RIDGE

ROSE AVENUE, GRAVESEND
BELOW GROUND DRAINAGE STRATEGY
REPORT

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BELOW GROUND DRAINAGE STRATEGY REPORT

Prepared for

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RIDGE

VERSION CONTROL

VERSION	DATE	DESCRIPTION	CREATED BY	REVIEWED BY
P01	01/08/25	Issued for planning	TW	EP

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1. TERMS OF REFERENCE

1.1. Introduction

Ridge and Partners LLP has been commissioned by the client to produce a drainage strategy report for the Rose Avenue development, 7-39 Rose Avenue, Gravesend, DA12 2LN. The development proposes the demolition of 5 No semi-detached houses and one terrace house with the construction of 29 new build units with 129 beds and their associated roads, parking and garden areas.

The scope of this report is to review data in relation to the existing drainage regime, review ground conditions for the suitability of SuDS, consider the use of SuDS for the disposal of surface water run-off and consider the disposal of foul water. This report has been carried out in accordance with the National Planning Policy Framework (NPPF), Kent Local Flood Risk Management Strategy and the National Standards for Sustainable Drainage Systems (SuDS).

2. EXISTING SITE

2.1. Site Location

The existing site is comprised of 5 semi-detached houses and one end of terrace house attached to 1-7 Rose Avenue totalling 17 No. residential units along with a central hardstanding area of public open space.

The planning boundary for the development is approximately 0.4034Ha with OS Grid Reference (approximately at the centre of the site) of 566419, 173332. Refer to Figure 1 for a site location plan.

Figure 1 - Site Location (Development site boundary shown in red)

2.2. Existing Site Topography

A topographical survey was undertaken by Laser Surveys in November 2024. This shows ground levels vary from approx. 11.50mAOD in the southeast to approximately 9.00mAOD in the northwest.

Figure 2 below contains an extract of the topographical survey covering the site, with a full copy located in **Appendix A**.

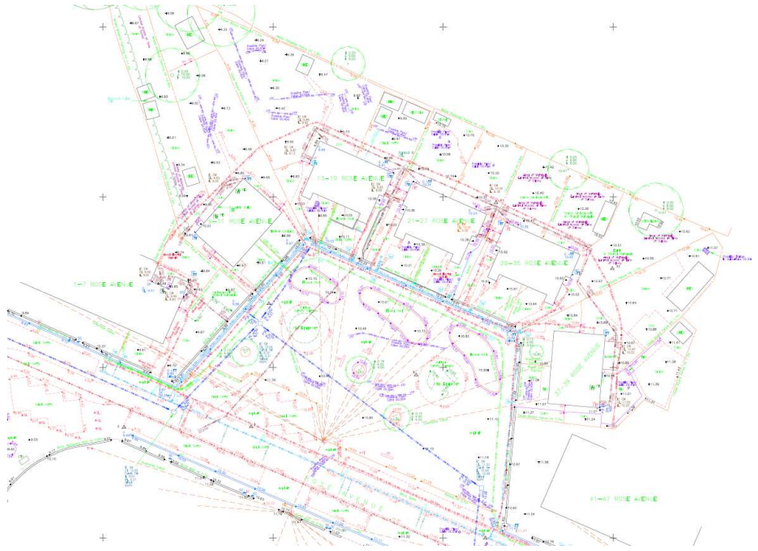


Figure 2 - Topographical survey extract

2.3. Underlying Geology

British Geological Society (BGS) records have been reviewed to understand the likely ground conditions and soil profile on site.

The BGS map data indicates that the underlying bedrock is made up of the Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation. Superficial geology information is not available in this location and is assumed to be solely formed of chalk – refer to Figure 3.

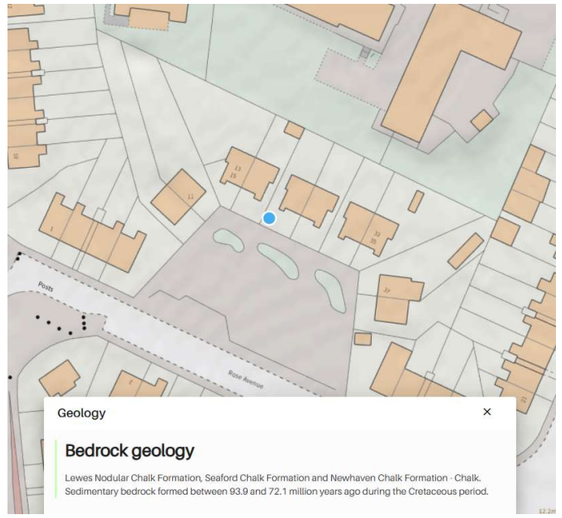


Figure 3 - BGS Geology Data (Bedrock)

An intrusive site survey has been conducted by Albury S.I Limited in December 2024. The surveys determined the ground conditions are as follows:

Table 1: Recorded Ground Conditions

STRATUM (GENERAL DESCRIPTION)	DEPTH TO TOP (MBGL)	DEPTH TO BASE (MBGL)
Made Ground	Ground Level	0.45 - 0.75
Gravelly silty sand	0.45 - 0.75	1.3 – 2.1
Lewes Nodular Formation	1.3 - 2.1	3.1 and 5 (base of intrusive investigation)

Made ground at boreholes 1, 2 and 3 was observed as being resin bound surface over greyish brown to black gravelly very silty sand. The made ground at boreholes A to F comprised of grass surfacing over brown silty gravelly silty sand to depths between 0.25m and 0.4m. The Lewes Nodular Formation was observed to 5mbgl, consisting of cream/ white chalk with occasional orange staining.

Groundwater strikes were not present during excavation nor upon completion of each borehole.

Infiltration testing was conducted via small scale falling head tests in two locations B and F. A total of 3 cycles were completed at location B and 1 cycle at location F. A summary of the results can be found in Table 2.

Table 2 – Infiltration test result summary

INTRUSIVE LOCATION	TEST NUMBER	PIT DEPTH (M)	INFILTRATION RATE (M/S)	TOTAL DURATION OF TEST (MINS)
B	1	2.5	$2.00x10^{-6}$	20
	2	2.5	$2.01x10^{-6}$	20
	3	2.5	$2.01x10^{-6}$	20
F	1	3.1	$1.10x10^{-7}$	120

Refer to the site investigation submitted with the planning application for further details.

3. THE PROPOSED DEVELOPMENT

The development proposes the demolition of 5 No semi-detached houses, the one terrace house will remain, and the construction of 29 new build units with 129 beds and their associated roads, parking and garden areas.

An extract of the proposed development can be seen within Figure 4 - refer to drawings by the Architect within the planning application for full details.

Figure 4 - Extract of the proposed general arrangement

4. EXISTING DRAINAGE

4.1. Southern Water Sewers

According to Southern Water sewer mapping, drainage within the local area is separated into foul and surface water, with 150mmØ and 225mmØ sewers within Rose Avenue, Dickens Road to the west and Ingoldsby Road to the east.

An extract of the Southern Water records is presented in Figure 5 and in full within **Appendix B**.

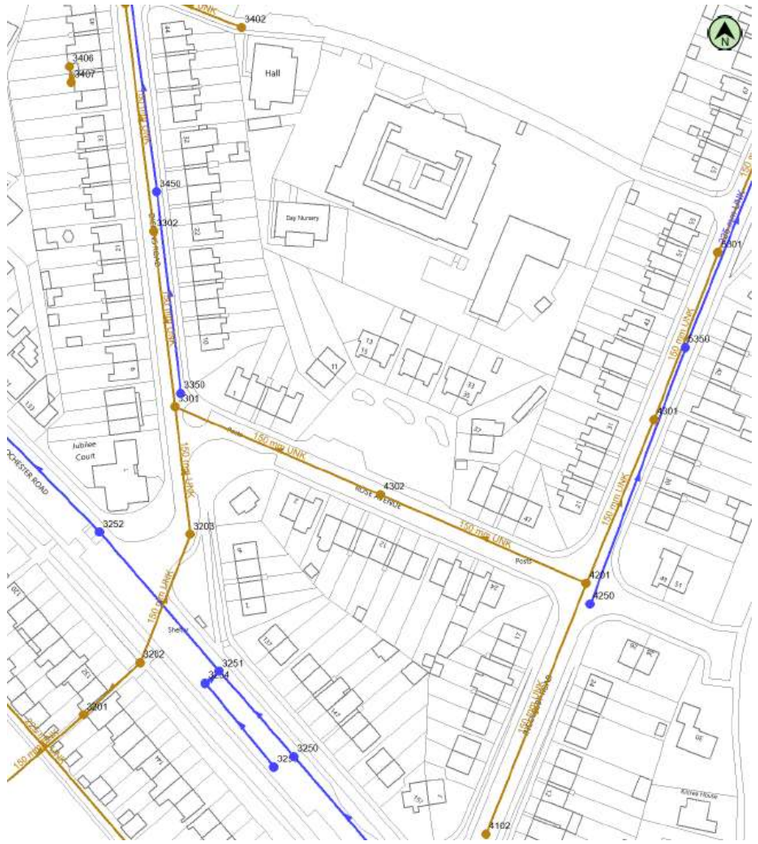


Figure 5 - Extract of sewer records

4.2. Existing Private Drainage

A topographical and utility survey has been undertaken and can be found in **Appendix A**.

The survey shows the external public realm area is positively drained via a series of gullies and drainage channels that connects into 150mmØ surface water sewer before draining in a southwest direction within Rose Avenue.

Rainwater downpipes and foul connections from the buildings appear to drain into a combined water drain which runs in a south-west direction through the site towards Rose Avenue.

The outfall location is not conclusive from the GPR survey (as shown in **Appendix A**) and appears to reconnect into the 150mmØ foul water sewer within Rose Avenue. The connection point into the Southern Water network will be confirmed as part of the detailed design stage.

4.3. Existing Surface Water Discharge Rate

An assessment of the existing permeable and impermeable areas has been undertaken with the results shown in Table 3 and summarised in Figure 6.

Table 3: Existing Area Breakdown

	M^2	HECTARES (HA)	% OF SITE
Hardstanding (Positively drained)	1922	0.1922	48
Existing buildings (Positively drained)	565	0.0209	14
Soft landscaping	1547	0.1547	38
Total	4034	0.4034	100

Figure 6 - Existing hard area summary

The existing brownfield runoff rate has been calculated and is shown in Table 4 with a full calculation sheet in **Appendix C**.

Table 4: Existing surface water discharge rates

STORM RETURN PERIOD	L/S
1yr	34.1
30yr	87.3
100yr	111.4
100yr +40%CC	156

Greenfield run-off rates have also been calculated with the SuDS Manual C753 and the National standards for sustainable drainage systems. The results are shown in Table 5 with full calculations in **Appendix C**.

Table 5: Greenfield runoff calculations

RETURN PERIOD	RATE (L/S)
Q_{bar}	0.6
1 in 1yr	0.5
1 in 30 yr	1.4
1 in 100yr	2.0

4.4. Existing Foul Water Rates

An assessment of the existing foul water flow rates has been undertaken with the following calculations in accordance with British Water Flows and Loads 4. The calculation is based on the projected occupancy of the buildings, using the total number of bedspaces (49 bedspaces) provided across the 17 residential units to calculate the population equivalent.

