



AKSward

MSCP Welwyn Garden City

**Proposed Surface Water Drainage Technical Note
and Maintenance Regime**

Prepared for:
Bourne Parking Ltd

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Revision	Amendments	Prepared By	Checked	Date
C01	Construction issue	TZ	CS	14.02.2022

1.0 Introduction

AKSWard have been commissioned to undertake a surface water drainage design for the above site.

The proposed surface water drainage design has been prepared in accordance with the Flood Risk Assessment and Drainage Strategy (FRA) prepared by Conisbee ref; 190997/A Marshall.

The FRA proposes that the whole impermeable areas are to be attenuated on site and discharged at a maximum rate of 5/s.

The site is located at grid reference TL 23520 13370 and is bounded by the AYOT Greenway to the north, Woodside House retirement housing to the west and Campus West leisure and entertainment facilities to the east. The site comprises of the existing car parking area providing approximately 300 car parking spaces.

The site is located within Flood Zone 1 'land assessed as having a less than 1 in 1000 annual probability of rivers or sea flooding in any year.'

2.0 Existing Site Drainage

A CCTV drainage survey concludes that the existing surface water drainage discharges towards to South of the site.

The survey indicates that surface water runoff is conveyed to the south via 225mm diameter connection to the Thames Water public sewer in the campus area.

Due to the surface water flooding issues in the drainage system serving the Roller City and Campus West Theatre in recent years, an assessment has been undertaken to identify the proposed mitigation measures to reduce the flooding issues.

The proposed mitigation measures included the provision of attenuation storage using oversized pipes and manholes, as well as the re-lining of damaged sections of the existing surface water pipe works.

The proposed works has been carried out on site and an 'As Built' drawing provided.



An extract of the proposed diversion works is attached below. An existing attenuation storage tank has been calculated and an oversized manhole provided to contribute to the attenuation storage loss.

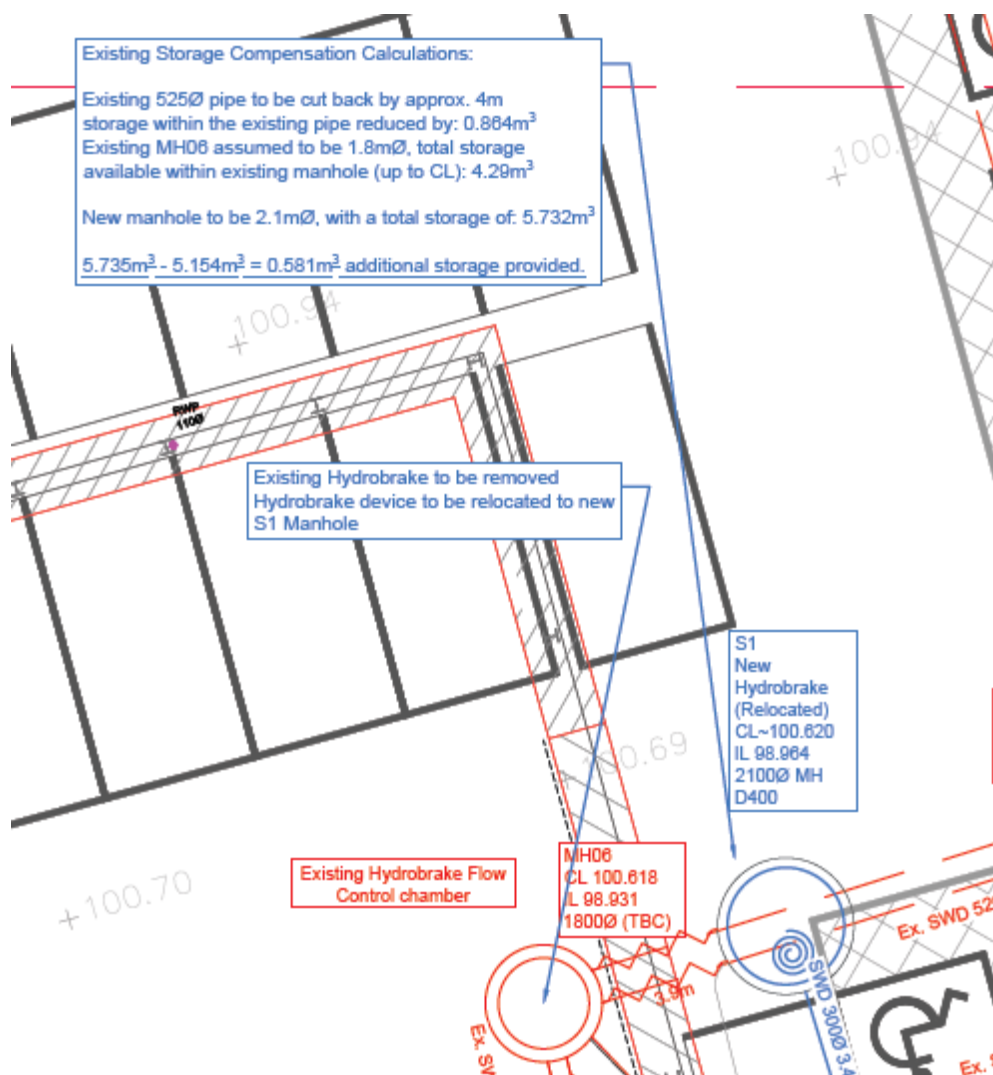


Figure 2: Proposed Drainage (drg. 9101) extract – Area 1

The existing attenuation storage compensation has been calculated for the Area 1 - existing manhole MH06 relocation as shown above. Due to the existing MH 06 being proposed to be relocated by approx. 4m which includes the existing 525mm diameter cut-back, it is proposed that flow control manhole is upgraded from the existing 1.8m diameter to 2.1m diameter PCC ring. A new 2.1m PCC ring will provide the required storage compensation.

A similar approach has been undertaken for Area 2 - the existing IC02 relocation as shown below.

It is proposed that the existing 1.2m diameter PCC ring is replaced with 1.5m diameter PCC ring which will compensate the loss of attenuation storage.

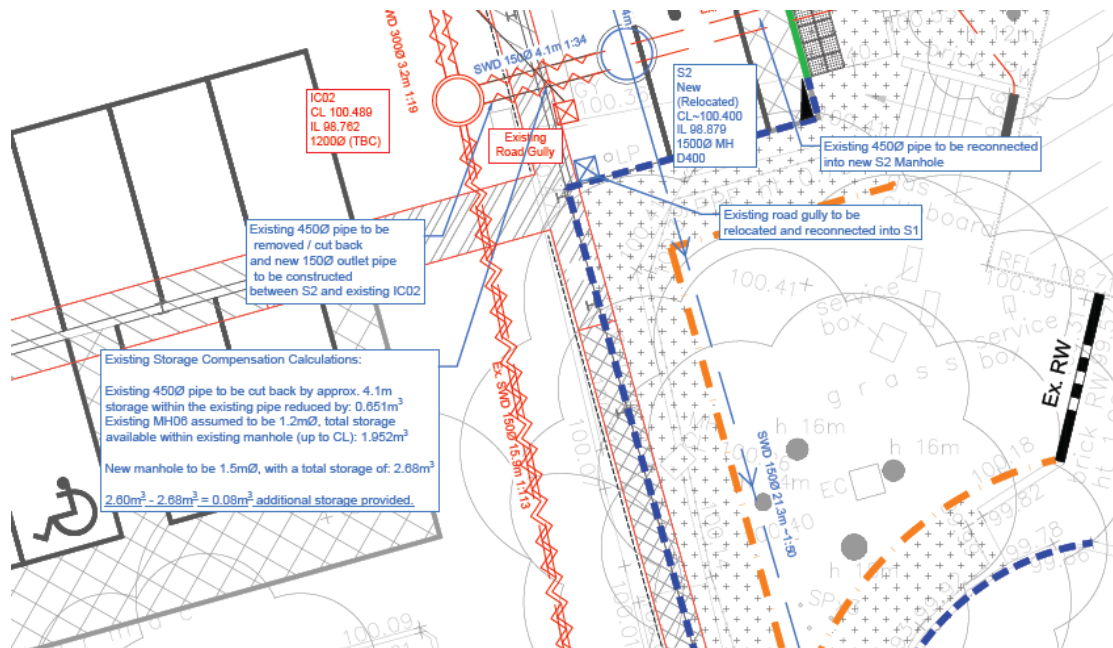


Figure 3: Proposed Drainage (drg. 9101) extract – Area 2

The remaining part of the proposed drainage diversion does not require any storage compensation to be provided as it is located downstream from the existing hydrobrake manhole. This part of existing surface water drainage pipe will be relocated beyond the proposed car parking area as shown below.

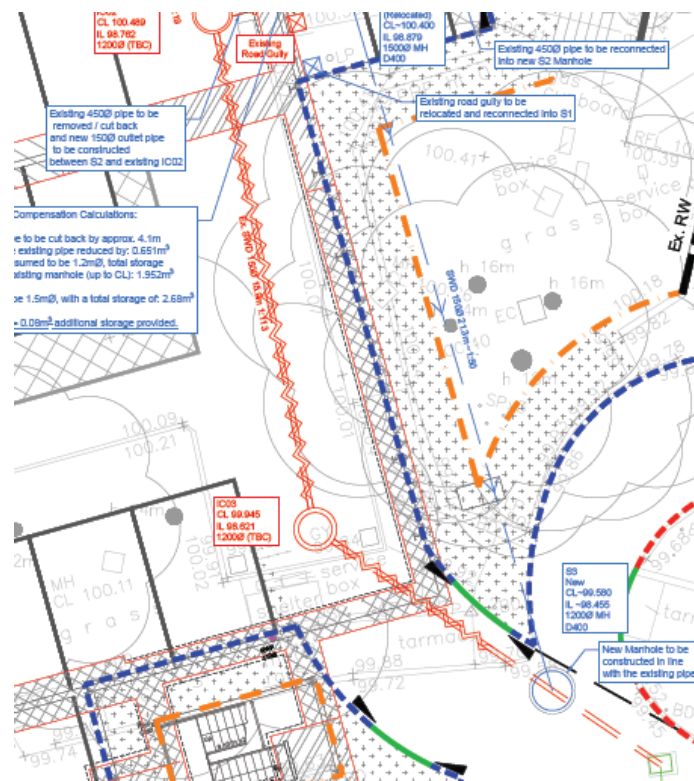


Figure 4: Proposed Drainage (drg. 9101) extract – Remaining Diversion Part

The existing topographical survey, as built drainage plan and utility surveys can be found in **Appendix A**.

3.0 Proposed Development Discharge Rates

The development proposal is construction of a new decked car park, with an upper car parking deck over parking at ground level. Total number of parking spaces provided post-development will be approximately 490 spaces over 2 car park levels.

The proposed development site will generate a total of **0.595ha** impermeable area.

It is proposed that part of the existing parking area will remain as existing with no new drainage being proposed, therefore surface water runoff from these areas will be discharged via the existing drainage system.

Access roads will be maintained as existing and therefore have been excluded from the drainage calculations.

The existing drainage system has been utilised for assessment and design purposes, along with the contributing area characteristics of the site.

4.0 Proposed Surface Water Drainage

It is proposed that surface water runoff from the proposed new car parking area is collected and attenuated on site prior to being discharged into the existing drainage network at restricted rate of 5l/s.

The proposed drainage design has been undertaken based on the Flood Risk and Drainage Strategy prepared by Conisbee ref; 190997/A Marshall.

It is proposed that surface water discharge will flow through a Downstream Defender or Hydrodynamic Vortex Separator to provide the required surface water pollution mitigation.

Proposed Surface Water drainage, typical construction details and associated drainage calculations are attached in **Appendix B**.

