



**Discharge of Condition 3
(Details of Foul & Surface Water Drainage)
Planning Approval F/TH/21/1948**

for

Proposed Residential Development on land at
4 The Grove
Westgate On Sea
Kent, CT8 8AS

on behalf of

Mr & Mrs Clarke

Document Control Sheet

Project Title Proposed Residential Development
4 The Grove, Westgate On Sea

Document Title Detailed Foul & Surface Water Drainage Design

Job No. T-2023-030

Revision 1.0

Status **Final**

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1.0	Final	P. Lavender	12.10.23	S. Carr	12.10.23	P. Lavender	12.10.23

Distribution List

Version	Issued to	Purpose	Date
1.0	Client / Architect (via email)	Planning	12/10/2023



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CONTENTS

1.0	Status.....	4
2.0	Introduction.....	5
	Background.....	5
3.0	Foul Water Drainage.....	6
	Proposed Discharge.....	6
	Consents.....	6
4.0	Surface Water Drainage.....	7
	Proposed Discharge.....	7
	Consents.....	7
5.0	Operation & Maintenance Statement.....	9
Appendix A	Tridax Drawings	
	T-2023-030-01 RevA Site Location Plan	
	T-2023-030-02 RevA Drainage Plan	
	T-2023-030-03 RevA Drainage Details	
Appendix B	MicroDrainage Design Calculations	
	1. Foul Water Network Design Calculations	
	2. BRE365 Soakage Test Results	
	3. Soakaway SA1 Design	
	4. Soakaway SA2 Design	
	5. Soakaway SA3 Design	
	6. Soakaway SA4 Design	
	7. Soakaway SA5 & SA6 Design	
	8. Permeable Paving Design	

1.0 STATUS

- 1.1 This Report is prepared for the sole use of Mr & Mrs Clarke and their agents in connection with the current planning application. No responsibility can be assumed for the Report if used by others.
- 1.2 For the purposes of the Contracts (Rights of Third Parties) Act 1999, nothing in this Report shall confer on any third party any right to enforce or benefit from any terms of this Report

2.0 INTRODUCTION

Background

2.1 Tridax Ltd have been commissioned by Mr & Mrs Clarke and requested to prepare the detailed foul & surface water drainage design for the proposed Residential Development on land at 4 The Grove, Westgate On Sea, Kent, CT8 8AS for the discharge of condition 3 of the planning approval F/TH/21/1948 to Thanet District Council.

- 3 No development shall take place until details of the means of foul and surface water disposal, including details of the implementation, management and maintenance of any proposed Sustainable urban Drainage Systems, have been submitted to and agreed in writing by the Local Planning Authority. The development shall be carried out in accordance with such details as are agreed and thereafter maintained.

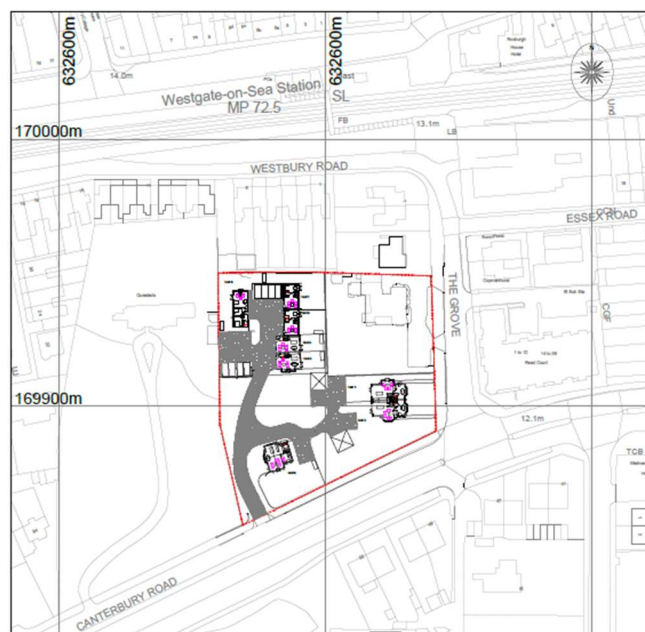
GROUND:

To protect the district's groundwater, and to ensure the development is served by satisfactory arrangements for the disposal of surface water, in accordance with Policies SE04 and CC02 of the Thanet Local Plan and advice contained within the National Planning Policy Framework.

Frame 1 ~ Extract of Planning Conditions

Site Location

2.2 The proposed development is accessed from Canterbury Road as shown on drawing T-2023-030-01 enclosed within appendix A and the extract as Frame 2 below. The total site area (Red Line) is approximately 6,190m² (0.62ha) and is centred at Ordnance Survey reference (632559mE, 169949mN).



Frame 2 – Site Location Plan Extract

3.0 FOUL WATER DRAINAGE

Existing Discharge

- 3.1 There is no existing foul water drainage on the site with the land currently forming the garden to 4 The Grove.

Proposed Discharge

- 3.2 The intention is to connect the foul water discharge from the development to the public foul water sewer within Canterbury Road via a new manhole
- 3.3 Detailed foul water drainage design drawings are included within Appendix A along with supporting MicroDrainage design calculations included within Appendix B.

Consents

- 3.4 A Section 104 Water Industry Act application will need to be made to and approved by Southern Water Services prior to new connection.

4.0 SURFACE WATER DRAINAGE

Proposed Discharge

- 4.1 The intention is for the surface water to be disposed via on site filtration using a combination of cellular soakaways and permeable paving. To inform the detailed design the Client excavated a trial pit in the centre of the site as shown in the photographs as frame3 below. A copy of the BRE365 soakage results are included within Appendix B that provided a minimum filtration rate of 2.18×10^{-5} m/s (0.0786m/hr).



Frame 3 – Soakage Test Photographs

- 4.2 MicroDrainage Detailed Design calculations are enclosed within Appendix B to demonstrate that the proposed soakaways would be adequate to cater for a 1in100 year return period with a 40% allowance for climate change. The drainage calculations provided comply with the Kent County Council SUDS guidance;

- FSR manually increased to 26.25mm
- Design to accommodate 40% Climate Change
- Half-drain times for 30year return < 24 hours

- 4.3 Note that there is no flood exceedance from the 40% sensitivity test with all flows contained with each structure.

- 4.4 The access road has a incline of a 1:28 gradient and concrete stanks are utilised within the sub base to prevent migration of surface water to allow a uniform filtration and utilise the minimum 140mm of storage required for storage within the 'no fines' sub base.
- 4.5 Detailed surface water disposal design drawings are included within Appendix A.

Consents

- 4.6 No formal consents are required for the SUDS features included for the surface water disposal strategy apart from the discharge of the pre-commencement planning condition requiring approval of the detailed design.
- 4.7 The responsibility of the management and maintenance will remain with the property owners to meet the requirements of the Flood and Water Management Act.

