COAST
CONSULTING ENGINEERS

Holmrook

Flood Risk Assessment and Drainage Strategy

Issue Date:
30 May 2025

Report Number:
25049 - 01

Client:
Genesis Homes

Revision:
A

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Revision	Date	Comments	Prepared by	Checked by
A	30.05.2025	Initial issue	RH	PL

Executive Summary

Site Location	The proposed development is located west of Holmrook and north of B5344, nearest postcode CA19 1UG
Site Proposals	Construction of 21 residential dwellings and associated infrastructure.
Ground Conditions	British Geological Society (BGS) maps have been reviewed and show that the site is likely to be underlain by a mixture of sands, gravels, silts and clays.
Nearest Watercourse	The nearest named watercourse is the River Irt located 550m to the south of the site.
Nearest Surface Water Sewer	None within the vicinity of the site.
Nearest Foul Water Sewer	An existing foul water sewer is located approximately 40m to the east of the site boundary
Nearest Combined Sewer	An existing combined water sewer is located approximately 100m to the east of the site boundary
Flood Zone	EA flood maps indicate that the development boundary is located entirely within an area classified as a **Flood Zone 1**.
Surface Water Flooding	Risk of surface water flooding is **low**
Ground Water	The risk of flooding due to ground water is **low**.
Surface Water Discharge Rate	Surface water should be discharged using infiltration techniques for all events up to and including the 100 year +50% climate change.
SUDS	Infiltration basin, soakaways and permeable paving.

The above summary should not be used in isolation and reference should be made the full report.

1. Introduction

Coast Consulting Engineers have been commissioned by Genesis Homes to assess the flood risk associated with a proposed development on land to the west of Holmrook, CA19 1UG. This Flood Risk Assessment is reviewed in accordance with the National Planning Policy Framework (NPPF) for Development and Flood Risk. In conjunction with assessing the site for flood risk a proposed drainage strategy has been prepared.

This site-specific Flood Risk Assessment (FRA) has been undertaken to determine the risk of flooding to the proposed development from all sources in accordance with the National Planning Policy Framework (NPPF) and to assess the flood risk to others as a result of the development. The assessment will recommend how the risk can be managed in line with planning policy requirements.

One of the key aims of the National Planning Policy Framework (NPPF) is to ensure that flood risk is considered at all stages of the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas at highest risk. Where new development is necessary in such areas, the policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.

1.1 National Planning Policy Framework (NPPF)

The NPPF requires that:

- A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account the vulnerability of its users, without increasing flood risk elsewhere, and where possible, will reduce flood risk overall.
- A site-specific flood risk assessment is required for proposals greater than 1 ha in size in a Flood Zone 1; all proposals for new development in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as identified in the Strategic Flood Risk Assessment).

The following definitions for flood zones are derived from NPPF:

FLOOD ZONE 1:

This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).

FLOOD ZONE 2:

This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.

FLOOD ZONE 3:

This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

In addition to the risk of flooding from rivers or sea, consideration must also be given to surface water flooding, flooding due to ground water and flooding from artificial sources such as sewer failure or overtopping of reservoirs.

2. Site location, Existing Topography and Proposals

2.1 Site Location

The proposed development is located west of Holmrook and north of B5344, nearest postcode CA19 1UG. The site boundary excluding areas of public open space, measures approximately 1.33 Ha and consists entirely of greenfield land.

The site location is indicated in figure 2.11 below.

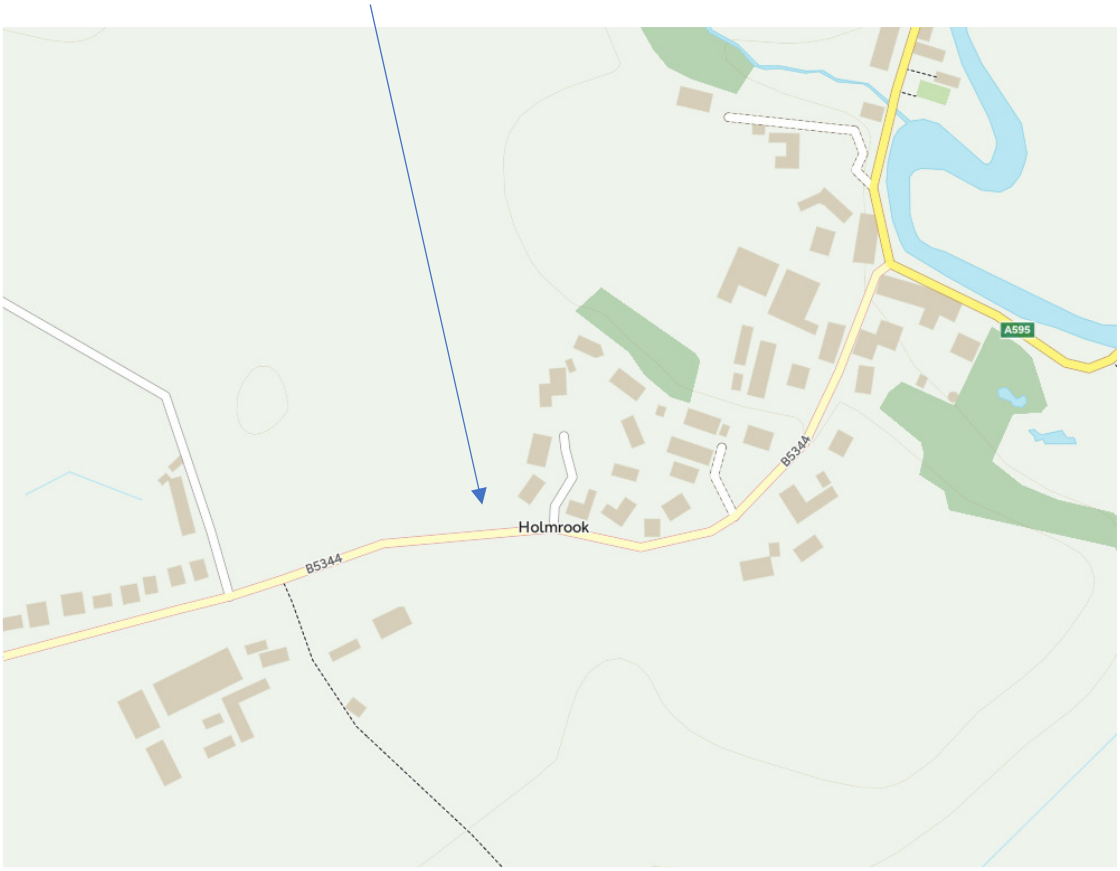


Figure 2.11 – Site location Plan.

2.2 Topography

Lidar data has been obtained, which shows slopes across the site, a high point is located around the northern boundary at c.26.00m AOD, falling south at c.22.50m AOD at the southern boundary.

Lidar data contours can be found in Appendix A.

The surrounding area is developed as follows:

North: Agricultural land
East: Residential units
South: Highway and agricultural land
West: Agricultural land

Figure 2.21 below, extracted from Google maps shows the existing site.

Figure 2.21 – Satellite image of existing site.

2.3 Existing sewers and watercourses

There are no existing sewers within the site boundary. An existing foul water sewer is located approximately 40m to the east of the site boundary and a combined sewer located approximately 100m to the east of the boundary. There are no surface water sewers located within the vicinity of the site.

There are no watercourses located within the vicinity of the site. The nearest named watercourse is the River Irt located 550m to the south of the site.

Please refer to the sewer records and watercourse locations contained in figure 2.31 below and Appendix B for further information.