- FW flow rate = Qww = DWF x PF + Factor of Safety
- Dry Weather Flow = DWF = q / (60x60x24) x nr

For full assessment of the existing foul water calculations refer to **Appendix C.**

5. PROPOSED DRAINAGE STRATEGY

5.1. Pre-Application Advice

Pre-application advice was sought from Southern Water to verify if their sewer network has capacity to accept foul water generated from the proposed development. As part of the consultation process, Southern Water have requested evidence indicating the point of connection of the existing site to a mapped asset.

The surveys undertaken to date, have not been conclusive with further survey to be organised. As part of Southern Water's capacity assessment, an indicative proposed point of connection was requested and the total number of occupants across the site. After this timely process a connection onto manhole reference TQ66733402 at a peak foul flow discharge rate of 0.52l/s was agreed with Southern Water.

For full correspondence with Southern Water and the agreed foul water calculation assessment can be found in **Appendix D.**

5.2. Proposed Drained Areas

An approximate breakdown of proposed drained areas is summarised within Table 6 and visually represented in **Figure 7**.

Table 6: Approximate Proposed Area Breakdown

	M^2	HECTARES (HA)	% OF SITE
Proposed Buildings (Positively drained)	1198	0.1198	30
Proposed Hardstanding (Positively drained)	1107	0.1107	27
Proposed parking bays (Drain to ground)	422	0.0422	11
Proposed soft landscaping	1261	0.1261	31
Existing building (Positively drained)	46	0.0046	1
Total	4034	0.4034	100

***Figure 7**: Proposed Drained Area summary.*

As a result of the development there is an increase of approximately 286m^2 in positively drained areas i.e., 7% more when compared to the existing site.

5.3. Sustainable Drainage Hierarchy

The inclusion of Sustainable Drainage (SuDS) has been considered for the management of surface water for this development, in line with the following and evaluated in Table 7:

1. Rainwater harvesting
2. Infiltration techniques and green roofs
3. Rainwater attenuation in open water features for gradual release
4. Rainwater discharge direct to a watercourse (unless not appropriate)
5. Rainwater attenuation above ground (including blue roofs)
6. Rainwater attenuation below ground
7. Rainwater discharge to a surface water sewer or drain.
8. Rainwater discharge to a combined sewer.

Table 7: SuDS Evaluation

SUDS EVALUATION		
SuDS	Viable	Comment
Green / Blue Roof	N	Refer to section 5.3.1
Rainwater reuse	N	Refer to section 5.3.2
Permeable Surfaces	**Y**	**Refer to section 5.3.3**
Infiltration Devices	**Y**	**Refer to section 5.3.4**
Basins and ponds	N	Refer to section 5.3.5
Filter Strips and swales	N	Refer to section 5.3.6
Tanked Systems	**Y**	**Refer to section 5.3.7**

5.3.1. Green / Blue Roofs

Green roofs consist of a multi-layered system that cover roofs and podiums on buildings. Typically, there is drainage layer below a growing medium. Green roofs intercept and hold rainwater, reducing the volume of runoff and restricting the peak rate of discharge. Due to the pitch roof design of the houses, it is not possible to incorporate green or blue roofs.

5.3.2. Rainwater Harvesting

Rainwater harvesting systems (RWH) have been considered, however are not being proposed for the buildings. The inclusion of a RWH system would be extremely complex and would offer limited benefits due to the limited water usage within the building.

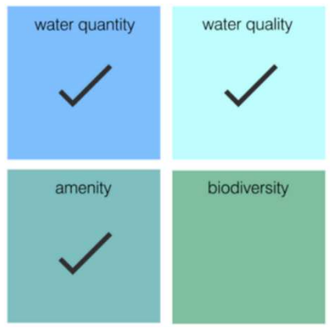
The treatment systems for a RWH system typically involve filters and possibly UV and these have high embodied energy and can perform poorly in terms of their Life Cycle Analysis. In addition, the quoted lifespan for many rainwater harvesting systems is approximately 10 years after which they may require significant repairs or will result in an inefficient system.

Therefore, it is considered to be more sustainable to use less water through water efficient appliances.

5.3.3. Permeable Surfaces

Permeable surfaces are proposed for the footpath areas and parking bays. The permeable paving system will drain to the surrounding ground as the results summarised in Table 2 indicate infiltration is viable.

Permeable surfaces provide high pollution mitigation indices and provide water quantity, water quality and amenity benefits.



Performance Criteria
Peak Flow Rate Reduction: **Good**
Volume Reduction: **Poor (as lined)**
Water Quality Treatment: **Good**
Amenity Potential: **Medium**
Biodiversity: **Poor**

Figure 8 - Permeable Paving, four pillar assessment.

5.3.4. Infiltration Devices

Deep borehole soakaways are to be proposed to dispose collected rainwater from the proposed buildings and adopted road area to ground. The borehole soakaways have been designed based on an assumed infiltration rate of 5.0 x 10^{-4}m/s for all rainfall events up to an including the 100yr +40%cc event. The dimensions of the borehole soakaways are subject to confirmed infiltration rate results following further testing, appropriate consideration will be given to the drainage design following confirmation of results.

The proposed roof area (circa 1198m^2), and the adopted road (circa 322m^2) are to drain via two separate deep bore soakaways in which the size can be found in InfoDrainage calculations in **Appendix E.**

Based on infiltration devices within chalk and in accordance with Kent County Council, The Soakaway Design Guide (July 2000) section 2.9, both soakaways are positioned at least 10m away from face of building foundations.

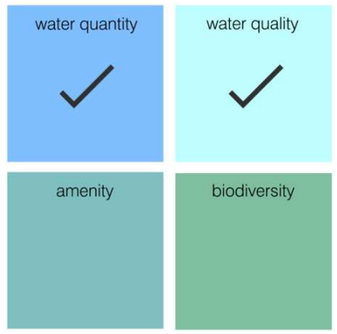


Figure 9 – Infiltration devices, foul pillar assessment

5.3.5. Basins and Ponds

Due to lack of space, it is not considered viable to incorporate basins or ponds.

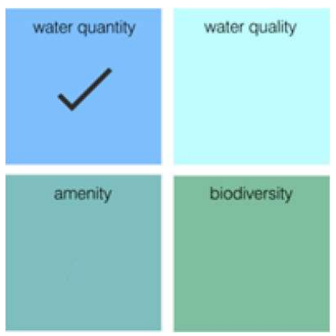
5.3.6. Filter Strips and Swales

There is minimal opportunity for the inclusion of filter strips and swales within the development. Instead, hard landscaped areas are to be constructed from permeable materials or are designed to drain to adjacent areas of soft.

5.3.7. Tanked Systems

Even with the SuDS proposed, a below ground attenuation tank is required to ensure sufficient attenuation volume is achieved.

The attenuation tank has been sized to manage surface water for all storm events up to and including the 1 in 100 + 40% climate change and is approximately 35.2m^3. Tanked systems provide water quantity improvements.



Performance Criteria
Peak Flow Rate Reduction: **Good**
Volume Reduction: **Poor**
Water Quality Treatment: **Poor**
Amenity Potential: **Poor**
Biodiversity: **Poor**

***Figure 10**: Tank Systems Performance*

5.3.8. Surface water disposal

It is proposed for surface water to be collected in a new surface water network, and the existing combined private network will be abandoned and grubbed up. The surface water network will connect via a piped system below ground into two deep borehole soakaways disposing rainwater to ground. The building roof areas will drain to a separate soakaway from the adopted road area, proposed footpaths and car parking bays are proposed to be permeable and drain to ground via infiltration.

The soakaways have been designed to prevent flooding at surface level for all events up to the 100yr+40% climate change event, based on an assumed infiltration rate of 5 x 10^{-4} m/s. This infiltration rate is subject to verification following further infiltration testing to confirm rates. Should infiltration prove insufficient then a connection to the surface water sewer network within Rose Avenue would be implemented.

The proposed strategy provides significant betterment from the existing arrangement which currently appears to discharge into the combined water network.

Refer to **Appendix E** for drainage calculations and **Appendix F** for the proposed drainage drawings.

5.4. Foul Water Drainage

Foul water drainage has been designed to be separate from the new surface water network and connect onto existing foul water sewer within Rose Avenue.

The proposed foul water discharge rates are based on an estimated flow of 600 l/day per property, resulting in a calculated peak flow rate of 0.524l/s. Southern Water has confirmed that their network has sufficient capacity to accommodate this flow rate. For a detailed breakdown of foul flow calculations, refer to Southern Water correspondence in **Appendix D.**

Given the existing rainwater downpipes appear to connect into a combined system and discharge into the Southern Water foul sewer, implementing a separate surface water network would provide significant reduction in discharge rates into the existing public foul sewer.

6. POLLUTION MANAGEMENT

6.1. Pollution Hazard Indices

As part of the CIRIA SuDS Manual C753, Section 26 provides guidance regarding methods for managing pollution risks from surface water run-off.

The development has been assessed in line with Table 26.2 of the SuDS Manual for the pollution hazard indices for different land use classifications – refer to **Figure 11**.

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

***Figure 11**: Extract of Table 26.2 from the SuDS Manual*

Table 26.3 of C753 shown in **Figure 12** sets out the mitigation indices provided by SuDS features for discharge to surface water (being used as a conservative approach).

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices[1]		
Type of SuDS component	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

***Figure 12**: SuDS Mitigation Methods*

The access road is considered to have a "low" pollution hazard, generating 0.5 total suspended solids, 0.4 metals and 0.4 hydrocarbons, which will drain via filter substrate channel (proposed Hauraton Drainfix Clean or equivalent) to provide sufficient treatment of polluted surface run-off. The parking bays will be constructed using permeable paving which provides sufficient mitigation before discharge to the sewer.

The drainage design therefore provides mitigation indices which exceed the pollution hazard indices therefore are therefore consider appropriate.

7. PROTECTION OF DRAINAGE DURING CONSTRUCTION

7.1. General

Appropriate measures will be taken to protect the surface water drainage system during construction and the surface water runoff. These measures will be developed by the contractor, but we would expect to include:

- All foul water and surface water drains downstream of the site works as well as the relevant water authority will be identified;
- Underground services will be investigated and identified to avoid damage to them;
- All containers and tanks will have clear notices of their contents and how to handle them;
- Stockpiled material will be protected to reduce rainwater infiltration;
- In the event of a spillage causing pollution to water (i.e., discharged into drains) or land, the source will be contained, and the Environment Agency will be notified; and
- All works should be in constructed in accordance with Best Practice, British Standards and CIRIA documents C753 and C768.

8. MAINTENANCE REQUIREMENTS

8.1. General

Regularly inspecting the surface water drainage network for blockages and clearing unwanted debris/silt from the system should improve the performance of the surface water network and decrease the need for future repairs.

The level and frequency of maintenance required on site to maintain the system is dependent on the type of facility. The type of maintenance will fall into one of three categories "regular maintenance", "occasional" and "remedial maintenance".