5.0 OPERATION & MAINTENANCE STATEMENT

5.1 We recommend that an annual maintenance contract is entered for the desludging of the primary settlement tank.

5.2 The surface water system as indicated on the design drawings is a private Sustainable Urban Drainage System (SUDS) and the owner of the property will be responsible for the inspection and maintenance for this system.

5.3 It is recommended that the chambers and the soakaway are inspected as part of the general planned inspection and maintenance regime for the development, but certainly at no greater intervals than once a year.

5.4 Annual Inspection to include;

- Lift all manhole covers and check general condition and ensure no floating debris within the manholes.
- Check the overall integrity of the soakaway location looking for any ground settlement local to the tanks.
- Carry out works as identified from inspection.

5.5 Five year Inspection / Five Year Anniversary

- Carry out a rapid 'Flush' through of the system (carry out works during a dry period) of all pipe work to ensure no blockages and free flow of water to the outfall and to check the overall integrity. Flushing of attenuation tank can be carried through the vent pipe.
- Empty all catchpits with a gully sucker and dispose off-site by a licensed carrier

5.6 Permeable Paving Drive & Paths Maintenance Statement

The System relies upon the permeability of the finished surface to allow for surface water to percolate through the open joints of the blocks / open graded asphalt and through the 'no-fines' bedding layer. The open graded sub-base also allows for the storage of extreme storm events that has been

designed to cater for a 1in100 year return period with a 40% allowance for climate change.

The most common form of failure of permeable paving systems is the 'clogging' of the joints and accumulation of silt within the sub-grade. A regular planned inspection and maintenance regime is essential to ensure the effectiveness of the system.

It is recommended that a regular visual inspection of the paving is carried out, but certainly at no greater intervals than once a year. Observe the performance of the paving during heavy periods of rain to ensure no ponding or standing water.

Annual Inspection to include:

- Vacuum sweep or pressure-wash the surface of the paving to remove debris from the open-joints and remove any weed growth.
- Apply a suitable weed-killer if required.

25-30 Year Anniversary:

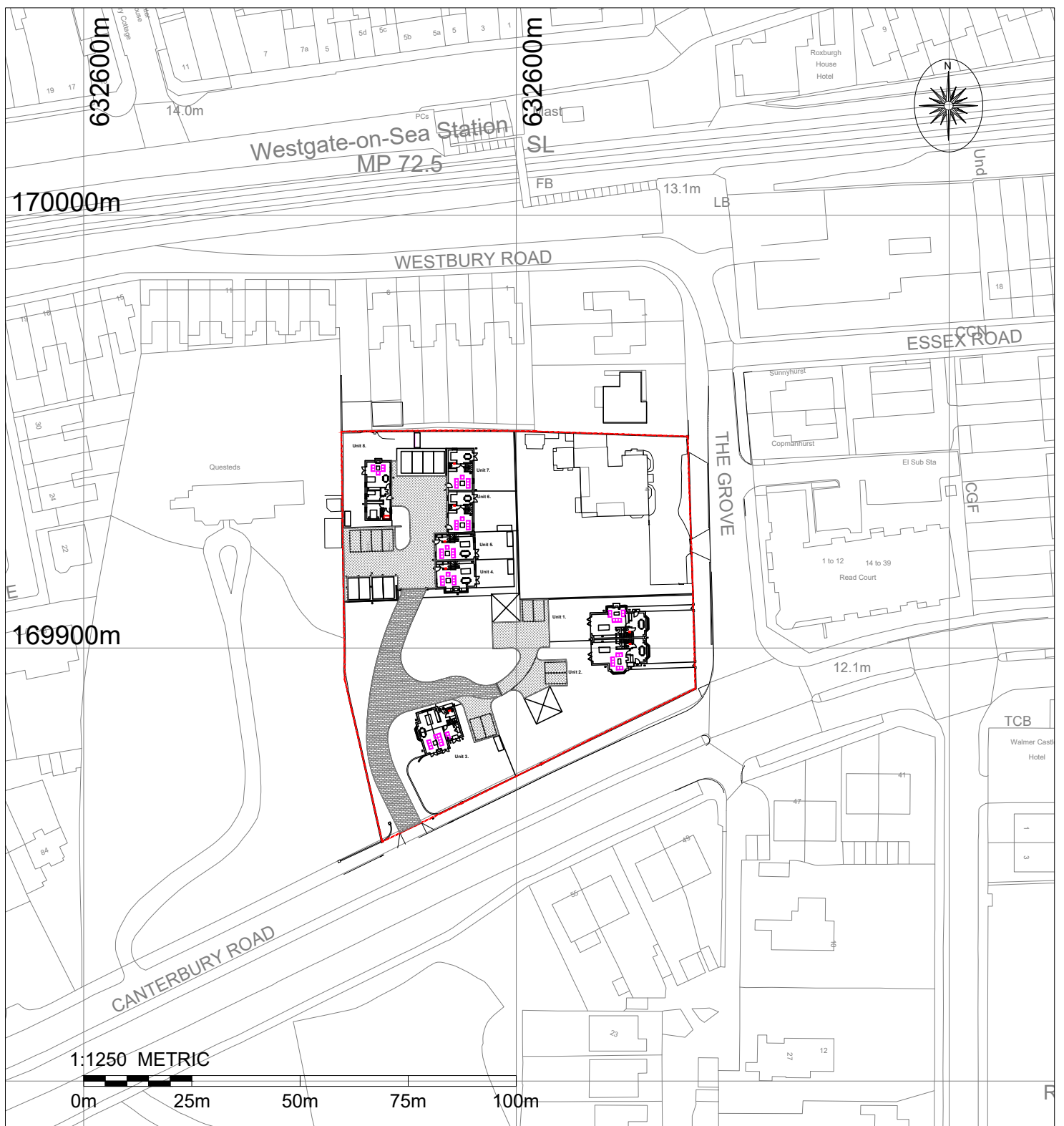
Lift and set-a-side the block paving and replace the subbase as per the construction detail shown on the drawing.

Maintenance Records:

Record the date of each inspection along with a brief description of any works carried out

APPENDIX A

Tridax Drawings
T-2023-030-01 RevA Site Location Plan
T-2023-030-02 RevA Drainage Plan
T-2023-030-03 RevA Drainage Details