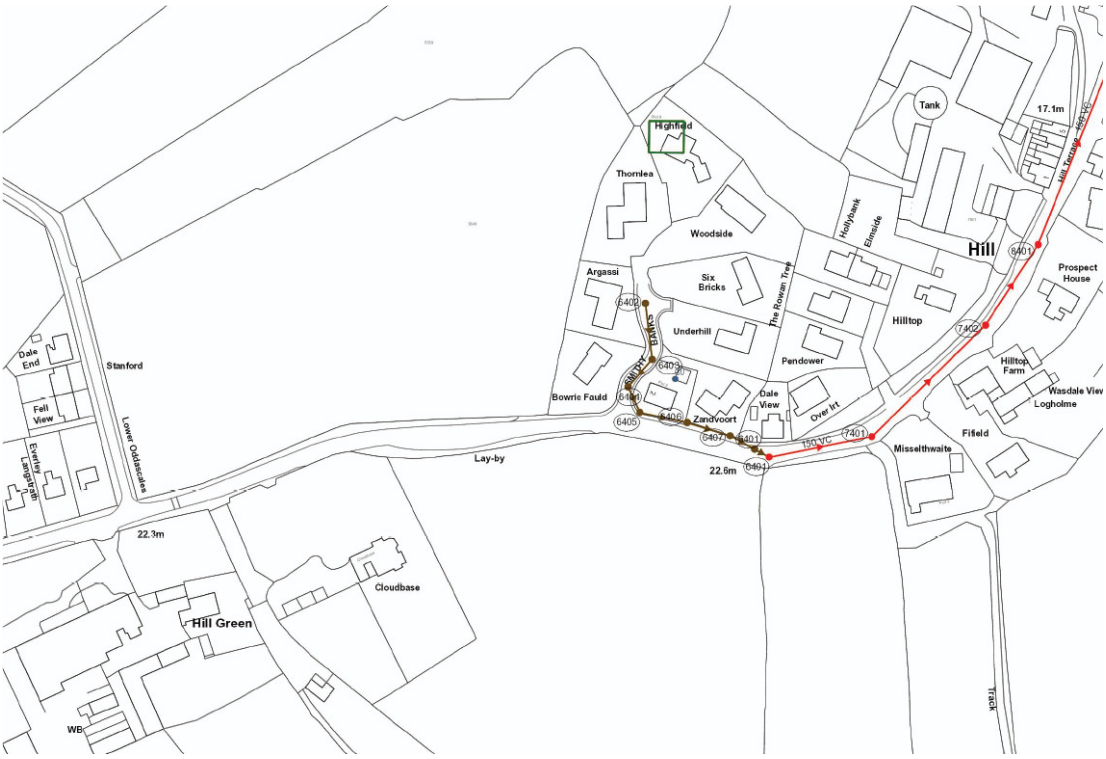


Figure 2.31 – Sewer records.

2.4 Ground conditions

A ground investigation report has not yet been completed for the development. British Geological Society (BGS) maps have been reviewed and show that the site is likely to be underlain by a mixture of sands, gravels, silts and clays.

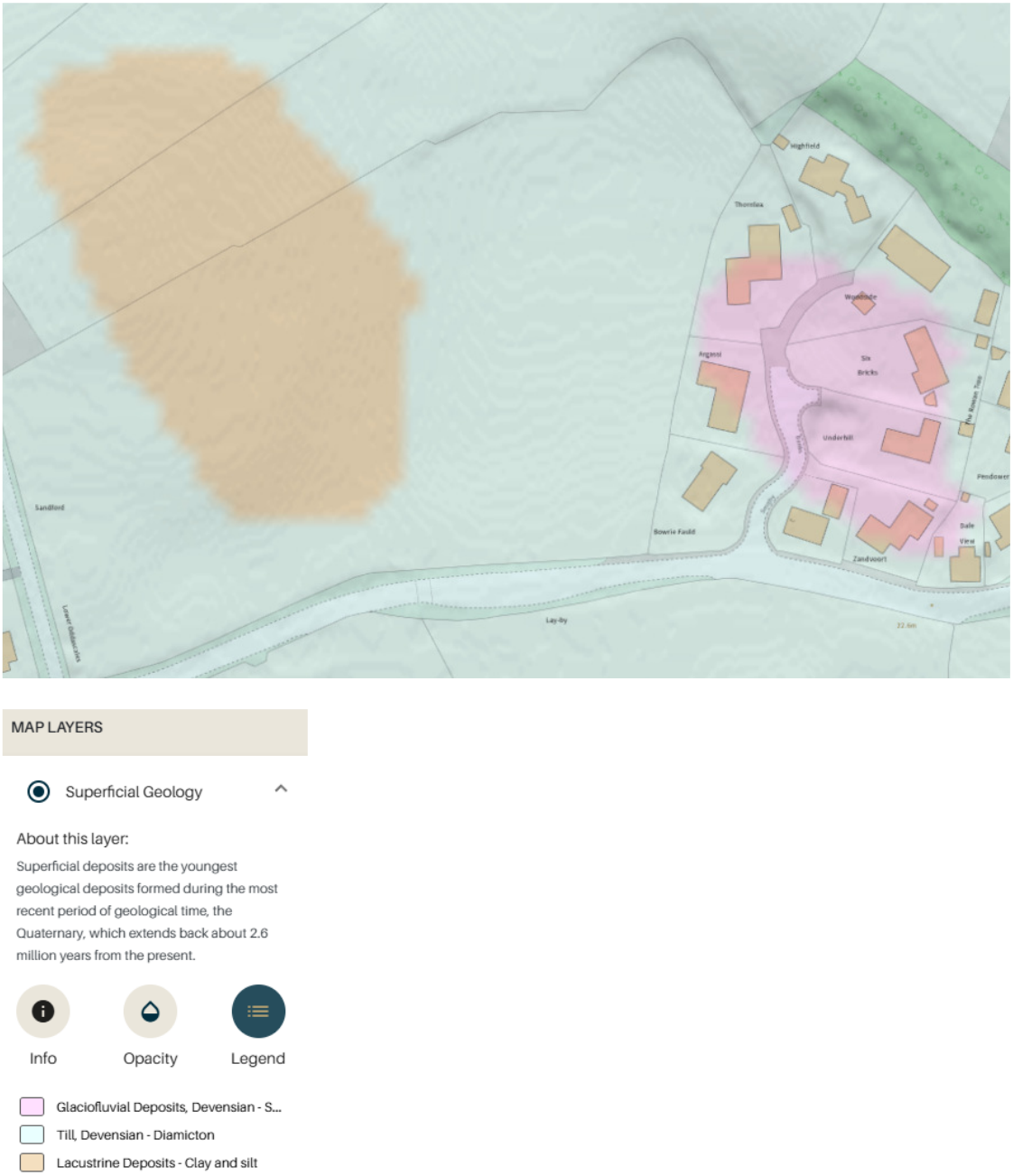


Figure 2.41 – BGS maps – Expected Superficial Geology.

2.5 Development Proposals

A copy of the proposed architectural site layout comprising of a residential development of 21 units and associated infrastructure can be found in Appendix B. An extract is also shown below in figure 2.51.

Figure 2.51 – Development proposals.

3. Potential Sources of Flooding and Proposed Mitigation

As required by the National Planning Policy Framework (NPPF) and Technical Guidance to the NPPF, each potential source of flooding needs to be considered; rivers and sea, land, groundwater, sewers and artificial sources (such as reservoirs and canals). Consideration also needs to be given to the flood risk vulnerability classification for this type of development.

3.1 Flood Zone Mapping

Environment Agency flood maps have been acquired to assist with this assessment (Updated March 2025). The flood maps indicate that the development boundary is located entirely within an area classified as a **Flood Zone 1**. Land located within a flood zone 1 is defined as having less than a 1 in 1,000 annual probability of river flooding (low risk). Refer to the extract below which identifies the extent of flooding from rivers and sea, both within and in proximity to the development site. The site is not considered to be at risk of flooding from rivers or sea.

Datasets:
Rivers and sea without defences
Including cliamte change
Rivers and sea 1 in 1000

Figure 3.11 – Flood zone map.

3.2 Flood Risk Vulnerability Classification

Table 2 of the Technical Guidance to the National Planning Policy Framework states the following with respect to flood risk vulnerability classification.

