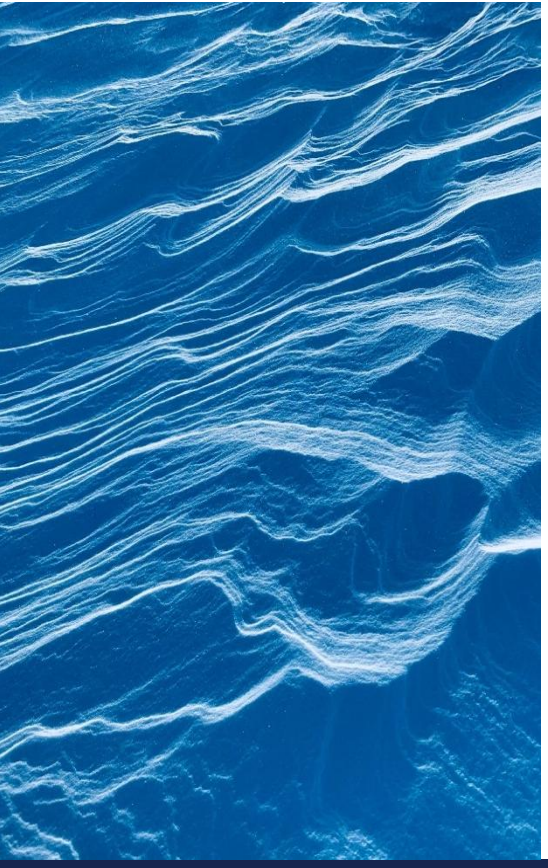
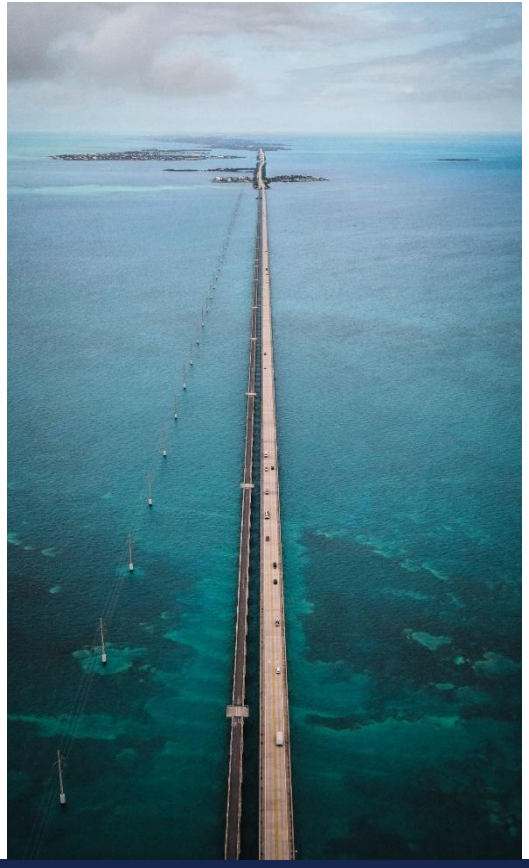




Surface Water Drainage Strategy
7420_DN17_Crowle_06

aegaea
water, civils and environment

Site Address: 40 The Yard
High Street
Crowle
Scunthorpe
DN17 4L

UK Experts in Flood Modelling, Flood Risk Assessments, and Surface Water Drainage Strategies

aegaea
water, civils and environment

Document Issue Record

Project: 40 The Yard, High Street, Crowle – Surface Water Drainage Strategy

Prepared for: Donna Mcclurey

Reference: 7420_DN17_Crowle_06

Site Location: 40 The Yard, High Street, Crowle, Scunthorpe, North Lincolnshire, DN17 4LD

Issue	Date	Author	Check	Auth.	Comments
1	13.03.25	Ceri Metcalfe	James Mahoney	James Mahoney	First issue

Please Note:

Table of Contents

aegaea

water, civils and environment

1. Introduction

1.1. Aegaea were commissioned to prepare a Surface Water Drainage Strategy to support a planning application for the proposed development at the below address.

Site Overview

1.2. The site of the proposed development is 40 The Yard, High Street, Crowle, DN17 4LD.

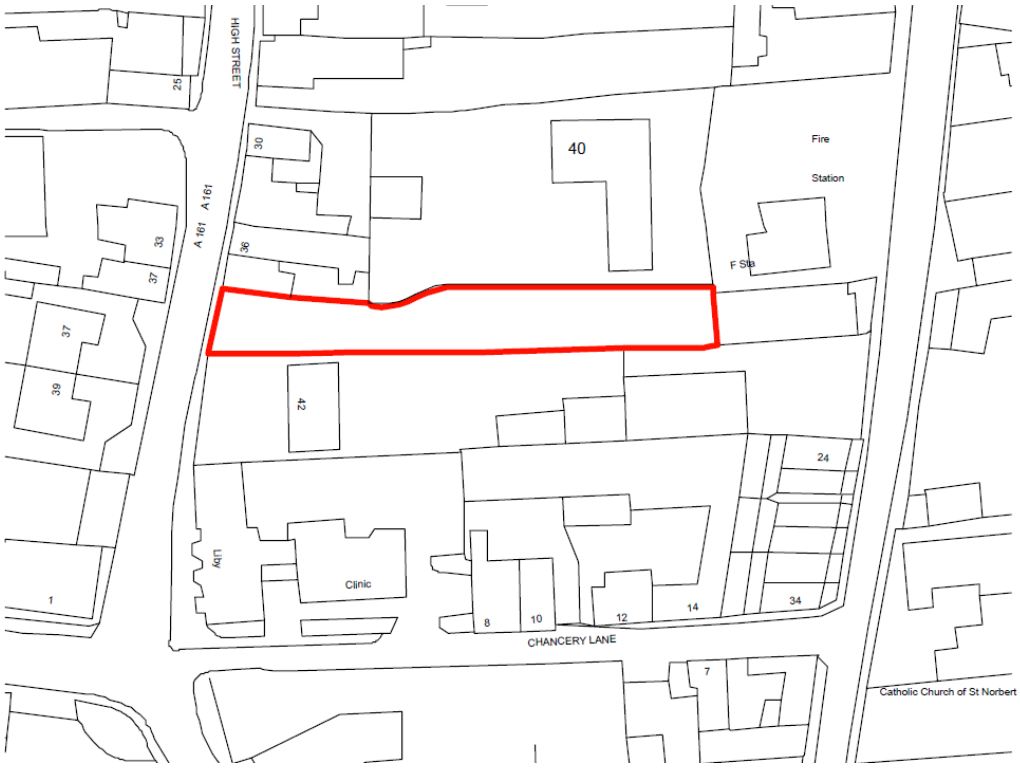


Figure 1: Site Location

1.3. The proposed development site is situated east of High Street (A161), Crowle and is accessed from an existing shared access.

1.4. The total application site measures approximately 631m^2 (0.063ha), with the proposed development area being approximately 285m^2 (0.029ha), and is currently an existing hardstanding area. The location plan can be found within Appendix A.

1.5. North Lincolnshire Council is the Local Planning Authority (LPA) for the site and also the designated Lead Local Flood Authority (LLFA).

1.6. Severn Trent Water is the sewage undertaker for the area. The public sewer mapping for the area is included in Appendix B.

Development Proposals

1.7. The proposed development comprises of the erection of a new 3-bedroom dwelling and associated works.

1.8. The proposed development layout is contained within Appendix C.

Ground Conditions

1.9. A review of readily available information indicates that the site is in an area of naturally wet very acid sandy and loamy soils, with high groundwater (Soilscapes soil types viewer).