00	First issue to client	12/10/2023
Rev	Description	Date

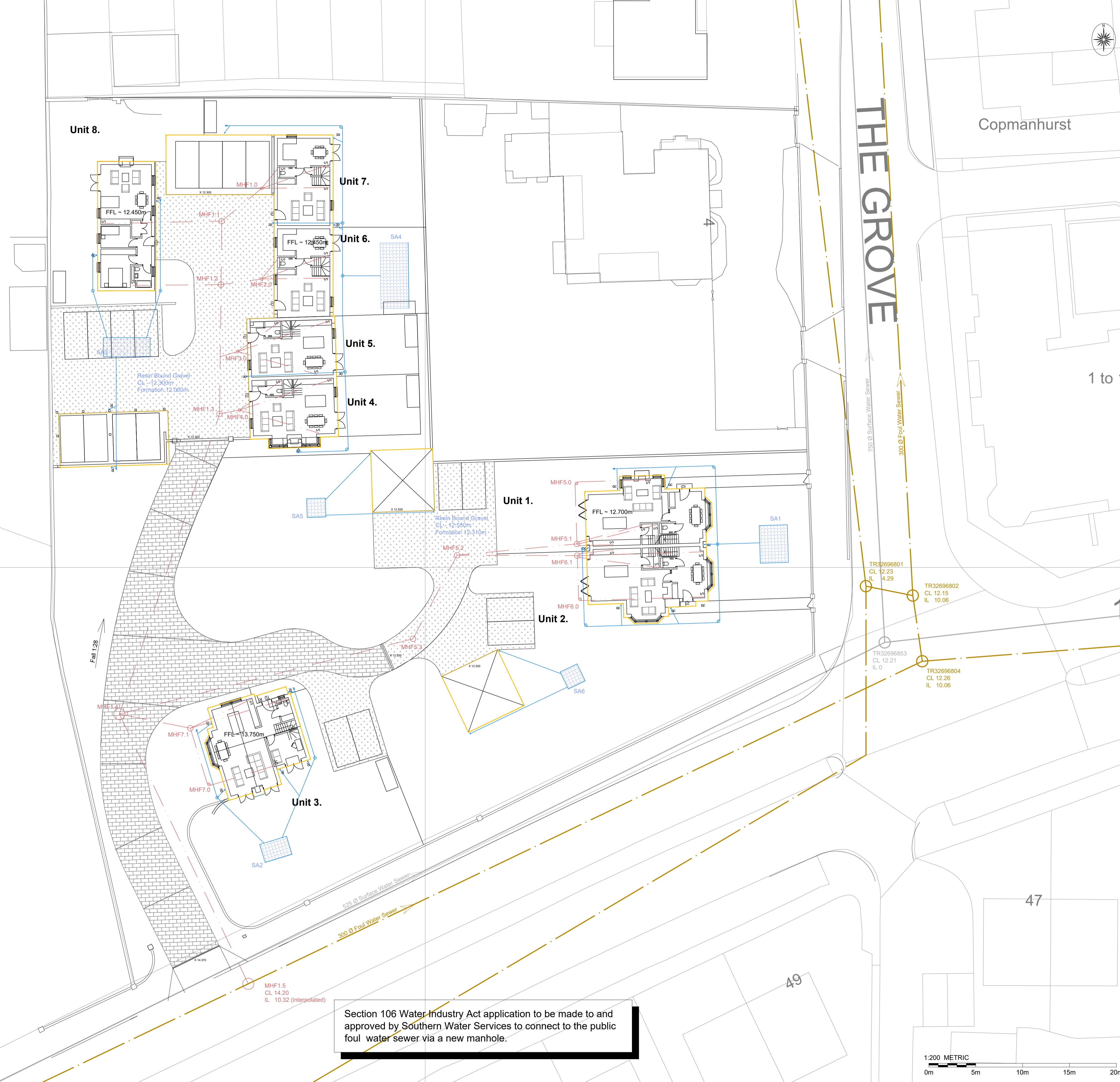
PROJECT	New Residential Development on land at 4 The Grove, Westgate-on-Sea, Kent, CT8 8AS
CLIENT	Mr & Mrs Graeme Clarke
DRAWING	Site Location Plan
STATUS	PLANNING



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SCALES	DATE	SIZE
1:1250	09/10/2023	A4
Dwg No.	REV.	
T-2023-030-01	A	

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- Public Sewers**
- Public Foul Water Sewer
 - Public Surface Water Sewer
 - Public Combined Sewer
- PROPOSED PRIVATE DRAINAGE**
- Private foul water drainage
 - Private surface water manhole
 - Soil Vent Pipe (with access hatch above FFL)
 - Private surface water drainage (100Ø 1:80)
 - Private surface water manhole
 - Rainwater pipe
 - Impermeable Areas
 - Resin Bound Gravel
 - Permeable Block Paving
 - Concrete Stanks in sub base to prevent migration of surface water



Section 106 Water Industry Act application to be made to and approved by Southern Water Services to connect to the public foul water sewer via a new manhole.

- NOTES**
- The Contractor should check all dimensions on site.
 - It is the Contractors responsibility to ensure compliance with building regulations and current codes of practice.
 - Drawings cannot take into account any drains or underground works not locatable by visual survey of the site.
 - Commencement of any building works prior to full building regulation approval is entirely at the clients risk.

Rev	Description	Date
A	First issue to client	12/10/2023

PROJECT
New Residential Development on land at 4 The Grove, Westgate-on-Sea, Kent, CT8 8AS

CLIENT
Mr & Mrs Graeme Clarke

DRAWING
Drainage Plan

STATUS
PLANNING

SCALE
1:200

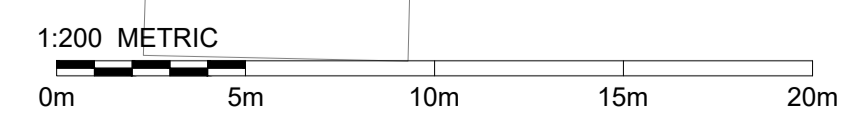
DATE
09/10/2023

SHEET
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T-2023-030-02


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APPENDIX B

MicroDrainage Design Calculations

1. Foul Water Network Design Calculations
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Tridax Ltd		Page 1
Honeywood House Whitfield Kent CT16 3EH	The Grove, Wesgate On Sea Foul Water Network	
Date 11/10/2023 16:49	Designed by prl	
File T-2023-030 FW Network.MDX	Checked by	
XP Solutions	Network 2020.1.3	

FOUL SEWERAGE DESIGN










Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.600
Flow Per Person (l/per/day)	222.00	Maximum Backdrop Height (m)	1.500
Persons per House	3.00	Min Design Depth for Optimisation (m)	0.500
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	100

Designed with Level Soffits

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	5.500	0.071	77.5	0.000	1	0.0	1.500	o	100	Pipe/Conduit	
1.001	6.750	0.087	77.6	0.000	1	0.0	1.500	o	100	Pipe/Conduit	
2.000	4.400	0.158	27.8	0.000	1	0.0	1.500	o	100	Pipe/Conduit	
1.002	13.800	0.178	77.5	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
3.000	2.000	0.336	6.0	0.000	1	0.0	1.500	o	100	Pipe/Conduit	
4.000	2.000	0.336	6.0	0.000	1	0.0	1.500	o	100	Pipe/Conduit	
1.003	33.750	0.435	77.6	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
5.000	6.300	0.081	77.8	0.000	1	0.0	1.500	o	100	Pipe/Conduit	
5.001	12.800	0.165	77.6	0.000	0	0.0	1.500	o	100	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	11.700	0.000	0.0	1	0.0	7	0.21	0.76	5.9	0.0
1.001	11.629	0.000	0.0	2	0.0	9	0.26	0.76	5.9	0.1
2.000	11.700	0.000	0.0	1	0.0	5	0.29	1.26	9.9	0.0
1.002	11.542	0.000	0.0	3	0.0	11	0.30	0.76	5.9	0.1
3.000	11.700	0.000	0.0	1	0.0	4	0.49	2.74	21.5	0.0
4.000	11.700	0.000	0.0	1	0.0	4	0.49	2.74	21.5	0.0
1.003	11.364	0.000	0.0	5	0.0	14	0.35	0.76	5.9	0.2
5.000	11.950	0.000	0.0	1	0.0	7	0.21	0.75	5.9	0.0
5.001	11.869	0.000	0.0	1	0.0	7	0.21	0.76	5.9	0.0