5.0 Water Quality

A key requirement of any SuDS system is that it protects the receiving water body from the risk of pollution.

Frequent and short duration rainfall events are those that are most loaded with potential contaminants (silts, fines, heavy metals and various organic and inorganic contaminants) therefore the first 5-10mm of rainfall should be adequately treated with SuDS.

The new SuDS Manual (Ciria C753, November 2015) introduces a slightly different approach compared to the previous version for the water quality management of surface water. The Manual describes risks posed by the surface water runoff to the receiving environment as a function of:

- The pollution hazard at a particular site (i.e. the pollution source)
- The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels
- The sensitivity of the receiving environment

The recommended approaches for water quality risk management are given in the SuDS Manual Table 26.1.

Approaches to Water Quality Risk Management			
Design method	Hazard Characterisation	Risk Reduction	
		For Surface Water	For Groundwater
Simple Index Approach	Simple pollution hazard indices based on land use (Table 26.2)	Simple SuDS hazard mitigation indices (Table 26.3)	Simple SuDS hazard mitigation indices (Table 26.4)
Risk Screening	Factors characterising traffic density and extent of infiltration likely to occur (Table 26.5)	N/A	Factors characterising unsaturated soil depth and type, and predominant flow type through the soils (Table 26.5)
Detailed Risk Assessment	Site specific information used to define likely pollutants and their significance	More detailed, component specific performance information used to demonstrate that the proposed SuDS components reduce the hazard to acceptable levels	
Process-based treatment modelling	Time series rainfall used with generic pollution characteristics to determine statistical distributions of likely concentrations and loadings in the runoff	Models that represent the treatment processes in the proposed SuDS components give estimates of reductions in even mean discharge concentrations and total annual load reductions delivered by the system	

Figure 5: Approaches to Water Quality Risk Management

As per Table 26.1 Simple Index approach will be used as a design method for this site.

Table 26.2 will provide hazard classification of different land uses. The land uses for the surface water drainage for this site are:

- Car parks and low traffic roads

To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index for each contaminant type that equals or exceeds the pollution hazard index for each contaminant type.

Therefore, the following must be achieved for the surface running off the site.

Total SuDS mitigation index \geq pollution hazard index

Pollution Hazard Indices are given for different land uses in Table 26.2 of the SuDS manual;

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 (e.g., cul-de-sacs, homezones and general access roads) and non-residential car parking with infrequent change (e.g., schools, offices) i.e., < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g., hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g., 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	High	0.8	0.8	0.9

Figure 6: Pollution Hazard Indices

Pollution Hazard Index and Destination of runoff for the proposed Site					
Land Use	Destination of Runoff	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Car parks and low traffic roads	Surface Water Sewer	Low	0.5	0.4	0.4

Figure 7: Pollution Hazard Index and Destination of Runoff for the Proposed Site

The SuDS mitigation index will be obtained from Table 26.4 (for discharges to surface waters) of the SuDS manual.

Indicative SuDS mitigation indices for discharges to surface waters			
	Mitigation Indices		
Type of SuDS Components	TSS	Metals	Hydrocarbons
Filter Strip	0.4	0.4	0.5
Filter Drain	0.4	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	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area		

Figure 8: Indicative SuDS mitigation indices

Mitigation Indices						
Runoff Source	Destination of Runoff	Mitigation Index Source	Type of SuDS Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Car park	Surface Water Sewer	Table 26.4 (for ground waters) Table 26.3 (for surface waters)	Advanced Hydrodynamic Vortex Separator	0.5	0.4	0.45
Low Traffic Road	Surface Water Sewer	Table 26.4 (for ground waters) Table 26.3 (for surface waters)	Advanced Hydrodynamic Vortex Separator	0.5	0.4	0.45

Figure 9: SuDS mitigation index for site

The above analysis demonstrates that the SuDS devices within the design will mitigate any pollution present within the surface water system.

6.0 Exceedance Events

Whilst it is a requirement to fully attenuate the 1 in 100 year critical storm event plus 40% climate change, it is also necessary to ensure storms which exceed this severity do not cause flooding to building areas or exacerbate flooding elsewhere.

Due to the proposed development site providing betterment to runoff rates when compared to the existing (based on topographical survey information and FRA Report) impermeable area, the proposed development will further reduce surface water flooding.

Based on the topographical survey information any exceedance event exceeding the Critical 1 in 100 year plus 40% climate change event or in case of drainage failure, surface water runoff will be routed towards the southern area mimicking current situation and away from building areas to less vulnerable area, in this case landscape and The Campus/Bridge Road.

The exceedance event flow plan is attached in **Appendix C**.

7.0 Maintenance

7.1 Introduction

During construction, the Contractor will be responsible for maintaining the drainage and SuDS (Sustainable Drainage Systems). Upon handover, the developer will appoint a maintenance firm to take on the responsibility of these duties as laid out in this report.

The maintenance schedule for the proposed development will be split down into two separate categories; SuDS features and regular private drainage.

7.2 SuDS at Welwyn Campus

As listed above, in Section 4 & 5, the SuDS features used on site will be geo-cellular attenuation.

The SuDS features have been designed for easy maintenance and comprise:

- Regular Day-to-Day care – litter collection, regular gardening to control vegetation growth and checking inlets where water enters the SuDS features
- Occasional tasks – checking the SuDS features and removing any silt that builds up in the SuDS feature
- Remedial work – repairing damage where necessary

7.3 SuDS Drainage Maintenance Specification

- Attenuation Tank

In order to maintain the functioning of the attenuation tanks, the following maintenance requirements should be adhered to:

Operation and maintenance requirements for attenuation storage tanks		
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 per-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

Figure 10: SuDS attenuation maintenance and storage

7.4 General Drainage Maintenance Specification

- Inlet Structures and Inspection Chambers:
 - Inlet structures such as rainwater downpipes, road gullies and channel drains should be free from obstruction at all times to all free flow through the SuDS
 - Inspection Chambers and Rodding Eyes are used on bends or where pipes come together. They allow access and leaning to the system if necessary.

Inlet Structures and Inspection Chambers	
Regular Maintenance	Frequency
Inlet Structures	
Inspect rainwater downpipes, channel drains and road gullies, removing obstructions and silt as necessary. Check that there is no physical damage.	Monthly
Strim vegetation 1m min surround to structures and keep area free from silt and debris	
Inspections Chambers and below ground control chambers.	
Remove cover and inspect, ensuring that the water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt.	Annually
Undertake inspection after leaf fall in Autumn	
Occasional Maintenance	
Check topsoil levels are 20mm above edges of chambers to avoid mower damage.	As necessary
Remedial Work	
Repair physical damage if necessary	As required

Figure 11: SuDS inlet structures and inspection chambers

- Below ground drainage pipes:

Below ground drainage pipes convey water to the SuDS system. They should always be free from obstruction to allow free flow.

Below Ground Drainage Pipes	
Regular Maintenance	Frequency
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
Remove sediment from pre-treatment inlet structures and inspection chambers.	Annually or as required
Maintain vegetation to designed limits within the vicinity of below ground drainage pipes and tanks.	Monthly or as required
Remedial Work	
Repair physical damage if necessary	As required
Monitoring	
Inspect all inlets, outlets and vents to ensure that they are in good conditions and operating as designed.	Annually
Survey inside of pipe runs for sediment build up and remove if necessary.	Every 5 years or as required

Figure 12: SuDS below ground drainage pipes

8.0 Conclusion

The proposed discharge rate of 5l/s as per the Planning FRA and Drainage Strategy Report.

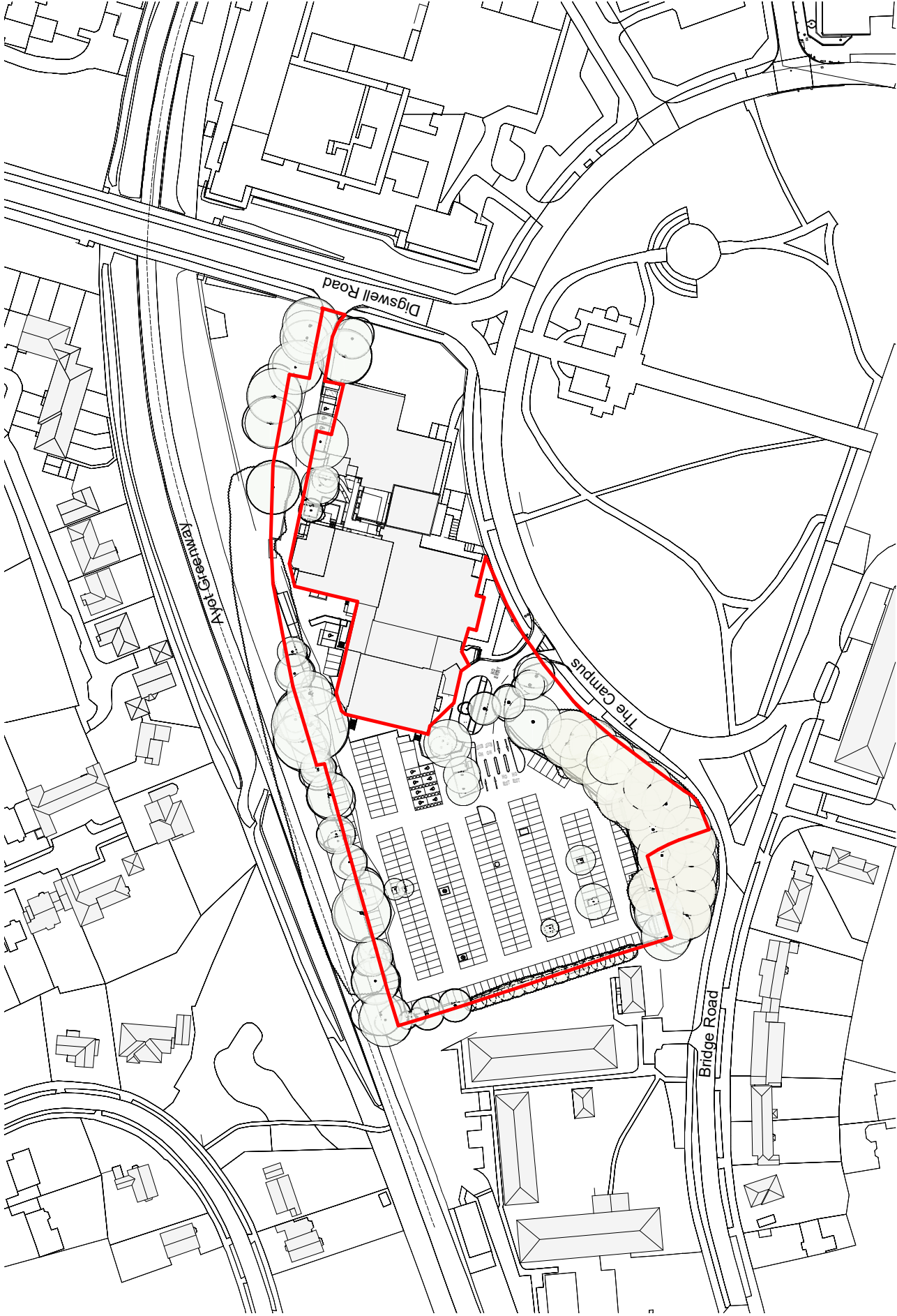
The proposed drainage system and attenuation tank has been calculated for the Critical 1 in 100 year + 40% rainfall event.

The proposed drainage system has been designed to provide the required pollution mitigation for runoff prior it being discharged into Thames Water existing surface water sewer.

The report has demonstrated that the proposed drainage measures ensure that suitable means of surface water and foul drainage can be achieved for the proposed development.