The drainage and SuDS elements used should after an initial inspection (following completion of construction) be inspected monthly for the first 12 months and after significant storms, thereafter the following maintenance regime should be implemented and adjusted if the 12-month monitoring process has identified any issues.

Following completion of the development the site owner will be responsible for the maintenance of the drainage, if they so choose, they can appoint a management company to undertake the maintenance on their behalf.

The following sections tabulates the maintenance requirements for each drainage element.

8.2. Permeable Paving

Table 8: Permeable Paving Maintenance

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove debris and leaves etc.	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surfaces from adjacent impermeable areas as this area is most likely to collect the most sediment.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds	As required- once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting etc	As required
	Rehabilitation of surface and upper substructure	Every 10 to 15 years or as required (if infiltration performance is

		reduced due to significant clogging)
Monitoring	Inspect for evidence of poor operation and/or weed growth - if required, take remedial action.	Three-monthly, 48 hours after large storms in the first six months
	Inspect silt accumulation rates and establish appropriate frequencies for rehabilitation	Annually
	Monitor inspection chambers	Annually

8.3. Infiltration Devices

Table 9: Infiltration Devices Maintenance

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 of 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
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of 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 not rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

8.4. Tanked Systems

Table 10: Tanked Systems Maintenance

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

8.5. Gullies/Linear Channels

Inspection and removal of debris from silt trap every three months, preferably after leaf fall in the autumn. (Timeframe can be adjusted to suit actual site conditions).

Table 11: Gullies/Linear Channel Maintenance

	Required Action	Typical Frequency
Regular maintenance	Litter and debris removal	Monthly or as required
	Check and remove large vegetation growth near channel runs	Monthly or as required
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving	3-monthly, 48 hours after large storms
Remedial Actions	Inspect access/outlet boxes and rod through poorly performing channels and outlets as initial remediation.	As required
Monitoring	Inspect/check all inlets, outlets, to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of gullies for sediment build-up and remove if necessary	Every year or as required

8.6. Drainage pipes, manholes & silt traps

Inspect manholes & silt traps for build-up of silt and general debris (minimum of 6 monthly or to suit site requirements). If silt/debris is building up, then clean with jetting lorry / gully sucker and inspect pipe – repeat cleaning if required.

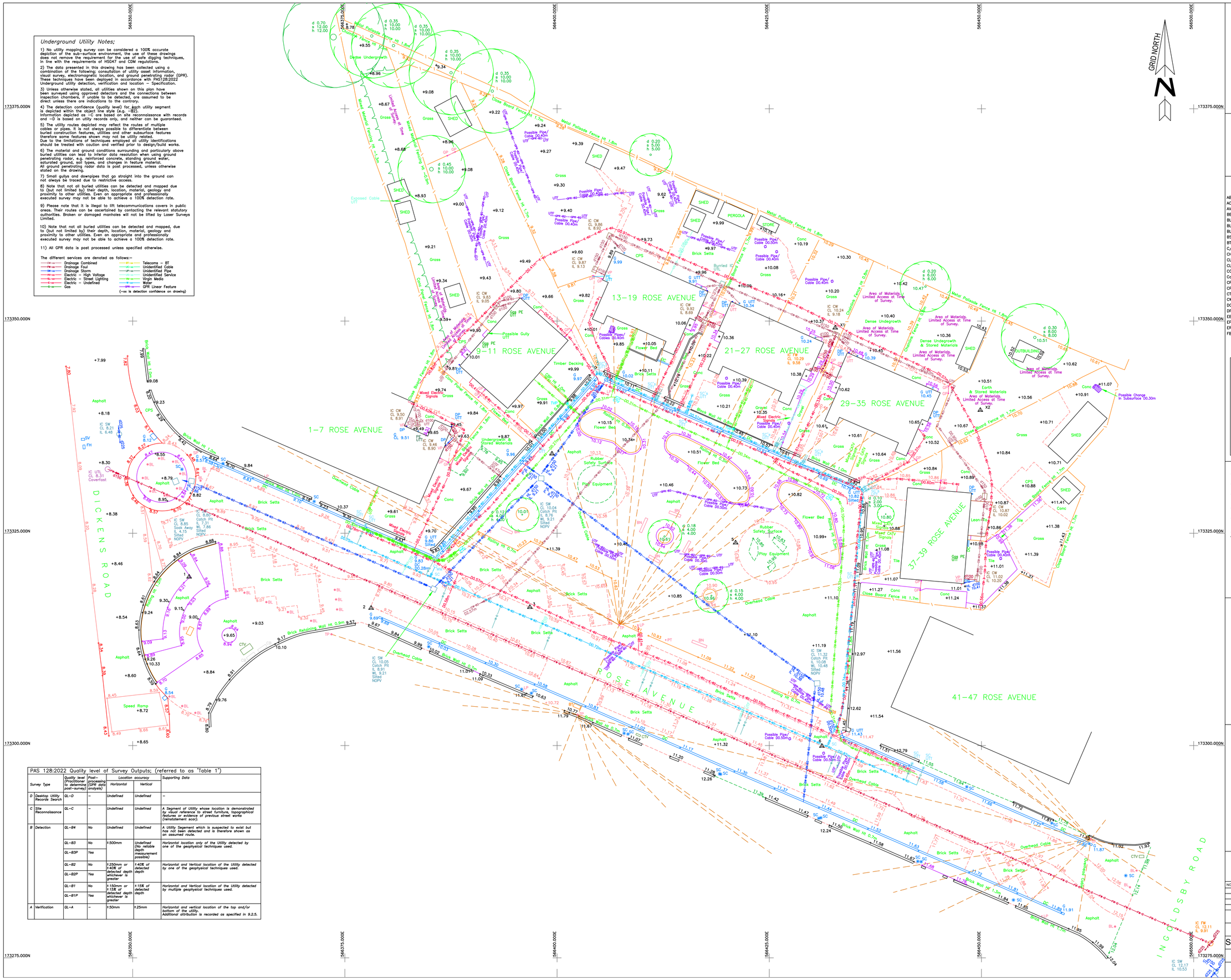
Table 12: Drainage pipes, manholes & silt traps maintenance

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect for evidence of poor operation via water level in chambers. If required, take remedial action.	3-monthly, 48 hours after large storms.
	Check and remove large vegetation growth near pipe runs.	Monthly or as required
	Remove sediment from structures.	Annually or as required
Remedial actions	Rod through poorly performing runs as initial remediation.	As required.

	If continued poor performance jet and CCTV survey poorly performing runs.	As required
Monitoring	Inspect/check all inlets, outlets, to ensure that they are in good condition and operating as designed.	Annually.
	Survey inside of pipe manholes for sediment build-up and remove if necessary	Every 5 years or as required.

9. APPENDICES

A. TOPOGRAPHICAL & UTILITY SURVEY



Underground Utility Notes;

1) No utility mapping survey can be considered a 100% accurate depiction of the sub-surface environment, the use of these drawings does not remove the requirement for the use of safe digging techniques, in line with the requirements of HSG47 and CDM regulations.

2) The data presented in this drawing has been collected using a combination of the following; consultation of utility asset information, visual survey, electromagnetic location, and ground penetrating radar, (GPR). These techniques have been deployed in accordance with PAS128:2022 Underground utility detection, verification and location – Specification.

3) Unless otherwise stated, all utilities shown on this plan have been surveyed using approved detectors and the connections between inspection chambers, if unable to be detected, are assumed to be direct unless there are indications to the contrary.

4) The detection confidence (quality level) for each utility segment is depicted within the object line style (e.g. –B2).
Information depicted as –C are based on site reconnaissance with records and –D is based on utility records only, and neither can be guaranteed.

5) The utility routes depicted may reflect the routes of multiple cables or pipes. It is not always possible to differentiate between buried construction features, utilities and other subsurface features therefore some features shown may not be utility related.
Due to the limitations of techniques employed all utility identifications should be treated with caution and verified prior to design/build works.

6) The material and ground conditions surrounding and particularly above buried utilities can lead to inferior data resolution when using ground penetrating radar, e.g. reinforced concrete, standing ground water, saturated ground, soil types, and changes in feature material.
All ground penetrating radar data is post processed, unless otherwise stated on the drawing.

7) Small gullys and downpipes that go straight into the ground can not always be traced due to restrictive access.

8) Note that not all buried utilities can be detected and mapped due to (but not limited by) their depth, location, material, geology and proximity to other utilities. Even an appropriate and professionally executed survey may not be able to achieve a 100% detection rate.

9) Please note that it is illegal to lift telecommunications covers in public areas. Their routes can be ascertained by contacting the relevant statutory authorities. Broken or damaged manholes will not be lifted by Laser Surveys Limited.

10) Note that not all buried utilities can be detected and mapped, due to (but not limited by) their depth, location, material, geology and proximity to other utilities. Even an appropriate and professionally executed survey may not be able to achieve a 100% detection rate.

11) All GPR data is post processed unless specified otherwise.

The different services are denoted as follows:–

Drainage Combined	Telecoms – BT
Drainage Foul	Unidentified Cable
Drainage Storm	Unidentified Pipe
Electric – High Voltage	Unidentified Service
Electric – Street Lighting	Virgin Media
Electric – Undefined	Water
Gas	GPR Linear Feature
	(–xx is detection confidence on drawing)

PAS 128:2022 Quality level of Survey Outputs; (referred to as 'Table 1')

Survey Type		Quality level (Practitioner to determine post–survey)	Post–processing (GPR data analysis)	Location accuracy: Horizontal	Location accuracy: Vertical	Supporting Data
D	Desktop Utility Records Search	QL–D	–	Undefined	Undefined	–
C	Site Reconnaissance	QL–C	–	Undefined	Undefined	A Segment of Utility whose location is demonstrated by visual reference to street furniture, topographical features or evidence of previous street works (reinstatement scar).
B	Detection	QL–B4	No	Undefined	Undefined	A Utility Segement which is suspected to exist but has not been detected and is therefore shown as an assumed route.
		QL–B3	No	±500mm	Undefined (No reliable depth measurement possible)	Horizontal location only of the Utility detected by one of the geophysical techniques used.
		QL–B3P	Yes			
		QL–B2	No	±250mm or ±40% of detected depth whichever is greater	±40% of detected depth	Horizontal and Vertical location of the Utility detected by one of the geophysical techniques used.
		QL–B2P	Yes			
		QL–B1	No	±150mm or ±15% of detected depth whichever is greater	±15% of detected depth	Horizontal and Vertical location of the Utility detected by multiple geophysical techniques used.
		QL–B1P	Yes			
A	Verification	QL–A	–	±50mm	±25mm	Horizontal and vertical location of the top and/or bottom of the utility. Additional attribution is recorded as specified in 9.2.5.

LASER SURVEYS.

LAND AND BUILDING SURVEYS, UNDERGROUND SERVICES LOCATION, CCTV DRAINAGE SURVEYS.
Established 1975. Member of The Survey Association.