Tridax Ltd		Page 2
Honeywood House Whitfield Kent CT16 3EH		The Grove, Wesgate On Sea Foul Water Network
Date 11/10/2023 16:49 File T-2023-030 FW Network.MDX		Designed by prl Checked by
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Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
6.000	4.500	0.058	77.6	0.000	1	0.0	1.500	o	100	Pipe/Conduit	
6.001	12.800	0.188	68.1	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
5.002	10.000	0.129	77.5	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
5.003	32.300	0.646	50.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
7.000	6.150	0.079	77.8	0.000	1	0.0	1.500	o	100	Pipe/Conduit	
7.001	7.700	1.992	3.9	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
1.004	31.900	0.409	78.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
6.000	11.950	0.000	0.0	1	0.0	7	0.21	0.76	5.9	0.0
6.001	11.892	0.000	0.0	1	0.0	6	0.22	0.81	6.3	0.0
5.002	11.704	0.000	0.0	2	0.0	9	0.26	0.76	5.9	0.1
5.003	11.575	0.000	0.0	2	0.0	8	0.31	0.94	7.4	0.1
7.000	13.000	0.000	0.0	1	0.0	7	0.21	0.75	5.9	0.0
7.001	12.921	0.000	0.0	1	0.0	3	0.56	3.40	26.7	0.0
1.004	10.929	0.000	0.0	8	0.0	17	0.41	0.75	5.9	0.4

Tridax Ltd		Page 3
Honeywood House Whitfield Kent CT16 3EH		The Grove, Wesgate On Sea Foul Water Network
Date 11/10/2023 16:49 File T-2023-030 FW Network.MDX		Designed by prl Checked by
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Manhole Schedules for Foul - Main

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
MHF1.0	12.300	0.600	Open Manhole	300	1.000	11.700	100				
MHF1.1	12.300	0.671	Open Manhole	600	1.001	11.629	100	1.000	11.629	100	
MHF2.0	12.300	0.600	Open Manhole	300	2.000	11.700	100				
MHF2.0	12.300	0.758	Open Manhole	600	1.002	11.542	100	1.001	11.542	100	
								2.000	11.542	100	
MHF3.0	12.300	0.600	Open Manhole	300	3.000	11.700	100				
MHF4.0	12.300	0.600	Open Manhole	300	4.000	11.700	100				
MHF1.3	12.300	0.936	Open Manhole	600	1.003	11.364	100	1.002	11.364	100	
								3.000	11.364	100	
								4.000	11.364	100	
MHF5.0	12.550	0.600	Open Manhole	300	5.000	11.950	100				
MHF5.1	12.550	0.681	Open Manhole	600	5.001	11.869	100	5.000	11.869	100	
MHF6.0	12.550	0.600	Open Manhole	300	6.000	11.950	100				
MHF6.1	12.550	0.658	Open Manhole	600	6.001	11.892	100	6.000	11.892	100	
MHF5.2	12.550	0.846	Open Manhole	600	5.002	11.704	100	5.001	11.704	100	
								6.001	11.704	100	
MHF5.3	12.550	0.975	Open Manhole	600	5.003	11.575	100	5.002	11.575	100	
MHF7.0	13.600	0.600	Open Manhole	300	7.000	13.000	100				
MHF7.1	13.600	0.679	Open Manhole	600	7.001	12.921	100	7.000	12.921	100	
MHF1.4	13.550	2.621	Open Manhole	1200	1.004	10.929	100	1.003	10.929	100	
								5.003	10.929	100	
								7.001	10.929	100	
	14.200	3.680	Open Manhole	1200		OUTFALL		1.004	10.520	100	

No coordinates have been specified, layout information cannot be produced.

Tridax Ltd		Page 4
Honeywood House Whitfield Kent CT16 3EH		The Grove, Wesgate On Sea Foul Water Network
Date 11/10/2023 16:49 File T-2023-030 FW Network.MDX		Designed by prl Checked by
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PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM. (mm)	L*W
1.000	o	100	MHF1.0	12.300	11.700	0.500	Open Manhole		300
1.001	o	100	MHF1.1	12.300	11.629	0.571	Open Manhole		600
2.000	o	100	MHF2.0	12.300	11.700	0.500	Open Manhole		300
1.002	o	100	MHF2.0	12.300	11.542	0.658	Open Manhole		600
3.000	o	100	MHF3.0	12.300	11.700	0.500	Open Manhole		300
4.000	o	100	MHF4.0	12.300	11.700	0.500	Open Manhole		300
1.003	o	100	MHF1.3	12.300	11.364	0.836	Open Manhole		600
5.000	o	100	MHF5.0	12.550	11.950	0.500	Open Manhole		300
5.001	o	100	MHF5.1	12.550	11.869	0.581	Open Manhole		600
6.000	o	100	MHF6.0	12.550	11.950	0.500	Open Manhole		300
6.001	o	100	MHF6.1	12.550	11.892	0.558	Open Manhole		600
5.002	o	100	MHF5.2	12.550	11.704	0.746	Open Manhole		600
5.003	o	100	MHF5.3	12.550	11.575	0.875	Open Manhole		600
7.000	o	100	MHF7.0	13.600	13.000	0.500	Open Manhole		300

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM. (mm)	L*W
1.000	5.500	77.5	MHF1.1	12.300	11.629	0.571	Open Manhole		600
1.001	6.750	77.6	MHF2.0	12.300	11.542	0.658	Open Manhole		600
2.000	4.400	27.8	MHF2.0	12.300	11.542	0.658	Open Manhole		600
1.002	13.800	77.5	MHF1.3	12.300	11.364	0.836	Open Manhole		600
3.000	2.000	6.0	MHF1.3	12.300	11.364	0.836	Open Manhole		600
4.000	2.000	6.0	MHF1.3	12.300	11.364	0.836	Open Manhole		600
1.003	33.750	77.6	MHF1.4	13.550	10.929	2.521	Open Manhole		1200
5.000	6.300	77.8	MHF5.1	12.550	11.869	0.581	Open Manhole		600
5.001	12.800	77.6	MHF5.2	12.550	11.704	0.746	Open Manhole		600
6.000	4.500	77.6	MHF6.1	12.550	11.892	0.558	Open Manhole		600
6.001	12.800	68.1	MHF5.2	12.550	11.704	0.746	Open Manhole		600
5.002	10.000	77.5	MHF5.3	12.550	11.575	0.875	Open Manhole		600
5.003	32.300	50.0	MHF1.4	13.550	10.929	2.521	Open Manhole		1200
7.000	6.150	77.8	MHF7.1	13.600	12.921	0.579	Open Manhole		600