Appendix A

Existing Topographical, As Built Drainage and Utility Survey



1 Existing Location Plan

P001 Scale - 1 : 1250

- Notes:
- All drawings are subject to Planning and Building Control consent.
 - The details shown are for design intent purposes only and are subject to further design development with suppliers and sub-contractors
 - All setting out dimensions should be checked on-site prior to construction and any discrepancies should be reported to the Architect immediately

Issued for:		PLANNING	
Project/Client:	20025	Project Number:	20025
Campus West Car Park		Drawing:	Site Location Plan
Welwyn Garden City		Scale:	1 : 1250@A3
		Dwg No:	P001
		Rev:	

Drawn By:	Date:	Checked:	Date:	Rev:	Date:	Details	Drawn:	Checked:
AH	23.03.21	DH	23.03.21					

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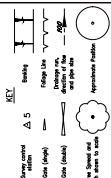
Station	Eastings	Northings	Level
1	523384.268	523384.206	96.679
2	523375.247	523377.817	96.739
3	523266.473	523378.883	100.429
4	523266.473	523418.740	101.273
5	523397.194	523423.482	100.534
6	523207.272	523438.761	100.320
7	523390.789	523438.093	100.334
8	523394.300	523437.259	96.536
9	523353.886	523437.259	100.505

DISCUSSION

This survey is made to G08303(15) coordinate system by using GPS total station methods. No scale factor has been taken into the survey information. All horizontal distances obtained from this drafting are ground distances.

Very effort has been made to confirm true species on the site, yet it is obtained to confirm these details with an additional before processing with any design.

Very effort has been made to confirm drainage run, type and size on site, yet it is advised to check these details against statutory authority records before processing with



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40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																				

WELWYN HATFIELD BOROUGH
COUNCIL

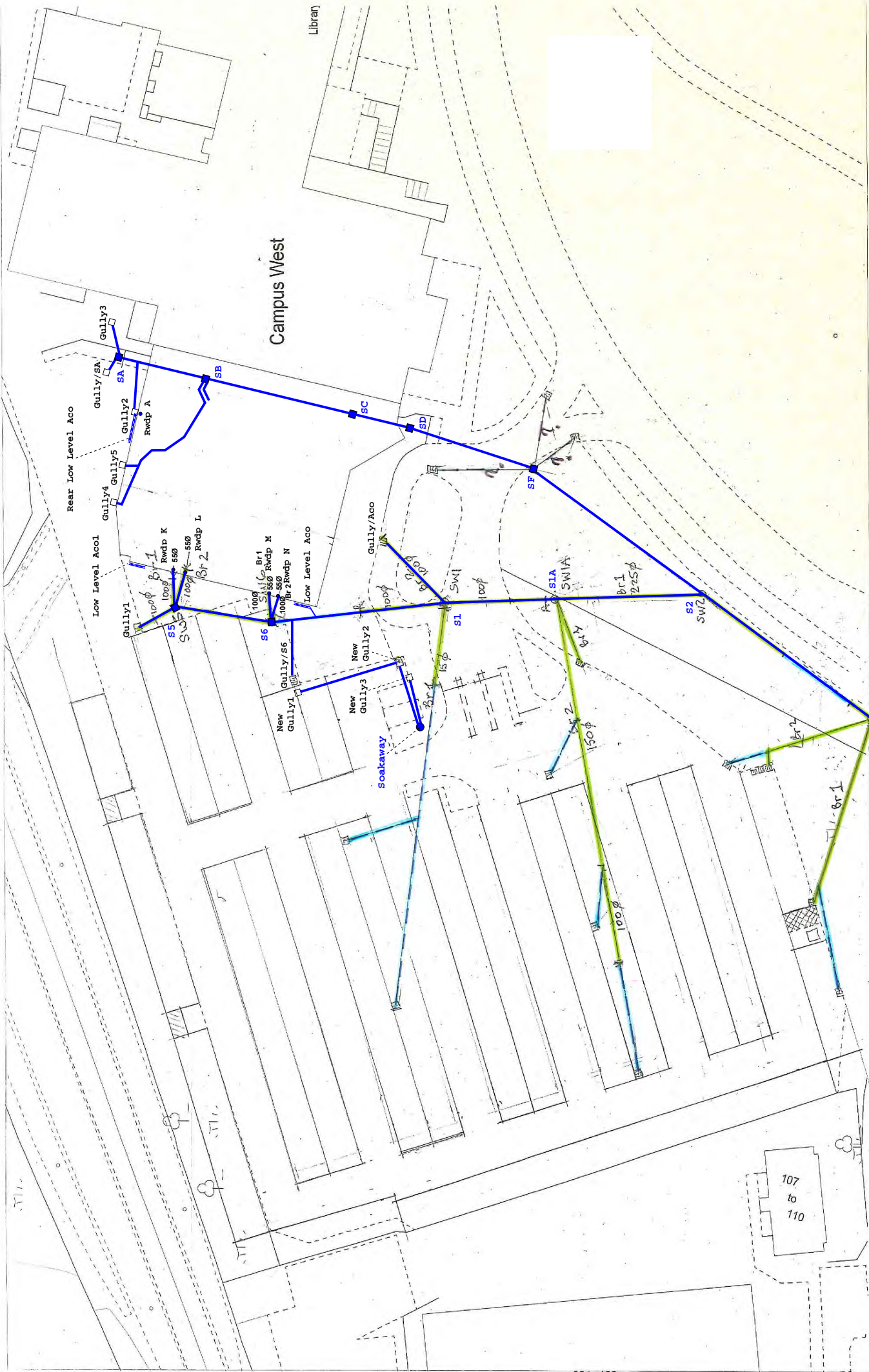
CAMPUS WEST, THE CAMPUS,
WEL WYN GARDEN CITY, HEFTS,

TOPOGRAPHICAL SURVEY

1000-008-2					
edition		Description		Date	
issue	1:2009A0			Sheet	2 of 2
Drawn by	AB	Checked by	PG	Date of Survey	JAN 2020



SURVEY NOTE
Topographical survey TS20-006-1 is an extension of previous survey TS19-312-1, carried out in July 2019. No site verification of the previous survey has taken place.



WELWYN HATFIELD BOROUGH COUNCIL Council Office, The Corners Welwyn Garden City, Herts. AL9 6AE		Title: S4 (Main) S W 4	Drawing Number: S W 3
Project: 15th December 2009		Date: 15th December 2009	Notes: This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the controller of Her Majesty's Stationary Office © Crown Copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Welwyn Hatfield Borough Council LA1001547 2009

Draincare Environmental Services Ltd

3220 External - Campus West (Roller City), AL8 6BX

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/ Main sections

Project name : 3220 External - Campus West (Roller)	Project number : 3220	Contact : Alan Robinson	Date : 02/07/2019
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Nr.	US MH	DS MH	Date	Road	Tape No.	Material	m	(m)
1	Gully1	S5	19/06/2019	Campus West Car park		Vitrified clay	5.19	5.19
2	Rwdp K	S5 Br1	19/06/2019	Campus West Car park		Vitrified clay	2.86	2.86
3	Rwdp K	S5 Br1	19/06/2019	Campus West Car park		Vitrified clay	3.91	3.91
4	Rwdp L	S5 Br2	19/06/2019	Campus West Car park		Vitrified clay	4.99	4.99
5	Rwdp L	S5 Br2	19/06/2019	Campus West Car park		Vitrified clay	5.64	5.64
6	Rwdp L	S5 Br2	19/06/2019	Campus West Car park		Vitrified clay	7.10	7.10
7	S5	S6	19/06/2019	Campus West Car park		Vitrified clay	14.42	14.42
8	Rwdp M	S6 Br1	19/06/2019	Campus West Car park		Vitrified clay	2.33	2.33
9	Rwdp N	S6 Br2	19/06/2019	Campus West Car park		Vitrified clay	4.11	4.11
10	Rwdp M	S6 Br1	19/06/2019	Campus West Car park		Vitrified clay	6.67	6.67
11	Rwdp N	S6 Br2	19/06/2019	Campus West Car park		Vitrified clay	3.79	3.79
12	Rwdp N	S6 Br2	19/06/2019	Campus West Car park		Vitrified clay	5.57	5.57
13	S5	S6	19/06/2019	Campus West Car park		Vitrified clay	13.85	13.85
14	S6	S1	19/06/2019	Campus West Car park		Vitrified clay	5.17	5.17
15	Low level aco	B/Junction	19/06/2019	Campus West Car park		Vitrified clay	1.77	1.73
17	Low level aco	B/Junction	19/06/2019	Campus West Car park		Polyvinyl chloride	2.37	2.37
18	SA	SF	19/06/2019	Campus West Car park		Vitrified clay	48.37	48.37
20	Gully2	B/Junction	19/06/2019	Campus West Car park		Vitrified clay	2.88	2.88
21	S6	S1	20/06/2019	Campus West Car park		Vitrified clay	19.81	19.81
22	S6	S1	20/06/2019	Campus West Car park		Vitrified clay	19.26	19.26
23	Gully/Aco	S1 Br2	20/06/2019	Campus West Car park		Vitrified clay	12.79	12.79
24	S6	S1	20/06/2019	Campus West Car park		Vitrified clay	7.04	7.04
25	Low level aco	B/Junction	20/06/2019	Campus West Car park		Vitrified clay	1.91	1.91
26	S6	S1	20/06/2019	Campus West Car park		Vitrified clay	6.71	6.71
33	New gully1	New gully2	20/06/2019	Campus West Car park		Polyvinyl chloride	15.28	0.00
34	New gully2	Soakaway	20/06/2019	Campus West Car park		Polyvinyl chloride	11.11	11.11

Pipe size: CIRCULAR 100/100 = 234.9 m (219.58 m)

Nr.	US MH	DS MH	Date	Road	Tape No.	Material	m	(m)
16	Gully/S6	B/Junction	19/06/2019	Campus West Car park		Vitrified clay	6.97	6.97
19	Gully/SA	SA Br1	19/06/2019	Campus West Car park		Polyvinyl chloride	0.76	0.76
27	S1	S1A	20/06/2019	Campus West Car park		Vitrified clay	14.85	14.85
29	S1	S1A	20/06/2019	Campus West Car park		Vitrified clay	14.89	14.82
35	New gully3	Soakaway	20/06/2019	Campus West Car park		Polyvinyl chloride	4.04	4.04

Pipe size: CIRCULAR 150/150 = 41.51 m (41.44 m)

Nr.	US MH	DS MH	Date	Road	Tape No.	Material	m	(m)
28	S1A	S2 Br1	20/06/2019	Campus West Car park		Vitrified clay	21.70	21.70
30	S2	S3	20/06/2019	Campus West Car park		Vitrified clay	19.04	19.04
31	S2	S3	20/06/2019	Campus West Car park		Vitrified clay	3.90	3.90
32	S3	S4	20/06/2019	Campus West Car park		Vitrified clay	7.11	0.00
36	SF	S2	21/06/2019	Campus West Car park		Vitrified clay	20.10	20.10
37	SF	S2	21/06/2019	Campus West Car park		Vitrified clay	19.06	19.06
38	SF	S2	21/06/2019	Campus West Car park		Vitrified clay	20.00	19.88
39	SF	S2	16/07/2019	Campus west		Vitrified clay	21.31	21.31
40	SF	S2	16/07/2019	Campus west		Vitrified clay	28.21	28.21
41	SF	S2	17/07/2019	Campus west		Vitrified clay	29.84	29.84
42	SF	S2	17/07/2019	Campus west		Vitrified clay	29.55	29.55
43	S2	S3	19/07/2019	Campus west		Vitrified clay	3.41	3.41
44	S2	S3	19/07/2019	Campus west		Vitrified clay	7.78	7.78
45	S2	S3	19/07/2019	Campus west		Vitrified clay	26.34	26.34

Pipe size: CIRCULAR 225/225 = 257.35 m (250.12 m)

Place :

Draincare

Draincare Environmental Services Ltd

Unit 20 Martinfield Business Centre

Welwyn Garden City, AL7 1HG

Tel: 01582 467111

Fax:

Email: info@draincare.com

/ Main sections

Project name :

3220 External - Campus West (Roller

Project number :

3220

Contact :

Alan Robinson

Date :

02/07/2019

All sections = 533.76 m (511.14 m)

Project-information

Project name : 3220 External - Campus West (Roller	Project Number : 3220	Contact : Alan Robinson	Date : 19/06/2019
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Client: Welwyn Hatfield Borough Council
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County: AL8 6AE
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Fax:
Mobile: 07881 008813
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Mobile:
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Project-information

Project name : 3220 External - Campus West (Roller	Project Number : 3220	Contact : Alan Robinson	Date : 19/06/2019
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Background:

Draincare Environmental Services Ltd has been requested to undertake an investigation of the drainage at the above site.