OLD DAIRY, STUBBERS FARM, MOUNTNESSING ROAD, BLACKMORE, CM4 0NX
TEL: 01277 821555 email: london@lasersurveys.com
OPEN SPACE, LEIGH SINTON ROAD, UPPER INTERFIELDS, MALVERN, WR14 1UT
TEL: 01886 833173 email: worcester@lasersurveys.com

DATUM NOTES

COORDINATES USED ARE BASED ON ORDNANCE SURVEY NATIONAL GRID, OBTAINED USING THE ACTIVE GPS NETWORK AND ADJUSTED TO A LOCAL GRID WITH A SCALE FACTOR OF 1.0000.

LEVELS ARE RELATED TO :- ORDNANCE SURVEY ACTIVE GPS NETWORK.

SURVEY CONTROL STATIONS SHOWN

ABBREVIATIONS (where applicable)

AB	Air Brick	FE	Fence	PE	Pipe
AC	Air Condition Unit	FH	Fire Hydrant	PM	Parking Meter
AV	Air Valve	FL	Floor Level	P/R	Post and Rail
BB	Belisha Beacon	FP	Flag Pole	PT	Post
BL	Bollard	FW	Foul Water	P/W	Post and Wire
BLM	Bollard Movable	GP	Gate Post	RE	Rodding Eye
BLR	Bollard Rising	GV	Gas Valve	RET	Retaining
BS	Bus Stop	GY,G	Gully	RS	Road Sign
BT	British Telecom	HL	High Level Invert	RSJ	Rolled Steel Joist
C/B	Close Boarded	HT	Height	SC	Stop Cock
CHP	Charging Point	IC	Inspection Cover	SK	Soakaway
CL	Cover Level	IL	Invert Level	SP	Sign Post
CLK	Chainlink	I/R	Iron Railings	SV	Stop Valve
CO	Column	JB	Junction Box	SW	Storm Water
Conc	Concrete	KO	Kerb Outlet	TAC	Tactile Paving
CP	Catch Pit	LB	Litter Bin	TCB	Telephone Call Box
CPS	Concrete Paving Slabs	LP	Lamp Post	TH	Door Threshold
CTV	Cable Television	MB	Multi Bole Tree	TL	Traffic Light
CW	Combined Water	MH	Manhole Cover	TP	Telegraph Pole
DC	Drainage Channel	MK	Marker	CTV	Cable Television
DP	Drain Pipe	M/P	Metal Palisade Fence	VP	Vent Pipe
EB	Electric Bollard	O/B	Open Boarded Fence	WL	Water Level
EP	Electricity Pole	OH	Overhead	WM	Water Meter
ER	Earthing Rod	PAV	Paving	WO	Wash Out
FB	Flower Bed	PB	Post Box		

ABBREVIATIONS (where applicable)

SW	Storm Water	NCV	No Cables Visible
CW	Combined Water	ECP	Enclosed Pipe
FW	Foul Water	UTM	Unable To Measure
d	Diameter (mm)	UTF	Unable to Trace Further
D	Depth (m)	UTL	Unable to Lift
HL	High Level Pipe	UTT	Unable to Trace
NDP	No Depths Possible	UPS	Unknown Pipe Size
NOPV	No Other Pipes Visible	OFP	Overflow Pipe
NPV	No Pipes Visible	HL	High Level Pipe
NPSP	No Pipe Size Possible	PD	Pit Depth
NVV	No Valve Visible	WP	Water Pipe
NOCV	No Other Cables Visible	WT	Windsor Trap
PL	Plastic	DU	Duct (mm)
CI	Cast Iron	(c)	Capped
VC	Vitreous Clay		
CH	Chamber	SH	Shaft

NOTES

- Drainage pipe sizes (where shown) have been gauged from the surface for safety reasons and should be regarded as approximate only.
- Tree species (where shown) should be treated with caution and expert identification is advised.
- Although this is a digital survey the accuracy and amount of detail shown is only commensurate with the graphical scale of mapping as specified. Care should be exercised when working to larger scales.
- Visible features in the vicinity of the boundaries as shown above, may not represent the extent of legally conveyed ownership.
- Whilst every effort has been made to achieve accuracy on this plan, CRUCIAL clearance dimensions, levels and invert levels should be checked prior to design and construction.
- Kerb levels have been taken in the bottom of the channel.
- Areas of dense undergrowth cannot be surveyed in detail, these areas will be shown in outline only and marked as 'dense undergrowth' on the plan.

SHEET LAYOUT
NOT TO SCALE

ROSE AVENUE
GRAVESEND
KENT
DA12 2LN

TOPOGRAPHICAL SURVEY
UNDERGROUND SERVICE TRACE & GPR SURVEY

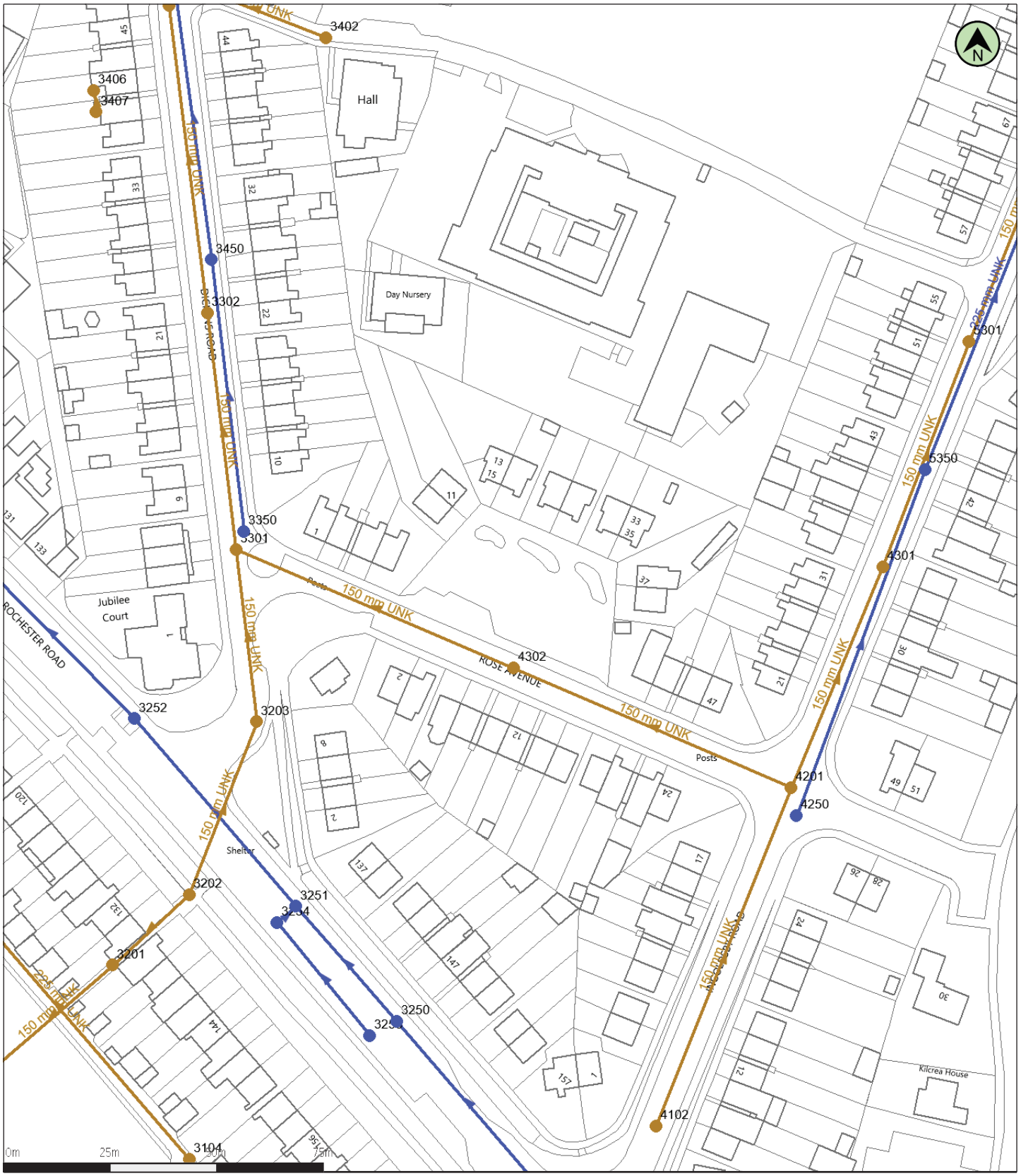
SURVEYED FOR HOUSING SERVICES
C/O GRAVESHAM BOROUGH COUNCIL
CIVIC CENTRE
WINDMILL STREET
GRAVESEND
DA12 1AU

SURVEYOR A.C/J.E
DATE NOVEMBER 2024

NO	DATE	REVISION

DRAWING NO	L 12419/1T REV 0
SCALE	1 : 200 @ A1
SEE ALSO DWG NOS	
SHEET	1 of 1
REF NO	L 12419

B. SOUTHERN WATER RECORDS



(c) Crown copyright and database rights 2024 Ordnance Survey AC0000808122 | Scale: 1:1250 | Date: 15/11/24 | Wastewater Plan A4

Data updated: 28/10/24 | Map Centre: 566411,173325 | Our Ref: 1620403 - 2 | Powered by digdat

Foul Gravity Sewer
Combined Gravity Sewer
Culverted Water Course or Treated Effluent
Surface Water Gravity Sewer
Rising Main, Vacuum or Syphon
Combined Outfall
Surface Water Outfall
Foul Outfall
Surface Water Inlet
Combined Pumping Station
Surface Water Pumping Station
Foul Pumping Station
Water Treatment Works
Section 104 Area
Building Over Agreement Area
Foul Manhole
Combined Manhole
Surface Water Manhole
Side Entry Manhole, Demarcation Chamber, Dummy Manhole or Surface Water Soakaway

bradley.inston@apogeeutilityconsultants.c

428307

WATER for LIFE from Southern Water

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2024 Ordnance Survey AC0000808122 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

C. EXISTING DRAINAGE CALCULATIONS

CALCULATION & DESIGN NOTES SHEET

RIDGE

Project Title:	Rose Avenue, Gravesend		
Calculations by	TW	Date	01/08/2025
Checked by:	EP	Date	01/08/2025

Project Number	Ridge Office and Code	Volume / System	Level / Area	Document Type	Role	Number	Status	Revision
5028150	RDG	XX	XX	CA	C	0001	S1	P1
Description	**Existing Foul Water Flow Rates Based on Population Equivalent**							

Formula for Foul Water flow rate:

FW flow rate = Q_{ww} = DWF x PF + Factor of Safety

Dry Weather Flow = DWF = q / (60x60x24) x nr

Variables

DWF: dry weather flow (l/s)
PF: Peaking Factor
q: dry weather flow rate (l/day)
nr: number of units

The foul loads are taken from British Water document "Flows and Loads - 4". The actual site or designated building uses within the site has been listed in the 1st column and the closest corresponding loading usage (Flows for Loads tables) listed in the 3rd column. The units and dry weather flow rate (q) are taken from this document.