1.10. British Geological Survey (BGS) data indicates that the bedrock underlying the site is Mercia Mudstone Group - Mudstone.

1.11. Furthermore, given the limited available space within the site curtilage it is unlikely that any soakaways could be sited with the adequate distances from the dwellings and site boundaries.

1.12. Based on the above, it is considered that the disposal of surface water via infiltration is not feasible and an alternative strategy in line with the SuDS hierarchy is to be sought.

2. Surface Water Drainage Strategy

Existing Drainage System

2.1. It is understood that surface water flows from the development site currently discharges overland to the neighbouring soft landscaping and the gullies within High Street.

2.2. It is understood that the neighbouring property (40 High Street) discharges combined flows to a 150mm diameter Severn Trent Water foul sewer located in High Street via the shared driveway.

Proposed Drainage Hierarchy

2.3. Current guidance indicates that the following surface water disposal options should be considered, listed in order of preference:

i. **Disposal via on-site infiltration systems:** As mentioned above, the site is in an area of naturally wet very acid sandy and loamy soils with high groundwater, therefore it is considered that the disposal of surface water via infiltration techniques is not feasible.

ii. **Disposal to a watercourse/surface water body:** No watercourses or surface water bodies are located within the vicinity of the site.

iii. **Disposal to surface water sewer:** There are no surface water sewers within the vicinity of the site.

iv. **Disposal to combined sewer:** It is proposed to discharge surface flows from the development to the existing private combined sewer located within the shared driveway, which has an existing connection to the Severn Trent Water foul sewer located in High Street.

In accordance with the SuDS hierarchy, it is proposed that surface water flows from the development are to discharge via a new connection to the existing private combined sewer located within the shared access of the site, subject to relevant approvals. The existing connection to the Severn Trent Water foul sewer within High Street is to remain as existing. Further surveys are to be undertaken to determine the exact location, dimensions and invert levels of the existing sewers.

Proposed Drainage Strategy

2.4. The use of permeable paving has been proposed to filter water and improve water quality and provide attenuation of surface water flows onsite prior to discharge.

2.5. SuDS attenuation planters are also proposed to filter and treat surface water flows from the roof prior to entering the drainage network.

2.6. In accordance with HR Wallingford, it is considered that 2 l/s forms a practical minimum flow rate that balances and mitigates both the increased flood risk and blockage risk to the proposed drainage system, therefore it is proposed to restrict surface water flows to the private combined sewer at a restricted rate of 2 l/s, which provides a 28% betterment on the existing brownfield runoff rate of 2.8 l/s from the site.

2.7. All on-site drainage has been designed to accommodate surface water runoff from all proposed impermeable areas on site, including all modelled 1 in 100 year storms plus 40% climate change.

2.8. The proposed drainage layout can be found within Appendix D and drainage calculations can be found in Appendix E.

3. Future Maintenance Strategy

General Management

3.1. The onsite surface water drainage network will be managed throughout the lifetime by the property owner.

3.2. All drainage, whether piped or SuDS require regular maintenance. the tables below provide an overview of general maintenance tasks and frequency of which they need to be undertaken.

General maintenance for Surface Water Drainage Systems as per CIRIA C753.

Maintenance Schedule	Required Action	Typical frequency
Regular Maintenance	Inspect for sediment and debris in catchpit manholes and gullies. Clean out as required	Twice Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris in catchpits, gullies, attenuation devices and inside concrete manhole rings.	As required, based on inspections.
Remedial actions	Reconstruct and/or replace components, if performance deteriorates or failure/blockage occurs.	As required
	Replacement of clogged components (flow restriction)	As required
Monitoring	Inspect silt traps/gullies/catchpits and note rate of sediment accumulation.	Monthly in the first year and then annually
	Check attenuation devices	Annually

3.3. The required maintenance for each component making up the drainage system is scheduled in the tables below, based on CIRIA report C753 – The SuDS manual.

Permeable Paving

General maintenance for permeable paving as per CIRIA C753.

	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	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 surface 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 or management using glyphospate applied directly into the weeds by an applicator rather than spraying.	As required – once per year on less frequently used pavements
Remedial Maintenance	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required
	Remediate work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action.	Three-monthly, 48 hr after large storms in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

3.4. Many of the specific maintenance activities for pervious pavements can be undertaken as part of general site cleaning and should have little or no cost implications.

Hydro-Brake (Vortex Flow Control)

Maintenance Schedule	Required Action	Typical frequency
Regular Maintenance	Remove sediment and debris from flow control chambers and upstream manholes. Check for signs of damage, wear and tear. Check any visible fixing bolts.	Monthly (for the first 12 months, then 6 monthly).
Remedial Actions	Replace or clean hydrobrake if performance deteriorates or failure occurs. In the event of the blockage, the blockage/foreign material should be manually removed	As necessary.
Monitoring	Check flow control to ensure emptying is occurring.	Quarterly and post high intensity storm event.

4. Pollution Prevention & Water Quality Management

SuDS Mitigation Indices

4.1. Chapter 26 of the CIRIA C753 The SuDS Manual, provides design advice to meet water quality standards by adopting the SuDS train treatment mechanism and thereby reduce the risk of pollution by evaluating potential pollution hazards at the outset.

4.2. The proposed site layout provides the opportunity to introduce SuDS into the scheme to reduce potential contaminant risk further.

4.3. Runoff from individual property driveways, residential car parks and low traffic roads are generally viewed as low risk (as per Table 26.2 of C753), shown in the tables below.

Pollutant Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Individual property driveways, residential car parks and low traffic roads	Low	0.5	0.4	0.4

Indicative SuDS Mitigation Indices

	Mitigation Indices				Indices for Calculation		
	TSS	Metals	Hydrocarbons		TSS	Metals	Hydrocarbons
Permeable Paving	0.7	0.6	0.7	100%	0.7	0.6	0.7
Total Mitigation Indices score					0.7	0.6	0.7
Sufficiency of Pollution Mitigation Indices					Sufficient (No additional mitigation required)		

4.4. The mitigation indices offered by the proposed permeable pavement exceed the hazard indices from individual property driveways and therefore provides adequate mitigation