Executive Summary / Overview:

Defects fully detailed and graded within the report.

CCTV survey conducted to establish pipework condition and defects.

Any operational or structural defects found during CCTV works are noted and graded, and if graded 4 or 5 photographed, within the following report.

All pipework, once past the property's boundary or found to be shared, may be the Water Utility's responsibility, following the 2011 legislation change, as described on the last page of this report.

CCTV survey undertaken to pipework;

Section 1: Manhole S5 upstream to Gully1 located in car park at rear (found to be full of silt and requires emptying) - deformed pipe under liner & open joint.

Section 2: Manhole S5 along Branch Br1 upstream to Rwdp K - no visible defects found before webs obscured camera lens, to be re-surveyed.

Section 3: Manhole S5 along Branch Br1 upstream to Rwdp K - displaced joint found where pipe diameter reduces to 55mm causing survey to cease due to camera unable to pass displaced joint. Rwdp K tested to confirm running clear into S5.

Section 4: Manhole S5 along Branch Br2 upstream to Rwdp L - substantial root ingress found within, high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 5: Manhole S5 along Branch Br2 upstream to Rwdp L following high pressure jetting works - substantial root ingress still found within, further high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 6: Manhole S5 along Branch Br2 upstream to Rwdp L following further high pressure jetting works - fracture & tap root still present in pipe. Rwdp L tested to confirm running clear into S5.

Section 7: Manhole S5 downstream to Manhole S6 - root ingress found within, high pressure jetting to be undertaken to clean & facilitate re-survey.

Project-information

Project name : 3220 External - Campus West (Roller	Project Number : 3220	Contact : Alan Robinson	Date : 19/06/2019
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Section 8: Manhole S6 along Branch Br1 to Rwdp M - root ingress and settled deposits found within, high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 9: Manhole S6 along Branch Br2 upstream to Rwdp N - crack and substantial root ingress found within, high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 10: Manhole S6 along Branch Br1 upstream to Rwdp M following high pressure jetting works - tap root still present in pipe. Rwdp M tested to confirm running clear into S6.

Section 11: Manhole S6 along Branch Br2 upstream to Rwdp N following high pressure jetting works - crack and substantial root ingress still found within, further high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 12: Manhole S6 along Branch Br2 upstream to Rwdp N following further high pressure jetting works - crack, fracture and fine roots remaining. Rwdp N tested to confirm running clear into S6.

Section 13: Manhole S6 upstream to Manhole S5 following high pressure jetting works - no visible defects.

Section 14: Manhole S6 downstream to Manhole S1 - settled deposits, medium displaced joint and substantial root ingress found within, high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 15: Low Level Aco downstream to Blind Junction on to pipework between S6 & S1 - pipework between S6 & S1 found to be full of silt debris.

Section 16: Gully/ S6 downstream to Blind Junction on to pipework between S6 & S1 - pipe found to be holding water and substantial root ingress causing survey to cease.

Section 17: Low Level Aco downstream to Blind Junction on to pipework between S6 & S1 following high pressure jetting works undertaken between S6 & S1 - unknown obstacle causing survey to cease, to be surveyed up from Manhole S1.

Section 18: Manhole SA downstream through internal Manholes SB, SC & SD (no Manhole SE) to Manhole SF - settled deposits found within, high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 19: Manhole SA along Branch Br1 upstream to Gully/SA - no visible defects.

Section 20: Gully2 downstream to Blind Junction on to pipework between SA & SB - no visible defects.

Section 21: Manhole S1 upstream to Manhole S6 following high pressure jetting works - root ingress, broken pipe, hole in pipe, fracture, crack and rod / spike protruding through pipe from 12 O'Clock to 6 O'Clock, further high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 22: Manhole S1 upstream to Manhole S6 following further high pressure jetting works - root ingress, broken pipe, hole in pipe, fracture and rod / spike protruding through pipe from 12 O'Clock to 6 O'Clock, further high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 23: Manhole S1 along Branch Br2 upstream to Gully/Aco - no visible defects before survey ceased due to camera unable to pass tight bend at 12.50m.

Project-information

Project name : 3220 External - Campus West (Roller	Project Number : 3220	Contact : Alan Robinson	Date : 19/06/2019
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Section 24: Manhole S6 downstream to Manhole S1 following further high pressure jetting works - root ingress, broken pipe, hole in pipe, fractures and rod / spike protruding through pipe from 12 O'Clock to 6 O'Clock, further high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 25: Low Level Aco downstream to Blind Junction on to pipework between S6 & S1 - no visible defects found within pipework between Aco & Blind Junction but root ingress and rod / spike protruding through pipe from 12 O'Clock to 6 O'Clock found within pipework between S6 & S1.

Section 26: Manhole S6 downstream to Manhole S1 following further high pressure jetting works - minor root ingress, broken pipe, hole in pipe, fractures and rod / spike protruding through pipe from 12 O'Clock to 6 O'Clock causing survey to cease.

Section 27: Manhole S1A upstream to Manhole S1 - root ingress, settled deposits and crack found within, high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 28: Manhole S1A downstream to Br1 within Manhole S2 - no visible defects.

Section 29: Manhole S1A upstream to Manhole S1 - minor root ingress and multiple substantial fractures found within.

Section 30: Manhole S2 downstream to Manhole S3 - fractures, crack and substantial root ingress found within, high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 31: Manhole S3 upstream to Manhole S2 - substantial root ingress, fracture and hole found within, high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 32: Manhole S3 downstream to Manhole S4 (Main) - no visible defects.

Section 33: New Gully2 upstream to New Gully1 - no visible defects.

Section 34: New Gully2 downstream to Soakaway - no visible defects but standing water found within pipework and Soakaway found to be full (even though it had not rained for some time) causing New Gully1, New Gully2 & New Gully3 to not operate correctly.

Section 35: New Gully3 downstream to Soakaway - no visible defects but standing water found within pipework and Soakaway found to be full (even though it had not rained for some time) causing New Gully1, New Gully2 & New Gully3 to not operate correctly.

Section 36: Manhole S2 upstream to Manhole SF - substantial root ingress, settled deposits, fractures and crack found within, high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 37: Manhole S2 upstream towards Manhole SF following high pressure jetting works - fractures and substantial root ingress found within, further high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 38: Manhole S2 upstream towards Manhole SF following further high pressure jetting works - fractures and substantial root ingress found within, further high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 39: Manhole S2 upstream towards Manhole SF following further high pressure jetting works - fractures, settled deposits, hole, deformed & broken pipework and substantial root ingress found within, further high pressure jetting to be undertaken to clean & facilitate re-survey.

Project-information

Project name : 3220 External - Campus West (Roller	Project Number : 3220	Contact : Alan Robinson	Date : 19/06/2019
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Section 40: Manhole S2 upstream towards Manhole SF following further high pressure jetting works - fractures, settled deposits, holes, deformed & broken pipework and root ingress found within, further high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 41: Manhole S2 upstream towards Manhole SF following further high pressure jetting works - fractures, holes, cracks, deformed & broken pipework and root ingress found within, further high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 42: Manhole S2 upstream towards Manhole SF following further high pressure jetting works - fractures, holes, cracks, deformed & broken pipework and high level tap root ingress found within.

Section 43: Manhole S3 upstream to Manhole S2 - substantial root ingress, settled deposits and fractures found within, high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 44: Manhole S3 upstream towards Manhole S2 following high pressure jetting works - settled deposits, fractures, broken pipework and root ingress found within, further high pressure jetting to be undertaken to clean & facilitate re-survey.

Section 45: Manhole S3 upstream towards Manhole S2 following further high pressure jetting works - fractures, broken & deformed pipework found within

SW pipework dye tested to confirm now running clear to Manhole S4 (Main).

Since work on site was completed there was an extremely heavy downpour of rain on a Saturday morning, during the downpour an engineer who was very close by at the time attended site and inspected the two areas known to have allowed water into Roller City during heavy rain (Low Level Aco & Rear Low Level Aco) and found both areas to be clear of any flooding / standing water and appearing to be coping with the heavy rain.

Recommendations:

- 1) All structural defects graded 4 or above should be considered for appropriate remedial works to be undertaken (i.e. excavation & replacing, lining etc.), in an attempt to retain the structure of the defective pipework and return the pipework to a satisfactory and serviceable condition.
- 2) All operational defects graded 4 or above should be considered for appropriate remedial works to be undertaken (i.e. concentrated HP Jetting, root cutting, suction etc.), in an attempt to return the pipework to a satisfactory and serviceable condition.

All operational and structural defects graded 1 or 2 should not be detrimental to the effectiveness of the drainage, and are identified as a general note only.

All operational and structural defects graded 3 are unlikely to be detrimental to the effectiveness of the drainage.

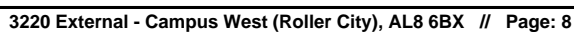
All operational and structural defects graded 4 or 5 may be detrimental to the effectiveness of the drainage and should be considered for remedial work.

Pipe deformation / ovaling is described in % terms - % being an approximation of the amount of vertical dimension compressed.

The pipe materials as described should be recognised as the survey engineer's best judgement only.