3.2.1 More vulnerable

- Hospitals.
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- **Buildings used for dwelling houses**, student halls of residence, drinking establishments, nightclubs and hotels.
- Non–residential uses for health services, nurseries and educational establishments.
- Landfill and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan

Table 3 of the Technical Guidance to the National Planning Policy Framework states the following with respect to appropriate land uses:

Table 3: flood risk vulnerability and flood zone 'compaibility'

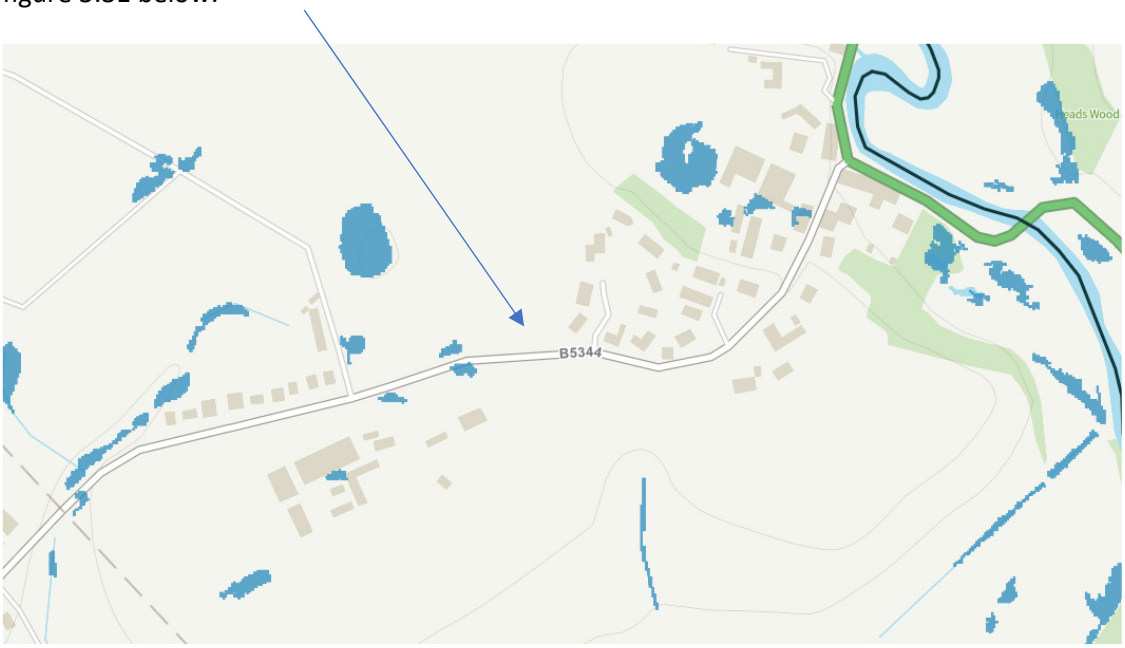
Flood Risk Vulnerability Classification (See Table 2)	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception Test required	✓	✓
Zone 3a	Exception Test required	✓	x	Exception Test required	✓
Zone 3b functional floodplain	Exception Test required	✓	x	x	x

Key: ✓ Development is appropriate.
X Development should not be permitted.

An exception test will not be required in this instance as development is located outside of a flood zone 2 or flood zone 3.

3.3 Surface Water Flood Risk

Surface water flood risk mapping shows the site is at **low** risk of surface water flooding. See figure 3.31 below.



Datasets:
Surface water
Annual likelyhood of flooding = 1 in 1000

Figure 3.31 – Surface Water flood risk map.

3.4 Ground Water Flooding

Flooding due to ground water occurs when the levels of water below the ground rise and emanate above finished ground level.

Long term flood risk amps, published by the government, state that flooding from ground water is unlikely in this area.

Based upon the information outlined above the risk of flooding due to ground water rise can be considered as **low** throughout the site.

3.5 Sewer Flooding

Sewer record drawings show existing foul and combined sewers are present to the east of the development site. Due to the relativley sloping topography, any flooding from existing sewers would trend away from proposed development. Risk to the develoment from sewer flooding is considered **low.**

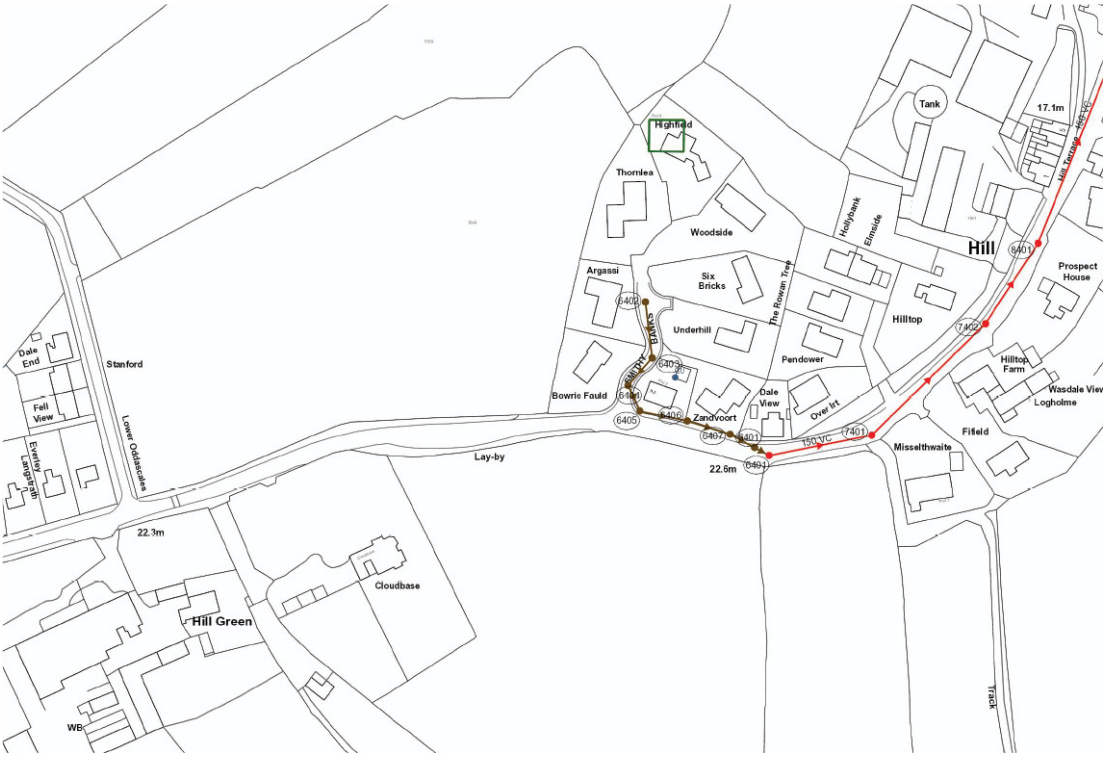


Figure 3.51 - Sewer Record Drawing.

3.6 Reservoir Flood Risk

Artificial sources of flood risk such as man-made ponds or reservoirs can cause a potential risk of flooding. The flood map below shows that there is no potential flooding of the site from reservoirs, therefore the risk of flooding due to this source can be deemed **low**.