Category references	C0	No foul loads	C1	Domestic Dwellings	C2	Industrial
	C3	School	C4	Accommodation	C5	Social
	C6	Eateries	C7	Public Facilities	C8	Hospitals

Actual Site Use	Cat. ref.	"Flows for Loads" Facility Uses Table Loadings	units	nr	q	DWF
17 Residential	C1	Standard Residential	Person	49	150	0.09
	C0					
	C0					
	C0					
	C0					
	C0					
	C0					
	C0					
	C0					
	C0					
	C0					

Total Dry Weather Flow (l/s) = 0.085

Total Dry Weather volume (m^3/day) = 7.35

Calculate peak flow rate (default 6) with Factor of Safety (default 10%)

FW flow rate = Q_{ww} = DWF x PF + Factor of Safety = 0.085 l/s x 6 + 10 % = 0.56 l/s

Therefore: Total Dry Weather Flow = 0.09 l/s
Peak flow rate = 0.56 l/s

Total Dry Weather volume = 7.35 m^3/day

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: UK and Ireland Rural Runoff Calculator	3 Valentines Place SE1 8QH		

ICP SUDS / IH 124

Details

Method	ICP SUDS
Area (ha)	0.403
SAAR (mm)	600.0
Soil	0.3
Region	Region 7
Urban	0
Return Period (years)	0

Results

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Region 7	0.6	0.6	0.5	1.4	2.0

D. WATER AUTHORITY CORRESPONDENCE

from Southern Water

Thomas Wong
Ridge and Partners LLP (Oxford)
3 Valentines Place
Elephant and Castle
London Borough of Southwark
SE1 8QH

Your ref
20414

Our ref
DSA000043537

Date
17 July 2025

Contact
Tel 0330 303 0119

Dear Mr Wong,

Level 1 Capacity Check Enquiry: 7-39 Rose Avenue, Gravesend, Kent, DA12 2LN.

We have completed the capacity check for the above development site and the results are as follows:

Foul Water

The enquiry has been reassessed to determine the capacity available for 0.52 l/s at manhole reference TQ66733402, Grid Reference: 566394 , 173314.

There is currently adequate capacity in the local sewerage network to accommodate a foul flow of 0.52 l/s for the above development at manhole reference TQ66733402. Southern Water will not permit a surface water connection into the foul network. Please refer to our surface water management policy.

Connecting to our network

It should be noted that this information is only a hydraulic assessment of the existing sewerage network and does not grant approval for a connection to the public sewerage system. A formal Sewer Connection (S106) application is required to be completed and approved by Southern Water Services. To make an application visit: developerservices.southernwater.co.uk

Please note the information provided above does not grant approval for any designs/drawings submitted for the capacity analysis. The results quoted above are only valid for 12 months from the date of issue of this letter. **Any revisions in flow rate or alternative point of connection will require a new Pre-Planning Application to be submitted.**

Please get in touch via the Get Connected customer dashboard if you have any queries.

Should it be necessary to contact us please quote our above reference number in all communications relating to this application by email at southernwaterplanning@southernwater.co.uk

Yours sincerely,

Future Growth Planning Team
Developer Services

southernwater.co.uk/developing-building/planning-your-development

Application Form		Flow and Loads								
		Suggested Dry Weather Flow rates				No		DWF Peaking Factors Multiplier 1.4 to 2.5 depending on Storm Duration & and 10% Infiltration		
			Property Type	Litres per day			1.0 DWF	(2.5 DWF + 10 %)	(2.0 DWF + 10 %)	(1.4 DWF + 10 %)
								30 to 120 min Duration storm	240 to 480 min Duration storm	960 min Duration storm
Classification	Property Type						L/S	L/S	L/S	L/S
A1	Shops	1	General Housing	600	per property	29	0.201	0.52	0.42	0.30
	Net tradable area	2	School	80	per pupil		0.000	0.00	0.00	0.00
A2	Financial and professional services	3	Assembly Hall	10	per seat		0.000	0.00	0.00	0.00
A3	Restaurants and cafes	4	Cinema	10	per seat		0.000	0.00	0.00	0.00
A4	Drinking Establishments	5	Theatre	10	per seat		0.000	0.00	0.00	0.00
A5	Hot food takeways	6	Sports Hall	50	per person		0.000	0.00	0.00	0.00
B1(a)	Office (other than A2)	7	Hotel	550	per room		0.000	0.00	0.00	0.00
B1(b)	Research and Development	8	Guest House	200	per room		0.000	0.00	0.00	0.00
B1(c)	Light industrial	9	Motel	300	per room		0.000	0.00	0.00	0.00
B2	General industrial	10	Holiday apartments	150	per person		0.000	0.00	0.00	0.00
B8	Storage or distribution	11	Leisure park	220	per person		0.000	0.00	0.00	0.00
C1	Hotels and halls of residence	12	Caravan park standard	250	per space		0.000	0.00	0.00	0.00
C2	Residential institutions	13	Caravan park serviced	450	per space		0.000	0.00	0.00	0.00
D1	Non-residential institutions	14	Camping Site standard	200	per space		0.000	0.00	0.00	0.00
D2	Assembly and Leisure	15	Camping Site serviced	350	per space		0.000	0.00	0.00	0.00
Other		16	Public house	150	per seat		0.000	0.00	0.00	0.00
	Nursing Care Homes	17	Restaurant	270	per seat		0.000	0.00	0.00	0.00
		18	Drive in restaurant	380	per seat		0.000	0.00	0.00	0.00
		19	Hospital	750	per bed		0.000	0.00	0.00	0.00
		20	Nursing Home	375	per bed		0.000	0.00	0.00	0.00
		21	Offices	7.5	per 1 m^2		0.000	0.00	0.00	0.00
		22	Shopping centre	4	per 1 m^2		0.000	0.00	0.00	0.00
		23	Warehouse	1.5	per 1 m^2		0.000	0.00	0.00	0.00
		24	Commercial premises	3	per 1 m^2		0.000	0.00	0.00	0.00
		25	Manufacturing unit	5.5	per 1 m^2		0.000	0.00	0.00	0.00
						Total - Foul	**0.201**	**0.524**	**0.423**	**0.302**

Reference:

1 For non-residential developments the above figures can be used, but consistency sought with the guidance in CED 4015 4.1.1 - see note 2 below.

2 For non-residential development and in absence of reliable data on either measured or unmeasured flows, the Britishwater Code of Practice - Flow & Loads should be used. See further guidance for trade and commercial flows in CED 4015.

3 See Developer Enquiries Modelling Procedure - December 2017 - Issue No .7 for Assessment of flow rate.

E. PROPOSED DRAINAGE CALCULATIONS

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Junctions Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
S8	Manhole	566426.855	173332.625	10.950	1.400	9.550	Circular	0.450
S5	Manhole	566423.715	173327.329	10.950	1.525	9.425	Circular	0.450
S4	Manhole	566417.778	173313.206	10.950	0.900	10.050	Circular	0.450
S6	Manhole	566440.051	173352.523	10.550	0.700	9.850	Circular	0.450
S7	Manhole	566434.537	173340.252	10.550	0.865	9.685	Circular	0.450
S3	Manhole	566419.452	173344.654	10.250	0.900	9.350	Circular	0.450
S9	Manhole	566411.043	173330.697	10.250	1.390	8.860	Circular	0.450
S10	Manhole	566396.542	173336.927	10.250	2.060	8.190	Circular	0.450
S11	Manhole	566392.964	173338.510	10.250	0.900	9.350	Circular	0.450
S1	Manhole	566389.579	173357.604	9.350	0.750	8.600	Circular	0.450
S2	Manhole	566402.984	173351.810	9.850	1.665	8.185	Circular	0.450
S21	Manhole	566410.505	173339.180	10.200	1.855	8.345	Circular	1.200
S20	Manhole	566416.498	173336.538	10.450	2.040	8.410	Circular	1.200

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Junctions Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

Name	Part Family	Lock
S8	Wavin Plastic Inspection Chambers	None
S5	Wavin Plastic Inspection Chambers	None
S4	Wavin Plastic Inspection Chambers	None
S6	Wavin Plastic Inspection Chambers	None
S7	Wavin Plastic Inspection Chambers	None
S3	Wavin Plastic Inspection Chambers	None
S9	Wavin Plastic Inspection Chambers	None
S10	Wavin Plastic Inspection Chambers	None
S11	Wavin Plastic Inspection Chambers	None
S1	Wavin Plastic Inspection Chambers	None
S2	Wavin Plastic Inspection Chambers	None
S21	CPM Marshalls Precast Concrete Chambers	None
S20	CPM Marshalls Precast Concrete Chambers	None

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Stormwater Controls Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

SA Roof

Type : Soakaway

Dimensions

Exceedance Level (m)	10.000
Depth (m)	30.000
Base Level (m)	-20.000
Freeboard (mm)	450
Soakaway Shape	Circular
Diameter / Width (m)	0.300
Porosity (%)	30
Ineffective Storage Depth (m)	0.410
Number of Soakaways	1
Base Infiltration Rate (m/hr)	1.8
Side Infiltration Rate (m/hr)	1.8
Safety Factor	2.0
Total Volume (m³)	0.627

SA Road

Type : Soakaway

Dimensions

Exceedance Level (m)	10.150
Depth (m)	30.000
Base Level (m)	-19.850
Freeboard (mm)	450
Soakaway Shape	Circular
Diameter / Width (m)	0.300
Porosity (%)	30
Ineffective Storage Depth (m)	0.410
Number of Soakaways	1
Base Infiltration Rate (m/hr)	1.8
Side Infiltration Rate (m/hr)	1.8
Safety Factor	2.0
Total Volume (m³)	0.627

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Stormwater Controls Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

Cellular Storage

Type : Cellular Storage

Dimensions

Exceedance Level (m)	9.990
Depth (m)	1.200
Base Level (m)	7.790
Number of Crates Long	10
Number of Crates Wide	6
Number of Crates High	3
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	0.5
Crate Height (m)	0.4
Total Volume (m³)	35.200

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Connections Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

Name	From	To	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)
1.000	S1	S2	14.603	Pipe	35.188		0.6	100
2.000	S3	S2	17.956	Pipe	15.413		0.6	100
3.002	S9	S10	15.783	Pipe	23.556		0.6	150
5.000	S11	S10	3.913	Pipe	3.374		0.6	100
4.000	S6	S7	13.453	Pipe	81.536		0.6	100
4.001	S7	S8	10.825	Pipe	80.185		0.6	100
3.000	S4	S5	15.320	Pipe	26.643		0.6	100
3.001	S5	S9	13.111	Pipe	23.206		0.6	150
4.002	S8	S5	6.158	Pipe	82.102		0.6	100
10.000	S20	S21	6.549	Pipe	100.000		0.6	150
1.001	S2	Cellular Storage	4.199	Pipe	10.630		0.6	150
3.003	S10	Cellular Storage	2.339	Pipe	5.849		0.6	150
10.001	S21	SA Road	2.071	Pipe	103.535		0.6	150
Pipe	Cellular Storage	SA Roof	3.742	Pipe	68.035		0.6	150