Project name : 3220 External - Campus West (Roller	Project Number : 3220	Contact : Alan Robinson	Date : 19/06/2019
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Project name : 3220 External - Campus West (Roller	Project Number : 3220	Contact : Alan Robinson	Date : 19/06/2019
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Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 1	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) S5 (U/S) Gully1	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Gully1 S5 1.16
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 5.19 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay Vitrified clay	

Comment :

1:50 Depth: 1.16	Position	Code	Observation	Photo	Grade				
	0.00	MH	Start node type, manhole reference number: S5		(Constr) 0				
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0				
	0.00	MC	Material changes, bitumen (lining)		(Misc) 0				
	2.79	D	Deformed sewer/drain, 10%	2_2_4_A.jpg	(Struct) 3				
	3.81	MC	Material changes, vitrified clay		(Misc) 0				
	4.40	OJM	Open joint, medium		(Struct) 1				
	4.62	LU	Line deviates up		(Serv) 0				
	5.19	GYF	Finish node type, gully reference number: Gully1 (car park road gully, found to be full)		(Constr) 0				
Structural Defects			Constructional Features						
Service Defects			Miscellaneous Features						
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
2	80	15.61	81	4	0	0	0	0	1

Place :

Draincare

Draincare Environmental Services Ltd

Unit 20 Martinfield Business Centre

Welwyn Garden City, AL7 1HG

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Fax:

Email: info@draincare.com

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 19/06/2019	Section number : 1	PLR Suffix : X
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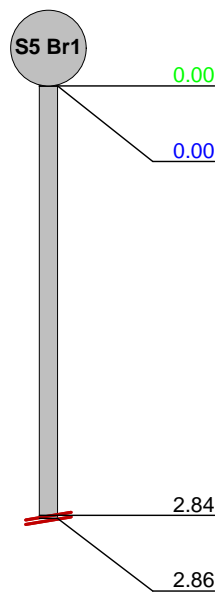
Photo: 2_2_4_A.jpg, 00:00:31
2.79m, Deformed sewer/drain, 10%

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 2	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) S5 Br1 (U/S) Rwdp K	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Rwdp K S5 Br1 1.16
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 2.86 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay Vitrified clay	

Comment :

1:50 Depth: 1.16	Position	Code	Observation	Photo	Grade
					
0.00		MH	Start node type, manhole reference number: S5 Br1		(Constr) 0
0.00		WL	Water level 0 % of the vertical dimension		(Serv) 0
2.84		CUZ	Loss of vision, other (webb across lens)		(Misc) 0
2.86		SA	Survey abandoned due to lens obscuring lens (to be re-surveyed)		(Misc) 0

Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 3	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) S5 Br1 (U/S) Rwdp K	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Rwdp K S5 Br1 1.16
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 3.91 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay Vitrified clay	

Comment :

1:50 Depth: 1.16	Position	Code	Observation	Photo	Grade																																							
	0.00	MH	Start node type, manhole reference number: S5 Br1		(Constr) 0																																							
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0																																							
	0.00	MC	Material changes, bitumen (lining)		(Misc) 0																																							
	3.17	MC	Material changes, vitrified clay		(Misc) 0																																							
	3.68	SC	Dimension changes, 55mm high, 55mm wide		0																																							
	3.68	LU	Line deviates up		(Serv) 0																																							
	3.79	JDL	Joint displaced, large		(Struct) 2																																							
	3.79	SV	Soil visible beyond defect		(Constr) 0																																							
	3.91	SA	Survey abandoned - unable to continue due to displaced joint & reduction in pipe diameter	4_4_20_A.jpg	(Misc) 0																																							
	<table><tr><th colspan="5">Structural Defects</th><th colspan="5">Constructional Features</th></tr><tr><th colspan="5">Service Defects</th><th colspan="5">Miscellaneous Features</th></tr><tr><th>STR no def</th><th>STR peak</th><th>STR mean</th><th>STR total</th><th>STR grade</th><th>SER no def</th><th>SER peak</th><th>SER mean</th><th>SER total</th><th>SER grade</th></tr><tr><td>1</td><td>2</td><td>0.51</td><td>2</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr></table>					Structural Defects					Constructional Features					Service Defects					Miscellaneous Features					STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade	1	2	0.51	2	1	0	0	0	0
Structural Defects					Constructional Features																																							
Service Defects					Miscellaneous Features																																							
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade																																			
1	2	0.51	2	1	0	0	0	0	1																																			

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Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 19/06/2019	Section number : 3	PLR Suffix : X
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Photo: 4_4_20_A.jpg, 00:01:36

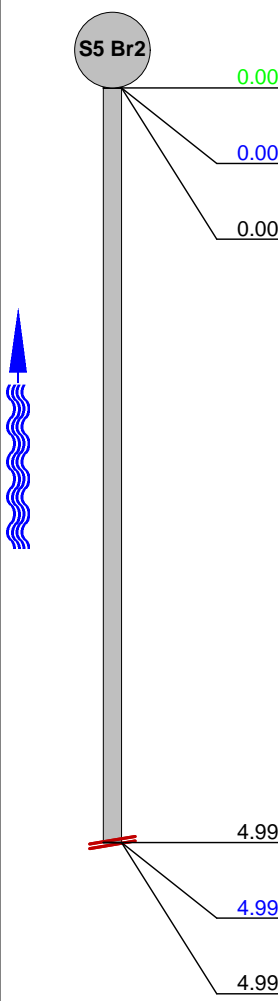
3.91m, Survey abandoned - unable to continue due to displaced joint & reduction in pipe diameter

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 4	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) S5 Br2 (U/S) Rwdp L	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Rwdp L S5 Br2 1.16
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 4.99 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay Vitrified clay	

Comment :

1:50 Depth: 1.16	Position	Code	Observation	Photo	Grade				
	0.00	MH	Start node type, manhole reference number: S5 Br2		(Constr) 0				
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0				
	0.00	MC	Material changes, bitumen (lining)		(Misc) 0				
	4.99	MC	Material changes, vitrified clay		(Misc) 0				
	4.99	RM	Roots, mass 40 % cross-sectional area loss	5_5_24_A.jpg	(Serv) 5				
	4.99	SA	Survey abandoned - unable to continue due to roots (to be HP Jetted & re-surveyed)		(Misc) 0				
Structural Defects			Constructional Features						
Service Defects			Miscellaneous Features						
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	1	10	2	10	5

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Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 19/06/2019	Section number : 4	PLR Suffix : X
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Photo: 5_5_24_A.jpg, 00:00:37

4.99m, Roots, mass 40 % cross-sectional area loss

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 5	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) S5 Br2 (U/S) Rwdp L	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Rwdp L S5 Br2 1.16
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 5.64 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay Vitrified clay	

Comment :

1:50 Depth: 1.16	Position	Code	Observation	Photo	Grade				
	0.00	MH	Start node type, manhole reference number: S5 Br2		(Constr) 0				
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0				
	0.00	MC	Material changes, bitumen (lining)		(Misc) 0				
	5.38	MC	Material changes, vitrified clay		(Misc) 0				
	5.64	RM	Roots, mass 30 % cross-sectional area loss	6_6_29_A.jpg	(Serv) 5				
	5.64	SA	Survey abandoned - unable to continue due to roots (to be further HP Jetted & re-surveyed)		(Misc) 0				
Structural Defects			Constructional Features						
Service Defects			Miscellaneous Features						
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	1	10	1.77	10	5

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 19/06/2019	Section number : 5	PLR Suffix : X
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Photo: 6_6_29_A.jpg, 00:00:43

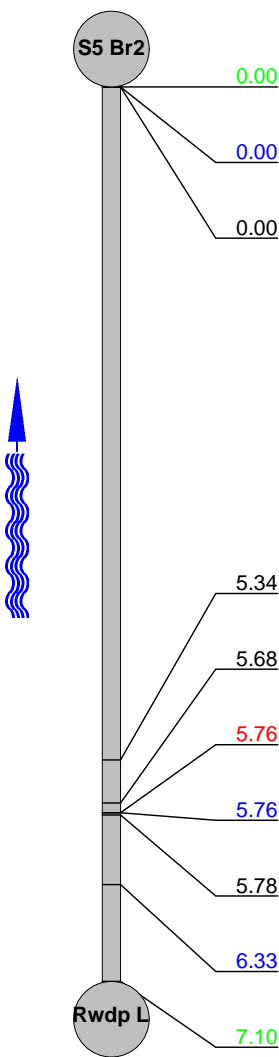
5.64m, Roots, mass 30 % cross-sectional area loss

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 6	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) S5 Br2 (U/S) Rwdp L	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Rwdp L S5 Br2 1.16
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 7.10 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay Vitrified clay	

Comment :

1:60 Depth: 1.16	Position	Code	Observation	Photo	Grade
		MH	Start node type, manhole reference number: S5 Br2		(Constr) 0
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0
	0.00	MC	Material changes, bitumen (lining)		(Misc) 0
	5.34	MC	Material changes, vitrified clay		(Misc) 0
	5.68	MC	Material changes, polyvinyl chloride		(Misc) 0
	5.76	FL	Fracture, longitudinal from 2 O'Clock		(Struct) 3
	5.76	RT	Roots, tap	7_7_37_A.jpg	(Serv) 4
	5.78	SC	Dimension changes, 55mm high, 55mm wide		0
	6.33	LU	Line deviates up		(Serv) 0
	7.10	BRF	Finish node type, major connection without manhole reference number: Internal Rwdp L		(Constr) 0

Structural Defects

Constructional Features

Service Defects

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
1	40	5.63	40	3	1	5	0.7	5	4

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Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 19/06/2019	Section number : 6	PLR Suffix : X
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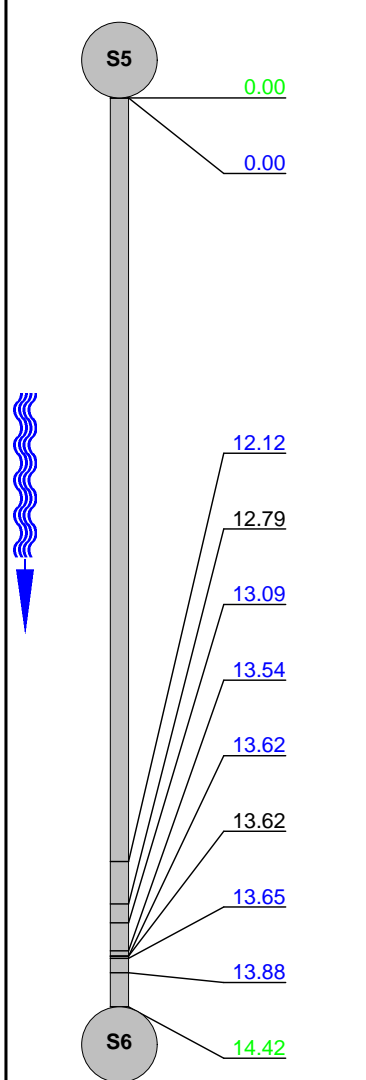
Photo: 7_7_37_A.jpg, 00:00:53
5.76m, Roots, tap

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 7	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) S5 (D/S) S6	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	S5 1.16 S6 1.05
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 14.42 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay 	

Comment :

1:120 Depth: 1.16	Position	Code	Observation	Photo	Grade
		MH	Start node type, manhole reference number: S5		(Constr) 0
		WL	Water level 0 % of the vertical dimension		(Serv) 0
		WL	Water level 5 % of the vertical dimension		(Serv) 0
		MC	Material changes, bitumen (lining)		(Misc) 0
		WL	Water level 10 % of the vertical dimension		(Serv) 0
		RMJ	Roots, mass at joint 10 % cross-sectional area loss		(Serv) 3
		WL	Water level 20 % of the vertical dimension		(Serv) 0
		MC	Material changes, vitrified clay		(Misc) 0
		LL	Line deviates left		(Serv) 0
		RM	Roots, mass 20 % cross-sectional area loss		(Serv) 3
		MHF	Finish node type, manhole reference number: S6 (to be HP Jetted & re-surveyed)		(Constr) 0

Depth: 1.05

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	2	4	0.55	8	3

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 8	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) S6 Br1 (U/S) Rwdp M	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Rwdp M S6 Br1 1.05
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 2.33 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay 	

Comment :

1:50 Depth: 1.05	Position	Code	Observation	Photo	Grade				
	0.00	MH	Start node type, manhole reference number: S6 Br1		(Constr) 0				
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0				
	0.00	RM	Roots, mass 10 % cross-sectional area loss		(Serv) 3				
	0.17	DES	Settled deposits, fine, 35% cross-sectional area loss	9_9_448_A.jpg	(Serv) 4				
	0.34	CUD	Loss of vision, silt		(Misc) 0				
	1.17	WL	Water level 5 % of the vertical dimension		(Serv) 0				
	1.19	REM	General remark - camera lens obscured		(Misc) 0				
	1.74	WL	Water level, 0% of the vertical dimension		(Serv) 0				
	2.33	SA	Survey abandoned - camera lens obscured (to be HP Jetted & re-surveyed)		(Misc) 0				
Structural Defects			Constructional Features						
Service Defects			Miscellaneous Features						
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	2	5	3.86	9	4

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 19/06/2019	Section number : 8	PLR Suffix : X
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Photo: 9_9_448_A.jpg, 00:00:12

