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MILTON MOUNT HALL

OLD ROAD EAST

GRAVESEND

KENT

DA12 1NQ

**DRAINAGE STRATEGY REPORT INCLUDING MANAGEMENT AND
MAINTENANCE REQUIREMENTS**

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Document Control

Revision	Purpose	Date	By	Approved
-	Initial issue	25/11/2021	MJ	JRH
A	Updated to Incorporate KCC comments	11/05/2022	RR	JRH
B	Scheme updated to suit new site plan.	30/06/2022	RR	JRH
C	Scheme updated to suit new site plan and KCC comments	16/05/2023	RR	JRH
D	In situ soakage testing incorporated	24/07/2023	JRH	JRH
E	Additional Microdrainage information added.	17/08/2023	RR	JOD

Prepared By: MJ

Approved By: JRH

Project No.

21-080

Revision

E

Date

17/08/2023

1 INTRODUCTION

- 1.1.1 Hodel Ltd. has been appointed by Wakes Construction Ltd. to produce a strategy for below ground foul and surface water drainage for the proposed development at Milton Mount Hall, Gravesend.
- 1.1.2 This report outlines the proposed drainage strategy and has been written in accordance with the requirements of the National Planning Policy Framework.

2 EXISTING SITE

- 2.1.1 The 1896m² site includes two buildings previously used as a Scout hall and Nursery. It is located within Flood Zone 1 with a low probability of flooding as defined by the Environment Agency (EA) on their Flood Map for Planning.
- 2.1.2 The existing impermeable area is approximately 400m², 21% of the site.
- 2.1.3 The British National Grid reference is E:564944, N:172977. It is bounded by Old Road East to the north and residential properties in all other directions.
- 2.1.4 The general topography of the site is a fall from the north to the south with an average gradient of approximately 1:13. The northern side of the site retains the public highway.

2.2 Geology

- 2.2.1 A site investigation (SI) by Ground and Environmental Services Ltd, 12722, found the site to be underlain by Thanet Formation Sands with varying quantities of sands, silts, clays and gravels. Lewes Chalk was encountered in borehole 1 at a depth of 15.1m bgl.

2.3 Surface Water & Groundwater

- 2.3.1 HM Government's map for Flood Risk from Rivers or Sea indicates that the site is at very low risk of flooding from Rivers or Sea.
- 2.3.2 HM Government's Surface Water Flood map indicates that the majority of the site is at very low risk of flooding, sections of the south-eastern corner are at Low risk.
- 2.3.3 DEFRA's Groundwater Source Protection Zone map indicates that the site is within a Zone 1 groundwater source protection zone.
- 2.3.4 DEFRA's Groundwater Vulnerability Zone map indicates that the site is in a High vulnerability zone with soluble rock risk.

2.4 Existing Surface Water Strategy

- 2.4.1 Surface water generated onsite currently partially discharges to a soakaway and partially discharges to the foul sewer to the west of the buildings.

2.5 Existing Foul Water Strategy

- 2.5.1 The foul water discharges to the foul sewer to the west of the buildings.

3 PROPOSED SITE

- 3.1.1 The proposal is to construct a block of 9 flats, a terrace of 4 houses, and associated parking area.
- 3.1.2 The proposed impermeable area is approximately 801m², an increase of 401m².

3.2 Proposed Surface Water Strategy

- 3.2.1 As per CIRIA C753, the options for controlling water at source have been assessed as per the SuDS hierarchy. Soakage testing has been carried out in the proposed soakaway locations and the soakaways have been designed accordingly, therefore soakaways are proposed to discharge to surface water generated from the roof and some areas of hardstanding which are not subject to parked vehicles.
- 3.2.2 Surface water generated from roof areas and some areas of hardstanding is to drain below ground via traditional methods and into two soakaways. The proposed soakaways are of geo-cellular construction with a void ratio of 95% and a combined volume of 60.65m³ to give a storage capacity of approximately 57.8m³. As according to calculations through Innovyze:MicroDrainage, during the critical 1 in 100 year event with a 45% allowance for climate change, the surface water shall be entirely held within the network as the risk of exceedance flows is deemed unacceptable for any event less than this.
- 3.2.3 Areas of vehicular parking where the greatest concentration of pollutants are most likely to be deposited are proposed to discharge via permeable paving to provide appropriate levels of treatment prior to discharge to ground. This is in accordance with the policies set out within the SuDS manual.

- 3.2.4 As per section 5.2 of the Ground and Environmental Services Limited Geo Environmental Investigation dated November 2021 Document Reference: 12722. "Groundwater was **not** recorded during the intrusive investigation. Post fieldwork monitoring recorded water at 3.87m in WS1 however this coincided with the base of the test hole and maybe water trapped in the end cap at the base of the installation. Borehole BH1 was recorded as **dry at 18.8m**" WS1 is located in the southern corner of the site, we do not have topographical level for this exact location due to dense vegetation at the time of survey.

From attending the site it was observed that area where WS1 is sited is lower than the closest topographical survey level of 29.27. Using this level as an approximate datum level would put the water encountered in WS1 at a level of 25.40. The lowest soakaway base level is 26.69 which on a worst-case scenario using the groundwater level of 25.40 would provide an unsaturated zone of 1.29m which is greater than the 1m required by the Environment Agency.

- 3.2.5 BRE365 testing is to be undertaken at the locations of the soakaways to confirm the preliminary falling head test infiltration rate and soakaway sizing.
- 3.2.6 Catchpits, gullies and permeable paving have been specified to mitigate the risk of pollutants entering the network/ground, these are to be maintained as per the maintenance schedule.

Calculations and results derived from MicroDrainage, can be found in Appendix 6.3

3.3 Proposed Foul Water Strategy

- 3.3.1 It is proposed to discharging foul water to the foul sewer. Foul water connection consented by Southern Water ref: 5327 dated 23rd May 2022.

4 MANAGEMENT & MAINTENANCE REQUIREMENTS

- 4.1.1 The pipework has been designed to be self-cleansing and as such should require no maintenance. If a blockage occurs, the system has been designed so that easy rodding or jetting can take place.
- 4.1.2 Gullies have been shown at the base of all rainwater pipes which will act as traps and also rodding access points. These traps should be cleared out twice annually.
- 4.1.3 Catchpits will be installed upstream of the soakaway tanks to collect silts/debris and preventing it from entering the system. These catchpits should be inspected and cleared out twice annually.
- 4.1.4 Inspections should be undertaken after any adverse weather event with the required maintenance or remediation works undertaken to ensure the system remain fully operational.
- 4.1.5 Below is a table setting out the various elements of the drainage system and maintenance requirements. The list of actions is not exhaustive and some actions may not always be required.