Tridax Ltd		Page 5
Honeywood House Whitfield Kent CT16 3EH	The Grove, Wesgate On Sea Foul Water Network	
Date 11/10/2023 16:49	Designed by prl	
File T-2023-030 FW Network.MDX	Checked by	
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PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
7.001	o	100	MHF7.1	13.600	12.921	0.579	Open Manhole	600
1.004	o	100	MHF1.4	13.550	10.929	2.521	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
7.001	7.700	3.9	MHF1.4	13.550	10.929	2.521	Open Manhole	1200
1.004	31.900	78.0		14.200	10.520	3.580	Open Manhole	1200

Free Flowing Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.004		14.200	10.520	10.520	1200	0



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Job No. **T-2023-030**
 Job **The Grove, Westgate-on-Sea**
 Client **Rebekah & Graeme Clarke**

Sheet **01**
 Rev:

Soakage Test ~ TP1

1.0 Calculation of Soil Infiltration Rate

Design to BRE 365: Sept 2003

Test 1			Trial Pit Length x Width x Depth		
Time	Dip		1.00	0.45	1.00
0	0.370	0.630			
5	0.630	0.370			
10	0.740	0.260			
15	0.800	0.200			
20	0.850	0.150			
25	0.900	0.100			
30	0.930	0.070			
60	1.000	0.000			

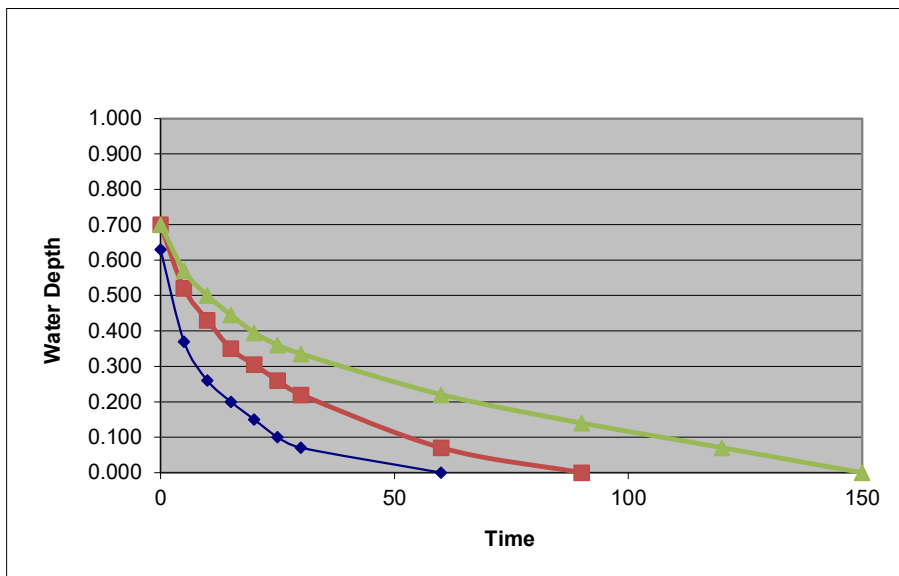
$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$


therefore lowest $f = 2.18E-05$ m/s
 $= 0.078$ m/hr

Test 2		
Time	Dip	
0	0.300	0.700
5	0.480	0.520
10	0.570	0.430
15	0.650	0.350
20	0.695	0.305
25	0.740	0.260
30	0.780	0.220
60	0.930	0.070
90	1.000	0.000

	Test 1	Test 2	Test 3
V_{p100} (Start test) =	0.284	0.315	0.257 m ³
V_{p0} (End test) =	0.000	0.000	0.000 m ³
Total Volume =	0.284	0.315	0.257 m ³
V_{p75} =	0.213	0.236	0.192 m ³
V_{p25} =	0.071	0.079	0.064 m ³
a_{p100} (Start Test) =	2.277	2.480	2.480 m ²
a_{p0} (End Test) =	0.450	0.450	0.450 m ²
t_{p75} =	3	4	9 min
t_{p25} =	19	39	76 min
V_{p75-25} =	0.142	0.158	0.128 m ³
a_{p50} =	1.364	1.465	1.465 m ²
t_{p75-25} =	16	35	67 min
therefore f =	1.08E-04	5.12E-05	2.18E-05 m/s

Test 3		
Time	Dip	
0	0.300	0.700
5	0.430	0.570
10	0.500	0.500
15	0.555	0.445
20	0.605	0.395
25	0.640	0.360
30	0.665	0.335
60	0.780	0.220
90	0.860	0.140
120	0.930	0.070
150	1.000	0.000




Tridax Ltd		Page 1
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA1	
Date 11/10/2023 13:46 File T-2023-030 SA1.SRCX	Designed by prl Checked by	
XP Solutions	Source Control 2020.1.3	

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

Half Drain Time : 416 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	11.085	0.535	0.2	6.1	O K
30 min Summer	11.235	0.685	0.2	7.8	O K
60 min Summer	11.365	0.815	0.3	9.3	O K
120 min Summer	11.458	0.908	0.3	10.3	O K
180 min Summer	11.491	0.941	0.3	10.7	O K
240 min Summer	11.499	0.949	0.3	10.8	O K
360 min Summer	11.487	0.937	0.3	10.7	O K
480 min Summer	11.468	0.918	0.3	10.5	O K
600 min Summer	11.448	0.898	0.3	10.2	O K
720 min Summer	11.426	0.876	0.3	10.0	O K
960 min Summer	11.381	0.831	0.3	9.5	O K
1440 min Summer	11.300	0.750	0.2	8.6	O K
15 min Winter	11.150	0.600	0.2	6.8	O K
30 min Winter	11.320	0.770	0.2	8.8	O K
60 min Winter	11.469	0.919	0.3	10.5	O K
120 min Winter	11.578	1.028	0.3	11.7	O K
180 min Winter	11.621	1.071	0.3	12.2	O K
240 min Winter	11.637	1.087	0.3	12.4	O K
360 min Winter	11.630	1.080	0.3	12.3	O K
480 min Winter	11.605	1.055	0.3	12.0	O K
600 min Winter	11.581	1.031	0.3	11.8	O K
720 min Winter	11.553	1.003	0.3	11.4	O K
960 min Winter	11.493	0.943	0.3	10.8	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	185.630	0.0	19
30 min Summer	120.567	0.0	33
60 min Summer	73.889	0.0	62
120 min Summer	43.472	0.0	122
180 min Summer	31.706	0.0	182
240 min Summer	25.287	0.0	240
360 min Summer	18.336	0.0	312
480 min Summer	14.573	0.0	374
600 min Summer	12.186	0.0	436
720 min Summer	10.523	0.0	506
960 min Summer	8.342	0.0	644
1440 min Summer	6.003	0.0	922
15 min Winter	185.630	0.0	19
30 min Winter	120.567	0.0	33
60 min Winter	73.889	0.0	62
120 min Winter	43.472	0.0	120
180 min Winter	31.706	0.0	178
240 min Winter	25.287	0.0	234
360 min Winter	18.336	0.0	340
480 min Winter	14.573	0.0	388
600 min Winter	12.186	0.0	462
720 min Winter	10.523	0.0	540
960 min Winter	8.342	0.0	694

