

L.A.C.E.

DOMESTIC PROJECTS LTD

Denbigh
Pex Hill
Cronton
Knowsley
WA8 5QN

Drainage Calculations
Document No: LACE DP 25-031-CALC001A

March 2026

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6 Gomersal Lane, BD19 4AE



	Project				Job Ref.	
	Denbigh				LACE DP 25-031	
	Section				Sheet no./rev.	
	Drainage Calculations				i Rev A	
	Calc. by	Date	Chk'd by	Date	App'd by	Date
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General Notes

- All setting out and finishes to architects details.
- Proposed levels are unknown at present. The design is based on the existing site levels as it likely that these levels are to be maintained. All levels to be confirmed prior to the commencement of the works.
- The systems are to be designed as Private with pipe cover of 600mm in footpaths/grassed areas and 900mm in roads.
- The existing dwelling is to be demolished and all existing drains to be removed.
- It is proposed to erect a new residential property on the site of the existing residential property. There is an allowance for future extension to the left hand side of the property.
- The proposed foul water and surface water drainage is to discharge unrestricted into the existing watercourse adjacent to the property as existing.

Design Codes

The Wallingford Procedure - Design and Analysis of Urban Drainage. Volume 1 Principles, Methods and Practice. Volume 4 - Modified Rational Method.

BS EN 12056-2:2000 Gravity drainage systems inside buildings – Part 2: Sanitary pipework, layout and calculation

Design Information

 2300485FUL Decision Notice

 Delegated Planning Report

 Exg Plans & Elevs

 Exg Site Block Plan

 Location Plan

 Prop Plans and Elevs

 Prop Site Plan

 Promap-3081769-3179895-720-0[7]

 Re_ 1830 - Denbigh_ Pex Hill - Drainage Quotation

 WMA_096_Denbigh[6]

 WMA_096_Denbigh-Topographical Survey A1-200 (1)[11]

 01_01 PROPOSED SITE PLAN

 01_01 PROPOSED SITE PLAN

 02_01A PROPOSED GROUND FLOOR PLANS

 02_01A PROPOSED GROUND FLOOR PLANS

 02_02A PROPOSED FIRST FLOOR PLANS

 02_02A PROPOSED FIRST FLOOR PLANS

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-  02_03A PROPOSED ROOF PLANS
-  02_03A PROPOSED ROOF PLANS
-  03_01A PROPOSED ELEVATIONS
-  03_01A PROPOSED ELEVATIONS
-  03_02A PROPOSED ELEVATIONS 2
-  03_02A PROPOSED ELEVATIONS 2
-  04_01A PROPOSED SECTIONS
-  04_01A PROPOSED SECTIONS
-  01703 - Denbigh, Pex Hill - Revised Design Planning March 24
-  01703-EX-01[3]
-  01703-EX-02[3]
-  997925-666802-de7fb741-6628-457a-9443-cc27ec3d0a58 (1)
-  01_01 C02 PROPOSED SITE PLAN
-  01_01 C02 PROPOSED SITE PLAN
-  01_01 C03 PROPOSED SITE PLAN
-  01_01 C03 PROPOSED SITE PLAN
-  01_03 C05 PROPOSED LANDSCAPE PLAN
-  01703_SK_02 E PROPOSED PLANS AND ELEVATIONS
-  SK-2 PROPOSED PLAN AND ELEVATIONS

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Cover Sheet

S1 – S3 Surface Water Drainage Design
F1 – F4 Foul Water Drainage Design

Drawings

LACE DP 25-031-500 Proposed Drainage GA
LACE DP 25-031-501 Drainage Details

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Surface Water Drainage Design

Based on the planning conditions and information available, the proposed development surface water drainage should be discharged as existing into the adjacent watercourse with an unlimited flow.

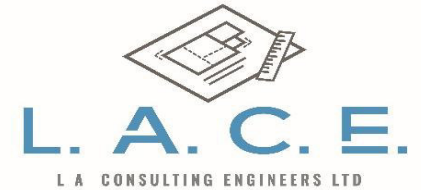
The drainage system is to be designed as a gravity system designed for 1 in 100 year rainfall event plus 40% allowance for climate change equal to 140mm/hr.