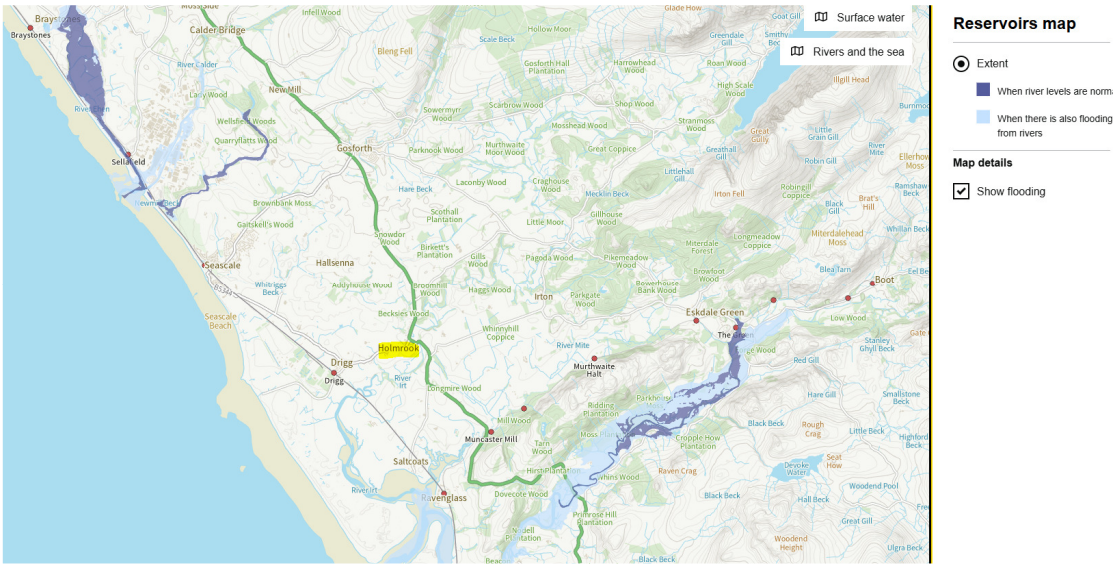


Figure 3.61 – Reservoir flood risk map.

The proposed development is considered appropriate within a Flood Zone 1 in line with the guidance contained within the National Planning Policy Framework for flooding.

4. Surface and Foul Water Disposal

National guidance and regulations including Part H of the Building Regulations provides a hierarchy for surface water disposal as follows:

1. By infiltration
2. To watercourse
3. To surface water sewer
4. To combined sewer

4.1 Infiltration

For infiltration drainage to provide an effective means of dealing with surface water run-off from development, the natural ground needs to be sufficiently permeable. This should be tested and proven by means of intrusive site investigation including soak-away testing to determine the natural soil's permeability. In addition, soak aways need to be positioned sufficient distance from buildings and roads in line with building regulations. At the time of writing a site investigation has not been undertaken.

Although a site investigation has not yet been undertaken for proposed development it is anticipated that soil conditions are likely to be suitable for the use of infiltration techniques.

4.2 Watercourse

Not required.

4.3 Sewer

Not required.

4.4 Proposed Surface Water Drainage

The proposed surface water drainage network will include an online infiltration basin to provide storage for run-off from the proposed impermeable areas up to the 1 in 100-year rainfall event with an allowance of 50% for climate change, and discharge to the ground via infiltration.

Most of the plot surface water drainage will discharge to private plot soakaways. A number of plots will be connected to the main drainage for adoptability reasons. It is intended to offer the main drainage network for adoption by a water authority or NAV.

The required volume of surface water attenuation in the basin has been calculated to be $254m^3$ based on an infiltration rate of 1×10^{-5}.

A detailed drainage strategy can be found in Appendix D, along with Hydraulic calculations for the proposed drainage network.

Hydraulic calculations are based on the following criteria:

- Climate change allowance of 50% applied to account for current predicted increase in peak rainfall intensity.
- 10% urban creep applied to plot impermeable areas.
- Volumetric runoff coefficient (CV value) of 1.0 of measured impermeable areas.
- Storm duration up to 1440 minutes analysed.

4.5 SuDS Techniques

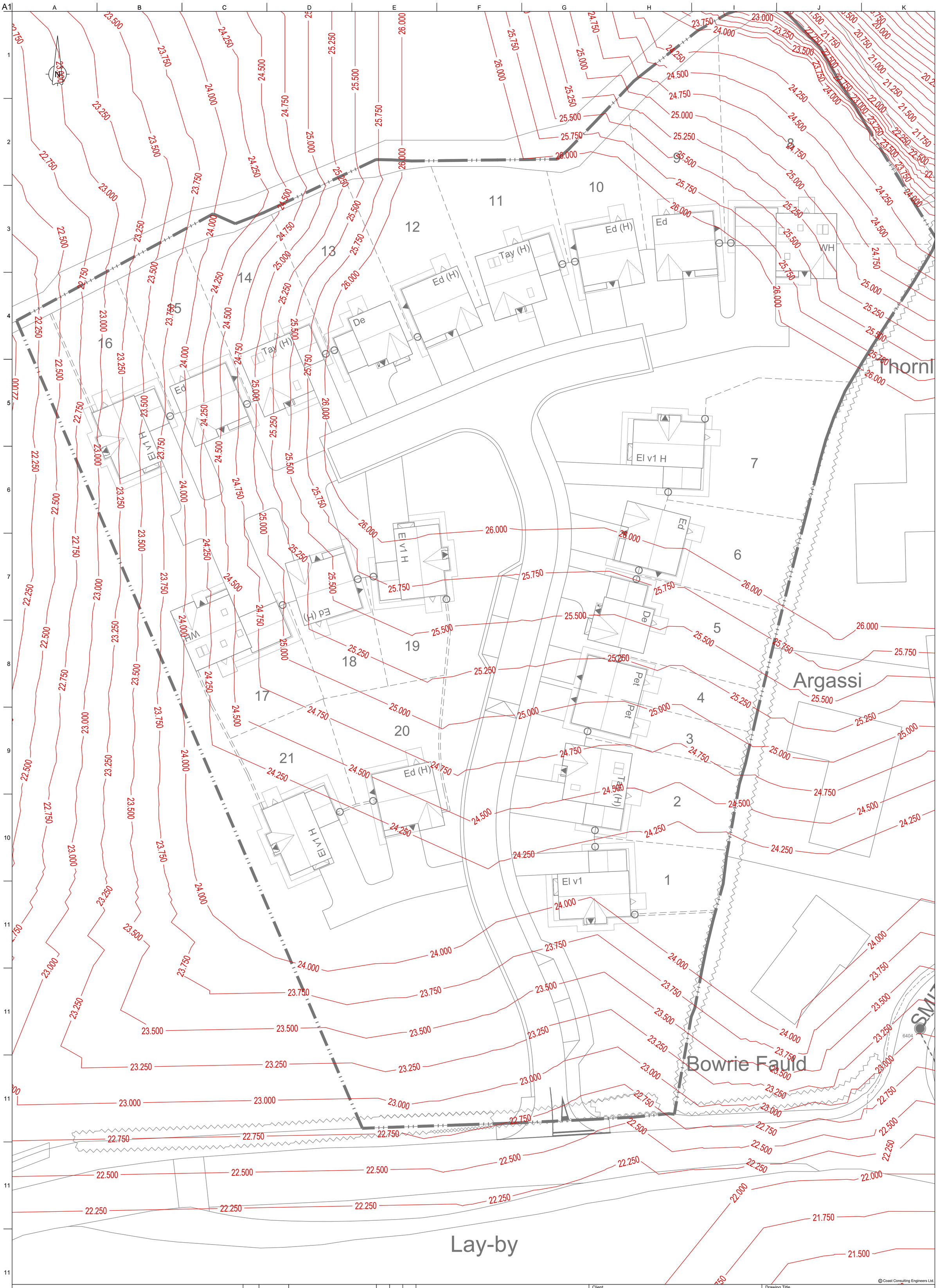
In line with National Planning Policy, SuDS techniques are to be utilised as part of the design of the surface water network. The appliable techniques and the benefits that they bring to the development are outlined below. Proposed basin details are included in Appendix F.

- Infiltration basin: An online infiltration basin will be installed to contain flows up to and including the 100-year event with a 50% allowance for climate change.
- Peak flow control: Permeable paving will be utilised on all driveways to collect and discharge surface water into the sub soils.

4.6 Proposed Foul Water Drainage

There are no foul or combined sewers within the site boundary. A foul sewer is located east of the development boundary. It is intended to offer the main drainage network for adoption by a water authority or NAV. A proposed foul water drainage layout is included in Appendix D.