Name	Upstream Cover Level (m)	Upstream Invert Level (m)	Downstream Cover Level (m)	Downstream Invert Level (m)	Part Family	Lock	Velocity (m/s)	Culvert Type
1.000	9.350	8.600	9.850	8.185	Plastic Pipes	None		(None)
2.000	10.250	9.350	9.850	8.185	Plastic Pipes	None		(None)
3.002	10.250	8.860	10.250	8.190	Plastic Pipes	All		(None)
5.000	10.250	9.350	10.250	8.190	Plastic Pipes	None		(None)
4.000	10.550	9.850	10.550	9.685	Plastic Pipes	None		(None)
4.001	10.550	9.685	10.950	9.550	Plastic Pipes	None		(None)
3.000	10.950	10.050	10.950	9.475	Plastic Pipes	All		(None)
3.001	10.950	9.425	10.250	8.860	Plastic Pipes	None		(None)
4.002	10.950	9.550	10.950	9.475	Plastic Pipes	All		(None)
10.000	10.450	8.410	10.200	8.345	Plastic Pipes	None		(None)
1.001	9.850	8.185	9.990	7.790		All		(None)
3.003	10.250	8.190	9.990	7.790		None		(None)
10.001	10.200	8.345	10.150	8.325		All		(None)
Pipe	9.990	7.790	10.000	7.735		All		(None)

Name	Culvert Entrance
1.000	(None)
2.000	(None)
3.002	(None)
5.000	(None)
4.000	(None)
4.001	(None)
3.000	(None)
3.001	(None)
4.002	(None)
10.000	(None)
1.001	(None)
3.003	(None)
10.001	(None)
Pipe	(None)

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Inflow Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	S1		Time of Concentration	0.015	100	0	100	0.015
Catchment Area (1)	S1		Time of Concentration	0.019	100	0	100	0.019
Catchment Area (2)	S3		Time of Concentration	0.016	100	0	100	0.016
Catchment Area (3)	S6		Time of Concentration	0.018	100	0	100	0.018
Catchment Area (4)	S7		Time of Concentration	0.010	100	0	100	0.010
Catchment Area (5)	S8		Time of Concentration	0.006	100	0	100	0.006
Catchment Area (6)	S8		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (7)	S5		Time of Concentration	0.005	100	0	100	0.005
Catchment Area (8)	S4		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (9)	S11		Time of Concentration	0.006	100	0	100	0.006
Catchment Area (10)	S9		Time of Concentration	0.005	100	0	100	0.005
Catchment Area (11)	S9		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (12)	S20		Time of Concentration	0.023	100	0	100	0.023
Catchment Area (13)	S20		Time of Concentration	0.009	100	0	100	0.009
TOTAL		**0.0**		**0.153**				**0.153**

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Rainfall Analysis Criteria	3 Valentines Place SE1 8QH		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Shortest
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Junctions Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S8	FSR: 1 years: +0 %: 15 mins: Summer	10.950	9.550	9.621	0.071	5.2	0.011	0.000	5.0	2.336	OK
S5	FSR: 1 years: +0 %: 15 mins: Summer	10.950	9.425	9.468	0.043	6.6	0.007	0.000	6.5	3.032	OK
S4	FSR: 1 years: +0 %: 15 mins: Summer	10.950	10.050	10.069	0.019	1.0	0.003	0.000	0.9	0.413	OK
S6	FSR: 1 years: +0 %: 15 mins: Summer	10.550	9.850	9.891	0.041	2.4	0.007	0.000	2.3	1.033	OK
S7	FSR: 1 years: +0 %: 15 mins: Summer	10.550	9.685	9.738	0.053	3.6	0.008	0.000	3.5	1.595	OK
S3	FSR: 1 years: +0 %: 15 mins: Summer	10.250	9.350	9.375	0.025	2.2	0.004	0.000	2.1	0.938	OK
S9	FSR: 1 years: +0 %: 15 mins: Summer	10.250	8.860	8.911	0.051	8.2	0.008	0.000	8.0	3.761	OK
S10	FSR: 1 years: +0 %: 15 mins: Summer	10.250	8.190	8.227	0.037	8.8	0.006	0.000	8.8	4.110	OK
S11	FSR: 1 years: +0 %: 15 mins: Summer	10.250	9.350	9.361	0.011	0.8	0.002	0.000	0.8	0.351	OK
S1	FSR: 1 years: +0 %: 15 mins: Summer	9.350	8.600	8.650	0.050	4.6	0.008	0.000	4.5	1.982	OK
S2	FSR: 1 years: +0 %: 15 mins: Summer	9.850	8.185	8.220	0.035	6.6	0.006	0.000	6.5	2.920	OK
S21	FSR: 1 years: +0 %: 15 mins: Summer	10.200	8.345	8.400	0.055	4.2	0.062	0.000	4.0	1.868	OK
S20	FSR: 1 years: +0 %: 15 mins: Summer	10.450	8.410	8.464	0.054	4.3	0.061	0.000	4.2	1.871	OK

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Junctions Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S8	FSR: 30 years: +0 %: 15 mins: Summer	10.950	9.550	9.762	0.212	10.5	0.034	0.000	9.6	5.737	Surcharged
S5	FSR: 30 years: +0 %: 15 mins: Summer	10.950	9.425	9.489	0.064	13.5	0.010	0.000	13.4	7.450	OK
S4	FSR: 30 years: +0 %: 15 mins: Summer	10.950	10.050	10.081	0.031	2.4	0.005	0.000	2.3	1.019	OK
S6	FSR: 30 years: +0 %: 15 mins: Summer	10.550	9.850	9.968	0.118	5.9	0.019	0.000	4.3	2.539	Surcharged
S7	FSR: 30 years: +0 %: 15 mins: Summer	10.550	9.685	9.893	0.208	7.5	0.033	0.000	6.3	3.919	Surcharged
S3	FSR: 30 years: +0 %: 15 mins: Summer	10.250	9.350	9.390	0.040	5.3	0.006	0.000	5.3	2.306	OK
S9	FSR: 30 years: +0 %: 15 mins: Summer	10.250	8.860	8.938	0.078	17.6	0.012	0.000	17.4	9.253	OK
S10	FSR: 30 years: +0 %: 15 mins: Summer	10.250	8.190	8.253	0.063	19.3	0.010	0.000	19.1	10.104	OK
S11	FSR: 30 years: +0 %: 15 mins: Summer	10.250	9.350	9.366	0.016	2.0	0.003	0.000	2.0	0.858	OK
S1	FSR: 30 years: +0 %: 15 mins: Summer	9.350	8.600	8.717	0.117	11.2	0.019	0.000	10.1	4.853	Surcharged
S2	FSR: 30 years: +0 %: 30 mins: Summer	9.850	8.185	8.249	0.064	10.8	0.010	0.000	10.8	9.315	OK
S21	FSR: 30 years: +0 %: 15 mins: Summer	10.200	8.345	8.489	0.145	9.8	0.164	0.000	8.3	4.590	OK
S20	FSR: 30 years: +0 %: 15 mins: Summer	10.450	8.410	8.507	0.097	10.6	0.110	0.000	9.8	4.592	OK

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Junctions Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

FSR: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S8	FSR: 100 years: +0 %: 15 mins: Summer	10.950	9.550	9.836	0.286	12.6	0.046	0.000	11.3	7.459	Surcharged
S5	FSR: 100 years: +0 %: 15 mins: Summer	10.950	9.425	9.496	0.071	16.3	0.011	0.000	16.2	9.682	OK
S4	FSR: 100 years: +0 %: 15 mins: Summer	10.950	10.050	10.085	0.035	3.1	0.006	0.000	3.0	1.325	OK
S6	FSR: 100 years: +0 %: 15 mins: Summer	10.550	9.850	10.107	0.257	7.6	0.041	0.000	5.1	3.300	Surcharged
S7	FSR: 100 years: +0 %: 15 mins: Summer	10.550	9.685	10.003	0.318	9.2	0.051	0.000	7.1	5.087	Surcharged
S3	FSR: 100 years: +0 %: 15 mins: Summer	10.250	9.350	9.396	0.046	6.9	0.007	0.000	6.8	2.999	OK
S9	FSR: 100 years: +0 %: 15 mins: Summer	10.250	8.860	8.952	0.092	21.6	0.015	0.000	21.2	12.015	OK
S10	FSR: 100 years: +0 %: 60 mins: Summer	10.250	8.190	8.443	0.253	17.1	0.040	0.000	16.1	21.559	Surcharged
S11	FSR: 100 years: +0 %: 15 mins: Summer	10.250	9.350	9.369	0.019	2.6	0.003	0.000	2.5	1.112	OK
S1	FSR: 100 years: +0 %: 15 mins: Summer	9.350	8.600	8.881	0.281	14.5	0.045	0.000	11.3	6.303	Surcharged
S2	FSR: 100 years: +0 %: 60 mins: Summer	9.850	8.185	8.442	0.257	12.3	0.041	0.000	11.9	15.257	Surcharged
S21	FSR: 100 years: +0 %: 15 mins: Summer	10.200	8.345	8.868	0.523	10.2	0.592	0.000	6.8	5.957	Surcharged
S20	FSR: 100 years: +0 %: 15 mins: Summer	10.450	8.410	8.875	0.465	13.7	0.526	0.000	10.2	5.962	Surcharged

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Junctions Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S8	FSR: 100 years: +40 %: 15 mins: Summer	10.950	9.550	9.981	0.431	16.4	0.069	0.000	14.2	10.465	Surcharged
S5	FSR: 100 years: +40 %: 15 mins: Summer	10.950	9.425	9.509	0.084	21.3	0.013	0.000	21.2	13.586	OK
S4	FSR: 100 years: +40 %: 15 mins: Summer	10.950	10.050	10.092	0.042	4.3	0.007	0.000	4.2	1.848	OK
S6	FSR: 100 years: +40 %: 30 mins: Summer	10.550	9.850	10.396	0.546	7.0	0.087	0.000	6.3	6.072	Flood Risk
S7	FSR: 100 years: +40 %: 30 mins: Summer	10.550	9.685	10.249	0.564	10.1	0.090	0.000	9.5	9.363	Surcharged
S3	FSR: 100 years: +40 %: 15 mins: Summer	10.250	9.350	9.407	0.057	9.7	0.009	0.000	9.5	4.193	OK
S9	FSR: 100 years: +40 %: 15 mins: Summer	10.250	8.860	8.973	0.113	28.7	0.018	0.000	28.2	16.807	OK
S10	FSR: 100 years: +40 %: 60 mins: Summer	10.250	8.190	8.817	0.627	23.1	0.100	0.000	21.8	30.151	Surcharged
S11	FSR: 100 years: +40 %: 15 mins: Summer	10.250	9.350	9.372	0.022	3.6	0.003	0.000	3.5	1.556	OK
S1	FSR: 100 years: +40 %: 15 mins: Summer	9.350	8.600	9.270	0.670	20.3	0.106	0.000	14.9	8.849	Flood Risk
S2	FSR: 100 years: +40 %: 60 mins: Summer	9.850	8.185	8.817	0.632	16.2	0.100	0.000	16.1	21.389	Surcharged
S21	FSR: 100 years: +40 %: 15 mins: Summer	10.200	8.345	9.643	1.299	13.0	1.469	0.000	6.9	8.346	Surcharged
S20	FSR: 100 years: +40 %: 15 mins: Summer	10.450	8.410	9.651	1.241	19.2	1.403	0.000	13.0	8.353	Surcharged