4.5. Runoff from other roofs is generally viewed as low risk (as per Table 26.2 of C753), Refer to the tables below.

Pollutant Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05

Indicative SuDS Mitigation Indices

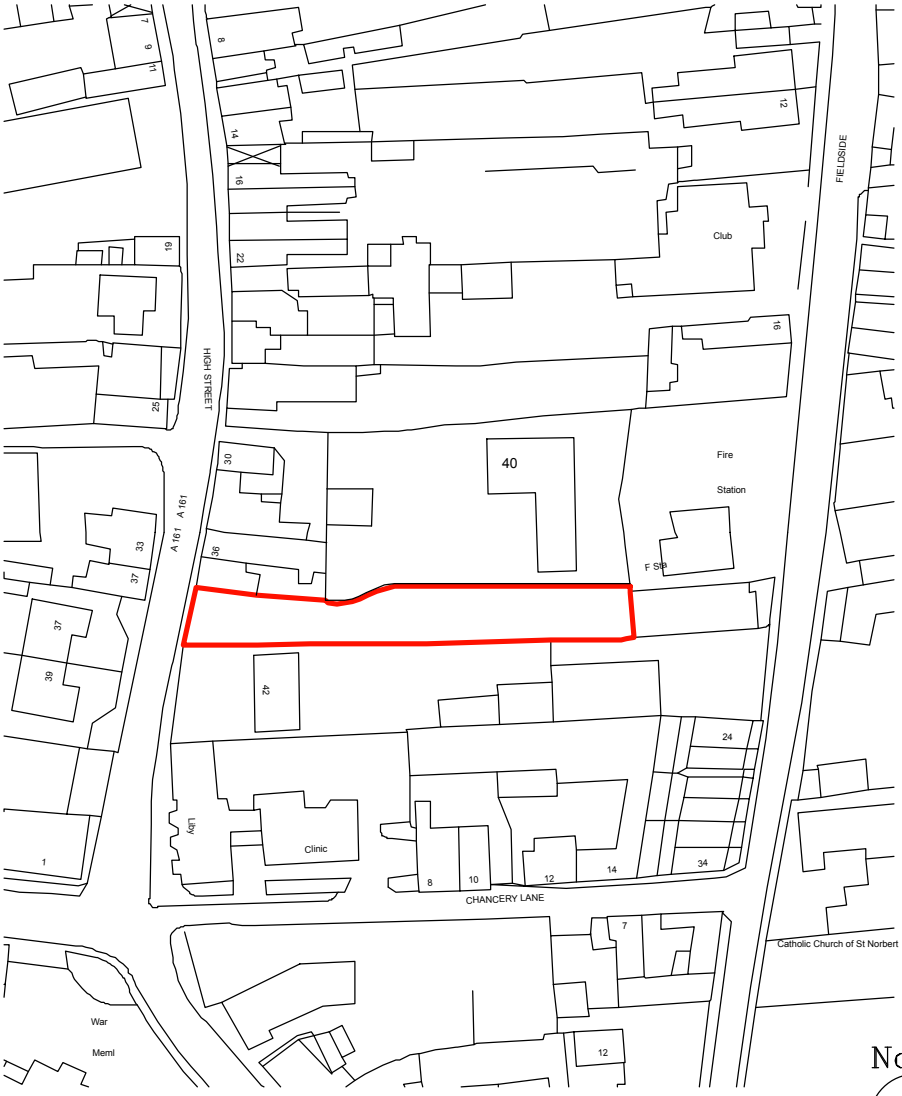
	Mitigation Indices				Indices for Calculation		
	TSS	Metals	Hydrocarbons		TSS	Metals	Hydrocarbons
Bioretention System	0.8	0.8	0.8	100%	0.8	0.8	0.8
Total Mitigation Indices score					**0.8**	**0.8**	**0.8**
Sufficiency of Pollution Mitigation Indices					Sufficient (No additional mitigation required)		

4.6. The mitigation indices offered by the proposed bioretention planters and soakaway exceed the hazard indices from individual property driveways and therefore provides adequate mitigation.

4.7. It is therefore considered that the proposed SuDS features on site are appropriate and acceptable in terms of water quality.

Appendix A - Site Location Plan

all dimensions to be checked on site and architect notified of any discrepancies prior to commencement.
do not scale.



rev:	date:	comment(s):	name:

status: PLANNING

client: MS D MCCLUREY

job: 40 HIGH STREET, CROWLE

title: LOCATION PLAN

date: MARCH 2021 scale @ a4: 1:1250

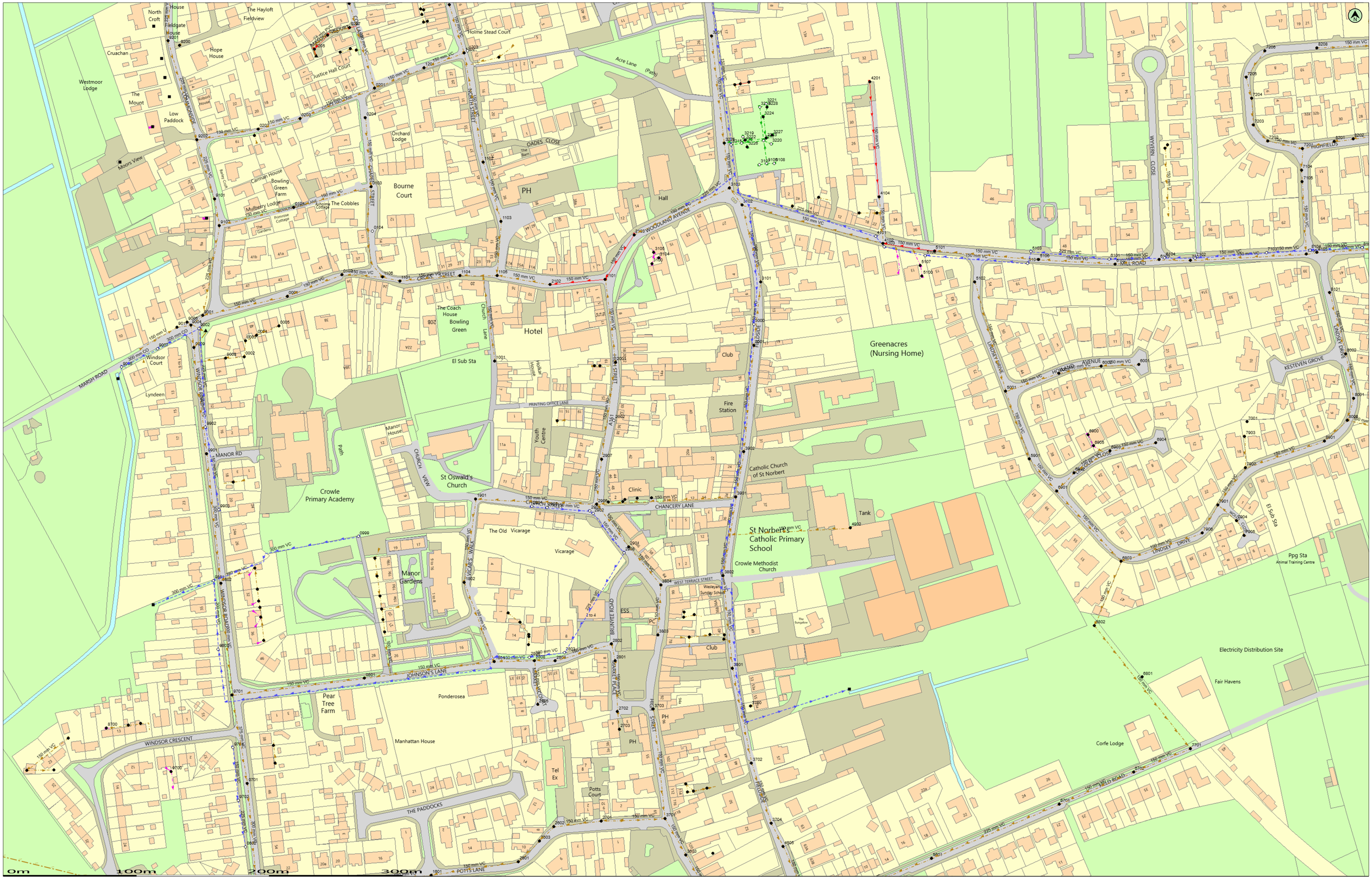
job no: 21.18 drg no: 01

0 10 20 30 40 50 60 70 80 90 100

scale 1:1250 metres

THE RURAL ARCHITECT

Appendix B - Severn Trent Water Sewer Mapping



(c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122 | Date: 04/03/25 | Scale: 1:1250 | Map Centre: 477333,412989 | Data updated: 14/02/25 | Our Ref: 1706289 - 1