Table 1 - Drainage Maintenance

Drainage Feature	Inspection Frequency / Requirement	Maintenance Requirement	Responsibility
Gullies	Every 6 months, for silt and debris.	Silt and debris to be cleared from gully pots.	Homeowner/ Management Company
Gutters	Every 12 months, for silt and debris.	Silt and debris to be cleared from gutters.	Homeowner/ Management Company
Rainwater Downpipes	Every 12 months, for silt and leaves.	Silt to be cleared from gully pot, leaves to be cleared from gutters and downpipes.	Homeowner/ Management Company
Catchpits & Sumps	Every 6 months, for silt, debris or other obstructions.	Silt and debris or obstructions to be cleared from catchpit chambers.	Management Company
Pipework	If a problem occurs, by CCTV surveys	As recommended by CCTV survey company.	Homeowner/ Management Company
Cellular Soakaway	Refer to 4.1.6	Refer to 4.1.3	Management Company
Permeable Paving	Refer to 4.1.7	Refer to 4.1.4	Management Company

4.1.6 Operations and maintenance requirements for soakaways as per Table 13.1 of the CIRIA SuDS Manual 2015

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside concrete manhole rings.	Annually
	Cleaning of gutters and any filters on downpipes.	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside concrete manhole rings.	As required based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required.
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required.
Monitoring	Inspect silt traps and note rate of sediment accumulation.	Monthly in the first year and then annually.
	Check Soakaway to ensure emptying is occurring.	Annually

4.1.7 Operations and maintenance requirements for permeable paving tanks as per Table 21.3 of the CIRIA SuDS Manual 2015. The areas of permeable paving on site will need to be regularly inspected and cleared of any debris and silts to help prolong the design life and effectiveness of its permeability. All manufacturers will have their bespoke management plans and should be read in conjunction.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing / vacuuming	Once a year or as required should there be an event that generates debris that could potentially impact the efficiency of the permeable surface.
Occasional Maintenance	Removal of weeds or vegetation growing within the permeable surface.	As required.
Remedial Actions	Remedial work to any depressions, rutting and cracked or broken blocks.	As required.
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and if required perform remedial action.	Three monthly and or after any adverse weather event.
	Inspect accumulation of silt	As required to establish the frequency of brushing.
	Inspect outfall	As required.

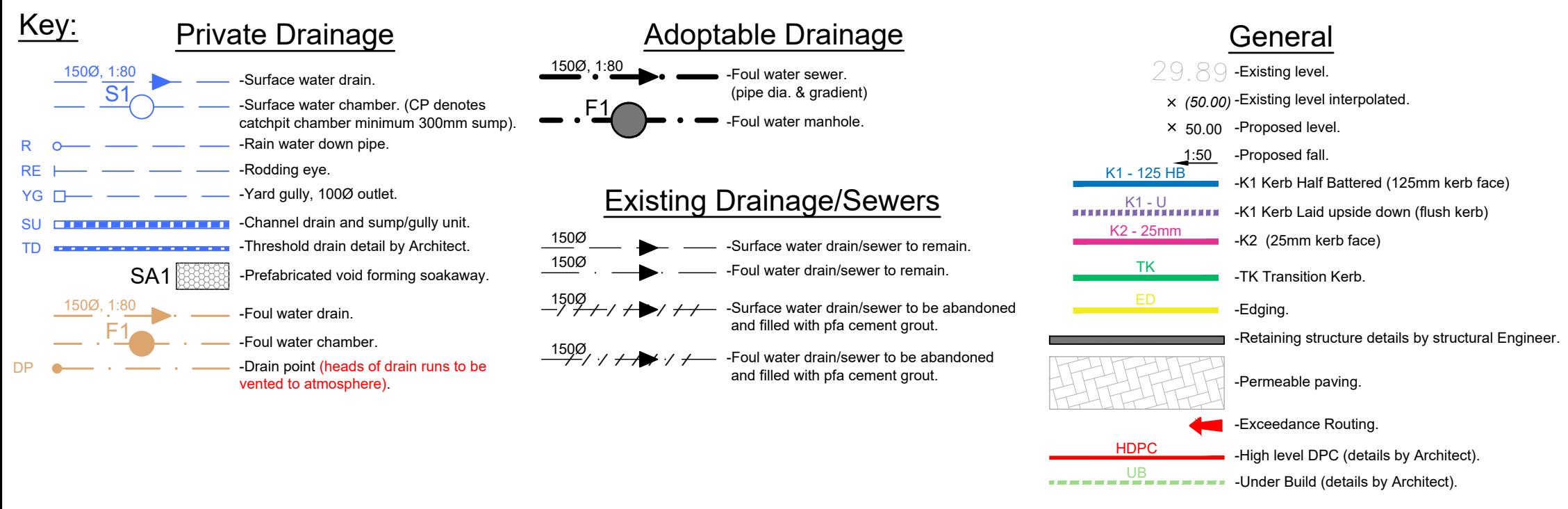
5 CONCLUSION

- 5.1.1 Surface water generated onsite is to drain via gravity to two soakaways and areas of permeable paving where it shall infiltrate to ground onsite. The network has been sized to accommodate the critical 1 in 100-year event with a 45% allowance for climate change.
- 5.1.2 There shall be no increased risk of flooding on or off-site.
- 5.1.3 It is proposed to discharging foul water to the foul sewer. Foul water connection consented by Southern Water ref: 5327 dated 23rd May 2022.
- 5.1.4 Maintenance will be required as set out in section 4.

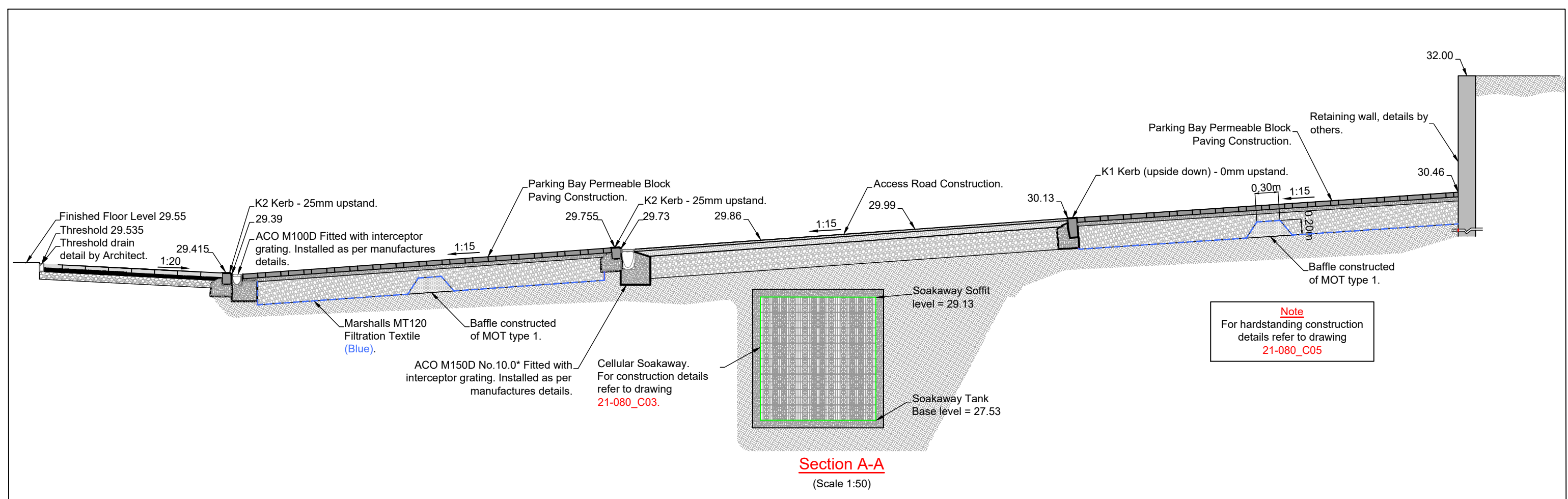
6 APPENDICES

- 6.1 Engineering Layout
- 6.2 Drained Areas Analysis Sketch
- 6.3 MicroDrainage Calculations and Results
- 6.4 Flood Risk from Rivers and Sea
- 6.5 Flood Risk from Surface Water
- 6.6 Groundwater Source Protection
- 6.7 Groundwater Vulnerability
- 6.8 Flood Map for Planning
- 6.9 In situ Soakage Testing Results

APPENDIX 6.1 ENGINEERING LAYOUT



Note
Foul and surface water drain points to be confirmed by Architect.