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Stormwater Controls Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Cellular Storage	FSR: 1 years: +0 %: 15 mins: Summer	7.904	7.904	0.114	0.114	15.3	3.265	0.000	0.000	10.8	6.478	8	90.723
SA Roof	FSR: 1 years: +0 %: 15 mins: Winter	8.144	8.144	28.144	28.144	7.9	0.597	0.000	6.376	0.0	0.000	2	4.652
SA Road	FSR: 1 years: +0 %: 15 mins: Summer	-7.166	-7.166	12.684	12.684	4.0	0.269	0.000	1.868	0.0	0.000	2	57.029

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Stormwater Controls Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

Status
OK
OK
OK

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Stormwater Controls Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Cellular Storage	FSR: 30 years: +0 %: 30 mins: Summer	8.247	8.247	0.457	0.457	25.9	13.014	0.000	0.000	7.4	20.486	29	63.030
SA Roof	FSR: 30 years: +0 %: 30 mins: Summer	8.238	8.238	28.238	28.238	7.4	0.599	0.000	19.903	0.0	0.001	1	4.335
SA Road	FSR: 30 years: +0 %: 15 mins: Summer	8.583	8.583	28.433	28.433	8.3	0.604	0.000	4.587	0.0	0.000	2	3.674

Status
OK
OK
OK

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Stormwater Controls Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

FSR: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Cellular Storage	FSR: 100 years: +0 %: 60 mins: Summer	8.441	8.441	0.651	0.651	27.3	18.543	0.000	0.000	9.1	36.504	25	47.320
SA Roof	FSR: 100 years: +0 %: 60 mins: Summer	8.432	8.432	28.432	28.432	9.1	0.604	0.000	36.477	0.0	0.000	1	3.677
SA Road	FSR: 100 years: +0 %: 15 mins: Summer	8.862	8.862	28.712	28.712	6.8	0.610	0.000	5.956	0.0	0.000	1	2.729

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Stormwater Controls Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

Status
OK
OK
OK

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Stormwater Controls Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Cellular Storage	FSR: 100 years: +40 %: 60 mins: Summer	8.815	8.815	1.025	1.025	36.7	29.213	0.000	0.000	6.8	44.406	47	17.007
SA Roof	FSR: 100 years: +40 %: 60 mins: Summer	8.807	8.807	28.807	28.807	6.8	0.612	0.000	43.809	0.0	0.000	1	2.408
SA Road	FSR: 100 years: +40 %: 15 mins: Summer	9.637	9.637	29.487	29.487	6.9	0.626	0.000	8.331	0.0	0.000	1	0.102

Status
OK
OK
OK

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Connections Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Total Discharge Volume

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
1.000	FSR: 1 years: +0 %: 1440 mins: Summer	Pipe	S1	S2	9.350	8.614	0.012	8.129	0.7	0.04	0.4	OK
2.000	FSR: 1 years: +0 %: 1440 mins: Summer	Pipe	S3	S2	10.250	9.358	0.009	3.899	0.5	0.01	0.2	OK
3.002	FSR: 1 years: +0 %: 1440 mins: Summer	Pipe	S9	S10	10.250	8.875	0.013	16.033	0.9	0.02	0.7	OK
5.000	FSR: 1 years: +0 %: 1440 mins: Summer	Pipe	S11	S10	10.250	9.353	0.007	1.584	0.3	0	0.1	OK
4.000	FSR: 1 years: +0 %: 1440 mins: Summer	Pipe	S6	S7	10.550	9.862	0.013	4.283	0.3	0.03	0.2	OK
4.001	FSR: 1 years: +0 %: 1440 mins: Summer	Pipe	S7	S8	10.550	9.699	0.016	6.575	0.4	0.04	0.3	OK
3.000	FSR: 1 years: +0 %: 1440 mins: Summer	Pipe	S4	S5	10.950	10.056	0.006	1.787	0.4	0.01	0.1	OK
3.001	FSR: 1 years: +0 %: 1440 mins: Summer	Pipe	S5	S9	10.950	9.438	0.014	12.836	0.7	0.02	0.6	OK
4.002	FSR: 1 years: +0 %: 1440 mins: Summer	Pipe	S8	S5	10.950	9.568	0.017	9.868	0.5	0.06	0.4	OK
10.000	FSR: 1 years: +0 %: 1440 mins: Winter	Pipe	S20	S21	10.450	8.422	0.012	7.674	0.3	0.01	0.2	OK
1.001	FSR: 1 years: +0 %: 1440 mins: Summer	Pipe	S2	Cellular Storage	9.850	8.196	0.019	12.028	0.4	0.01	0.5	OK
3.003	FSR: 1 years: +0 %: 1440 mins: Summer	Pipe	S10	Cellular Storage	10.250	8.201	0.019	17.617	0.8	0.01	0.8	OK
10.001	FSR: 1 years: +0 %: 1440 mins: Winter	Pipe	S21	SA Road	10.200	8.357	0.012	7.673	0.3	0.01	0.2	OK
Pipe	FSR: 1 years: +0 %: 1440 mins: Summer	Pipe	Cellular Storage	SA Roof	9.990	7.817	0.026	29.616	0.7	0.06	1.3	OK

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Connections Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Total Discharge Volume

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
1.000	FSR: 30 years: +0 %: 1440 mins: Summer	Pipe	S1	S2	9.350	8.619	0.017	16.709	0.8	0.07	0.8	OK
2.000	FSR: 30 years: +0 %: 1440 mins: Summer	Pipe	S3	S2	10.250	9.361	0.013	7.895	0.6	0.02	0.4	OK
3.002	FSR: 30 years: +0 %: 1440 mins: Winter	Pipe	S9	S10	10.250	8.878	0.015	31.891	1.0	0.03	0.9	OK
5.000	FSR: 30 years: +0 %: 1440 mins: Winter	Pipe	S11	S10	10.250	9.354	0.008	3.000	0.3	0	0.1	OK
4.000	FSR: 30 years: +0 %: 1440 mins: Winter	Pipe	S6	S7	10.550	9.864	0.015	8.765	0.3	0.04	0.3	OK
4.001	FSR: 30 years: +0 %: 1440 mins: Winter	Pipe	S7	S8	10.550	9.702	0.019	13.451	0.4	0.06	0.4	OK
3.000	FSR: 30 years: +0 %: 1440 mins: Winter	Pipe	S4	S5	10.950	10.057	0.007	3.539	0.4	0.01	0.1	OK
3.001	FSR: 30 years: +0 %: 1440 mins: Winter	Pipe	S5	S9	10.950	9.440	0.016	25.754	0.7	0.02	0.8	OK
4.002	FSR: 30 years: +0 %: 1440 mins: Winter	Pipe	S8	S5	10.950	9.571	0.020	19.876	0.5	0.09	0.6	OK
10.000	FSR: 30 years: +0 %: 1440 mins: Summer	Pipe	S20	S21	10.450	8.431	0.022	15.804	0.5	0.04	0.7	OK
1.001	FSR: 30 years: +0 %: 1440 mins: Summer	Pipe	S2	Cellular Storage	9.850	8.200	0.027	24.604	0.9	0.02	1.1	OK
3.003	FSR: 30 years: +0 %: 1440 mins: Winter	Pipe	S10	Cellular Storage	10.250	8.202	0.022	34.891	0.9	0.01	1.0	OK
10.001	FSR: 30 years: +0 %: 1440 mins: Summer	Pipe	S21	SA Road	10.200	8.367	0.021	15.803	0.5	0.04	0.7	OK
Pipe	FSR: 30 years: +0 %: 1440 mins: Winter	Pipe	Cellular Storage	SA Roof	9.990	7.821	0.030	59.447	0.7	0.08	1.7	OK

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Connections Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