The system is to be designed as Private with pipe cover of 600mm in footpaths/grassed areas and 900mm in roads.

For the proposed extension to the left hand side of the property we have made an allowance of 126m² of roof area.

To allow for the fall for future of the surface water drainage system we have made an allowance of 150mm.

Surface Water Drainage System Calculations



Project Title: Denbigh, Pex Hill, Cronton				Sheet: S2 Rev A	
Project No: LACE 25-031	Prepared By: KA	Date: March 2026	Checked By: LA	Date: March 2026	

SURFACE WATER DRAINAGE

DESIGN DATA

Rainfall return period (years) =	1 in 100	Earth gravity, g (m/s^2) =	9.81
Rainfall intensity (mm) =	140	Kinematic viscosity of water, ν (m^2/s) =	1.14E-06
Pipe roughness, K_s (mm) =	0.6		

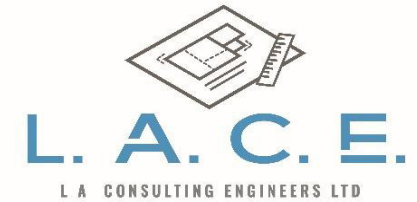
SURFACE WATER PIPE DESIGN

Surface Pipe	Sub-area total	Sum of areas	Sub-area total	Sum of areas	Pipe diameter	Upstream Pipe IL	Downstream Pipe IL	Pipe length	Gradient	Gradient	Pipe full velocity, V	Pipe capacity	Rainfall intensity	Actual discharge	OK/FAIL
Ref MH to MH	m ²	m ²	ha	ha	mm	m AD	m AD	m		1/	m/sec	Q l/sec	mm/hr	Q l/sec	
Sf - S1	126.0	126.0	0.0126	0.0126	150	43.200	43.146	5.43	0.010	100.0	1.003	17.73	140	4.904	OK
S1 - S2	37.1	163.1	0.0037	0.0163	150	43.146	43.028	11.73	0.010	100.0	1.003	17.73	140	6.348	OK
S2 - S2A	69.9	233.0	0.0070	0.0233	150	43.028	42.953	7.50	0.010	100.0	1.003	17.73	140	9.068	OK
S2A - S3	28.5	191.6	0.0029	0.0192	150	42.953	42.892	6.17	0.010	100.0	1.003	17.73	140	7.457	OK
S3 - S6	0.0	191.6	0.0000	0.0192	150	42.892	42.796	9.62	0.010	100.0	1.003	17.73	140	7.457	OK
S4 - S5	56.4	56.4	0.0056	0.0056	150	43.350	43.274	7.64	0.010	100.0	1.003	17.73	140	2.195	OK
S5 - S6	56.4	112.8	0.0056	0.0113	150	43.274	42.796	16.59	0.029	34.7	1.713	30.27	140	4.390	OK
S6 - C1	0.0	304.4	0.0000	0.0304	150	42.796	42.725	7.09	0.010	100.0	1.003	17.73	140	11.847	OK

NOTES

- Design in accordance with the Wallingford Procedure - Design and Analysis of Urban Drainage. Volume 1 Principles, Methods and Practice. Volume 4 - Modified Rational Method.
- External gulley outlet level = 605mm max below FFL

Surface Water Drainage System Calculations



Project Title: Denbigh, Pex Hill, Cronton				Sheet: S3 Rev A	
Project No: LACE 25-031	Prepared By: KA	Date: March 2026	Checked By: LA	Date: March 2026	