Appendix A – Lidar Data



Issue	Date	Description	By	Chkd	Appd
P1	30.05.25	Preliminary Issue	AS	RH	RH

COAST CONSULTING ENGINEERS

7 Silverton Court, Northumberland Business Park, NE23 7RY
0191 5977879

Client: GENISIS HOMES

Job Title: HOLMROOK

Drawing Title: LIDAR DATA

Scale at A1: 1:250

Drawing Status: **PRELIMINARY**

Job No: 25049

Drawing No: 100

Issue: P1

Do not scale

Appendix B –
Proposed Layout

NOTES AND AMENDMENTS

This drawing is copyright ©. Figured dimensions are to be followed in preference to scaled dimensions and particulars are to be taken from the actual work where possible. Any discrepancy must be reported to the architect immediately and before proceeding.

REVISIONS

Rev	Description	Drawn	Date

ASHWOOD
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Purpose:
Planning

Client:
Genesis Homes

Project:
Holmrook

Title:
Colour Layout

Scale:	Sheet Size:	Drawn:	Date:
1/500	A2	TH	05/24
Project No:	Drawing No:		Revision:
2324	013		-

Appendix C –
Greenfield Run Off Estimation

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

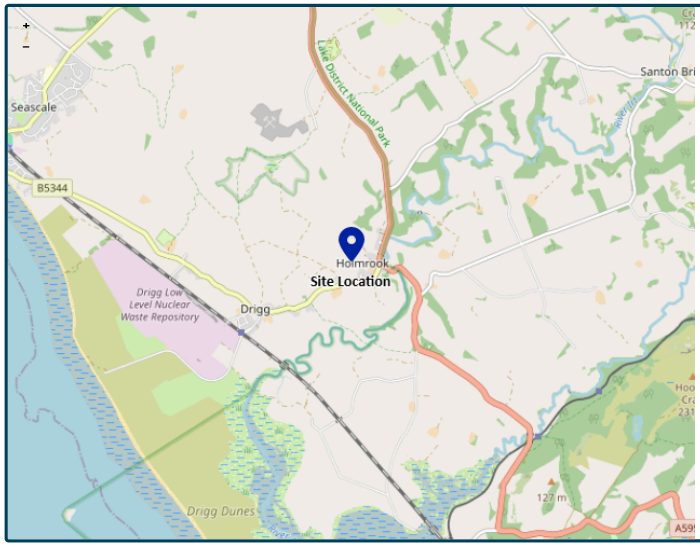
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	29/05/2025
Calculated by	Richard Hall
Reference	Holmrook
Model version	2.0.1

Location

Site name	Holmrook
Site location	



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Site easting	307533
Site northing	499466

Site details

Total site area (ha)	1.33	ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	1120	mm	1120
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4
SPR	0.47		
QBar (IH124) (l/s)	11.1	l/s	

Growth curve factors

	My value	Map value
Hydrological region	10	10
1 year growth factor	0.87	
2 year growth factor	0.93	
10 year growth factor	1.38	
30 year growth factor	1.7	
100 year growth factor	2.08	
200 year growth factor	2.37	

Results

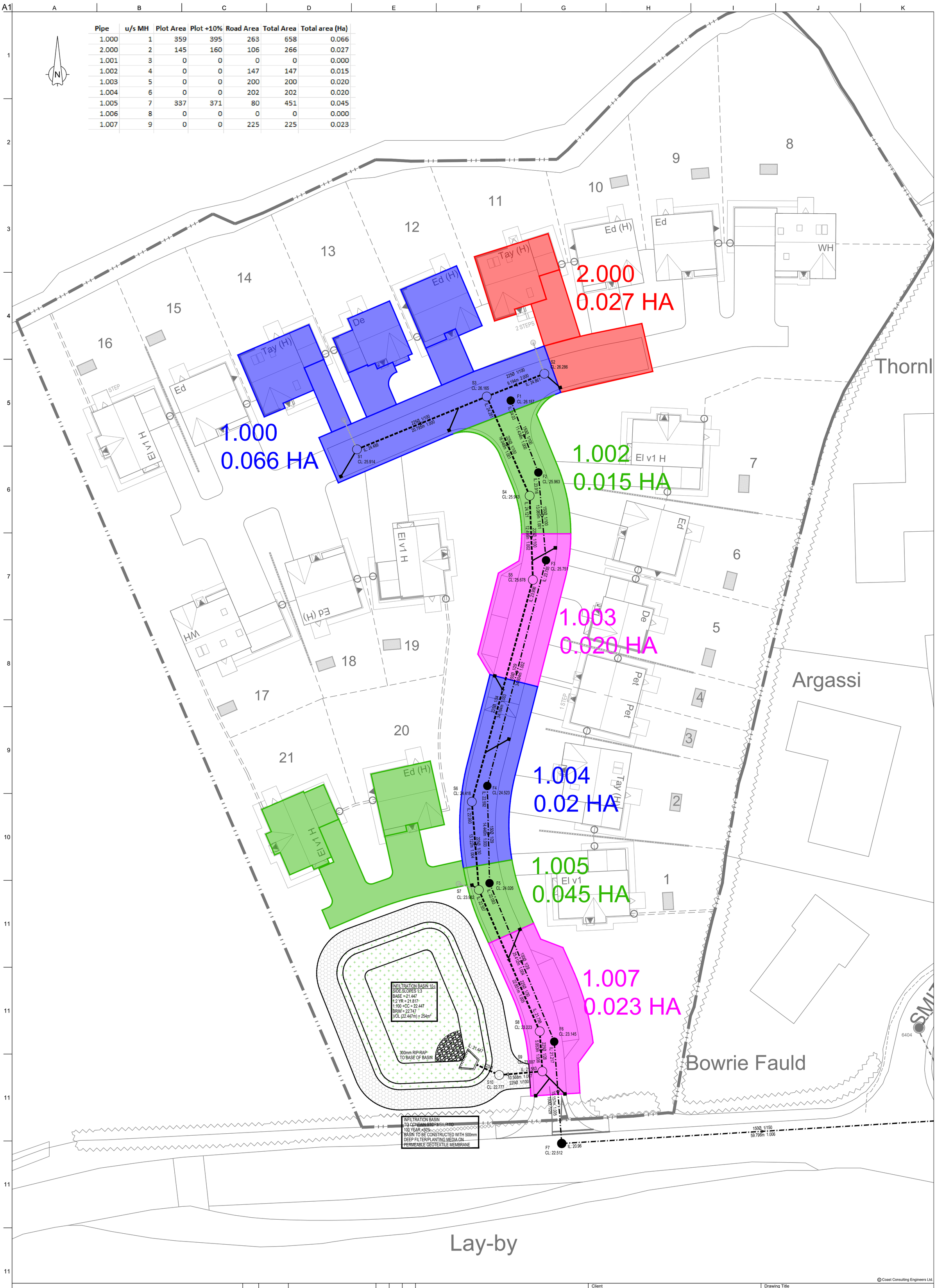
Method	IH124	
Flow rate 1 year (l/s)	9.7	l/s
Flow rate 2 year (l/s)	10.4	l/s
Flow rate 10 years (l/s)	15.4	l/s
Flow rate 30 years (l/s)	18.9	l/s
Flow rate 100 years (l/s)	23.1	l/s
Flow rate 200 years (l/s)	26.4	l/s

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.0.1) developed by HR Wallingford and available at uksuds.com (https://www.uksuds.com/). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Appendix D –
Proposed Drainage Strategy Layout and surface water calculations

Pipe	u/s MH	Plot Area	Plot +10%	Road Area	Total Area	Total area (Ha)
1.000	1	359	395	263	658	0.066
2.000	2	145	160	106	266	0.027
1.001	3	0	0	0	0	0.000
1.002	4	0	0	147	147	0.015
1.003	5	0	0	200	200	0.020
1.004	6	0	0	202	202	0.020
1.005	7	337	371	80	451	0.045
1.006	8	0	0	0	0	0.000
1.007	9	0	0	225	225	0.023