Wastewater Plan A1
Powered by digdat

Public Foul Gravity/Lateral Drain
Public Combined Gravity/Lateral Drain
Public Surface Water Gravity/Lateral Drain
Pressure Foul
Pressure Combined
Pressure Surface Water
Highway Drain
Overflow Pipe
Disposal Pipe
Culverted Water Course
Pumping Station
Fitting
Manhole Foul
Manhole Surface
Abandoned Pipe
Chamber
Section 104 sewers are shown in green
Private sewers are shown in magenta

nick@aegaea.com
7420

SEVERN TRENT

GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK ADJACENT TO SEVERN TRENT WATER'S APPARATUS

Please ensure that a copy of these conditions is passed to your representative and/or your contractor on site. If any damage is caused to Severn Trent Water Limited (STW) apparatus (defined below), the person, contractor or subcontractor responsible must inform STW immediately on:
0800 783 4444 (24 hours)

a) These general conditions and precautions apply to the public sewerage, water distribution and cables in ducts including (but not limited to) sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991(a legal agreement between a developer and STW, where a developer agrees to build sewers to an agreed standard, which STW will then adopt); mains installed in accordance with an agreement for the self-construction of water mains entered into with STW and the assets described at condition b) of these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions.

b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.

c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private drains, private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.

d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.

e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations).

f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

In order to achieve safe working conditions adjacent to any STW Apparatus the following should be observed:

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.

2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to STW Apparatus. You or your contractor must ensure the safety of STW Apparatus and will be responsible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts).

3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated.

4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented.

5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.

6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.

7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW Apparatus.

8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW Apparatus for smaller sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus.

9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected.

10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you.

11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable. Minor reduction in existing levels may result in conflict with STW Apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works.

12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.

13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,

14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

TREE PLANTING RESTRICTIONS

There are many problems with the location of trees adjacent to sewers, water mains and other STW Apparatus and these can lead to the loss of trees and hence amenity to the area which many people may have become used to. It is best if the problem is not created in the first place. Set out below are the recommendations for tree planting in close proximity to public sewers, water mains and other STW Apparatus.

15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below.

16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.

17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May2014

18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other STW Apparatus.

19. In certain circumstances, both STW and landowners may wish to plant shrubs/bushes in close proximity to a sewer, water main of other STW Apparatus for screening purposes. The following are shallow rooting and are suitable for this purpose: Blackthorn, Broom, Cotoneaster, Elder, Hazel, Laurel, Privet, Quickthorn, Snowberry, and most ornamental flowering shrubs.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
	C		0	0
	C		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
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	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
0001	F	2.61	1.5	1.11
0002	F	2.54	1.56	0.98
0003	F	2.55	1.68	0.87
0004	F		0	0
0005	F	2.85	2.09	0.76
0101	F	3.87	2.14	1.73
0102	F	3.6	2.23	1.37
0103	F	4.87	3.45	1.42
0201	F	4.89	3.44	1.45
0202	F	3.73	2.58	1.15
0203	F	4.55	3.16	1.39
0204	F	5.08	3.58	1.5
0205	F		0	0
0206	F		0	0
0207	F		0	0
0302	F	5.36	4.12	1.24
0701	F	2.54	0	2.54
0801	F	3.99	1.64	2.35
1001	F	5.52	4.61	0.91
1101	F	4.62	2.97	1.65
1102	F	6.06	4.78	1.28
1103	F	6.03	4.51	1.52
1104	F	4.94	3.66	1.28
1105	F	5.73	4.19	1.54
1106	F	4.3	2.49	1.81
1201	F	5.04	3.88	1.16
1202	F	5.47	4.15	1.32
1301	F	5.83	4.71	1.12
1601	F	2.73	1.03	1.7
1801	F	5.41	2.49	2.92
1802	F	6.1	4.36	1.74
1901	F	6.28	4.68	1.6
2001	F	7.26	5.7	1.56
2101	F	7.27	4.98	2.29
2102	F	6.08	4.8	1.28
2103	F	7.67	5.18	2.49
2601	F	2.98	1.4	1.58
2602	F	4.04	2.46	1.58
2603	F	3.52	1.82	1.7
2701	F	4.73	2.72	2.01

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
2703	F	6.71	5.43	1.28
2705	F	5.51	3.3	2.21
2801	F	6.41	3.31	3.1
2802	F	6.32	3.24	3.08
2804	F	5.65	2.92	2.73
2808	F	5.42	2.7	2.72
2901	F	6.7	5.34	1.36
2906	F	6.86	5.15	1.71
2907	F	7.04	5.33	1.71
3001	F	7.66	6.28	1.38
3100	F		0	0
3101	F	7.91	5.83	2.08
3102	F	7.6	5.46	2.14
3103	F	7.54	5.35	2.19
3104	F		0	0
3105	F		0	0
3201	F	7.19	5.9	1.29
3222	F		0	0
3223	F		0	0
3224	F		0	0
3225	F		5.9	0
3226	F		0	0
3227	F		0	0
3228	F		0	0
3603	F	5.29	3.44	1.85
3700	F		0	0
3701	F	5.71	3.84	1.87
3702	F	6.16	4.14	2.02
3703	F	6.78	4.99	1.79
3704	F	5.66	3.97	1.69
3801	F	6.84	4.42	2.42
3802	F	7.44	4.74	2.7
3803	F	7.44	5.7	1.74
3804	F	7.18	5.51	1.67
3901	F	7.55	5.72	1.83
3902	F	7.74	5.09	2.65
4102	F	8.43	6.97	1.46
4104	F	8.07	7.15	0.92
4201	F	9.32	7.96	1.36
4605	F	5.36	3.73	1.63
4902	F	6.87	5.59	1.28
5001	F	7.6	6.11	1.49
5100	F		0	0
5101	F	8.93	7.26	1.67
5102	F	8.58	6.79	1.79
5106	F	9.62	8.28	1.34
5107	F		0	0
5601	F	4.29	2.81	1.48
5901	F	7.08	5.75	1.33
6001	F	11.88	10.38	1.5
6002	F	11.04	9.39	1.65
6003	F	9.6	7.89	1.71
6102	F	12.96	11.28	1.68
6103	F	13.21	11.5	1.71
6701	F	4.63	3.19	1.44
6702	F	5.54	3.57	1.97
6801	F	6.63	0	0
6802	F	7.3	6.19	1.11
6803	F	7.79	6.52	1.27
6900	F		0	0
6901	F	7.18	5.55	1.63
6902	F	7.99	6.5	1.49
6903	F	9.68	7.9	1.78
6904	F	10.91	9.47	1.44
6905	F		0	0
7001	F	11.63	0	0
7101	F	13.22	11.64	1.58
7104	F	16.18	13.48	2.7
7105	F	15.64	13.33	2.31
7106	F	14.52	12.95	1.57
7201	F	16.9	13.7	3.2
7202	F	16.13	13.95	2.18
7203	F	16.63	14.58	2.05
7204	F	17.83	15.77	2.06
7205	F	19.06	17.09	1.97
7206	F	19.51	18	1.51
7701	F	6.65	3.85	2.8
7901	F	9.19	8.22	0.97
7902	F	10.9	9.12	1.78
7903	F	11.37	10	1.37
7904	F	9.81	8.45	1.36
7905	F	9.66	8.6	1.06
7906	F	9.41	7.53	1.88
8001	F	12.45	10.23	2.22
8002	F	12.89	10.74	2.15
8006	F	12.15	10.12	2.03
8101	F	13.86	12.3	1.56
8105	F	14.72	13.1	1.62
8201	F	18.07	15.33	2.74
8202	F	18.77	15.45	3.32
8208	F	19.6	18	1.6
8700	F		0	0
8901	F	11.88	9.84	2.04
9001	F	2.05	0.91	1.14
9004	F	2.06	0	2.06
9005	F		0	0
9008	F	2.31	1.17	1.14
9009	F	0	0	0
9011	F	2.13	1	1.13
9101	F	2.35	0.67	1.68
9102	F	2.33	0.63	1.7
9200	F		0	0
9201	F	2.48	1.22	1.26
9202	F	2.5	0.9	1.6