SURFACE WATER DRAINAGE

SURFACE WATER MANHOLE SPECIFICATION

Ref	Pipe size	MH CL	Pipe IL	MH depth	MH location	Pipe cover, m	OK/ Concrete protection Req'd	MH Diameter, m	MH Material	MH Type	MH Cover
Sf	150	44.400	43.200	1.20	Road	1.05	OK	0.60	Plastic	Type 3	D400
S1	150	44.400	43.146	1.25	Road	1.10	OK	0.60	Plastic	Type 3	D400
S2	150	44.400	43.028	1.37	Soft	1.22	OK	0.45	Plastic	Type 1	B125
S2A	150	44.400	42.953	1.45	Soft	1.30	OK	0.45	Plastic	Type 1	B125
S3	150	44.400	42.892	1.51	Soft	1.36	OK	0.45	Plastic	Type 1	B125
S4	150	44.400	43.350	1.05	Road	0.90	OK	0.60	Plastic	Type 3	D400
S5	150	44.400	43.274	1.13	Soft	0.98	OK	0.45	Plastic	Type 1	B125
S6	150	45.160	42.796	2.36	Soft	2.21	OK	0.60	Plastic	Type 3	B125
C1	150	45.200	42.725	2.48	Soft	2.33	OK	0.60	Plastic	Type 3	B125

NOTES

- Design in accordance with the Wallingford Procedure - Design and Analysis of Urban Drainage. Volume 1 Principles, Methods and Practice. Volume 4 - Modified Rational Method.
- For pipe design refer to Sheet
- Cover levels to be confirmed, currently based upon a proposed FFI and the existing external levels

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	KA	March 2026	LAA	March 2026		

Foul Water Drainage Design

The drainage system is to be designed as a gravity system collecting foul water from the proposed residential property and discharging as existing into the watercourse adjacent to the property via a package treatment plant.

The package treatment plant is to be a Marsh Ensign 6 PE Gravity by Marsh Industries or similar approved. A sampling chamber is to be provided for quality purposes in Manhole F8. The discharge effluent quality is to be agreed with the Environment Agency prior to the installation due to the local abstraction point.

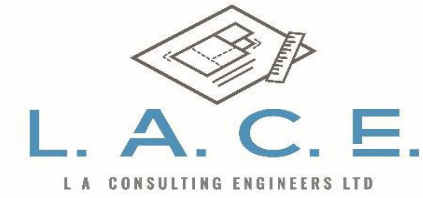
The proposed discharge level into the adjacent watercourse is unknown at present and is to be confirmed prior to commencement of the works.

For the proposed extension to the left hand side of the property we have made an allowance for the following:

- 1 x WC
- 1 x Basin
- 1 x Bath
- 1 x Floor Gulley to a Wet Room

To allow for the fall for future of the foul drainage system we have made an allowance of 150mm.

Foul Water Flows Calculation sheet



Project Title: Denbigh, Pex Hill, Cronton

Sheet: F2 Rev A

Project No: LACE 25-031

Prepared By: KA

Date: March 2026

Checked By: LA

Date: March 2026

Appliance	DU (l/s) System I,II,III,IV	MH Ref and Gulley Ref										Total
		F1	F2	F3	F4	F5	F6	F7	F8	Ffuture		
Wash basin, Bidet	0.5	2	1	1	1	2				1		8
Shower without plug	0.6											0
Shower with plug	1.3	1				1						2
Single urinal with cistern	0.8											0
Urinal with flushing valve	0.5											0
Slab urinal (per person)	0.2											0
Bath	1.3	1	1	1						1		4
Kitchen Sink	1.3	1			1							2
Fridge	0.2											0
Dishwasher	0.8				1							1
Washing MC up to 6kg	0.8											0
Washing MC up to 12kg	1.5	1										1
WC (6L)	2.0	1	1	1	1	1				1		6
Cleaners Sink	1.5											0
Floor gully - store rooms	0.1	1										1
Floor gully - wet rooms	2.0									1		1
Total l/s		8.5	3.8	3.8	4.6	4.3	0	0	0	5.8		30.8
K Usage Factor		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
Pipe flow Q _{ww} = KvΣDU		1.5	1.0	1.0	1.1	1.0	0.0	0.0	0.0	1.2		6.7

Calculations based on BS EN 12056:Part 2

Foul Water Drainage System Calculations



Project Title: Denbigh, Pex Hill, Cronton Sheet: F3 Rev A

Project No: LACE 25-031 Prepared By: KA Date: March 2026 Checked By: LA Date: March 2026

FOUL WATER DRAINAGE

DESIGN DATA

Rainfall return period (years) =	1 in 100	Earth gravity, g (m/s ²) =	9.81
Rainfall intensity (mm) =	140	Kinematic viscosity of water, ν (m/s ²) =	1.14E-06
Pipe roughness, Ks (mm) =	1.5		

