21	46.6
1.004	4	Tank	7.605	0.600	113.100	113.000	0.100	76.1	300	5.29	46.3
1.005	Tank	5	9.984	0.600	113.000	112.900	0.100	99.8	300	5.40	45.9
1.006	5	Existing	9.387	0.600	112.900	112.667	0.233	40.3	150	5.49	45.6

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	2.552	20.0	2.7	1.742	1.714	0.021	0.0	25	1.772
1.001	3.593	63.5	11.3	1.714	1.834	0.089	0.0	42	2.716
1.002	4.279	170.1	15.3	1.834	1.682	0.121	0.0	45	2.676
1.003	5.083	359.3	15.3	1.682	1.360	0.121	0.0	42	2.570
2.000	1.000	7.9	1.5	1.200	1.423	0.012	0.0	30	0.776
2.001	1.404	11.0	3.3	1.423	1.185	0.026	0.0	37	1.220
1.004	1.804	127.5	19.7	3.110	3.076	0.157	0.0	79	1.321
1.005	1.573	111.2	19.5	3.076	3.240	0.157	0.0	85	1.193
1.006	1.590	28.1	21.2	3.390	2.871	0.172	0.0	98	1.744

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	4.177	9.3	100	Circular_Default Sewer Type	122.842	121.000	1.742	122.364	120.550	1.714
1.001	16.719	8.0	150	Circular_Default Sewer Type	122.364	120.500	1.714	120.384	118.400	1.834
1.002	14.192	9.5	225	Circular_Default Sewer Type	120.384	118.325	1.834	118.732	116.825	1.682
1.003	18.375	9.7	300	Circular_Default Sewer Type	118.732	116.750	1.682	116.510	114.850	1.360
2.000	10.293	59.5	100	Circular_Default Sewer Type	116.810	115.510	1.200	116.860	115.337	1.423
2.001	3.407	30.4	100	Circular_Default Sewer Type	116.860	115.337	1.423	116.510	115.225	1.185
1.004	7.605	76.1	300	Circular_Default Sewer Type	116.510	113.100	3.110	116.376	113.000	3.076
1.005	9.984	99.8	300	Circular_Default Sewer Type	116.376	113.000	3.076	116.440	112.900	3.240
1.006	9.387	40.3	150	Circular_Default Sewer Type	116.440	112.900	3.390	115.688	112.667	2.871

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	IC1	450	Manhole	Adoptable	1	1200	Manhole	Adoptable
1.001	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.002	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.003	3	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
2.000	IC7	450	Manhole	Adoptable	6	600	Manhole	Adoptable
2.001	6	600	Manhole	Adoptable	4	1200	Manhole	Adoptable
1.004	4	1200	Manhole	Adoptable	Tank		Junction	
1.005	Tank		Junction		5	1800	Manhole	Adoptable
1.006	5	1800	Manhole	Adoptable	Existing		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
IC1	1091.637	958.333	122.842	1.842	450				
						0	1.000	121.000	100
1	1089.908	962.135	122.364	1.864	1200		1	1.000	120.550	100
							0	1.001	120.500	150
2	1083.240	977.467	120.384	2.059	1200		1	1.001	118.400	150
							0	1.002	118.325	225
3	1070.397	983.505	118.732	1.982	1200		1	1.002	116.825	225
							0	1.003	116.750	300
IC7	1053.257	968.539	116.810	1.300	450				
						0	2.000	115.510	100
6	1055.893	978.489	116.860	1.523	600		1	2.000	115.337	100
							0	2.001	115.337	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
4	1052.548	979.138	116.510	3.410	1200	1	2.001	115.225	100
						2	1.003	114.850	300
						0	1.004	113.100	300
Tank	1051.794	971.570	116.376	3.376		1	1.004	113.000	300
						0	1.005	113.000	300
5	1050.175	961.718	116.440	3.540	1800	1	1.005	112.900	300
						0	1.006	112.900	150
Existing	1040.905	960.242	115.688	3.021		1	1.006	112.667	150

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.300	Check Discharge Rate(s)	✓
Summer CV	0.750	Check Discharge Volume	✓
Winter CV	0.840	100 year 360 minute (m³)	
Analysis Speed	Detailed		

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 %)
2	0	0	0
30	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m^3)	

Node 5 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	112.900	Product Number	CTL-SHE-0064-3000-3000-3000
Design Depth (m)	3.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.0	Min Node Diameter (mm)	1200