Tridax Ltd		Page 2
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA1	
Date 11/10/2023 13:46	Designed by prl	
File T-2023-030 SA1.SRCX	Checked by	
XP Solutions	Source Control 2020.1.3	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
1440 min Winter	11.378	0.828	0.3	9.4	OK

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
1440 min Winter	6.003	0.0	994

Tridax Ltd		Page 3
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA1	
Date 11/10/2023 13:46 File T-2023-030 SA1.SRCX	Designed by prl Checked by	
XP Solutions	Source Control 2020.1.3	


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)	26.250	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	1440
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.018

Time (mins)	Area
From: To:	(ha)
0	4 0.018

Tridax Ltd		Page 4
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA1	
Date 11/10/2023 13:46	Designed by prl	
File T-2023-030 SA1.SRCX	Checked by	
XP Solutions	Source Control 2020.1.3	


Model Details

Storage is Online Cover Level (m) 12.550

Cellular Storage Structure

Invert Level (m) 10.550 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.07800 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.07800

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	12.0	12.0	1.200	12.0	28.8	1.201	0.0	28.8


Tridax Ltd		Page 1
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA2	
Date 11/10/2023 14:07 File T-2023-030 SA2.SRCX	Designed by prl Checked by	
XP Solutions	Source Control 2020.1.3	

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

Half Drain Time : 347 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	12.283	0.533	0.1	3.0	O K
30 min Summer	12.431	0.681	0.1	3.9	O K
60 min Summer	12.557	0.807	0.2	4.6	O K
120 min Summer	12.639	0.889	0.2	5.1	O K
180 min Summer	12.663	0.913	0.2	5.2	O K
240 min Summer	12.662	0.912	0.2	5.2	O K
360 min Summer	12.648	0.898	0.2	5.1	O K
480 min Summer	12.629	0.879	0.2	5.0	O K
600 min Summer	12.607	0.857	0.2	4.9	O K
720 min Summer	12.583	0.833	0.2	4.7	O K
960 min Summer	12.535	0.785	0.2	4.5	O K
1440 min Summer	12.451	0.701	0.1	4.0	O K
15 min Winter	12.349	0.599	0.1	3.4	O K
30 min Winter	12.516	0.766	0.1	4.4	O K
60 min Winter	12.660	0.910	0.2	5.2	O K
120 min Winter	12.758	1.008	0.2	5.7	O K
180 min Winter	12.791	1.041	0.2	5.9	O K
240 min Winter	12.797	1.047	0.2	6.0	O K
360 min Winter	12.777	1.027	0.2	5.9	O K
480 min Winter	12.754	1.004	0.2	5.7	O K
600 min Winter	12.726	0.976	0.2	5.6	O K
720 min Winter	12.693	0.943	0.2	5.4	O K
960 min Winter	12.627	0.877	0.2	5.0	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	185.630	0.0	19
30 min Summer	120.567	0.0	33
60 min Summer	73.889	0.0	62
120 min Summer	43.472	0.0	122
180 min Summer	31.706	0.0	180
240 min Summer	25.287	0.0	230
360 min Summer	18.336	0.0	286
480 min Summer	14.573	0.0	348
600 min Summer	12.186	0.0	416
720 min Summer	10.523	0.0	486
960 min Summer	8.342	0.0	626
1440 min Summer	6.003	0.0	896
15 min Winter	185.630	0.0	18
30 min Winter	120.567	0.0	33
60 min Winter	73.889	0.0	62
120 min Winter	43.472	0.0	120
180 min Winter	31.706	0.0	176
240 min Winter	25.287	0.0	230
360 min Winter	18.336	0.0	296
480 min Winter	14.573	0.0	370
600 min Winter	12.186	0.0	446
720 min Winter	10.523	0.0	522
960 min Winter	8.342	0.0	674

Tridax Ltd		Page 2
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA2	
Date 11/10/2023 14:07	Designed by prl	
File T-2023-030 SA2.SRCX	Checked by	
XP Solutions	Source Control 2020.1.3	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
1440 min Winter	12.507	0.757	0.1	4.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
1440 min Winter	6.003	0.0	966

Tridax Ltd		Page 3
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA2	
Date 11/10/2023 14:07 File T-2023-030 SA2.SRCX	Designed by prl Checked by	
XP Solutions	Source Control 2020.1.3	


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)	26.250	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	1440
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.009

Time (mins)	Area
From: To:	(ha)
0	4 0.009

Tridax Ltd		Page 4
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA2	
Date 11/10/2023 14:07	Designed by prl	
File T-2023-030 SA2.SRCX	Checked by	
XP Solutions	Source Control 2020.1.3	


Model Details

Storage is Online Cover Level (m) 13.750

Cellular Storage Structure

Invert Level (m) 11.750 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.07800 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.07800

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	6.0	6.0	1.200	6.0	18.0	1.201	0.0	18.0


Tridax Ltd		Page 1
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA3	
Date 11/10/2023 14:45 File T-2023-030 SA3.SRCX	Designed by prl Checked by	
XP Solutions	Source Control 2020.1.3	