NOTES

- Do not scale this drawing.
- This drawing is to be read in conjunction with all other relevant Engineer's and Architect's drawings and specifications.

RISK ASSESSMENT

Residual Risks Identified

- Existing Highway Wall.
- Existing live access way.

Contractor's General Risk Items

(List is not exhaustive but includes commonly raised issues)

- Location of all buried services.
- Existing drainage:
 - i) Gases, confined spaces, diseases.
 - ii) Maintain flow in drains during works.
- Manual lifting of heavy objects; manhole covers, drainage pipes, concrete rings, kerbs, etc.
- Excavation for drainage trenches and manholes.
- Security:
 - Keep site secure from members of the public.
 - maintain public safety when accessing site.

Rev	Date	By	Chkd.	Revision notes
H	24/07/23	JH	JH	Soakaway sizes updated to suit results of BRE365 onsite testing.
G	11/07/23	JH	JH	Location of F11 & F12 amended to suit sites request, invert levels of F11 & F12 amended to suit.
F	16/05/23	JH	JH	Drawing updated to suit LLFA comments. Soakaways resized for the 1:100 year + 45% climate change event.
E	21/03/23	JH	JH	Drawing updated to suit latest site plan.
D	09/03/23	JH	JH	Drawing issued for construction.
C	13/01/23	JH	JH	Drawing updated to suit new site layout.
B	30/06/22	JH	JH	Drawing updated to suit new site layout.
A	11/05/22	JH	JH	Drawing updated to incorporate areas of permeable paving.
-	25/11/21	JH	JH	Issued for approval.

Job Title
Milton Mount Hall
Old Road East
Gravesend
DA12 1NQ

Drawing Title

Engineering Layout.

Client
Wakes LTD

HODEL
CONSULTING
ENGINEERS
01732 617555
mail@hodel.uk

Scale at A1:	Status:
1:100	CONSTRUCTION
Drawn:	Checked:
Date:	Date:
Nov '21	Nov '21
Approved:	Date:
Mar'23	
Drawing No.:	Revision:
21-080_C01	H

APPENDIX 6.2 DRAINED AREAS ANALYSIS SKETCH

Areas Key:

Pre Development Areas

Soft Landscaping Area = 1496 m²

Hardstanding Area = 0 m²

Building Roof Area = 400 m²

Total Impermeable Area = 400 m²

Total Area = 1896 m²

Post Development Areas

Soft Landscaping Area = 785 m²

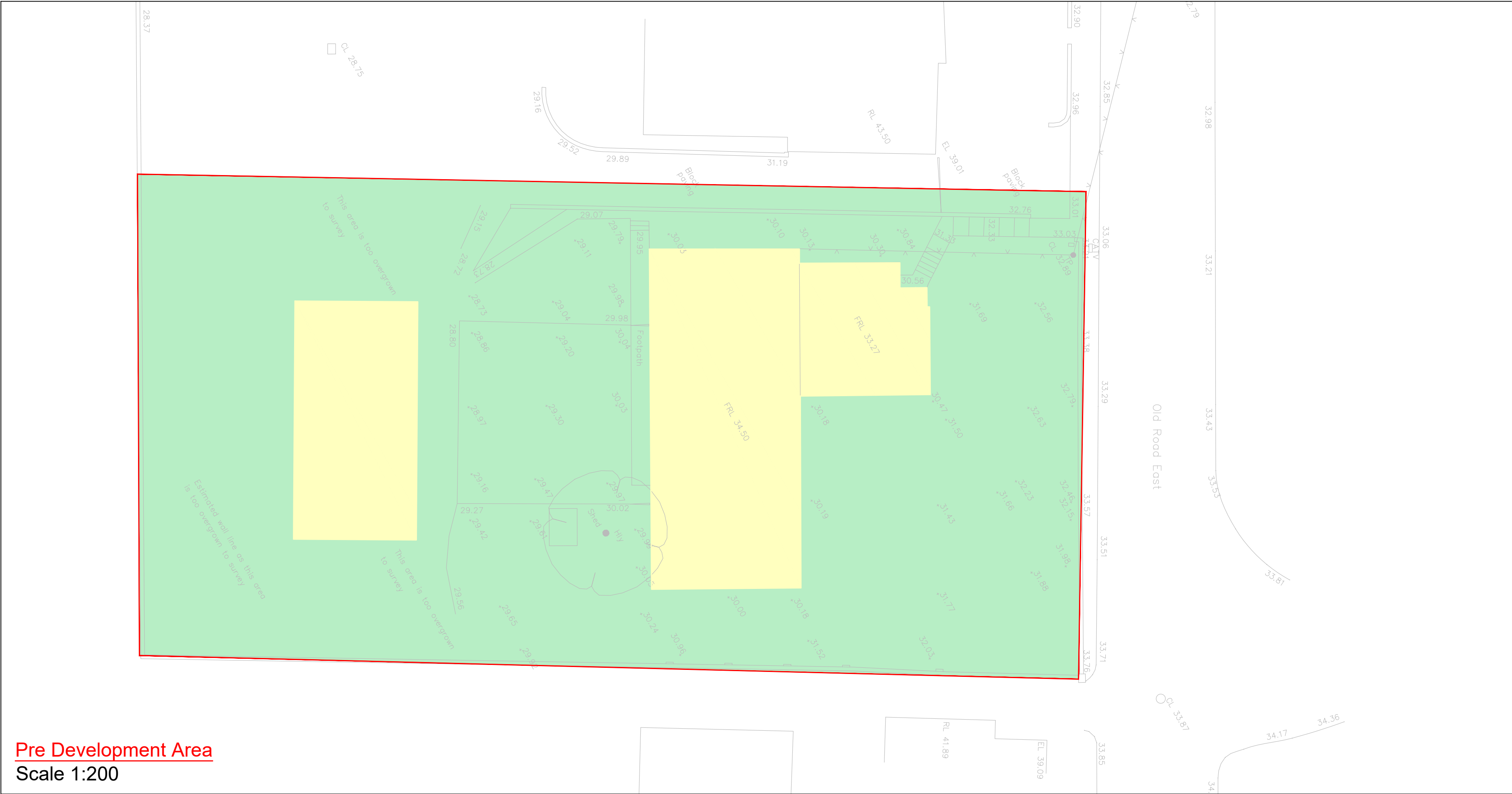
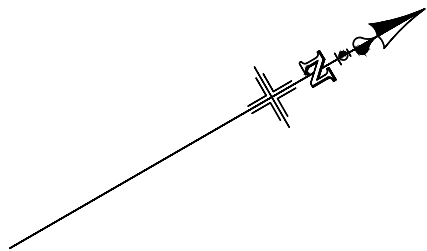
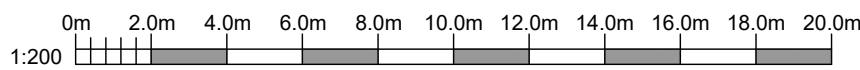
Hardstanding Area = 310 m² (Permeable)

Hardstanding Area = 296 m²

Building Roof Area = 505 m²

Total Impermeable Area = 801 m²

Total Area = 1896 m²



Pre Development Area
Scale 1:200



Post Development Area
Scale 1:200

- NOTES
1. Do not scale this drawing.