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Issue	Date	Description	By	Chkd	Appd
P1	30.05.25	Preliminary Issue	AS	RH	RH

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7 Silverton Court, Northumberland Business Park, NE23 7RY
0191 5977879

Client: GENISIS HOMES

Job Title: HOLMROOK

Drawing Title: IMPERMEABLE AREAS

Scale at A1: 1:250

Drawing Status: **PRELIMINARY**

Job No: 25049

Drawing No: 00

Issue: P1

Do not scale

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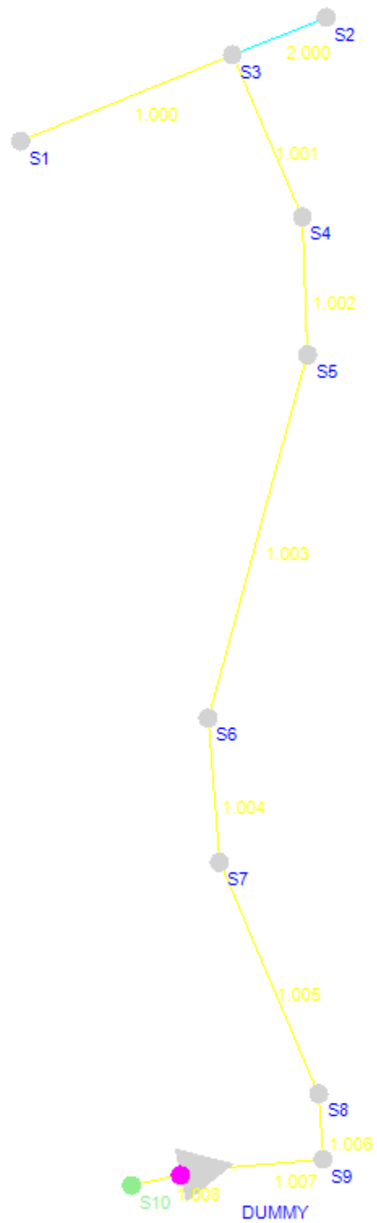
Suite 6, Vita House Fish Quay North Shields, NE30 1JA		
Date 30/05/2025 08:30 File Holmrook sw.mdx	Designed by rh Checked by	
Innovyze	Network 2020.1.3	



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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Surface Network 1

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	Auto Design
1.000	20.795	0.208	100.0	0.066	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	9.195	0.092	99.9	0.027	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	16.046	0.160	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	12.499	0.125	100.0	0.015	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	34.164	1.003	34.1	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	13.122	0.436	30.1	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	22.851	0.759	30.1	0.045	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	5.953	0.215	27.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.007	10.569	0.106	100.0	0.023	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.008	7.046	0.070	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	45.79	5.27	24.489	0.066	0.0	0.0	0.0	1.31	52.0	8.2
2.000	46.22	5.12	24.861	0.027	0.0	0.0	0.0	1.31	52.0	3.4
1.001	45.21	5.47	24.281	0.093	0.0	0.0	0.0	1.31	52.0	11.4
1.002	44.77	5.63	24.121	0.108	0.0	0.0	0.0	1.31	52.0	13.1
1.003	44.10	5.88	23.996	0.128	0.0	0.0	0.0	2.25	89.4	15.3
1.004	43.86	5.97	22.993	0.148	0.0	0.0	0.0	2.39	95.2	17.6
1.005	43.46	6.13	22.557	0.193	0.0	0.0	0.0	2.39	95.2	22.7
1.006	43.36	6.17	21.798	0.193	0.0	0.0	0.0	2.50	99.2	22.7
1.007	43.03	6.31	21.583	0.216	0.0	0.0	0.0	1.31	52.0	25.2
1.008	42.81	6.40	21.477	0.216	0.0	0.0	0.0	1.31	52.0	25.2

Free Flowing Outfall Details for Surface Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008	S10	23.101	21.406	0.000	1350	0

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Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.203		

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Online Controls for Surface Network 1

Pump Manhole: DUMMY, DS/PN: 1.008, Volume (m³): 1.5

Invert Level (m) 21.477

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.0000	0.900	0.0000	1.700	0.0000	2.500	0.0000
0.200	0.0000	1.000	0.0000	1.800	0.0000	2.600	0.0000
0.300	0.0000	1.100	0.0000	1.900	0.0000	2.700	0.0000
0.400	0.0000	1.200	0.0000	2.000	0.0000	2.800	0.0000
0.500	0.0000	1.300	0.0000	2.100	0.0000	2.900	0.0000
0.600	0.0000	1.400	0.0000	2.200	0.0000	3.000	0.0000
0.700	0.0000	1.500	0.0000	2.300	0.0000		
0.800	0.0000	1.600	0.0000	2.400	0.0000		

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Storage Structures for Surface Network 1

Infiltration Basin Manhole: DUMMY, DS/PN: 1.008

Invert Level (m) 21.477 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.03600 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	167.0	1.000	354.0	1.300	421.0

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.206
Region England and Wales Cv (Summer) 1.000
M5-60 (mm) 18.700 Cv (Winter) 1.000

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 2
Climate Change (%) 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Summer	2	+0%					24.564
2.000	S2	15 Summer	2	+0%					24.910
1.001	S3	15 Summer	2	+0%					24.373
1.002	S4	15 Summer	2	+0%					24.220
1.003	S5	30 Summer	2	+0%					24.072
1.004	S6	30 Summer	2	+0%					23.076
1.005	S7	30 Summer	2	+0%					22.649
1.006	S8	30 Summer	2	+0%					21.906
1.007	S9	1440 Summer	2	+0%	2/1440 Summer				21.819
1.008	DUMMY	1440 Summer	2	+0%	2/180 Summer				21.817

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.150	0.000	0.24			11.2	OK	
2.000	S2	-0.176	0.000	0.11			4.6	OK	
1.001	S3	-0.133	0.000	0.34			15.9	OK	

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.002	S4	-0.125	0.000	0.41			18.1	OK	
1.003	S5	-0.149	0.000	0.25			20.9	OK	
1.004	S6	-0.142	0.000	0.29			23.9	OK	
1.005	S7	-0.133	0.000	0.35			30.4	OK	
1.006	S8	-0.116	0.000	0.47			30.6	OK	
1.007	S9	0.012	0.000	0.14			6.1	SURCHARGED	
1.008	DUMMY	0.115	0.000	0.00		706	0.0	SURCHARGED	

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Surface Network 1

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	Auto Design
1.000	20.795	0.208	100.0	0.066	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	9.195	0.092	99.9	0.027	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	16.046	0.160	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	12.499	0.125	100.0	0.015	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	34.164	1.003	34.1	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	13.122	0.436	30.1	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	22.851	0.759	30.1	0.045	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	5.953	0.215	27.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.007	10.569	0.106	100.0	0.023	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.008	7.046	0.070	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	45.79	5.27	24.489	0.066	0.0	0.0	0.0	1.31	52.0	8.2
2.000	46.22	5.12	24.861	0.027	0.0	0.0	0.0	1.31	52.0	3.4
1.001	45.21	5.47	24.281	0.093	0.0	0.0	0.0	1.31	52.0	11.4
1.002	44.77	5.63	24.121	0.108	0.0	0.0	0.0	1.31	52.0	13.1
1.003	44.10	5.88	23.996	0.128	0.0	0.0	0.0	2.25	89.4	15.3
1.004	43.86	5.97	22.993	0.148	0.0	0.0	0.0	2.39	95.2	17.6
1.005	43.46	6.13	22.557	0.193	0.0	0.0	0.0	2.39	95.2	22.7
1.006	43.36	6.17	21.798	0.193	0.0	0.0	0.0	2.50	99.2	22.7
1.007	43.03	6.31	21.583	0.216	0.0	0.0	0.0	1.31	52.0	25.2
1.008	42.81	6.40	21.477	0.216	0.0	0.0	0.0	1.31	52.0	25.2