0.17m, Settled deposits, fine, 35% cross-sectional area loss

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 9	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) S6 Br2 (U/S) Rwdp N	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Rwdp N S6 Br2 1
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 4.11 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay	

Comment :

1:50 Depth: 1	Position	Code	Observation	Photo	Grade				
	0.00	MH	Start node type, manhole reference number: S6 Br2		(Constr) 0				
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0				
	0.19	LR	Line deviates right		(Serv) 0				
	2.27	CC	Crack, circumferential from 3 O'Clock to 9 O'Clock		(Struct) 2				
	2.27	RF	Roots, fine		(Serv) 2				
	2.71	RF	Roots, fine		(Serv) 2				
	4.07	RM	Roots, mass 30 % cross-sectional area loss	10_10_62_A.jpg	(Serv) 5				
	4.11	SA	Survey abandoned - unable to continue due to roots (to be HP Jetted & re-surveyed)		(Misc) 0				
Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
3	11	0	12	2	1	10	0	10	5

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Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 19/06/2019	Section number : 9	PLR Suffix : X
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Photo: 10_10_62_A.jpg, 00:00:48

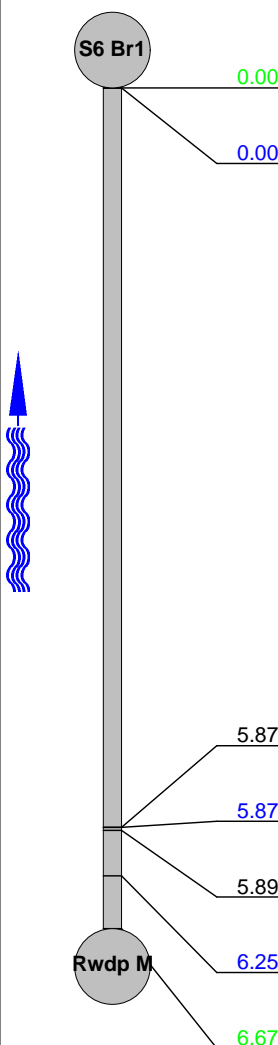
4.07m, Roots, mass 30 % cross-sectional area loss

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 10	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) S6 Br1 (U/S) Rwdp M	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Rwdp M S6 Br1 1
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 6.67 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay	

Comment :

1:60 Depth: 1	Position	Code	Observation	Photo	Grade
		MH	Start node type, manhole reference number: S6 Br1		(Constr) 0
		WL	Water level 0 % of the vertical dimension		(Serv) 0
		MC	Material changes, polyvinyl chloride		(Misc) 0
		RTJ	Roots, tap at joint	11_11_67_A.jpg	(Serv) 4
		SC	Dimension of drain/sewer changes 55 mm high 55 mm wide		0
		LU	Line deviates up		(Serv) 0
		BRF	Finish node type, major connection without manhole reference number: Internal Rwdp M		(Constr) 0

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	1	5	0.75	5	4

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Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 19/06/2019	Section number : 10	PLR Suffix : X
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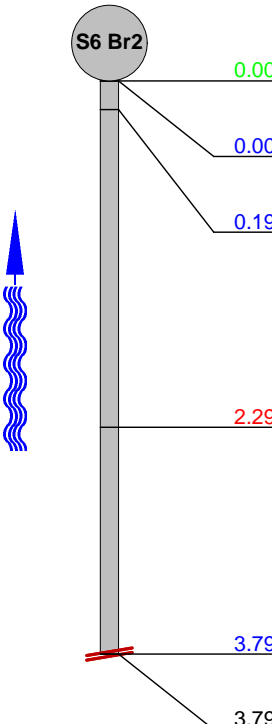
Photo: 11_11_67_A.jpg, 00:00:56
5.87m, Roots, tap at joint

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 11	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) S6 Br2 (U/S) Rwdp N	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Rwdp N S6 Br2 1
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 3.79 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay	

Comment :

1:50	Position	Code	Observation	Photo	Grade				
Depth: 1									
	0.00	MH	Start node type, manhole reference number: S6 Br2		(Constr) 0				
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0				
	0.19	LR	Line deviates right		(Serv) 0				
	2.29	CC	Crack, circumferential, from 12 to 12 o'clock		(Struct) 2				
	3.79	RM	Roots, mass 80 % cross-sectional area loss	12_12_75_A.jpg	(Serv) 5				
	3.79	SA	Survey abandoned - unable to continue due to roots (to be further HP Jetted & re-surveyed)		(Misc) 0				
Structural Defects			Constructional Features						
Service Defects			Miscellaneous Features						
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
1	10	2.64	10	2	1	20	5.28	20	5

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 19/06/2019	Section number : 11	PLR Suffix : X
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Photo: 12_12_75_A.jpg, 00:00:25

3.79m, Roots, mass 80 % cross-sectional area loss

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 12	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) S6 Br2 (U/S) Rwdp N	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Rwdp N S6 Br2 1
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 5.57 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay	

Comment :

1:50 Depth: 1	Position	Code	Observation	Photo	Grade
0.00		MH	Start node type, manhole reference number: S6 Br2		(Constr) 0
0.00		WL	Water level 0 % of the vertical dimension		(Serv) 0
0.29		LR	Line deviates right		(Serv) 0
2.24		CC	Crack, circumferential, from 12 to 12 o'clock		(Struct) 2
4.09		FC	Fracture, circumferential, from 12 to 12 o'clock		(Struct) 3
4.11		RF	Roots, fine		(Serv) 2
4.21		MC	Material changes, polyvinyl chloride		(Misc) 0
4.28		SC	Dimension of drain/sewer changes 55 mm high 55 mm wide		0
4.83		LU	Line deviates up		(Serv) 0
5.57		BRF	Finish node type, major connection without manhole reference number: Internal Rwdp N		(Constr) 0

Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
3	40	9.16	51	3	0	0	0	0	1

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 13	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) S6 (U/S) S5	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	S5 1.16 S6 1.05
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 13.85 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay 	

Comment :

1:120 Depth: 1.05	Position	Code	Observation	Photo	Grade
		MH	Start node type, manhole reference number: S6		(Constr) 0
		WL	Water level 0 % of the vertical dimension		(Serv) 0
		LR	Line deviates right		(Serv) 0
		MC	Material changes, bitumen (lining)		(Misc) 0
		MC	Material changes, vitrified clay		(Misc) 0
		MHF	Finish node type, manhole reference number: S5 (debris visible in channel removed)		(Constr) 0
Depth: 1.16					

Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

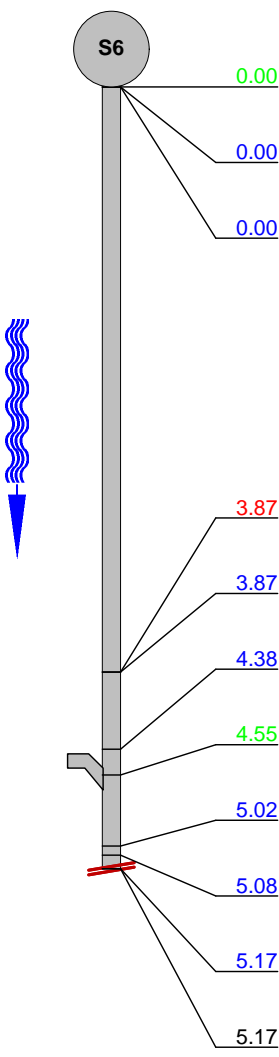
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	1	1	0.07	1	2

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 14	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) S6 (D/S) S1	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	S6 1.05 S1 1.04
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 5.17 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay 	

Comment :

1:50 Depth: 1.05	Position	Code	Observation	Photo	Grade
		MH	Start node type, manhole reference number: S6		(Constr) 0
0.00		WL	Water level 0 % of the vertical dimension		(Serv) 0
0.00		DES	Settled deposits, fine, 5% cross-sectional area loss		(Serv) 2
3.87		JDM	Joint displaced, medium		(Struct) 1
3.87		RFJ	Roots, fine at joint		(Serv) 2
4.38		RFJ	Roots, fine at joint		(Serv) 2
4.55		JN	Junction from 2 O'Clock diameter: 100 mm - Gully2 (roots in line from gully)		(Constr) 0
5.02		WL	Water level, 10% of the vertical dimension		(Serv) 0
5.08		WL	Water level 30 % of the vertical dimension		(Serv) 0
5.17		RM	Roots, mass 70 % cross-sectional area loss	15_15_102_A.jpg	(Serv) 5
5.17		SA	Survey abandoned - unable to continue due to roots (to be HP Jetted & re-surveyed)		(Misc) 0

Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
1	1	0.19	1	1	4	15	3.48	18	5

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Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 19/06/2019	Section number : 14	PLR Suffix : X
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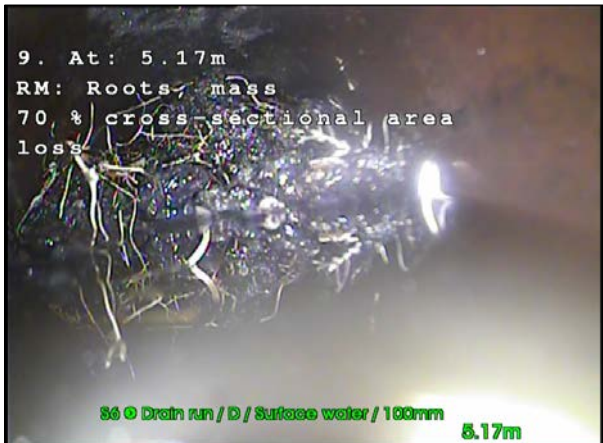


Photo: 15_15_102_A.jpg, 00:00:49

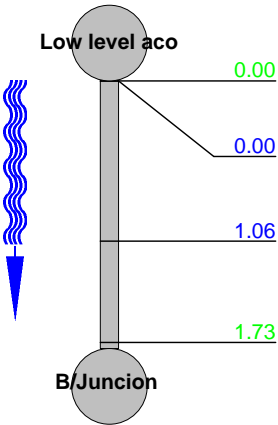
5.17m, Roots, mass 70 % cross-sectional area loss

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 15	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) Low level aco (D/S) B/Junction	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Low level aco B/Junction
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 1.77 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay	

Comment :

1:50	Position	Code	Observation	Photo	Grade				
	0.00	RE	Start node type, rodding eye reference number: Low level aco		(Constr) 0				
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0				
	1.06	LL	Line deviates left		(Serv) 0				
	1.73	BRF	Finish node type, major connection without manhole reference number: Blind junction on to pipework between S6 & S1 (pipework between S6 & S1 full of silt)	16_16_463_A.jpg	(Constr) 0				
Structural Defects			Constructional Features						
Service Defects			Miscellaneous Features						
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

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Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 19/06/2019	Section number : 15	PLR Suffix : X
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Photo: 16_16_463_A.jpg, 00:01:18

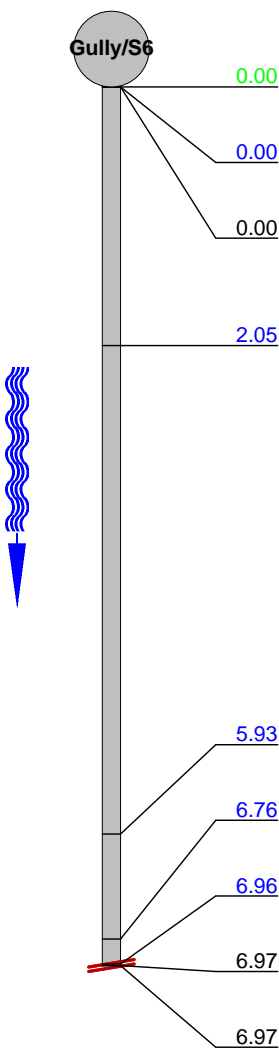
1.73m, Finish node type, major connection without manhole
 reference number: Blind junction on to pipework between S6 &
 S1 (pipework between S6 & S1 full of silt)