2. This drawing is to be read in conjunction with all other relevant Engineer's and Architect's drawings and specifications.

C	16/05/23		JWH	Drawing updated to suit new site layout.
B	30/06/22		JWH	Drawing updated to suit new site layout.
A	11/05/22		JWH	Drawing updated to incorporate permeable paving.
-	24/11/21		JWH	Preliminary issue

Rev	Date	By	Chkd.	Revision notes
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Job Title
Milton Mount Hall
Old Road East
Gravesend
DA12 1NQ

Drawing Title

Drained Areas Analysis Sketch

Client
Wakes LTD

HODEL

CONSULTING
ENGINEERS

01732 617555mail@hodel.uk

Scale at A1: 1:200	Status: PRELIMINARY
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Drawn: Date: Nov '21	Checked: Date: Nov '21	Approved: - Date: XXX
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Drawing No.: 21-080_SKC01	Revision: C
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APPENDIX 6.3 MICRODRAINAGE CALCULATIONS AND RESULTS

Existing Network Details for Existing

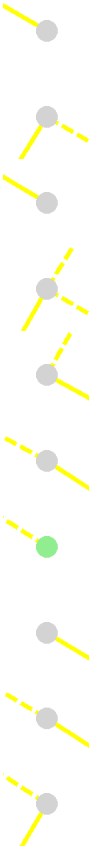
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	18.000	0.230	78.3	0.009	5.00	0.0	0.600	o	150	Pipe/Conduit
1.001	14.326	0.600	23.9	0.008	0.00	0.0	0.600	o	150	Pipe/Conduit
2.000	24.977	0.320	78.1	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit
1.002	9.095	1.320	6.9	0.012	5.00	0.0	0.600	o	150	Pipe/Conduit
1.003	14.390	0.230	62.6	0.004	0.00	0.0	0.600	o	150	Pipe/Conduit
1.004	6.779	0.000	0.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
3.000	10.026	0.140	71.6	0.011	5.00	0.0	0.600	o	150	Pipe/Conduit
3.001	5.893	0.270	21.8	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit
3.002	12.791	0.160	79.9	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit
3.003	4.595	0.070	65.6	0.011	5.00	0.0	0.600	o	150	Pipe/Conduit
3.004	3.637	0.000	0.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
1.000	31.350	0.009	0.0	1.14	20.1
1.001	31.120	0.017	0.0	2.07	36.6
2.000	30.920	0.010	0.0	1.14	20.1
1.002	30.520	0.039	0.0	3.86	68.3
1.003	29.200	0.043	0.0	1.27	22.5
1.004	28.950	0.043	0.0	0.00	0.0
3.000	28.750	0.011	0.0	1.19	21.0
3.001	28.610	0.016	0.0	2.17	38.3
3.002	28.340	0.026	0.0	1.13	19.9
3.003	28.180	0.037	0.0	1.24	22.0
3.004	28.110	0.037	0.0	0.00	0.0

Manhole Schedules for Existing

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out			Pipes In				MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out			Pipes In			
					PN	Invert Level (m)	Diameter (mm)		PN	Invert Level (m)	Diameter (mm)	Backdrop (mm)					PN	Invert Level (m)	Diameter (mm)	PN	Invert Level (m)	Diameter (mm)	Backdrop (mm)
RE1.1	31.950	0.600	Open Manhole	100	1.000	31.350	150																
S1	31.950	0.830	Open Manhole	450	1.001	31.120	150	1.000	31.120	150			S4	29.400	0.650	Open Manhole	450	3.000	28.750	150			
RE2.1	31.520	0.600	Open Manhole	100	2.000	30.920	150						S5	29.450	0.840	Open Manhole	450	3.001	28.610	150	3.000	28.610	150
S2	31.640	1.120	Open Manhole	450	1.002	30.520	150	1.001	30.520	150			S6	29.350	1.010	Open Manhole	450	3.002	28.340	150	3.001	28.340	150
								2.000	30.600	150	80		S7	29.380	1.200	Open Manhole	450	3.003	28.180	150	3.002	28.180	150
S3	30.280	1.080	Open Manhole	1050	1.003	29.200	150	1.002	29.200	150			SA2	29.000	0.890	Open Manhole	1200	3.004	28.110	100	3.003	28.110	150
SA1	29.800	0.850	Open Manhole	450	1.004	28.950	150	1.003	28.970	150	20			29.000	0.890	Open Manhole	0		OUTFALL		3.004	28.110	100
	29.900	0.950	Open Manhole	0		OUTFALL		1.004	28.950	150													

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
RE1.1	564971.739	172983.055	564971.739	172983.055	Required	
S1	564956.171	172992.090	564956.171	172992.090	Required	
RE2.1	564970.085	172967.124	564970.085	172967.124	Required	
S2	564948.629	172979.909	564948.629	172979.909	Required	
S3	564944.150	172971.994	564944.150	172971.994	Required	
SA1	564956.782	172965.102	564956.782	172965.102	Required	
	564962.465	172961.406			No Entry	
S4	564944.455	172962.049	564944.455	172962.049	Required	
S5	564953.054	172956.892	564953.054	172956.892	Required	
S6	564957.990	172953.672	564957.990	172953.672	Required	

Manhole Schedules for Existing

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S7	564951.481	172942.661	564951.481	172942.661	Required	
SA2	564948.625	172939.061	564948.625	172939.061	Required	
	564945.115	172940.015			No Entry	

Simulation Criteria for Existing

Volumetric Runoff Coeff 0.750

Hot Start Level (mm) 0

Additional Flow - % of Total Flow 0.000

Flow per Person per Day (l/per/day) 0.000

Areal Reduction Factor 1.000

Manhole Headloss Coeff (Global) 0.500

MADD Factor * 10m³/ha Storage 2.000

Run Time (mins) 60

Hot Start (mins) 0

Foul Sewage per hectare (l/s) 0.000

Inlet Coeffiecient 0.800

Output Interval (mins) 1

Number of Input Hydrographs 0

Number of Online Controls 2

Number of Offline Controls 0

Number of Storage Structures 2

Number of Time/Area Diagrams 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH

Data Type Point

Cv (Winter) 0.840

Return Period (years) 2

Summer Storms Yes

Storm Duration (mins) 30

FEH Rainfall Version 2013

Winter Storms No

Site Location GB 564944 172977 TQ 64944 72977

Cv (Summer) 0.750

Storage Structures for Existing

Cellular Storage Manhole: SA1, DS/PN: 1.004

Invert Level (m) 27.530 Infiltration Coefficient Side (m/hr) 0.08388 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00360 Safety Factor 1.5