Free Flowing Outfall Details for Surface Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008	S10	23.101	21.406	0.000	1350	0

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Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.203		

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Online Controls for Surface Network 1

Pump Manhole: DUMMY, DS/PN: 1.008, Volume (m³): 1.5

Invert Level (m) 21.477

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.0000	0.900	0.0000	1.700	0.0000	2.500	0.0000
0.200	0.0000	1.000	0.0000	1.800	0.0000	2.600	0.0000
0.300	0.0000	1.100	0.0000	1.900	0.0000	2.700	0.0000
0.400	0.0000	1.200	0.0000	2.000	0.0000	2.800	0.0000
0.500	0.0000	1.300	0.0000	2.100	0.0000	2.900	0.0000
0.600	0.0000	1.400	0.0000	2.200	0.0000	3.000	0.0000
0.700	0.0000	1.500	0.0000	2.300	0.0000		
0.800	0.0000	1.600	0.0000	2.400	0.0000		

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Storage Structures for Surface Network 1

Infiltration Basin Manhole: DUMMY, DS/PN: 1.008

Invert Level (m) 21.477 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.03600 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	167.0	1.000	354.0	1.300	421.0

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.206
Region England and Wales Cv (Summer) 1.000
M5-60 (mm) 18.700 Cv (Winter) 1.000

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 30
Climate Change (%) 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Summer	30	+0%					24.595
2.000	S2	15 Summer	30	+0%					24.930
1.001	S3	15 Summer	30	+0%					24.415
1.002	S4	15 Summer	30	+0%					24.272
1.003	S5	15 Summer	30	+0%					24.109
1.004	S6	15 Summer	30	+0%					23.118
1.005	S7	15 Summer	30	+0%					22.702
1.006	S8	30 Summer	30	+0%	30/15 Summer				22.140
1.007	S9	1440 Summer	30	+0%	30/15 Summer				22.032
1.008	DUMMY	1440 Summer	30	+0%	30/30 Summer				22.029

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.119	0.000	0.45			21.1	OK	
2.000	S2	-0.156	0.000	0.20			8.7	OK	
1.001	S3	-0.091	0.000	0.65			29.9	OK	

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.002	S4	-0.073	0.000	0.78			34.9	OK	
1.003	S5	-0.112	0.000	0.49			41.3	OK	
1.004	S6	-0.099	0.000	0.58			47.7	OK	
1.005	S7	-0.080	0.000	0.71			62.1	OK	
1.006	S8	0.117	0.000	0.94			61.3	SURCHARGED	
1.007	S9	0.225	0.000	0.22			9.6	SURCHARGED	
1.008	DUMMY	0.328	0.000	0.00		908	0.0	SURCHARGED	

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Surface Network 1

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	Auto Design
1.000	20.795	0.208	100.0	0.066	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	9.195	0.092	99.9	0.027	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	16.046	0.160	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	12.499	0.125	100.0	0.015	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	34.164	1.003	34.1	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	13.122	0.436	30.1	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	22.851	0.759	30.1	0.045	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	5.953	0.215	27.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.007	10.569	0.106	100.0	0.023	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.008	7.046	0.070	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	45.79	5.27	24.489	0.066	0.0	0.0	0.0	1.31	52.0	8.2
2.000	46.22	5.12	24.861	0.027	0.0	0.0	0.0	1.31	52.0	3.4
1.001	45.21	5.47	24.281	0.093	0.0	0.0	0.0	1.31	52.0	11.4
1.002	44.77	5.63	24.121	0.108	0.0	0.0	0.0	1.31	52.0	13.1
1.003	44.10	5.88	23.996	0.128	0.0	0.0	0.0	2.25	89.4	15.3
1.004	43.86	5.97	22.993	0.148	0.0	0.0	0.0	2.39	95.2	17.6
1.005	43.46	6.13	22.557	0.193	0.0	0.0	0.0	2.39	95.2	22.7
1.006	43.36	6.17	21.798	0.193	0.0	0.0	0.0	2.50	99.2	22.7
1.007	43.03	6.31	21.583	0.216	0.0	0.0	0.0	1.31	52.0	25.2
1.008	42.81	6.40	21.477	0.216	0.0	0.0	0.0	1.31	52.0	25.2

Free Flowing Outfall Details for Surface Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008	S10	23.101	21.406	0.000	1350	0

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Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.203		

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Online Controls for Surface Network 1

Pump Manhole: DUMMY, DS/PN: 1.008, Volume (m³): 1.5

Invert Level (m) 21.477

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.0000	0.900	0.0000	1.700	0.0000	2.500	0.0000
0.200	0.0000	1.000	0.0000	1.800	0.0000	2.600	0.0000
0.300	0.0000	1.100	0.0000	1.900	0.0000	2.700	0.0000
0.400	0.0000	1.200	0.0000	2.000	0.0000	2.800	0.0000
0.500	0.0000	1.300	0.0000	2.100	0.0000	2.900	0.0000
0.600	0.0000	1.400	0.0000	2.200	0.0000	3.000	0.0000
0.700	0.0000	1.500	0.0000	2.300	0.0000		
0.800	0.0000	1.600	0.0000	2.400	0.0000		

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Storage Structures for Surface Network 1

Infiltration Basin Manhole: DUMMY, DS/PN: 1.008

Invert Level (m) 21.477 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.03600 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	167.0	1.000	354.0	1.300	421.0

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.206
Region England and Wales Cv (Summer) 1.000
M5-60 (mm) 18.700 Cv (Winter) 1.000

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 100
Climate Change (%) 50

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	30 Summer	100	+50%	100/15 Summer				24.911
2.000	S2	30 Summer	100	+50%					24.960
1.001	S3	30 Summer	100	+50%	100/15 Summer				24.794
1.002	S4	30 Summer	100	+50%	100/15 Summer				24.614
1.003	S5	30 Summer	100	+50%	100/15 Summer				24.425
1.004	S6	30 Summer	100	+50%	100/15 Summer				23.844
1.005	S7	30 Summer	100	+50%	100/15 Summer				23.522
1.006	S8	30 Summer	100	+50%	100/15 Summer				22.678
1.007	S9	1440 Summer	100	+50%	100/15 Summer				22.451
1.008	DUMMY	1440 Summer	100	+50%	100/15 Summer				22.447

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.197	0.000	0.81			38.3	SURCHARGED	
2.000	S2	-0.126	0.000	0.40			17.1	OK	
1.001	S3	0.288	0.000	1.13			52.0	SURCHARGED	

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.002	S4	0.268	0.000	1.31			58.6	SURCHARGED	
1.003	S5	0.204	0.000	0.78			65.5	SURCHARGED	
1.004	S6	0.626	0.000	0.89			73.0	SURCHARGED	
1.005	S7	0.740	0.000	1.05			91.0	SURCHARGED	
1.006	S8	0.655	0.000	1.39			90.9	SURCHARGED	
1.007	S9	0.644	0.000	0.40			17.4	SURCHARGED	
1.008	DUMMY	0.745	0.000	0.00		1202	0.0	SURCHARGED	