Node Tank Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	113.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
0.000	40.0	0.0	2.000	40.0	0.0	2.010	0.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.55%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	IC1	10	121.030	0.030	3.5	0.0117	0.0000	OK
15 minute winter	1	10	120.551	0.051	14.8	0.0946	0.0000	OK
15 minute winter	2	10	118.379	0.054	20.0	0.0779	0.0000	OK
15 minute winter	3	10	116.799	0.049	19.8	0.0554	0.0000	OK
15 minute winter	IC7	10	115.544	0.034	2.0	0.0118	0.0000	OK
15 minute winter	6	10	115.385	0.048	4.3	0.0225	0.0000	OK
120 minute winter	4	114	113.449	0.349	13.4	0.4154	0.0000	SURCHARGED
120 minute winter	Tank	118	113.449	0.449	18.0	17.0631	0.0000	SURCHARGED
120 minute winter	5	110	113.449	0.549	13.3	1.4437	0.0000	SURCHARGED
15 minute summer	Existing	1	112.667	0.000	1.8	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	IC1	1.000	1	3.5	1.829	0.174	0.0079	
15 minute winter	1	1.001	2	14.7	2.860	0.231	0.0857	
15 minute winter	2	1.002	3	19.8	2.799	0.117	0.1006	
15 minute winter	3	1.003	4	19.7	2.702	0.055	0.1341	
15 minute winter	IC7	2.000	6	2.0	0.651	0.252	0.0314	
15 minute winter	6	2.001	4	4.2	1.218	0.384	0.0118	
120 minute winter	4	1.004	Tank	14.6	1.027	0.114	0.5355	
120 minute winter	Tank	1.005	5	12.4	0.249	0.112	0.7031	
120 minute winter	5	Hydro-Brake®	Existing	1.8				29.8

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.55%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	IC1	10	121.043	0.043	6.6	0.0168	0.0000	OK
15 minute winter	1	10	120.573	0.073	27.9	0.1360	0.0000	OK
15 minute winter	2	10	118.401	0.076	37.7	0.1099	0.0000	OK
15 minute winter	3	10	116.818	0.068	37.5	0.0768	0.0000	OK
15 minute winter	IC7	10	115.559	0.049	3.8	0.0168	0.0000	OK
15 minute winter	6	10	115.412	0.075	8.1	0.0350	0.0000	OK
240 minute winter	4	224	114.084	0.984	11.1	1.1712	0.0000	SURCHARGED
240 minute winter	Tank	224	114.084	1.084	20.6	41.1987	0.0000	SURCHARGED
240 minute winter	5	224	114.084	1.184	6.4	3.1131	0.0000	SURCHARGED
15 minute summer	Existing	1	112.667	0.000	1.8	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	IC1	1.000	1	6.6	2.143	0.327	0.0128	
15 minute winter	1	1.001	2	27.7	3.364	0.436	0.1376	
15 minute winter	2	1.002	3	37.5	3.314	0.220	0.1607	
15 minute winter	3	1.003	4	37.3	3.232	0.104	0.2123	
15 minute winter	IC7	2.000	6	3.7	0.733	0.476	0.0520	
15 minute winter	6	2.001	4	8.0	1.385	0.726	0.0196	
240 minute winter	4	1.004	Tank	13.1	0.943	0.103	0.5355	
240 minute winter	Tank	1.005	5	-7.4	-0.235	-0.067	0.7031	
240 minute winter	5	Hydro-Brake®	Existing	2.0				47.7

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.55%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	IC1	10	121.063	0.063	11.9	0.0244	0.0000	OK
15 minute winter	1	10	120.610	0.110	50.6	0.2049	0.0000	OK
15 minute winter	2	10	118.433	0.108	68.4	0.1559	0.0000	OK
15 minute winter	3	10	116.844	0.094	68.1	0.1058	0.0000	OK
360 minute winter	IC7	288	116.340	0.830	1.5	0.2856	0.0000	SURCHARGED
360 minute winter	6	288	116.340	1.003	2.5	0.4684	0.0000	SURCHARGED
360 minute winter	4	288	116.340	3.240	15.1	3.8553	0.0000	FLOOD RISK
360 minute winter	Tank	288	116.340	3.340	16.1	76.1900	0.0000	FLOOD RISK
360 minute winter	5	288	116.340	3.440	8.7	9.0425	0.0000	FLOOD RISK
15 minute summer	Existing	1	112.667	0.000	1.8	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	IC1	1.000	1	11.9	2.385	0.592	0.0211	
15 minute winter	1	1.001	2	50.2	3.797	0.790	0.2207	
15 minute winter	2	1.002	3	68.1	3.832	0.400	0.2521	
15 minute winter	3	1.003	4	67.7	3.785	0.188	0.3289	
360 minute winter	IC7	2.000	6	1.2	0.585	0.152	0.0805	
360 minute winter	6	2.001	4	2.5	1.073	0.226	0.0267	
360 minute winter	4	1.004	Tank	14.7	0.950	0.115	0.5355	
360 minute winter	Tank	1.005	5	8.4	0.354	0.076	0.7031	
360 minute winter	5	Hydro-Brake®	Existing	3.2				82.6