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	21.0	21.0	1.600	21.0	70.6	1.601	0.0	70.6

Cellular Storage Manhole: SA2, DS/PN: 3.004

Invert Level (m) 26.690 Infiltration Coefficient Side (m/hr) 0.09828 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00360 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	17.0	17.0	1.600	17.0	74.6	1.601	0.0	74.6

Hodel Consulting		Page 6
The Gatehouse Pattenden Lane TN12 9QS	21-080	
	Milton Mount Hall Gravesend	
Date 17/08/2023 11:42 File 21-080-Network Rev F.MDX	Designed by RR Checked by	
XP Solutions		Network 2020.1.3

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

Simulation Criteria

Areal Reduction Factor 1.000 Hot Start Level (mm) 0 Foul Sewage per hectare (l/s) 0.000 MADD Factor * 10m³/ha Storage 2.000 Flow per Person per Day (l/per/day) 0.000
Hot Start (mins) 0 Manhole Headloss Coeff (Global) 0.500 Additional Flow - % of Total Flow 0.000 Inlet Coeffiecient 0.800

Number of Input Hydrographs 0 Number of Online Controls 2 Number of Offline Controls 0 Number of Storage Structures 2 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Site Location GB 564944 172977 TQ 64944 72977 Cv (Summer) 0.750
FEH Rainfall Version 2013 Data Type Point Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status ON
Analysis Timestep 2.5 Second Increment (Extended) DVD Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 2, 10, 30, 100
Climate Change (%) 0, 0, 35, 45

										Water	Surcharged	Flooded	Half Drain			Pipe		
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded	
1.000	RE1.1	15 Winter	2	+0%					31.379	-0.121	0.000	0.08			1.5	OK		
1.001	S1	15 Winter	2	+0%					31.148	-0.122	0.000	0.08			2.6	OK		
2.000	RE2.1	15 Winter	2	+0%					30.950	-0.120	0.000	0.09			1.7	OK		
1.002	S2	15 Winter	2	+0%					30.552	-0.118	0.000	0.10			6.2	OK		
1.003	S3	15 Winter	2	+0%	30/15 Summer				29.260	-0.090	0.000	0.33			6.8	OK		
1.004	SA1	360 Winter	2	+0%	100/360 Winter				27.910	-1.190	0.000	0.00		456	0.0	OK		
3.000	S4	15 Winter	2	+0%					28.781	-0.119	0.000	0.10			1.8	OK		
3.001	S5	15 Winter	2	+0%					28.638	-0.122	0.000	0.08			2.4	OK		
3.002	S6	15 Winter	2	+0%	100/15 Summer				28.387	-0.103	0.000	0.21			3.9	OK		
3.003	S7	15 Winter	2	+0%	30/15 Summer				28.241	-0.089	0.000	0.34			5.7	OK		
3.004	SA2	360 Winter	2	+0%	100/240 Winter				27.061	-1.149	0.000	0.00		438	0.0	OK		

10 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

Simulation Criteria

Areal Reduction Factor 1.000 Hot Start Level (mm) 0 Foul Sewage per hectare (l/s) 0.000 MADD Factor * 10m³/ha Storage 2.000 Flow per Person per Day (l/per/day) 0.000
Hot Start (mins) 0 Manhole Headloss Coeff (Global) 0.500 Additional Flow - % of Total Flow 0.000 Inlet Coeffiecient 0.800

Number of Input Hydrographs 0 Number of Online Controls 2 Number of Offline Controls 0 Number of Storage Structures 2 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Site Location GB 564944 172977 TQ 64944 72977 Cv (Summer) 0.750
FEH Rainfall Version 2013 Data Type Point Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status ON
Analysis Timestep 2.5 Second Increment (Extended) DVD Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 2, 10, 30, 100
Climate Change (%) 0, 0, 35, 45

										Water	Surcharged	Flooded	Half Drain			Pipe		
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Time	Flow	Level		
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status	Exceeded	
1.000	RE1.1	15 Winter	10	+0%					31.388	-0.112	0.000	0.15			2.7	OK		
1.001	S1	15 Winter	10	+0%					31.160	-0.110	0.000	0.16			5.2	OK		
2.000	RE2.1	15 Winter	10	+0%					30.960	-0.110	0.000	0.16			3.0	OK		
1.002	S2	15 Winter	10	+0%					30.565	-0.105	0.000	0.19			11.6	OK		
1.003	S3	15 Winter	10	+0%	30/15 Summer				29.287	-0.063	0.000	0.62			12.8	OK		
1.004	SA1	360 Winter	10	+0%	100/360 Winter				28.131	-0.969	0.000	0.00		470	0.0	OK		
3.000	S4	15 Winter	10	+0%					28.792	-0.108	0.000	0.18			3.3	OK		
3.001	S5	15 Winter	10	+0%					28.648	-0.112	0.000	0.15			4.7	OK		
3.002	S6	15 Winter	10	+0%	100/15 Summer				28.410	-0.080	0.000	0.44			7.9	OK		
3.003	S7	15 Winter	10	+0%	30/15 Summer				28.272	-0.058	0.000	0.68			11.2	OK		
3.004	SA2	240 Winter	10	+0%	100/240 Winter				27.275	-0.935	0.000	0.00		398	0.0	OK		

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

Simulation Criteria

Areal Reduction Factor 1.000 Hot Start Level (mm) 0 Foul Sewage per hectare (l/s) 0.000 MADD Factor * 10m³/ha Storage 2.000 Flow per Person per Day (l/per/day) 0.000
Hot Start (mins) 0 Manhole Headloss Coeff (Global) 0.500 Additional Flow - % of Total Flow 0.000 Inlet Coeffiecient 0.800

Number of Input Hydrographs 0 Number of Online Controls 2 Number of Offline Controls 0 Number of Storage Structures 2 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Site Location GB 564944 172977 TQ 64944 72977 Cv (Summer) 0.750
FEH Rainfall Version 2013 Data Type Point Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status ON
Analysis Timestep 2.5 Second Increment (Extended) DVD Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 2, 10, 30, 100
Climate Change (%) 0, 0, 35, 45

					Water				Surcharged Flooded				Half Drain		Pipe		
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	RE1.1	15 Winter	30	+35%					31.403	-0.097	0.000	0.27			5.0	OK	
1.001	S1	15 Winter	30	+35%					31.175	-0.095	0.000	0.28			9.6	OK	
2.000	RE2.1	15 Winter	30	+35%					30.975	-0.095	0.000	0.28			5.4	OK	
1.002	S2	15 Winter	30	+35%					30.582	-0.088	0.000	0.35			21.2	OK	
1.003	S3	15 Winter	30	+35%	30/15 Summer				29.417	0.067	0.000	1.13			23.4	SURCHARGED	
1.004	SA1	360 Winter	30	+35%	100/360 Winter				28.614	-0.486	0.000	0.00		483	0.0	OK	
3.000	S4	15 Winter	30	+35%					28.808	-0.092	0.000	0.32			6.0	OK	
3.001	S5	15 Winter	30	+35%					28.663	-0.097	0.000	0.27			8.5	OK	
3.002	S6	15 Winter	30	+35%	100/15 Summer				28.466	-0.024	0.000	0.78			14.2	OK	
3.003	S7	15 Winter	30	+35%	30/15 Summer				28.361	0.031	0.000	1.22			20.3	SURCHARGED	
3.004	SA2	360 Winter	30	+35%	100/240 Winter				27.741	-0.469	0.000	0.00		454	0.0	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