FSR: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Total Discharge Volume

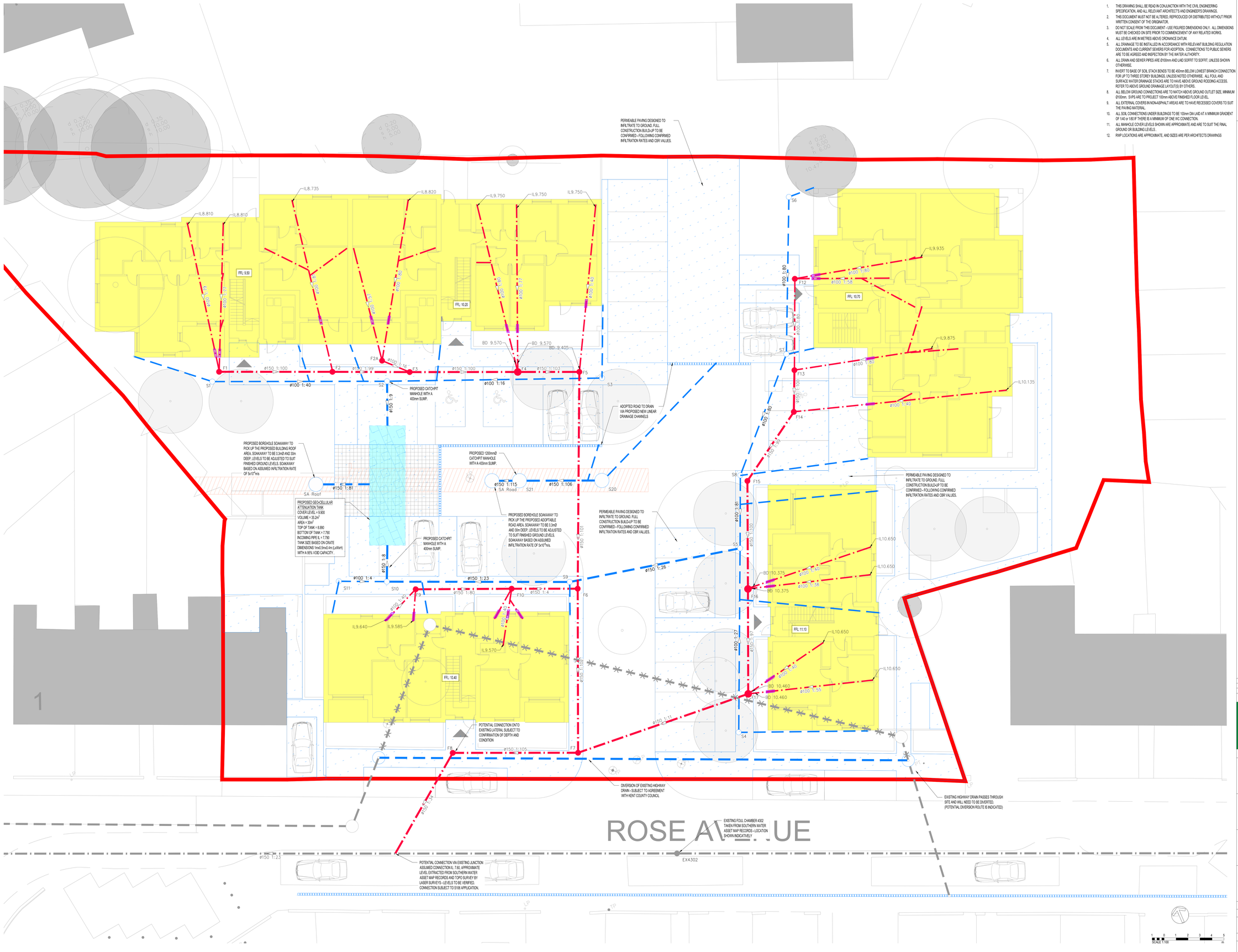
Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
1.000	FSR: 100 years: +0 %: 1440 mins: Summer	Pipe	S1	S2	9.350	8.622	0.019	21.233	0.9	0.09	1.0	OK
2.000	FSR: 100 years: +0 %: 1440 mins: Summer	Pipe	S3	S2	10.250	9.362	0.014	10.073	0.7	0.03	0.5	OK
3.002	FSR: 100 years: +0 %: 1440 mins: Winter	Pipe	S9	S10	10.250	8.880	0.017	40.501	1.1	0.03	1.2	OK
5.000	FSR: 100 years: +0 %: 1440 mins: Winter	Pipe	S11	S10	10.250	9.354	0.009	3.762	0.3	0	0.1	OK
4.000	FSR: 100 years: +0 %: 1440 mins: Winter	Pipe	S6	S7	10.550	9.865	0.017	11.129	0.4	0.05	0.3	OK
4.001	FSR: 100 years: +0 %: 1440 mins: Winter	Pipe	S7	S8	10.550	9.704	0.021	17.135	0.4	0.07	0.5	OK
3.000	FSR: 100 years: +0 %: 1440 mins: Summer	Pipe	S4	S5	10.950	10.059	0.009	4.493	0.6	0.02	0.2	OK
3.001	FSR: 100 years: +0 %: 1440 mins: Winter	Pipe	S5	S9	10.950	9.442	0.018	32.642	0.8	0.03	0.9	OK
4.002	FSR: 100 years: +0 %: 1440 mins: Summer	Pipe	S8	S5	10.950	9.579	0.028	25.132	0.6	0.17	1.1	OK
10.000	FSR: 100 years: +0 %: 1440 mins: Winter	Pipe	S20	S21	10.450	8.429	0.020	20.058	0.4	0.03	0.6	OK
1.001	FSR: 100 years: +0 %: 1440 mins: Summer	Pipe	S2	Cellular Storage	9.850	8.202	0.030	31.307	0.9	0.03	1.4	OK
3.003	FSR: 100 years: +0 %: 1440 mins: Winter	Pipe	S10	Cellular Storage	10.250	8.204	0.024	44.263	1.0	0.02	1.3	OK
10.001	FSR: 100 years: +0 %: 1440 mins: Winter	Pipe	S21	SA Road	10.200	8.365	0.019	20.057	0.4	0.03	0.6	OK
Pipe	FSR: 100 years: +0 %: 1440 mins: Summer	Pipe	Cellular Storage	SA Roof	9.990	7.834	0.042	75.523	0.8	0.16	3.4	OK

Project:	Date:		
Rose Avenue, Gravesend	01/08/2025		
	Designed by:	Checked by:	Approved By:
	TW	EP	EP
Report Details:	Company Address:		
Type: Connections Summary Storm Phase: 5028150 - Proposed SW	3 Valentines Place SE1 8QH		

FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Total Discharge Volume

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
1.000	FSR: 100 years: +40 %: 1440 mins: Winter	Pipe	S1	S2	9.350	8.621	0.018	29.705	0.9	0.08	0.9	OK
2.000	FSR: 100 years: +40 %: 1440 mins: Summer	Pipe	S3	S2	10.250	9.364	0.017	14.099	0.7	0.04	0.6	OK
3.002	FSR: 100 years: +40 %: 1440 mins: Summer	Pipe	S9	S10	10.250	8.889	0.024	56.521	1.4	0.07	2.6	OK
5.000	FSR: 100 years: +40 %: 1440 mins: Winter	Pipe	S11	S10	10.250	9.355	0.011	5.286	0.3	0	0.2	OK
4.000	FSR: 100 years: +40 %: 1440 mins: Winter	Pipe	S6	S7	10.550	9.868	0.020	15.557	0.4	0.07	0.5	OK
4.001	FSR: 100 years: +40 %: 1440 mins: Summer	Pipe	S7	S8	10.550	9.712	0.031	23.933	0.5	0.16	1.1	OK
3.000	FSR: 100 years: +40 %: 1440 mins: Summer	Pipe	S4	S5	10.950	10.061	0.011	6.263	0.6	0.02	0.3	OK
3.001	FSR: 100 years: +40 %: 1440 mins: Summer	Pipe	S5	S9	10.950	9.449	0.026	45.524	1.0	0.06	2.1	OK
4.002	FSR: 100 years: +40 %: 1440 mins: Winter	Pipe	S8	S5	10.950	9.578	0.027	35.080	0.6	0.15	1.0	OK
10.000	FSR: 100 years: +40 %: 1440 mins: Summer	Pipe	S20	S21	10.450	8.438	0.029	28.056	0.5	0.07	1.3	OK
1.001	FSR: 100 years: +40 %: 1440 mins: Summer	Pipe	S2	Cellular Storage	9.850	8.205	0.036	43.793	1.1	0.04	2.0	OK
3.003	FSR: 100 years: +40 %: 1440 mins: Summer	Pipe	S10	Cellular Storage	10.250	8.210	0.036	61.729	1.2	0.04	2.8	OK
10.001	FSR: 100 years: +40 %: 1440 mins: Summer	Pipe	S21	SA Road	10.200	8.374	0.028	28.055	0.5	0.07	1.3	OK
Pipe	FSR: 100 years: +40 %: 1440 mins: Summer	Pipe	Cellular Storage	SA Roof	9.990	7.843	0.050	105.493	0.9	0.22	4.8	OK

F. PROPOSED DRAINAGE LAYOUTS



NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE CIVIL ENGINEERING SPECIFICATION, AND ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS.
2. THIS DOCUMENT MUST NOT BE ALTERED, REPRODUCED OR DISTRIBUTED WITHOUT PRIOR WRITTEN CONSENT OF THE ORIGINATOR.
3. DO NOT SCALE FROM THIS DOCUMENT - USE FIGURED DIMENSIONS ONLY. ALL DIMENSIONS MUST BE CHECKED ON SITE PRIOR TO COMMENCEMENT OF ANY RELATED WORKS.
4. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM.
5. ALL DRAINAGE TO BE INSTALLED IN ACCORDANCE WITH RELEVANT BUILDING REGULATION DOCUMENTS AND CURRENT SEWERS FOR ADOPTION. CONNECTIONS TO PUBLIC SEWERS ARE TO BE AGREED AND INSPECTION BY THE WATER AUTHORITY.
6. ALL DRAIN AND SEWER PIPES ARE Ø100mm AND LAID SOFFIT TO SOFFIT, UNLESS SHOWN OTHERWISE.
7. INVERT TO BASE OF SOIL STACK BENDS TO BE 450mm BELOW LOWEST BRANCH CONNECTION FOR UP TO THREE STOREY BUILDINGS, UNLESS NOTED OTHERWISE. ALL FOUL AND SURFACE WATER DRAINAGE STACKS ARE TO HAVE ABOVE GROUND RODDING ACCESS. REFER TO ABOVE GROUND DRAINAGE LAYOUT(S) BY OTHERS.
8. ALL BELOW GROUND CONNECTIONS ARE TO MATCH ABOVE GROUND OUTLET SIZE. MINIMUM Ø100mm. SVPS ARE TO PROJECT 100mm ABOVE FINISHED FLOOR LEVEL.
9. ALL EXTERNAL COVERS IN NON-ASPHALT AREAS ARE TO HAVE RECESSED COVERS TO SUIT THE PAVING MATERIAL.
10. ALL SOIL CONNECTIONS UNDER BUILDINGS TO BE 100mm DIA LAID AT A MINIMUM GRADIENT OF 1:40 or 1:60 IF THERE IS A MINIMUM OF ONE WC CONNECTION.
11. ALL MANHOLE COVER LEVELS SHOWN ARE APPROXIMATE AND ARE TO SUIT THE FINAL GROUND OR BUILDING LEVELS.
12. RWP LOCATIONS ARE APPROXIMATE, AND SIZES ARE PER ARCHITECTS DRAWINGS

CDM REGULATIONS 2015

Significant or non-obvious risks and risks which are difficult to manage are identified on this drawing using the following symbol identified to the right with brief accompanying text. For further details of the risks identified by designers, reference should be made to CDM hazard register.

DRAINAGE LEGEND

KEY	DESCRIPTION
	NEW CHAMBER AND SEWER/DRAIN
	REDUNDANT SURFACE WATER SEWER OR DRAIN
	NEW FOUL CHAMBER AND SEWER/DRAIN
	EXISTING FOUL DRAIN / SEWER
	NEW DRAINAGE CHANNEL WITH ACCESS PANELS AT ENDS
	NEW GEOCELLULAR ATTENUATION TANK
	NEW PERMEABLE PAVING
	10m OFFSET DISTANCE FROM BUILDING
	PIPE THROUGH FOUNDATION SECTION

DRAINAGE SUBJECT TO FURTHER DEVELOPMENT FOLLOWING REVIEW OF FOUNDATION SCHEME

EXTERNAL DRAINAGE FOR THE ADOPTED ROAD IN ABEYANCE FOLLOWING CONFIRMATION OF LEVELS

IT IS ASSUMED THAT THRESHOLD DRAINS ARE NOT REQUIRED – INSTEAD SUITABLE DOOR DETAIL AND LEVELS TO STOP AWAY FROM THE BUILDING SHALL BE PROVIDED

REV	DESCRIPTION	DATE	BY	CHKD
P02	Minor amendments to site wide drainage	20/06/2025	TW	PCh
P01	First issue	09/06/2025	TW	PCh

ORIGINATOR: www.ridge.co.uk

RIDGE

PROJECT NUMBER: 5028150

CLIENT:
BAILEY GARNER

IN ASSOCIATION WITH:

PROJECT:
BAILEY GARNER - ROSE AVENUE

TITLE:
BELOW GROUND DRAINAGE GENERAL ARRANGEMENT

DRAWN BY: TW | CHECKED BY: PCh | APPROVED BY: PCh

SCALE @ A0: 1:100 | DATE OF REVIEW: 09/06/2025

ISO 19650 STATUS:
S2 - Issued for Information

DRAWING No: 5028150-RDG-XX-XX-D-C-110001-Below Ground Drainage General Arrangement.dwg

PROJECT:	ORG:	FUNCTION:	SPATIAL:	FORM:	DISCIPLINE:	NUMBER:	REV:
5028150	RDG	XX	XX	D	C	110001	P02

RIDGE

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