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
9701	F	2.8	0	2.8
9802	F	2.42	0	2.42
9901	F	2.2	0	2.2
0104	S	4.69	0	4.69
0602	S	1.98	0	1.98
0999	S		0	0
1203	S	5.43	0	5.43
2002	S	7.06	0	0
2803	S	5.69	4.72	0.97
2806	S	5.42	4.67	0.75
2902	S	6.84	5.43	1.41
2903	S	6.59	5.44	1.15
2904	S	6.83	6.34	0.49
2905	S	6.16	5.56	0.6
2908	S	6.75	5.3	1.45
3000	S		0	0
3106	S		0	0
3107	S		0	0
3108	S		0	0
3215	S		3.76	0
3216	S		0	0
3217	S		0	0
3218	S		0	0
3219	S		0	0
3220	S		0	0
3221	S		0	0
4101	S	8.32	6.83	1.49
4103	S	8.39	6.9	1.49
5103	S	11.38	10.44	0.94
5104	S	11.12	10.14	0.98
5105	S		0	0
6101	S	12.94	11.14	1.8
6104	S	13.18	11.28	1.9
7102	S	13.32	12.16	1.16
7103	S	13.88	12.48	1.4
8102	S	15.68	14	1.68
8104	S	14.47	13.19	1.28
9002	S	2.05	0.93	1.12
9006	S	2.27	0.46	1.81
9007	S	2.49	0.8	1.69
9702	S	2.34	1.74	0.6
9703	S	2.75	2.16	0.59
9801	S	2.41	0.78	1.63
9803	S	2.69	1.15	1.54
9902	S	2.34	1.4	0.94
9903	S	2.56	1.91	0.65

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

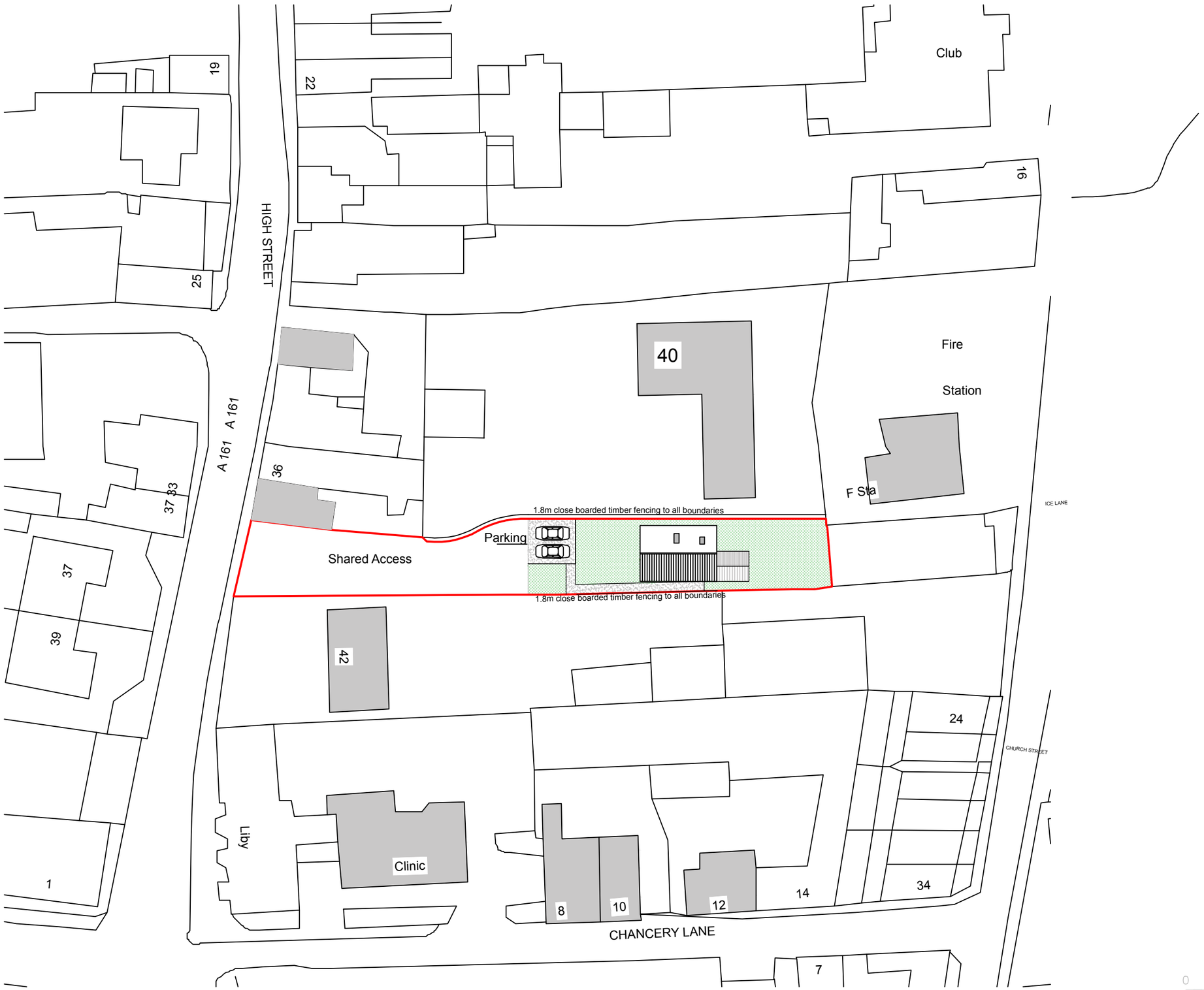
Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

2702	F	6.9	5.33	1.57

9700	F		0	0

Appendix C - Proposed Development Layout



North

rev:	date:	comment(s):	name:
A	23.04.21	House orientation revised.	RCB

status: PLANNING

client: BRIGHTER INVESTMENTS

job: 40 HIGH STREET, CROWLE

title: SITE PLAN

date: MARCH 2021 scale @ a3: 1:500

job no: 21.18 drg no: 02A

THE RURAL ARCHITECT

0 5 10 20 30 40

scale 1:500 metres

Appendix D - Proposed Drainage Layout

DO NOT SCALE THIS DRAWING. USE FIGURED DIMENSIONS ONLY.
THE CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON SITE.
ANY DISCREPANCIES MUST BE REPORTED IMMEDIATELY TO THE ENGINEER FOR CLARIFICATION BEFORE PROCEEDING.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
REFER TO THE RELEVANT CONSTRUCTION (DESIGN AND MANAGEMENT) DOCUMENTATION WHERE APPLICABLE.
IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WORKING WHERE APPROPRIATE TO AN APPROVED METHOD STATEMENT.