Simulation Criteria
Areal Reduction Factor 1.000 Hot Start Level (mm) 0 Foul Sewage per hectare (l/s) 0.000 MADD Factor * 10m³/ha Storage 2.000 Flow per Person per Day (l/per/day) 0.000
Hot Start (mins) 0 Manhole Headloss Coeff (Global) 0.500 Additional Flow - % of Total Flow 0.000 Inlet Coeffiecient 0.800
Number of Input Hydrographs 0 Number of Online Controls 2 Number of Offline Controls 0 Number of Storage Structures 2 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details
Rainfall Model FEH Site Location GB 564944 172977 TQ 64944 72977 Cv (Summer) 0.750
FEH Rainfall Version 2013 Data Type Point Cv (Winter) 0.840
Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status ON
Analysis Timestep 2.5 Second Increment (Extended) DVD Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 2, 10, 30, 100
Climate Change (%) 0, 0, 35, 45

										Water	Surcharged	Flooded	Half Drain				Pipe		
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Time	Flow		Level		
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status	Exceeded		
1.000	RE1.1	15 Winter	100	+45%					31.414	-0.086	0.000	0.37			7.0		OK		
1.001	S1	15 Winter	100	+45%					31.186	-0.084	0.000	0.40			13.4		OK		
2.000	RE2.1	15 Winter	100	+45%					30.986	-0.084	0.000	0.40			7.6		OK		
1.002	S2	15 Winter	100	+45%					30.595	-0.075	0.000	0.49			29.7		OK		
1.003	S3	15 Winter	100	+45%	30/15 Summer				29.697	0.347	0.000	1.58			32.6	SURCHARGED			
1.004	SA1	480 Winter	100	+45%	100/360 Winter				29.130	0.030	0.000	0.00		550	0.0	SURCHARGED			
3.000	S4	15 Winter	100	+45%					28.821	-0.079	0.000	0.45			8.4		OK		
3.001	S5	15 Winter	100	+45%					28.700	-0.060	0.000	0.37			11.7		OK		
3.002	S6	15 Winter	100	+45%	100/15 Summer				28.661	0.171	0.000	1.08			19.6	SURCHARGED			
3.003	S7	15 Winter	100	+45%	30/15 Summer				28.461	0.131	0.000	1.70			28.2	SURCHARGED			
3.004	SA2	480 Winter	100	+45%	100/240 Winter				28.238	0.028	0.000	0.00		482	0.0	SURCHARGED			

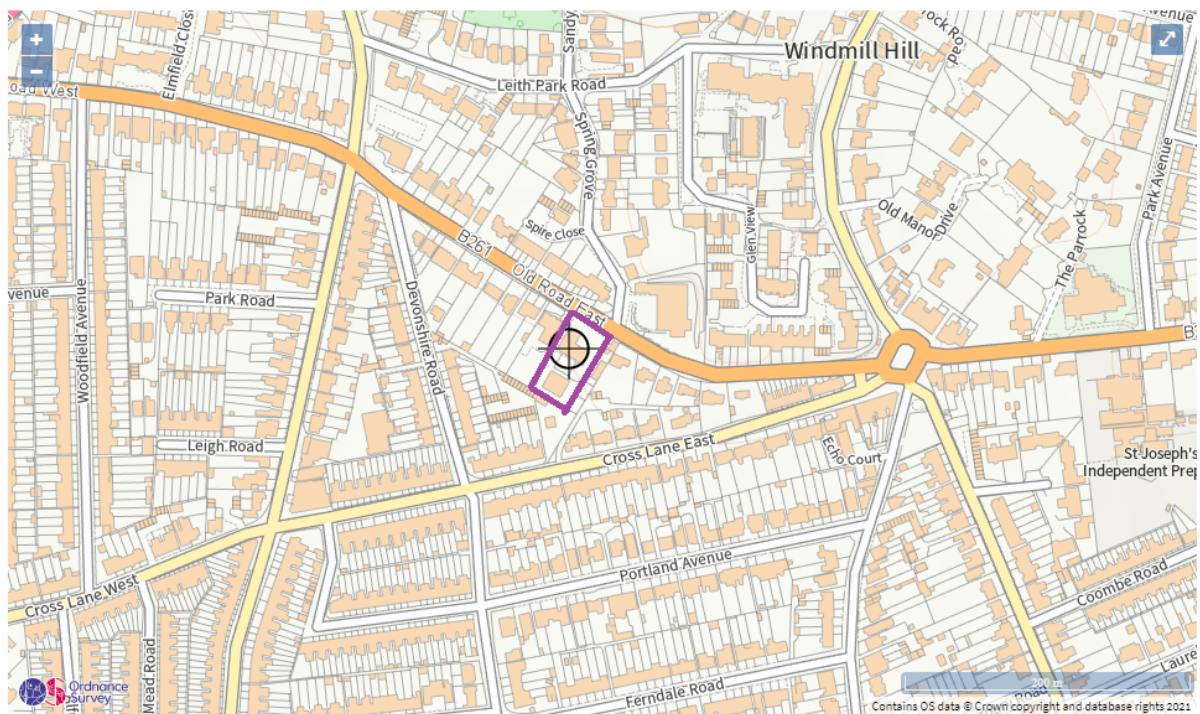
APPENDIX 6.4 FLOOD RISK FROM RIVERS OR SEA