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

Half Drain Time : 371 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.834	0.534	0.2	5.1	O K
30 min Summer	10.983	0.683	0.2	6.5	O K
60 min Summer	11.111	0.811	0.2	7.7	O K
120 min Summer	11.199	0.899	0.2	8.5	O K
180 min Summer	11.227	0.927	0.2	8.8	O K
240 min Summer	11.231	0.931	0.2	8.8	O K
360 min Summer	11.218	0.918	0.2	8.7	O K
480 min Summer	11.199	0.899	0.2	8.5	O K
600 min Summer	11.178	0.878	0.2	8.3	O K
720 min Summer	11.155	0.855	0.2	8.1	O K
960 min Summer	11.109	0.809	0.2	7.7	O K
1440 min Summer	11.026	0.726	0.2	6.9	O K
15 min Winter	10.899	0.599	0.2	5.7	O K
30 min Winter	11.068	0.768	0.2	7.3	O K
60 min Winter	11.215	0.915	0.2	8.7	O K
120 min Winter	11.319	1.019	0.3	9.7	O K
180 min Winter	11.357	1.057	0.3	10.0	O K
240 min Winter	11.368	1.068	0.3	10.1	O K
360 min Winter	11.353	1.053	0.3	10.0	O K
480 min Winter	11.330	1.030	0.3	9.8	O K
600 min Winter	11.304	1.004	0.3	9.5	O K
720 min Winter	11.274	0.974	0.3	9.3	O K
960 min Winter	11.211	0.911	0.2	8.7	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	185.630	0.0	19
30 min Summer	120.567	0.0	33
60 min Summer	73.889	0.0	62
120 min Summer	43.472	0.0	122
180 min Summer	31.706	0.0	180
240 min Summer	25.287	0.0	240
360 min Summer	18.336	0.0	298
480 min Summer	14.573	0.0	360
600 min Summer	12.186	0.0	426
720 min Summer	10.523	0.0	494
960 min Summer	8.342	0.0	634
1440 min Summer	6.003	0.0	910
15 min Winter	185.630	0.0	18
30 min Winter	120.567	0.0	33
60 min Winter	73.889	0.0	62
120 min Winter	43.472	0.0	120
180 min Winter	31.706	0.0	176
240 min Winter	25.287	0.0	232
360 min Winter	18.336	0.0	334
480 min Winter	14.573	0.0	376
600 min Winter	12.186	0.0	454
720 min Winter	10.523	0.0	532
960 min Winter	8.342	0.0	684

Tridax Ltd		Page 2
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA3	
Date 11/10/2023 14:45	Designed by prl	
File T-2023-030 SA3.SRCX	Checked by	
XP Solutions	Source Control 2020.1.3	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
1440 min Winter	11.093	0.793	0.2	7.5	OK

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
1440 min Winter	6.003	0.0	980

Tridax Ltd		Page 3
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA3	
Date 11/10/2023 14:45 File T-2023-030 SA3.SRCX	Designed by prl Checked by	
XP Solutions	Source Control 2020.1.3	


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)	26.250	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	1440
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.015

Time (mins)	Area
From: To:	(ha)
0	4 0.015

Tridax Ltd		Page 4
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA3	
Date 11/10/2023 14:45	Designed by prl	
File T-2023-030 SA3.SRCX	Checked by	
XP Solutions	Source Control 2020.1.3	


Model Details

Storage is Online Cover Level (m) 12.300

Cellular Storage Structure

Invert Level (m) 10.300 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.07800 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.07800

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	10.0	10.0	1.200	10.0	26.8	1.201	0.0	26.8


Tridax Ltd		Page 1
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA4	
Date 11/10/2023 14:53 File T-2023-030 SA4.SRCX	Designed by prl Checked by	
XP Solutions	Source Control 2020.1.3	

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

Half Drain Time : 458 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	10.842	0.542	0.3	10.8	O K
30 min Summer	10.996	0.696	0.4	13.9	O K
60 min Summer	11.131	0.831	0.4	16.6	O K
120 min Summer	11.230	0.930	0.4	18.5	O K
180 min Summer	11.269	0.969	0.4	19.3	O K
240 min Summer	11.283	0.983	0.4	19.6	O K
360 min Summer	11.274	0.974	0.4	19.4	O K
480 min Summer	11.256	0.956	0.4	19.1	O K
600 min Summer	11.236	0.936	0.4	18.7	O K
720 min Summer	11.215	0.915	0.4	18.2	O K
960 min Summer	11.171	0.871	0.4	17.4	O K
1440 min Summer	11.091	0.791	0.4	15.8	O K
15 min Winter	10.909	0.609	0.4	12.1	O K
30 min Winter	11.082	0.782	0.4	15.6	O K
60 min Winter	11.236	0.936	0.4	18.7	O K
120 min Winter	11.353	1.053	0.5	21.0	O K
180 min Winter	11.403	1.103	0.5	22.0	O K
240 min Winter	11.424	1.124	0.5	22.4	O K
360 min Winter	11.426	1.126	0.5	22.5	O K
480 min Winter	11.402	1.102	0.5	22.0	O K
600 min Winter	11.378	1.078	0.5	21.5	O K
720 min Winter	11.353	1.053	0.5	21.0	O K
960 min Winter	11.296	0.996	0.4	19.9	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	185.630	0.0	22
30 min Summer	120.567	0.0	37
60 min Summer	73.889	0.0	66
120 min Summer	43.472	0.0	124
180 min Summer	31.706	0.0	182
240 min Summer	25.287	0.0	242
360 min Summer	18.336	0.0	336
480 min Summer	14.573	0.0	392
600 min Summer	12.186	0.0	454
720 min Summer	10.523	0.0	520
960 min Summer	8.342	0.0	658
1440 min Summer	6.003	0.0	930
15 min Winter	185.630	0.0	22
30 min Winter	120.567	0.0	36
60 min Winter	73.889	0.0	64
120 min Winter	43.472	0.0	122
180 min Winter	31.706	0.0	180
240 min Winter	25.287	0.0	236
360 min Winter	18.336	0.0	346
480 min Winter	14.573	0.0	444
600 min Winter	12.186	0.0	476
720 min Winter	10.523	0.0	552
960 min Winter	8.342	0.0	706

Tridax Ltd		Page 2
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA4	
Date 11/10/2023 14:53	Designed by prl	
File T-2023-030 SA4.SRCX	Checked by	
XP Solutions	Source Control 2020.1.3	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
1440 min Winter	11.183	0.883	0.4	17.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
1440 min Winter	6.003	0.0	1010

Tridax Ltd		Page 3
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA4	
Date 11/10/2023 14:53 File T-2023-030 SA4.SRCX	Designed by prl Checked by	
XP Solutions	Source Control 2020.1.3	


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)	26.250	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	1440
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.032

Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)
0	4 0.016	4	8 0.016

Tridax Ltd		Page 4
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA4	
Date 11/10/2023 14:53	Designed by prl	
File T-2023-030 SA4.SRCX	Checked by	
XP Solutions	Source Control 2020.1.3	


Model Details

Storage is Online Cover Level (m) 12.300

Cellular Storage Structure

Invert Level (m) 10.300 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.07800 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.07800

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	21.0	21.0	1.200	21.0	45.0	1.201	0.0	45.0


Tridax Ltd		Page 1
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA5 & SA6	
Date 12/10/2023 08:31 File T-2023-030 SA5.SRCX	Designed by prl Checked by	
XP Solutions		Source Control 2020.1.3