GENERAL NOTES

1. THE CONTRACTOR IS TO CHECK AND VERIFY ALL SITE DIMENSIONS AND LEVELS, INCLUDING EXISTING SEWER INVERT LEVELS AND UTILITIES, PRIOR TO START ON SITE.
2. POSITIONS OF EXISTING SERVICES/STATUTORY UNDERTAKERS APPARATUS ADJACENT TO OR CROSSING PROPOSED EXCAVATIONS ARE TO BE CONFIRMED PRIOR TO START ON SITE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH AND CHECKED AGAINST ALL; ENGINEERING DETAILS, SPECIFICATIONS, GEOTECHNICAL AND OTHER RELEVANT DOCUMENTATION PROVIDED.
4. THIS DRAWING IS SCHEMATIC FOR CLARITY ONLY, POSITIONS OF PIPE RUNS AND MANHOLES MAY VARY ON SITE DUE TO SITE CONDITIONS.
5. WHERE EXISTING OR PROPOSED TREES ADJACENT TO HIGHWAYS OR DRAINAGE ARE PROPOSED, ROOT BARRIERS (TYPE TO BE APPROVED) ARE REQUIRED TO PREVENT STRUCTURAL DAMAGE.
6. ANY ANOMALY OR CONTRADICTIONS BETWEEN ANY OF THE ABOVE IS TO BE REPORTED IMMEDIATELY.
7. THE CONTRACTOR IS TO COMPLY IN ALL ASPECTS WITH THE CURRENT BRITISH STANDARDS, BUILDING REGULATIONS AND BUILDING LEGISLATION ETC.
8. FOR PLANNING PURPOSES ONLY. FURTHER SURVEYS REQUIRED TO CONFIRM LEVELS PRIOR TO CONSTRUCTION.
9. FURTHER SURVEYS REQUIRED TO DETERMINE EXACT LOCATION, DIMENSIONS AND LEVELS OF EXISTING SEWERS.
10. PROPOSED LEVELS ARE ASSUMED BASED ON LIDAR DATA AND SUBJECT TO DETAILED DESIGN.

HIGH STREET
A 161
25
30
36
40
42
37
33
F Sta
Liby

PROPOSED TYPE-C LINED PERMEABLE PAVING
WITH NO INFILTRATION.
400mm PERMEABLE SUB-BASE.
PERMEABLE SUB-BASE TO FALL IN DIRECTION
OF 100mmØ PERFORATED DISTRIBUTOR PIPE
WRAPPED IN GEOTEXTILE.
AS PER MANUFACTURER'S SPECIFICATION.

PROPOSED ATTENUATION SUDS PLANTERS.
AS PER MANUFACTURER'S SPECIFICATION

S3 - EXISTING
COMBINED CHAMBER
ASSUMED LOCATION
IL TBC

Parking

Shared Access

100mmØ
RE
S1

PROPOSED CONNECTION TO EXISTING
PRIVATE COMBINED SEWER.
FURTHER SURVEYS REQUIRED TO CONFIRM
EXACT LOCATION, DIMENSIONS AND LEVELS

ASSUMED EXISTING CONNECTION TO SEVERN
TRENT WATER FOUL SEWER TO REMAIN, SUBJECT
TO RELEVANT APPROVALS.
FURTHER SURVEYS REQUIRED TO DETERMINE
EXACT LOCATION, DIMENSIONS AND INVERT LEVELS.

S2 - HYDROBRAKE FLOW CONTROL CHAMBER
RESTRICTED TO A RATE OF 2.0 L/S
SUBJECT TO RELEVANT APPROVALS

EXISTING SEVERN TRENT
FOUL MANHOLE REF. 2907
CL: 7.04
IL: 5.33
DEPTH TO IL: 1.71m

LEGEND

- SITE BOUNDARY
- DEVELOPMENT BOUNDARY
- PROPOSED SURFACE WATER DRAINAGE
- RE — PROPOSED RODDING EYE
- PROPOSED SURFACE WATER HYDROBRAKE CHAMBER
- PROPOSED SUDS PLANTER
- PROPOSED TYPE-C LINED PERMEABLE PAVING
- PERMEABLE PAVING OUTLET
- EXISTING PRIVATE COMBINED SEWER
- EXISTING SEVERN TRENT WATER FOUL SEWER

FURTHER SURVEYS REQUIRED TO CONFIRM EXACT DIMENSIONS, LOCATION AND CONDITION OF EXISTING SEWERS.

SUBJECT TO DETAILED DESIGN AND RELEVANT APPROVALS.

0m 2 4 6 8 10
SCALE 1 : 100

Rev	Date	Description	
A01	12.03.25	FIRST ISSUE	CM

Client
DONNA MCCLUREY

Project
40 THE YARD, HIGH STREET
CROWLE

Title
PROPOSED SURFACE WATER DRAINAGE LAYOUT

Project No.	Drawing No.	Revision
AEG7420	CIV-100	A01

Drawn	Checked	Approved	Date	Scale @ A0
CM	JM	JM	MAR 2025	1:100

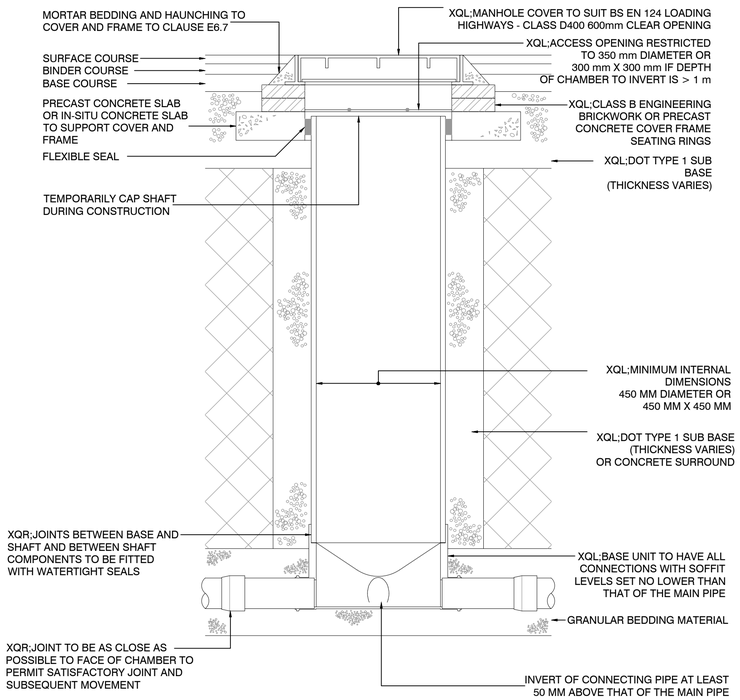
Drawing Status
PLANNING

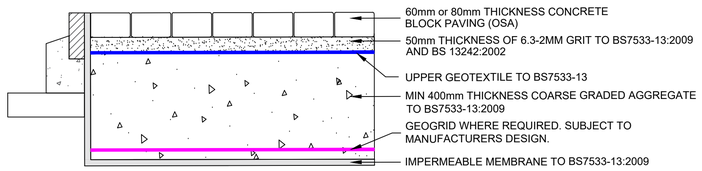
aegaea
water, civils and environment

FIGURE B18
TYPICAL INSPECTION CHAMBER DETAIL - TYPE D (FLEXIBLE MATERIAL DETAIL)

MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE
IN AREAS SUBJECT TO VEHICLE LOADING 2M, NON-ENTRY

PLASTIC CHAMBERS AND RINGS SHALL COMPLY WITH BS EN 13598-1 AND BS EN 13598-2 OR HAVE EQUIVALENT INDEPENDENT APPROVAL

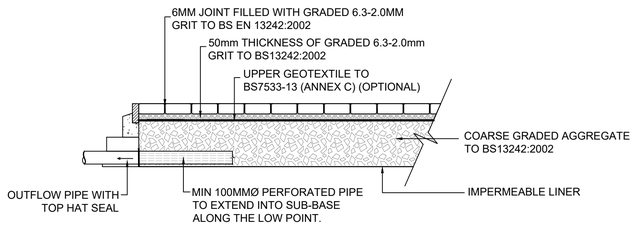




SUB-BASE & CAPPING LAYERS
CAPPING THICKNESS TO BE SUFFICIENT TO PROVIDE A FIRM WORKING PLATFORM OR IN THE CASE OF LOW CBR SUBGRADE GROUND STABILISATION MAY BE MORE COST EFFECTIVE