Flood risk

Extent of flooding

Location

Enter a place or postcode



Extent of flooding from rivers or the sea

● High
 ● Medium
 ● Low
 ● Very low
 ⊕ Location you selected

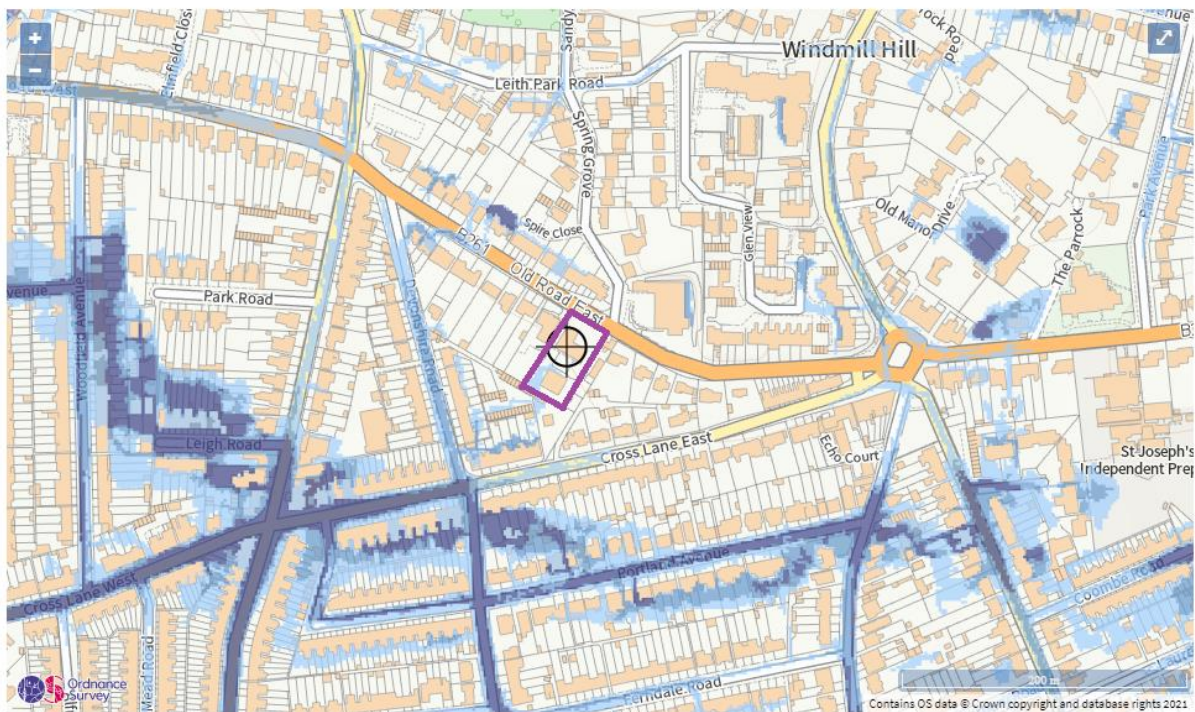
APPENDIX 6.5 FLOOD RISK FROM SURFACE WATER