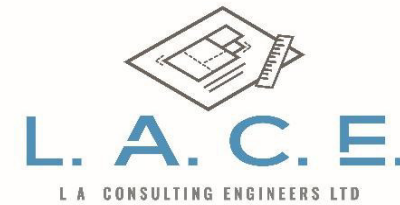
FOUL WATER PIPE DESIGN

Foul Drainage	Outlet pipe dia.	Upstream I.L.	Downstream I.L.	Length of pipe section	Gradient	Gradient	V	Pipe capacity	Total DU (From Table)	K Usage Factor	Pipe flow Q _{ww} = $K_v \sum DU$	OK / FAIL
Ref	mm	m AD	m AD	m	1/xxx	1/xxx	m/sec	Q l/sec	l/s		l/sec	
F1 - F2	100	43.700	43.678	1.74	0.013	80.0	0.743	5.837	8.5	0.5	1.458	OK
F2 - F3	100	43.678	43.648	2.46	0.013	80.0	0.743	5.837	12.3	0.5	1.754	OK
F3 - F7	100	43.648	43.219	6.29	0.068	14.7	1.743	13.689	16.1	0.5	2.006	OK
Ff - F4	100	43.550	43.418	10.55	0.013	80.0	0.743	5.837	5.8	0.5	1.204	OK
F4 - F5	100	43.418	43.409	0.70	0.013	80.0	0.743	5.837	10.4	0.5	1.612	OK
F5 - F6	100	43.409	43.325	6.75	0.013	80.0	0.743	5.837	14.7	0.5	1.917	OK
F6 - F7	100	43.325	43.219	8.52	0.013	80.0	0.743	5.837	14.7	0.5	1.917	OK
F7 - PTP	100	43.219	43.133	6.86	0.013	80.0	0.743	5.837	30.8	0.5	2.775	OK
PTP - F8	100	43.133	43.104	2.28	0.013	80.0	0.743	5.837	30.8	0.5	2.775	OK
F8 - C1	100	43.104	43.085	1.53	0.013	80.0	0.743	5.837	30.8	0.5	2.775	OK

Unrestricted FW flow into Combined Sewer : 2.77 l/s

PTP - Foul Water Package Treatment Plant

Foul Water Drainage System Calculations



Project Title: Denbigh, Pex Hill, Cronton				Sheet: F4 Rev A
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FOUL WATER DRAINAGE

FOUL WATER MANHOLE SPECIFICATION

MH's	Pipe Size	C.L.	I.L.	MH Depth to I.L.	Pipe laid	Cover to pipe C.L.	OK/ Concreting Reqd	MH diameter	MH Type	MH Cover Type
Ref	m	m	m	m	in	m		m		
F1	100	44.400	43.700	0.700	Soft	0.600	OK	0.45	TYPE 1	B125
F2	100	44.400	43.678	0.722	Soft	0.622	OK	0.45	TYPE 1	B125
F3	100	44.400	43.648	0.752	Soft	0.652	OK	0.45	TYPE 1	B125
Ff	100	44.400	43.550	0.850	Soft	0.750	OK	0.60	Type 3	B125
F4	100	44.400	43.418	0.982	Soft	0.882	OK	0.45	TYPE 1	B125
F5	100	44.400	43.409	0.991	Soft	0.891	OK	0.45	TYPE 1	B125
F6	100	44.400	43.325	1.075	Soft	0.975	OK	0.45	TYPE 1	B125
F7	100	44.400	43.219	1.182	Soft	1.082	OK	0.45	TYPE 1	B125
F8	100	45.200	43.104	2.096	Soft	1.996	OK	0.60	TYPE 3	B125
C1	100	45.200	43.085	2.115	Soft	2.015	OK	0.60	TYPE 3	B125

Usage	K value	Flowrate
Dwelling, Guest house	0.5	Intermittent
Hospital, school, hotel	0.7	Frequent
Public showers, toilets	1	Congested
Laboratory	1.2	Special

NOTES:

All gully Outlet Levels to be 600mm max below GFL unless noted otherwise

Cover levels to be confirmed, currently based upon a proposed FFI and the existing external levels