TYPICAL PERMEABLE PAVING DETAIL

DETAIL TO BE USED AS GUIDE ONLY. MANUFACTURERS DETAILS TO TAKE PRECEDENCE



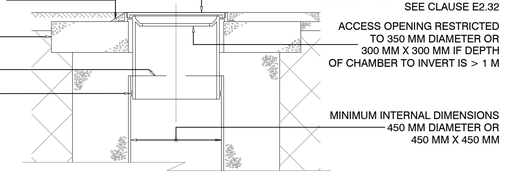
TYPICAL PERMEABLE PAVING OUTLET DETAIL

DETAIL TO BE USED AS GUIDE ONLY. MANUFACTURERS DETAILS TO TAKE PRECEDENCE

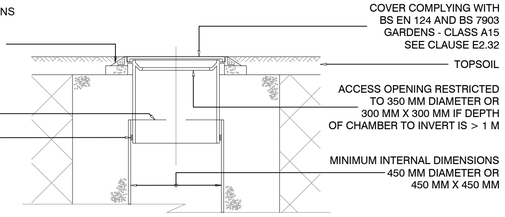
FIGURE B19
ALTERNATIVE TOP DETAILS FOR LIGHT VEHICLE LOADING AND LANDSCAPED AREAS - TYPE D

PLASTIC CHAMBERS AND RINGS SHALL COMPLY WITH BS EN 13598-1 AND BS EN 13598-2 OR HAVE EQUIVALENT INDEPENDENT APPROVAL

SITED IN DOMESTIC DRIVEWAYS OR FOOTWAYS

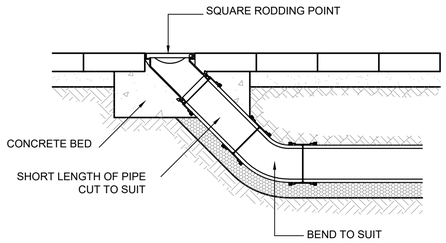


SITED IN DOMESTIC GARDENS



NOTE: WHERE THE ACCESS CHAMBER IS IN THE HIGHWAY THE HIGHWAY AUTHORITY CAN HAVE SPECIFIC REQUIREMENTS

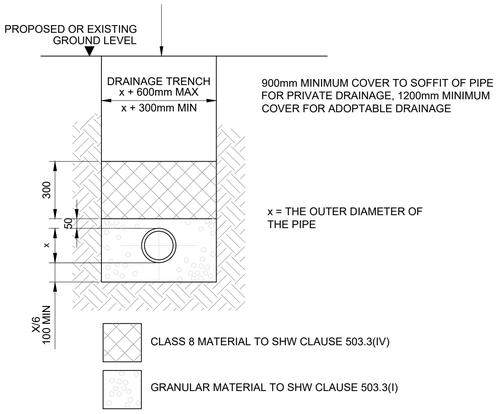
NOT TO SCALE



RODDING EYE DETAIL

NTS

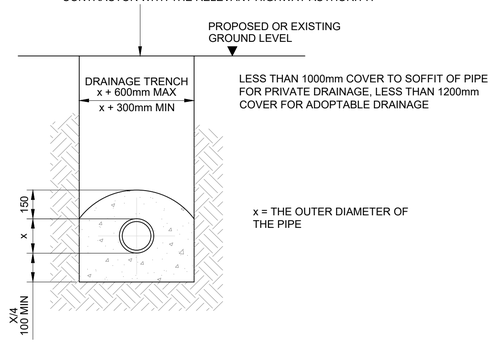
FOR SURFACE FINISH TO DRAINAGE EXCAVATION REFER TO THE EXTERNAL FINISHES PLAN AND THEN RELEVANT HIGHWAY DETAILS. NOTE THAT REINSTATEMENT FOR WORKS IN EXISTING ADOPTED HIGHWAYS ARE TO BE AGREED BY THE CONTRACTOR WITH THE RELEVANT HIGHWAY AUTHORITY.



NOTE: CLASS `S` BEDDING FOR USE WITH ALL ADOPTABLE DRAINAGE WITH COVER TO SOFFIT OF PIPE GREATER THAN 1200MM. PRIVATE DRAINAGE WITHIN LANDSCAPED AND OTHER NON-TRAFFICKED AREAS WITH COVER GREATER THAN 1000MM TO THE PIPE SOFFIT MAY USE PIPE BEDDING CLASS `T` REFER TO DRAWING F1 (SHW) HIGHWAY CONSTRUCTION DETAILS.

CLASS 'S' PIPE BEDDING

FOR SURFACE FINISH TO DRAINAGE EXCAVATION REFER TO THE EXTERNAL FINISHES PLAN AND THEN RELEVANT HIGHWAY DETAILS. NOTE THAT REINSTATEMENT FOR WORKS IN EXISTING ADOPTED HIGHWAYS ARE TO BE AGREED BY THE CONTRACTOR WITH THE RELEVANT HIGHWAY AUTHORITY.



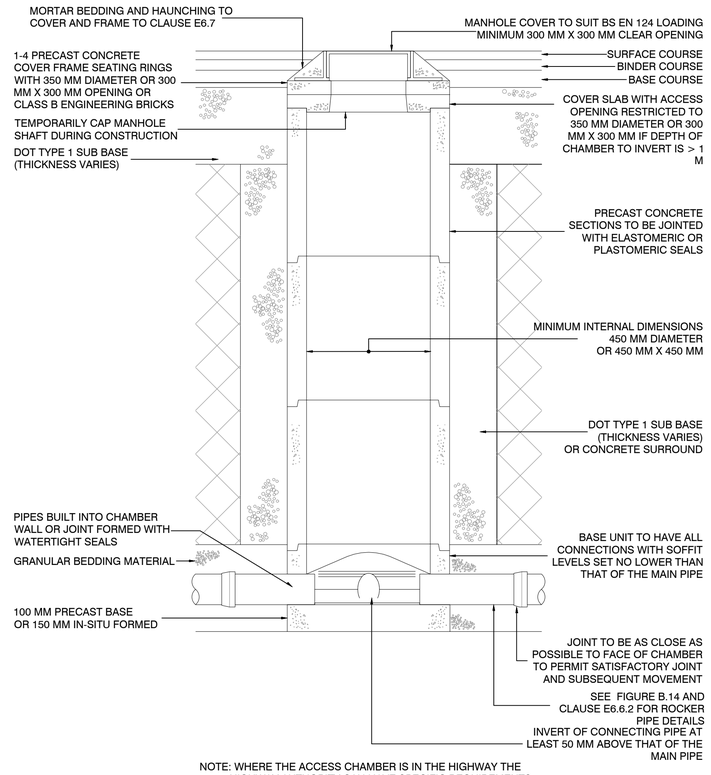
CONCRETE TO S.H.W CLAUSE 503.3 (II).
ST2 CONCRETE WITH COMPRESSIBLE FIILER BOARD AT 3m MAXIMUM CENTRES AND ALL PIPE JOINTS. FILLER BOARD SHALL CONSIST OF BITUMEN IMPREGNATED INSULATION BOARD TO B.S. EN 622, AND B.S. EN 317. THICKNESS OF COMPRESSIBLE BOARD AS TABLE ABOVE.