Flood risk

Extent of flooding

Location

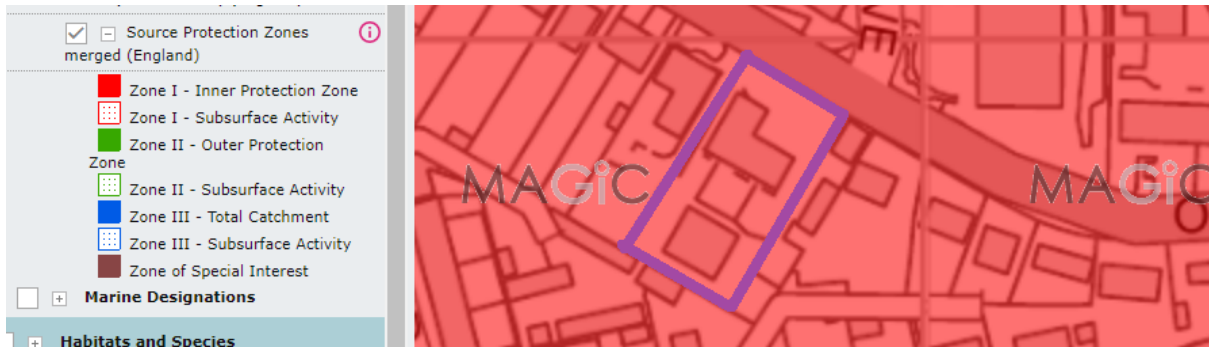
Enter a place or postcode



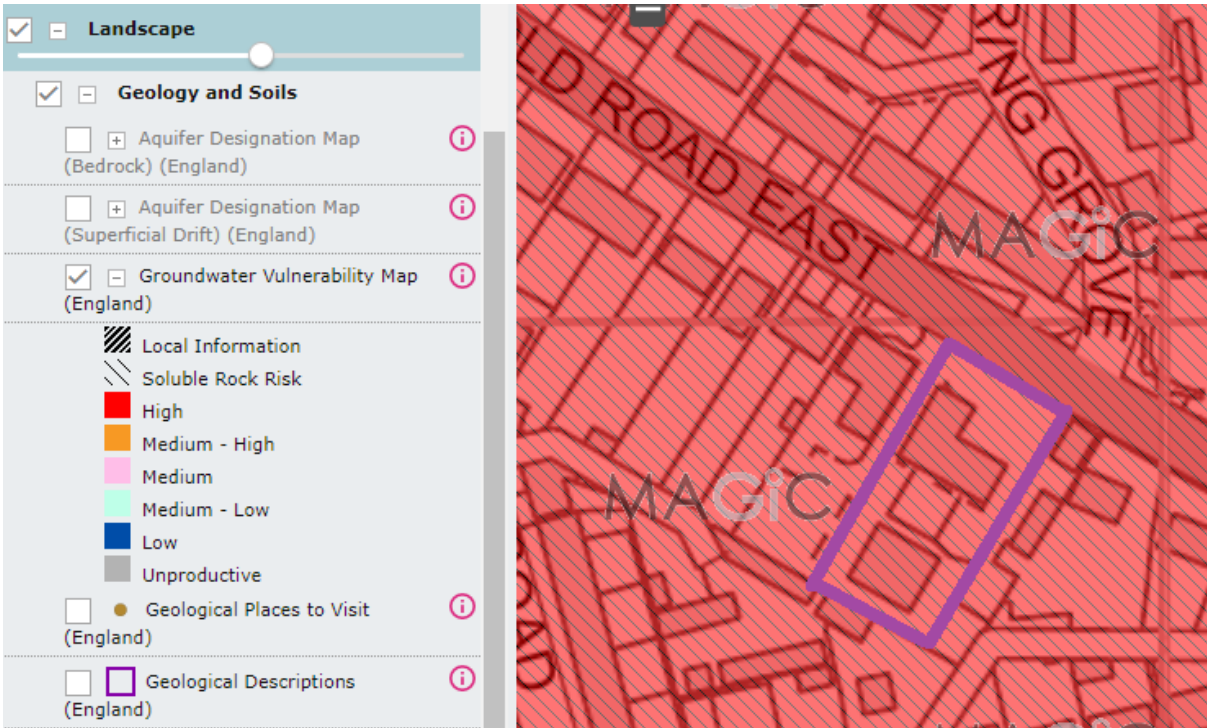
Extent of flooding from surface water

● High
 ● Medium
 ● Low
 Very low
 ⊕ Location you selected

APPENDIX 6.6 GROUNDWATER SOURCE PROTECTION



APPENDIX 6.7 GROUNDWATER VULNERABILITY



APPENDIX 6.8 FLOOD MAP FOR PLANNING

Flood map for planning

Your reference
21-080

Location (easting/northing)
564965/172983

Created
27 Sep 2021 10:56

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

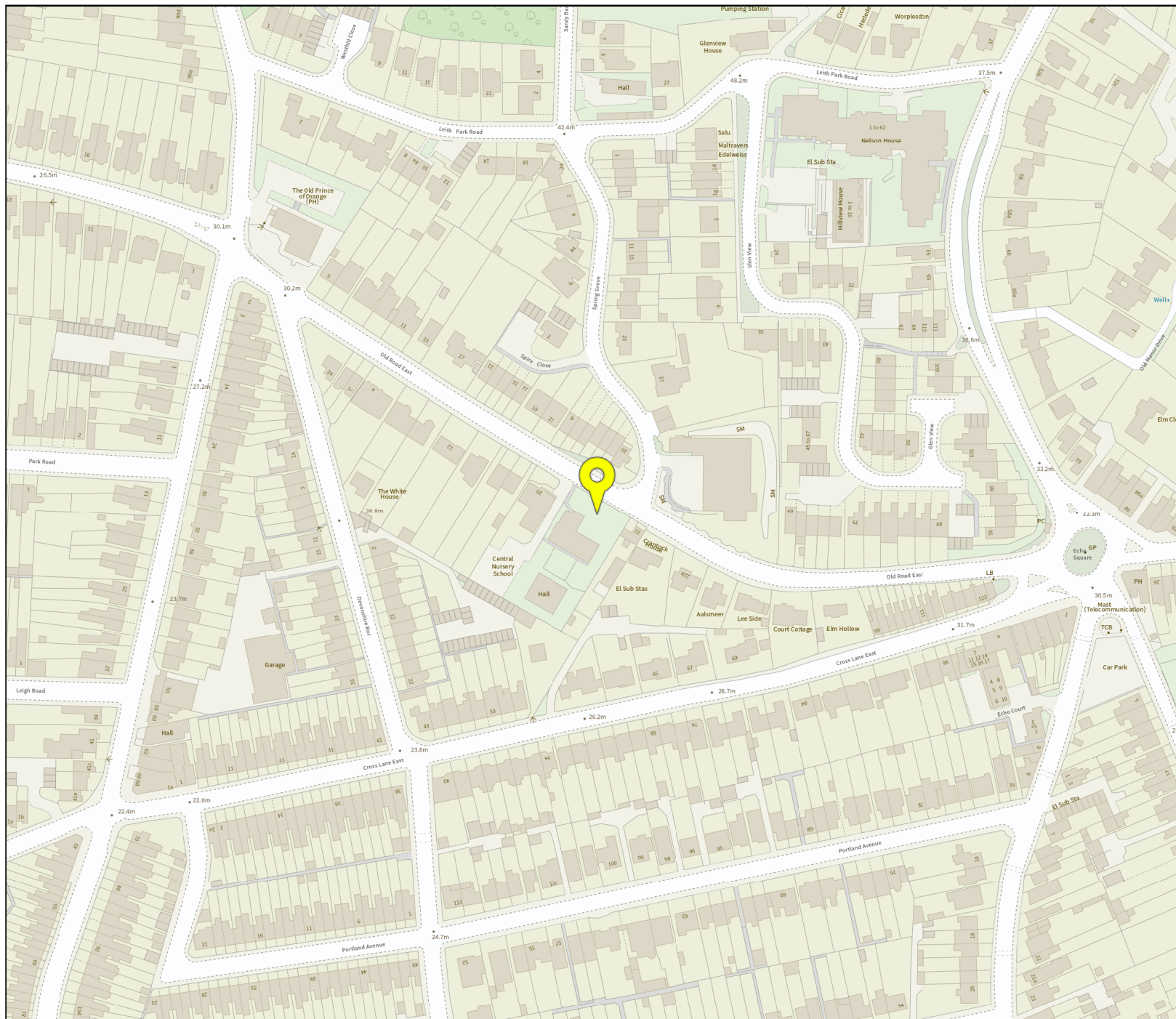
Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2021 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>



Flood map for planning

Your reference

21-080

Location (easting/northing)

564965/172983

Scale

1:2500

Created

27 Sep 2021 10:56



Selected point



Flood zone 3



Flood zone 3: areas benefitting from flood defences



Flood zone 2



Flood zone 1



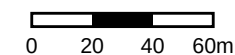
Flood defence



Main river



Flood storage area



APPENDIX 6.9 IN SITU SOAKAGE TESTING RESULTS

SOIL INFILTRATION RATE

DT05-0915



The Gate House | Bays 2&3 Pattenden Lane
Marden | Tonbridge | Kent | TN12 9QS
Tel: 01732 617555
Email: mail@hodel.uk

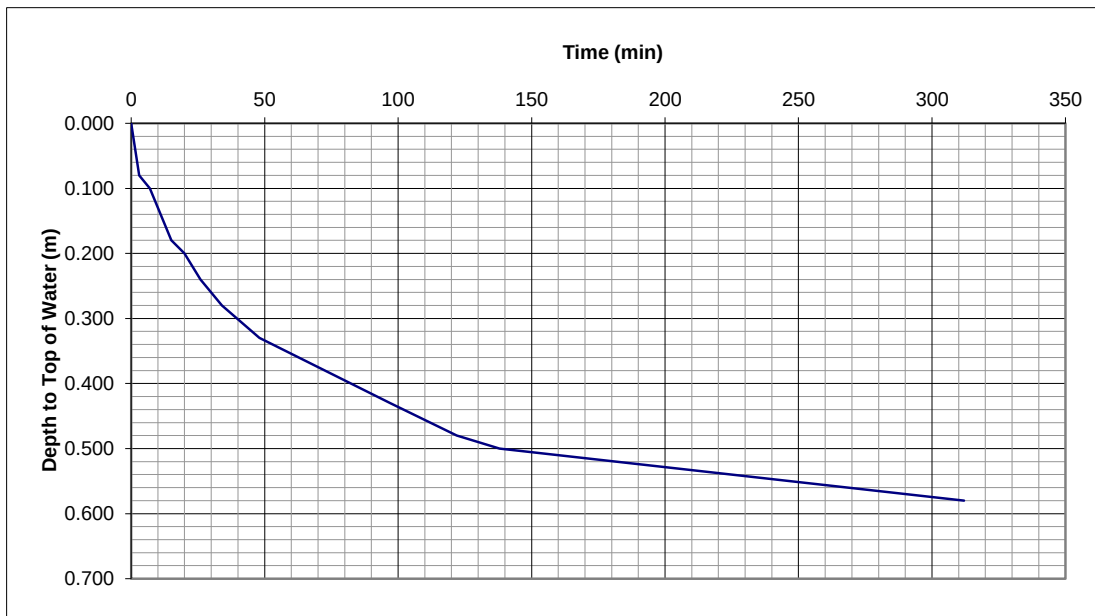
Project No: **21-080** Sheet No. SA1
Made By: **RR** Revision: -
Date: **24/07/2023** Project: Milton Mount

SA1 - Location

Length (m):	1.50	Depth at 75% Full (m):	0.15
Width (m):	0.60	Time at 75% Full (mins.):	11.50
Water Depth (m):	0.58		
Void Ratio:	1.00	Depth at 25% Full (m):	0.44
		Time at 25% Full (mins.):	99.50

V_{p75-25} :	0.26
a_{p50} :	2.12
t_{p75-25} :	88.00

f: 2.33E-05 m/s



SOIL INFILTRATION RATE

DT05-0915



The Gate House | Bays 2&3 Pattenden Lane
Marden | Tonbridge | Kent | TN12 9QS
Tel: 01732 617555
Email: mail@hodel.uk

Project No: **21-080** Sheet No. SA2
Made By: **RR** Revision: -
Date: **24/07/2023** Project: Milton Mount

SA2 - Location

Length (m):	1.60	Depth at 75% Full (m):	0.24
Width (m):	0.60	Time at 75% Full (mins.):	12.46
Water Depth (m):	0.97		
Void Ratio:	1.00		

Depth at 25% Full (m):	0.73
Time at 25% Full (mins.):	104.25

V_{p75-25} :	0.47
----------------	------

a_{p50} :	3.09
-------------	------

t_{p75-25} :	91.79
----------------	-------

f :	2.73E-05 m/s
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