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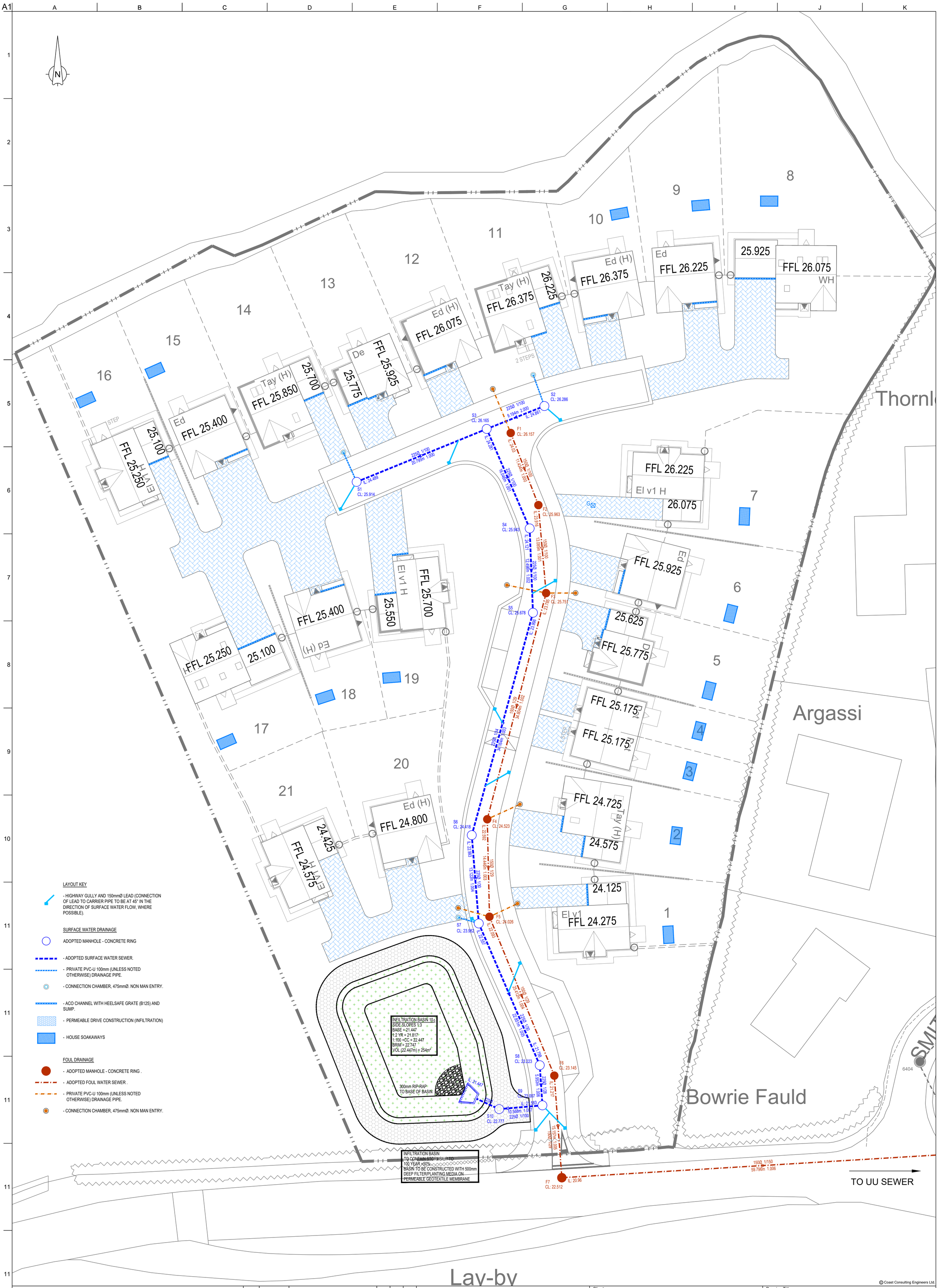

Issue	Date	Description	By	Chkd	Appd
P1	30.05.25	Preliminary Issue	AS	RH	RH

COAST CONSULTING ENGINEERS

7 Silverton Court, Northumberland Business Park, NE23 7RY
0191 5977879

Client: GENISIS HOMES

Job Title: HOLMROOK

Drawing Title: DRAINAGE LAYOUT

Scale at A1: 1:250

Drawing Status: **PRELIMINARY**

Job No: 25049 | Drawing No: 01 | Issue: P1

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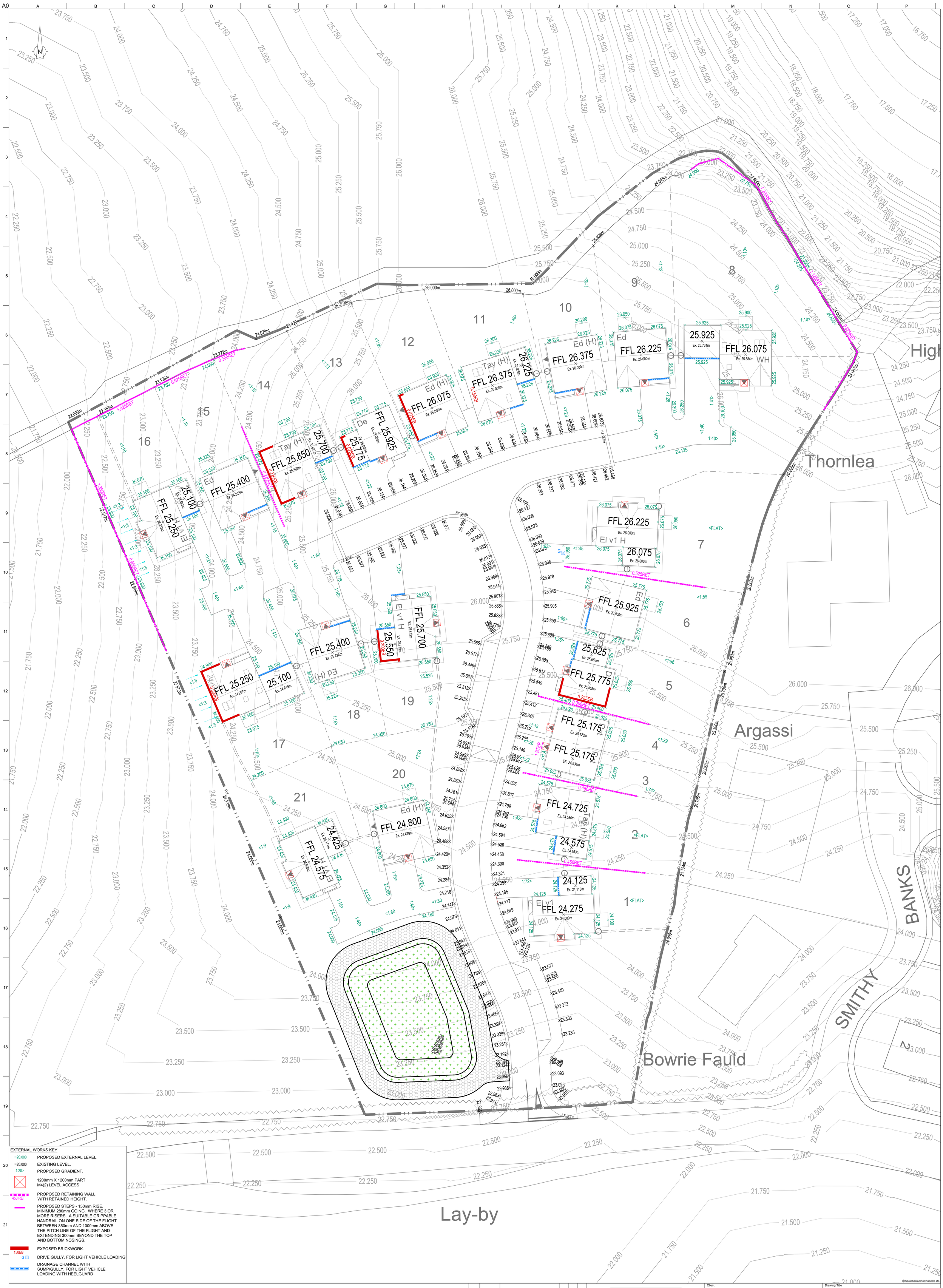
Do not scale



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Issue	Date	Description	By	Chkd	Appd
P1	30.05.25	Preliminary Issue	AS	RH	RH

COAST CONSULTING ENGINEERS

7 Silverton Court, Northumberland Business Park, NE23 7RY
0191 5977879

Client: GENESIS HOMES

Job Title: HOLMROOK

Drawing Title: EXTERNAL WORKS

Scale at A0: 1:200

Drawing Status: PRELIMINARY

Job No: 25049

Drawing No: 31

Issue: P1

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