NOTE: CLASS `Z` BEDDING FOR USE WITH ALL ADOPTABLE DRAINAGE WITH COVER TO SOFFIT OF PIPE LESS THAN 1200mm.

CLASS 'Z' PIPE BEDDING

FIGURE B20
TYPICAL INSPECTION CHAMBER DETAIL - TYPE D (RIGID MATERIAL DETAIL)

MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE
IN AREAS SUBJECT TO VEHICLE LOADING 2 M, NON-ENTRY



NOTE: WHERE THE ACCESS CHAMBER IS IN THE HIGHWAY THE HIGHWAY AUTHORITY CAN HAVE SPECIFIC REQUIREMENTS
NOT TO SCALE

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
REFER TO THE RELEVANT CONSTRUCTION (DESIGN AND MANAGEMENT) DOCUMENTATION WHERE APPLICABLE.
IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WORKING WHERE APPROPRIATE TO AN APPROVED METHOD STATEMENT.

GENERAL NOTES

1. THE CONTRACTOR IS TO CHECK AND VERIFY ALL SITE DIMENSIONS AND LEVELS, INCLUDING EXISTING SEWER INVERT LEVELS AND UTILITIES, PRIOR TO START ON SITE.
2. POSITIONS OF EXISTING SERVICES ADJACENT TO OR CROSSING PROPOSED EXCAVATIONS ARE TO BE CONFIRMED PRIOR TO START ON SITE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH AND CHECKED AGAINST ALL, ENGINEERING DETAILS, SPECIFICATIONS, GEOTECHNICAL AND OTHER RELEVANT DOCUMENTATION PROVIDED.
4. POSITIONS OF PIPE RUNS AND MANHOLES MAY VARY ON SITE DUE TO ONGOING STATUTORY UNDERTAKER COMMENTS/SITE CONDITIONS.
5. ANY ANOMALY OR CONTRADICTIONS BETWEEN ANY OF THE ABOVE IS TO BE REPORTED IMMEDIATELY.
6. THE CONTRACTOR IS TO COMPLY IN ALL ASPECTS WITH THE CURRENT BRITISH STANDARDS, BUILDING REGULATIONS AND BUILDING LEGISLATION ETC.
7. WE RECOMMEND INFILTRATION TESTING IS UNDERTAKEN TO THE BASE OF THE INFILTRATION BASIN ONCE CONSTRUCTED TO CONFIRM THE RATE.

Rev	Date	Description	By
A01	12.03.25	FIRST ISSUE	CM

Client
DONNA MCCLUREY

Project
40 THE YARD, HIGH STREET
CROWLE

Title
PROPOSED DRAINAGE DETAILS

Project No.	Drawing No.		Revision
AEG7420	CIV-110		A01
Drawn	**Checked**	**Approved**	**Date**	**Scale @ A1**
CM	JM	JM	MAR 2025	1:100

Drawing Status
PLANNING

aegaea
water, civils and environment

Appendix E - Drainage Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.006	5.00	7.500	350	117.461	-7.285	0.650
S2			7.500	1200	111.363	-5.656	1.000
PAVE	0.008	5.00	7.500		113.096	-1.810	0.990
EXISTING			7.450	1200	99.554	-2.355	1.541
PUBLIC			7.040		61.467	-4.640	1.654

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	PAVE	7.002	0.600	6.850	6.510	0.340	20.6	100	5.07	50.0
1.001	PAVE	S2	4.218	0.600	6.510	6.500	0.010	421.8	100	5.26	50.0
1.002	S2	EXISTING	12.262	0.600	6.500	5.909	0.591	20.7	100	5.38	50.0
1.003	EXISTING	PUBLIC	38.155	0.600	5.909	5.386	0.523	73.0	100	6.08	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.709	13.4	0.8	0.550	0.890	0.006	0.0	17	0.940
1.001	0.368	2.9	1.9	0.890	0.900	0.014	0.0	59	0.393
1.002	1.703	13.4	1.9	0.900	1.441	0.014	0.0	25	1.202
1.003	0.902	7.1	1.9	1.441	1.554	0.014	0.0	36	0.766

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	7.002	20.6	100	Circular	7.500	6.850	0.550	7.500	6.510	0.890
1.001	4.218	421.8	100	Circular	7.500	6.510	0.890	7.500	6.500	0.900
1.002	12.262	20.7	100	Circular	7.500	6.500	0.900	7.450	5.909	1.441
1.003	38.155	73.0	100	Circular	7.450	5.909	1.441	7.040	5.386	1.554

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	350	Manhole	Adoptable	PAVE		Junction	
1.001	PAVE		Junction		S2	1200	Manhole	Adoptable
1.002	S2	1200	Manhole	Adoptable	EXISTING	1200	Manhole	Adoptable
1.003	EXISTING	1200	Manhole	Adoptable	PUBLIC		Junction	

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.400	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	45	0	0

Node S2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	6.500	Product Number	CTL-SHE-0067-2000-1000-2000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node PAVE Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	7.100	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	12	Depth (m)	0.400
Safety Factor	2.0	Width (m)	6.000	Inf Depth (m)	
Porosity	0.30	Length (m)	6.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	11	6.867	0.017	0.8	0.0047	0.0000	OK
15 minute winter	S2	12	6.612	0.112	1.6	0.1262	0.0000	SURCHARGED
15 minute winter	PAVE	12	6.615	0.105	1.9	0.0170	0.0000	SURCHARGED
15 minute winter	EXISTING	13	5.941	0.032	1.5	0.0359	0.0000	OK
15 minute winter	PUBLIC	13	5.418	0.032	1.5	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	PAVE	0.8	0.294	0.060	0.0297	
15 minute winter	S2	1.002	EXISTING	1.5	0.911	0.115	0.0213	
15 minute winter	PAVE	1.001	S2	1.6	0.364	0.570	0.0330	
15 minute winter	EXISTING	1.003	PUBLIC	1.5	0.721	0.216	0.0811	0.9

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	14	6.928	0.078	2.1	0.0219	0.0000	OK
15 minute winter	S2	14	6.922	0.422	3.4	0.4770	0.0000	SURCHARGED
15 minute winter	PAVE	14	6.927	0.417	4.9	0.0675	0.0000	SURCHARGED
30 minute winter	EXISTING	28	5.945	0.036	2.0	0.0408	0.0000	OK
30 minute winter	PUBLIC	28	5.422	0.036	2.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	PAVE	2.1	0.366	0.155	0.0503	
30 minute summer	S2	1.002	EXISTING	2.0	0.952	0.146	0.0254	
15 minute winter	PAVE	1.001	S2	3.4	0.431	1.167	0.0330	
30 minute winter	EXISTING	1.003	PUBLIC	2.0	0.771	0.276	0.0966	2.9

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	S1	26	7.221	0.371	3.0	0.1043	0.0000	FLOOD RISK
30 minute winter	S2	27	7.216	0.716	3.9	0.8095	0.0000	FLOOD RISK
30 minute winter	PAVE	27	7.220	0.710	6.5	1.2496	0.0000	FLOOD RISK
120 minute winter	EXISTING	62	5.945	0.036	2.0	0.0408	0.0000	OK
120 minute winter	PUBLIC	62	5.422	0.036	2.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	PAVE	3.2	0.502	0.241	0.0548	
120 minute winter	S2	1.002	EXISTING	2.0	0.947	0.146	0.0254	
15 minute summer	PAVE	1.001	S2	4.8	0.613	1.657	0.0330	
120 minute winter	EXISTING	1.003	PUBLIC	2.0	0.771	0.276	0.0966	8.3