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

Half Drain Time : 281 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.742	0.442	0.1	1.7	O K
30 min Summer	10.863	0.563	0.1	2.1	O K
60 min Summer	10.962	0.662	0.1	2.5	O K
120 min Summer	11.020	0.720	0.1	2.7	O K
180 min Summer	11.030	0.730	0.1	2.8	O K
240 min Summer	11.026	0.726	0.1	2.8	O K
360 min Summer	11.011	0.711	0.1	2.7	O K
480 min Summer	10.990	0.690	0.1	2.6	O K
600 min Summer	10.968	0.668	0.1	2.5	O K
720 min Summer	10.945	0.645	0.1	2.5	O K
960 min Summer	10.901	0.601	0.1	2.3	O K
1440 min Summer	10.826	0.526	0.1	2.0	O K
15 min Winter	10.796	0.496	0.1	1.9	O K
30 min Winter	10.933	0.633	0.1	2.4	O K
60 min Winter	11.047	0.747	0.1	2.8	O K
120 min Winter	11.119	0.819	0.1	3.1	O K
180 min Winter	11.136	0.836	0.1	3.2	O K
240 min Winter	11.133	0.833	0.1	3.2	O K
360 min Winter	11.111	0.811	0.1	3.1	O K
480 min Winter	11.085	0.785	0.1	3.0	O K
600 min Winter	11.055	0.755	0.1	2.9	O K
720 min Winter	11.023	0.723	0.1	2.7	O K
960 min Winter	10.961	0.661	0.1	2.5	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	185.630	0.0	18
30 min Summer	120.567	0.0	33
60 min Summer	73.889	0.0	62
120 min Summer	43.472	0.0	122
180 min Summer	31.706	0.0	180
240 min Summer	25.287	0.0	206
360 min Summer	18.336	0.0	268
480 min Summer	14.573	0.0	336
600 min Summer	12.186	0.0	404
720 min Summer	10.523	0.0	474
960 min Summer	8.342	0.0	614
1440 min Summer	6.003	0.0	880
15 min Winter	185.630	0.0	18
30 min Winter	120.567	0.0	33
60 min Winter	73.889	0.0	62
120 min Winter	43.472	0.0	118
180 min Winter	31.706	0.0	174
240 min Winter	25.287	0.0	226
360 min Winter	18.336	0.0	282
480 min Winter	14.573	0.0	360
600 min Winter	12.186	0.0	436
720 min Winter	10.523	0.0	512
960 min Winter	8.342	0.0	658

Tridax Ltd		Page 2
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA5 & SA6	
Date 12/10/2023 08:31	Designed by prl	
File T-2023-030 SA5.SRCX	Checked by	
XP Solutions	Source Control 2020.1.3	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
1440 min Winter	10.853	0.553	0.1	2.1	OK

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
1440 min Winter	6.003	0.0	940

Tridax Ltd		Page 3
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA5 & SA6	
Date 12/10/2023 08:31	Designed by prl	
File T-2023-030 SA5.SRCX	Checked by	
XP Solutions	Source Control 2020.1.3	


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)	26.250	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	1440
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.005

Time (mins)	Area
From: To:	(ha)
0	4 0.005

Tridax Ltd		Page 4
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea SA5 & SA6	
Date 12/10/2023 08:31	Designed by prl	
File T-2023-030 SA5.SRCX	Checked by	
XP Solutions	Source Control 2020.1.3	


Model Details

Storage is Online Cover Level (m) 12.300

Cellular Storage Structure

Invert Level (m) 10.300 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.07800 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.07800

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	4.0	4.0	1.200	4.0	13.6	1.201	0.0	13.6


Tridax Ltd		Page 1
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea Permeable Paving	
Date 11/10/2023 16:21 File T-2023-030 Permeable.SRCX	Designed by prl Checked by	
XP Solutions	Source Control 2020.1.3	

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

Half Drain Time : 29 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	11.941	0.091	2.4	6.0	O K
30 min Summer	11.957	0.107	2.4	7.0	O K
60 min Summer	11.960	0.110	2.4	7.3	O K
120 min Summer	11.948	0.098	2.4	6.4	O K
180 min Summer	11.934	0.084	2.4	5.5	O K
240 min Summer	11.921	0.071	2.4	4.7	O K
360 min Summer	11.903	0.053	2.4	3.5	O K
480 min Summer	11.895	0.045	2.1	2.9	O K
600 min Summer	11.889	0.039	1.8	2.6	O K
720 min Summer	11.885	0.035	1.6	2.3	O K
960 min Summer	11.879	0.029	1.4	1.9	O K
1440 min Summer	11.872	0.022	1.0	1.4	O K
15 min Winter	11.954	0.104	2.4	6.9	O K
30 min Winter	11.973	0.123	2.4	8.1	O K
60 min Winter	11.974	0.124	2.4	8.2	O K
120 min Winter	11.954	0.104	2.4	6.9	O K
180 min Winter	11.932	0.082	2.4	5.4	O K
240 min Winter	11.914	0.064	2.4	4.2	O K
360 min Winter	11.895	0.045	2.1	3.0	O K
480 min Winter	11.887	0.037	1.8	2.4	O K
600 min Winter	11.882	0.032	1.5	2.1	O K
720 min Winter	11.878	0.028	1.3	1.8	O K
960 min Winter	11.872	0.022	1.1	1.5	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	185.630	0.0	16
30 min Summer	120.567	0.0	27
60 min Summer	73.889	0.0	44
120 min Summer	43.472	0.0	78
180 min Summer	31.706	0.0	110
240 min Summer	25.287	0.0	140
360 min Summer	18.336	0.0	198
480 min Summer	14.573	0.0	256
600 min Summer	12.186	0.0	316
720 min Summer	10.523	0.0	376
960 min Summer	8.342	0.0	498
1440 min Summer	6.003	0.0	736
15 min Winter	185.630	0.0	16
30 min Winter	120.567	0.0	29
60 min Winter	73.889	0.0	48
120 min Winter	43.472	0.0	84
180 min Winter	31.706	0.0	116
240 min Winter	25.287	0.0	146
360 min Winter	18.336	0.0	200
480 min Winter	14.573	0.0	260
600 min Winter	12.186	0.0	320
720 min Winter	10.523	0.0	382
960 min Winter	8.342	0.0	502

Tridax Ltd		Page 2
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea Permeable Paving	
Date 11/10/2023 16:21	Designed by prl	
File T-2023-030 Permeable.SRCX	Checked by	
XP Solutions	Source Control 2020.1.3	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
1440 min Winter	11.866	0.016	0.8	1.1	OK

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
1440 min Winter	6.003	0.0	738

Tridax Ltd		Page 3
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea Permeable Paving	
Date 11/10/2023 16:21	Designed by prl	
File T-2023-030 Permeable.SRCX	Checked by	
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Rainfall Details

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Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	26.250	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	1440
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.022

Time (mins)	Area
From: To:	(ha)
0	4 0.022

Tridax Ltd		Page 4
Honeywood House Whitfield Kent CT16 3EH	The Grove, Westgate on Sea Permeable Paving	
Date 11/10/2023 16:21	Designed by prl	
File T-2023-030 Permeable.SRCX	Checked by	
XP Solutions	Source Control 2020.1.3	

Model Details

Storage is Online Cover Level (m) 12.300

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.07800	Width (m)	14.8
Membrane Percolation (mm/hr)	1000	Length (m)	14.8
Max Percolation (l/s)	60.8	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	1
Porosity	0.30	Evaporation (mm/day)	0
Invert Level (m)	11.850	Membrane Depth (m)	0