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 16	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) Gully/S6 (D/S) B/Junction	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Gully/S6 B/Junction
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 6.97 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 150 mm Vitrified clay	

Comment :

1:60	Position	Code	Observation	Photo	Grade
					
	0.00	GY	Start node type, gully reference number: Gully/S6		(Constr) 0
	0.00	WL	Water level 50 % of the vertical dimension		(Serv) 0
	0.00	S1	CUW Loss of vision, camera under water, Start		(Misc) 0
	2.05	LL	Line deviates left		(Serv) 0
	5.93	RM	Roots, mass 30 % cross-sectional area loss	17_17_113_A.jpg	(Serv) 5
	6.76	RM	Roots, mass 40 % cross-sectional area loss	17_17_114_A.jpg	(Serv) 5
	6.96	RM	Roots, mass, 95% cross-sectional area loss		(Serv) 5
	6.97	F1	CUW Loss of vision, camera under water, End		(Misc) 0
	6.97	SA	Survey abandoned - unable to continue due to roots underwater		(Misc) 0

Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	3	20	5.74	40	5

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 19/06/2019	Section number : 16	PLR Suffix : X
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Photo: 17_17_113_A.jpg, 00:01:19
5.93m, Roots, mass 30 % cross-sectional area loss



Photo: 17_17_114_A.jpg, 00:01:36
6.76m, Roots, mass 40 % cross-sectional area loss

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 17	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) Low level aco (D/S) B/Junction	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Low level aco B/Junction
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 2.37 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Polyvinyl chloride	

Comment :

1:50	Position	Code	Observation	Photo	Grade
	0.00	RE	Start node type, rodding eye reference number: Low level aco		(Constr) 0
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0
	0.83	LL	Line deviates left		(Serv) 0
	1.36	LL	Line deviates left (Blind junction between manholes S6 & S1)		(Serv) 0
	1.44	JN	Junction from 3 O'Clock diameter: 100 mm		(Constr) 0
	1.55	WL	Water level 10 % of the vertical dimension		(Serv) 0
	1.91	WL	Water level, 20% of the vertical dimension		(Serv) 0
	1.97	CUW	Loss of vision, camera under water due to testing		(Misc) 0
	2.37	OBZ	Other obstacles, other, from 12 to 12 o'clock, 95% cross-sectional area loss	18_18_584_A.jpg	(Serv) 5
	2.37	SA	Survey abandoned (to be re-surveyed up from S1)		(Misc) 0

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	2	20	8.44	20	5

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Place : Welwyn Garden city	Road : Campus West Car park	Date : 19/06/2019	Section number : 17	PLR Suffix : X
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Low level ooo ● Drain run / D / Surface water / 188mm
2.37m

Photo: 18_18_584_A.jpg, 00:03:32

2.37m, Other obstacles, other, from 12 to 12 o'clock, 95%
cross-sectional area loss

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 18	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) SA (D/S) SF	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	SA 1.7 SF 1
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 48.37 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay 	

Comment :

1:198 Depth: 1.7	Position	Code	Observation	Photo	Grade
	0.00	MH	Start node type, manhole reference number: SA		(Constr) 0
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0
	0.33	MC	Material changes, bitumen (lining)		(Misc) 0
	0.83	MC	Material changes, vitrified clay		(Misc) 0
	1.29	JN	Junction from 2 O'Clock diameter: 100 mm unknown		(Constr) 0
	6.98	DEC	Settled deposits, hard or compacted 5 % cross-sectional area loss S1		(Serv) 2
	9.34	REM	General remark Internal SB		(Misc) 0
	9.45	REM	General remark Red dye from external rear low level aco & Gully2		(Misc) 0
	9.55	WL	Water level 20 % of the vertical dimension		(Serv) 0
	10.00	CUW	Loss of vision, camera under water		(Misc) 0
	10.88	DEX	Settled deposits, other 10 % cross-sectional area loss Debris		(Serv) 3
	11.05	WL	Water level 10 % of the vertical dimension		(Serv) 0
	11.27	DEC	Settled deposits, hard or compacted 10 % cross-sectional area loss S2		(Serv) 3
	14.27	CUZ	Loss of vision, other at 12 O'Clock Lens obscurd		(Misc) 0
	14.75	WL	Water level, 0% of the vertical dimension		(Serv) 0

Inspection Report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 18	PLR : X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Grade:

1:198	Position	Code	Observation	Photo	Grade
	14.76	SC	Dimension of drain/sewer changes 150 mm high 150 mm wide		0
	17.09	WL	Water level 10 % of the vertical dimension		(Serv) 0
	17.69	CUW	Loss of vision, camera under water		(Misc) 0
	17.77	DEX	Settled deposits, other 10 % cross-sectional area loss Debris		(Serv) 3
	19.37	WL	Water level 20 % of the vertical dimension		(Serv) 0
	19.77	CUW	Loss of vision, camera under water		(Misc) 0
	22.22	CUW	Loss of vision, camera under water		(Misc) 0
	22.24	DER	Settled deposits, coarse, 20% cross-sectional area loss		(Serv) 3
	23.75	WL	Water level 0 % of the vertical dimension		(Serv) 0
	27.99	DEC	Settled deposits, hard or compacted 10 % cross-sectional area loss		(Serv) 3
	29.21	S01 DEX	Settled deposits, other, 25% cross-sectional area loss, Start (loose / pushed)	19_19_477_A.jpg	(Serv) 4
	33.81	REM	General remark Unlocated SC		(Misc) 0
	44.43	REM	General remark Unlocated SD		(Misc) 0
	48.37	F01 DEX	Settled deposits, other, 25% cross-sectional area loss, End		(Serv) 4
	48.37	SA	Survey abandoned Debris in front of camera (to be HP Jetted & re-surveyed)		(Misc) 0

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	7	7	2.17	105	4

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 19/06/2019	Section number : 18	PLR Suffix : X
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Photo: 19_19_477_A.jpg, 00:08:06

29.21m, Settled deposits, other, 25% cross-sectional area
loss, Start (loose / pushed)

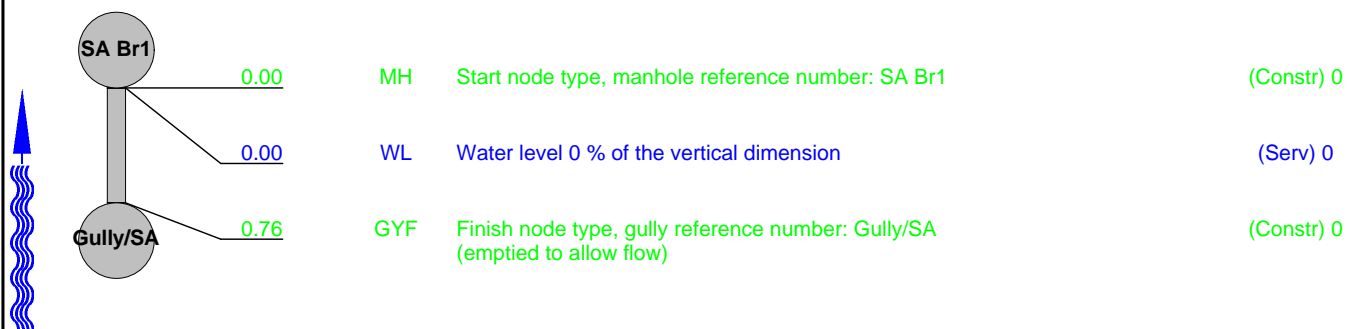
Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 19	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) SA Br1 (U/S) Gully/SA	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Gully/SA SA Br1 1.7
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 0.76 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 150 mm Polyvinyl chloride	

Comment :

1:50 Position Code Observation Photo Grade
Depth: 1.7



Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

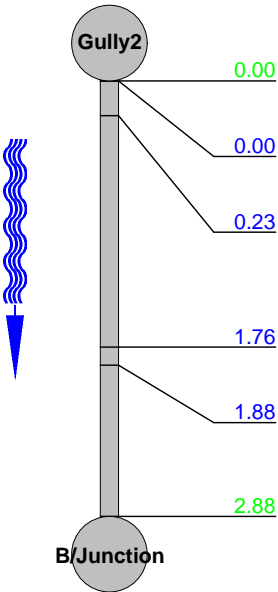
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

Inspection report

Date : 19/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 20	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Other (state in comments) Gully2 (D/S) B/Junction	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Gully2 B/Junction
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 2.88 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay	

Comment :

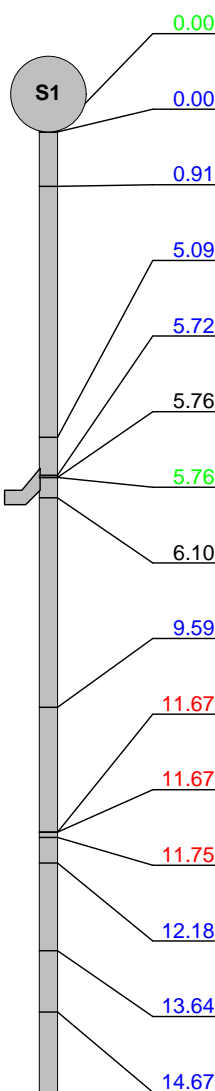
1:50	Position	Code	Observation	Photo	Grade				
	0.00	MH	Start node type, manhole reference number: Gully2 (vertical start, incorrectly named Rwdp A on video)		(Constr) 0				
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0				
	0.23	LU	Line deviates up 90 degrees to horizontal pipework internal / under building		(Serv) 0				
	1.76	LL	Line deviates left		(Serv) 0				
	1.88	LD	Line deviates down		(Serv) 0				
	2.88	BRF	Finish node type, major connection without manhole reference number: Blind junction @ 12 O'Clock on to pipework between Manholes SA & SB		(Constr) 0				
Structural Defects			Constructional Features						
Service Defects			Miscellaneous Features						
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 21	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Road S1 (U/S) S6	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	S6 1.05 S1 1.04
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 19.81 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay 	

Comment :

1:126 Depth: 1.04	Position	Code	Observation	Photo	Grade
	0.00	MH	Start node type, manhole reference number: S1		(Constr) 0
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0
	0.91	RFJ	Roots, fine at joint		(Serv) 2
	5.09	RFJ	Roots, fine at joint		(Serv) 2
	5.72	WL	Water level 5 % of the vertical dimension		(Serv) 0
	5.76	MC	Material changes, polyvinyl chloride		(Misc) 0
	5.76	JN	Junction from 2 O'Clock diameter: 100 mm Unknown		(Constr) 0
	6.10	MC	Material changes, vitrified clay		(Misc) 0
	9.59	LR	Line deviates right (slight)		(Serv) 0
	11.67	B	Broken pipe, from 12 to 12 o'clock	22_22_488_A.jpg	(Struct) 4
	11.67	H	Hole in drain/sewer, from 9 to 12 o'clock	22_22_489_A.jpg	(Struct) 5
	11.75	FC	Fracture, circumferential, from 12 to 12 o'clock		(Struct) 3
	12.18	RF	Roots, fine		(Serv) 2
	13.64	RFJ	Roots, fine at joint		(Serv) 2
	14.67	RM	Roots, mass 30 % cross-sectional area loss	22_22_176_A.jpg	(Serv) 5

Inspection Report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 21	PLR : X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Grade:

1:126	Position	Code	Observation	Photo	Grade
	16.79	CC	Crack, circumferential from 12 O'Clock to 6 O'Clock		(Struct) 2
	18.85	RFJ	Roots, fine at joint		(Serv) 2
	19.61	RM	Roots, mass 70 % cross-sectional area loss	22_22_179_A.jpg	(Serv) 5
	19.61	B	Broken pipe from 11 O'Clock to 1 O'Clock	22_22_180_A.jpg	(Struct) 4
	19.75	OBI	Other obstacles protuding through wall, at 12 o'clock, 40% cross-sectional area loss	22_22_181_A.jpg	(Serv) 5
	19.81	SA	Survey abandoned - unable to continue due to roots and rod / spike protruding through soffit of pipe (to be HP Jetted & re-surveyed)		(Misc) 0

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
6	245	18.98	376	5	7	15	1.97	39	5

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 20/06/2019	Section number : 21	PLR Suffix : X
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Photo: 22_22_488_A.jpg, 00:01:13
11.67m, Broken pipe, from 12 to 12 o'clock



Photo: 22_22_489_A.jpg, 00:01:13
11.67m, Hole in drain/sewer, from 9 to 12 o'clock



Photo: 22_22_176_A.jpg, 00:01:52
14.67m, Roots, mass 30 % cross-sectional area loss



Photo: 22_22_179_A.jpg, 00:02:43
19.61m, Roots, mass 70 % cross-sectional area loss

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 20/06/2019	Section number : 21	PLR Suffix : X
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Photo: 22_22_180_A.jpg, 00:02:45

19.61m, Broken pipe from 11 O'Clock to 1 O'Clock



Photo: 22_22_181_A.jpg, 00:02:52

19.75m, Other obstacles protruding through wall, at 12 o'clock, 40% cross-sectional area loss

Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 22	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Road S1 (U/S) S6	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	S6 1.05 S1 1.04
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 19.26 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay 	

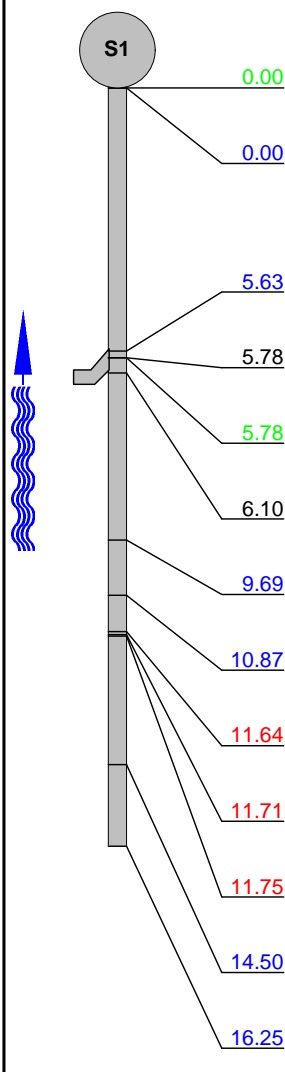
Comment :

1:162 Position
Depth: 1.04

Code Observation

Photo

Grade

	S1	0.00	MH	Start node type, manhole reference number: S1		(Constr) 0
		0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0
		5.63	WL	Water level 5 % of the vertical dimension		(Serv) 0
		5.78	MC	Material changes, polyvinyl chloride		(Misc) 0
		5.78	JN	Junction from 2 O'Clock diameter: 100 mm		(Constr) 0
		6.10	MC	Material changes, vitrified clay		(Misc) 0
		9.69	LR	Line deviates right (slight)		(Serv) 0
		10.87	RFJ	Roots, fine at joint		(Serv) 2
		11.64	FM	Fracture, multiple, from 12 to 12 o'clock	23_23_190_A.jpg	(Struct) 4
		11.71	B	Broken pipe, from 12 to 12 o'clock	23_23_191_A.jpg	(Struct) 4
		11.75	H	Hole in drain/sewer, from 9 to 12 o'clock	23_23_486_A.jpg	(Struct) 5
		14.50	RFJ	Roots, fine at joint		(Serv) 2
		16.25	DEX	Settled deposits, other 5 % cross-sectional area loss (loose roots)		(Serv) 2

Inspection Report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 22	PLR : X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Grade:

1:162	Position	Code	Observation	Photo	Grade
	19.20	RM	Roots, mass 40 % cross-sectional area loss	23_23_195_A.jpg	(Serv) 5
	19.20	OBI	Other obstacles protruding through wall, at 12 o'clock, 40% cross-sectional area loss (rod / spike)	23_23_196_A.jpg	(Serv) 5
	19.26	SA	Survey abandoned - unable to continue due to roots / obstruction (to be further HP jetted & re-surveyed)		(Misc) 0

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
3	245	16.87	325	5	5	20	1.19	23	5

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 20/06/2019	Section number : 22	PLR Suffix : X
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Photo: 23_23_190_A.jpg, 00:01:04
11.64m, Fracture, multiple, from 12 to 12 o'clock



Photo: 23_23_191_A.jpg, 00:01:08
11.71m, Broken pipe, from 12 to 12 o'clock



Photo: 23_23_486_A.jpg, 00:01:09
11.75m, Hole in drain/sewer, from 9 to 12 o'clock



Photo: 23_23_195_A.jpg, 00:02:06
19.2m, Roots, mass 40 % cross-sectional area loss

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 20/06/2019	Section number : 22	PLR Suffix : X
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Photo: 23_23_196_A.jpg, 00:02:08

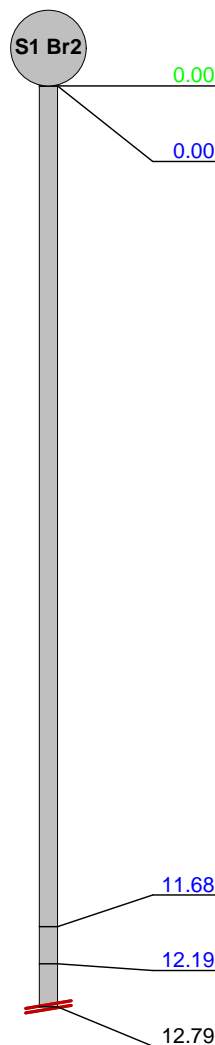
19.2m, Other obstacles protruding through wall, at 12 o'clock,
40% cross-sectional area loss (rod / spike)

Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 23	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Road S1 Br2 (U/S) Gully/Aco	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Gully/Aco S1 Br2 1.04
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 12.79 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay	

Comment :

1:105 Depth: 1.04	Position	Code	Observation	Photo	Grade
		MH	Start node type, manhole reference number: S1 Br2		(Constr) 0
		WL	Water level 0 % of the vertical dimension		(Serv) 0
		LR	Line deviates right		(Serv) 0
		LU	Line deviates up		(Serv) 0
		SA	Survey abandoned - unable to push camera past bend		(Misc) 0

Structural Defects

Constructional Features

Service Defects

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 24	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Road S6 (D/S) S1	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	S6 1.05 S1 1.04
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 7.04 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay 	

Comment :

1:60 Depth: 1.05	Position	Code	Observation	Photo	Grade
0.00	MH		Start node type, manhole reference number: S6		(Constr) 0
0.02	WL		Water level 0 % of the vertical dimension		(Serv) 0
4.45	RF		Roots, fine		(Serv) 2
5.02	RFJ		Roots, fine at joint		(Serv) 2
5.11	JN		Junction from 2 O'Clock diameter: 100 mm (Gully/S6)		(Constr) 0
6.00	JN		Junction from 9 O'Clock diameter: 100 mm (Low Level Aco)		(Constr) 0
6.36	JN		Junction from 2 O'Clock diameter: 100 mm		(Constr) 0
6.95	H		Hole in drain/sewer from 11 O'Clock to 1 O'Clock	25_25_212_A.jpg	(Struct) 4
6.95	B		Broken pipe, from 12 to 12 o'clock	25_25_585_A.jpg	(Struct) 4
6.97	FM		Fracture, multiple at 12 O'Clock	25_25_213_A.jpg	(Struct) 4
6.97	OBI		Other obstacles protruding through wall, from 12 to 6 o'clock, 95% cross-sectional area loss (rod / spike)	25_25_214_A.jpg	(Serv) 5
6.97	RM		Roots, mass 30 % cross-sectional area loss	25_25_215_A.jpg	(Serv) 5
7.04	SA		Survey abandoned - unable to continue past obstruction (to be further HP Jetted & re-surveyed)		(Misc) 0

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
4	240	34.23	241	5	3	20	2.98	21	5

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 20/06/2019	Section number : 24	PLR Suffix : X
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Photo: 25_25_212_A.jpg, 00:01:12
 6.95m, Hole in drain/sewer from 11 O'Clock to 1 O'Clock



Photo: 25_25_585_A.jpg, 00:01:13
 6.95m, Broken pipe, from 12 to 12 o'clock



Photo: 25_25_213_A.jpg, 00:01:18
 6.97m, Fracture, multiple at 12 O'Clock



Photo: 25_25_214_A.jpg, 00:01:19
 6.97m, Other obstacles protruding through wall, from 12 to 6 o'clock, 95% cross-sectional area loss (rod / spike)

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 20/06/2019	Section number : 24	PLR Suffix : X
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Photo: 25_25_215_A.jpg, 00:01:21

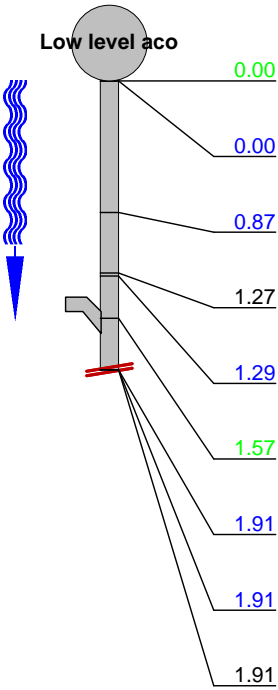
6.97m, Roots, mass 30 % cross-sectional area loss

Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 25	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Difficult access Low level aco (D/S) B/Junction	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	Low level aco B/Junction
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 1.91 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay	

Comment :

1:50	Position	Code	Observation	Photo	Grade				
									
	0.00	RE	Start node type, rodding eye reference number: Low level aco		(Constr) 0				
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0				
	0.87	LL	Line deviates left		(Serv) 0				
	1.27	REM	General remark Blind junction		(Misc) 0				
	1.29	LL	Line deviates left (blich junction onto pipework in between S6 & S1)		(Serv) 0				
	1.57	JN	Junction from 2 O'Clock diameter: 100 mm		(Constr) 0				
	1.91	RM	Roots, mass 40 % cross-sectional area loss	26_26_223_A.jpg	(Serv) 5				
	1.91	OBI	Other obstacles protuding through wall, from 12 to 6 o'clock, 95% cross-sectional area loss	26_26_224_A.jpg	(Serv) 5				
	1.91	SA	Survey abandoned - unable to continue due to obstruction		(Misc) 0				
Structural Defects			Constructional Features						
Service Defects			Miscellaneous Features						
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	2	20	10.47	20	5

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 20/06/2019	Section number : 25	PLR Suffix : X
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Photo: 26_26_223_A.jpg, 00:00:27

1.91m, Roots, mass 40 % cross-sectional area loss



Photo: 26_26_224_A.jpg, 00:00:27

1.91m, Other obstacles protruding through wall, from 12 to 6 o'clock, 95% cross-sectional area loss

Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 26	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Road S6 (D/S) S1	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	S6 1.05 S1 1.04
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 6.71 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Vitrified clay 	

Comment :

1:60 Depth: 1.05	Position	Code	Observation	Photo	Grade
		MH	Start node type, manhole reference number: S6		(Constr) 0
		WL	Water level 0 % of the vertical dimension		(Serv) 0
		JN	Junction from 2 O'Clock diameter: 100 mm		(Constr) 0
		JN	Junction from 9 O'Clock diameter: 100 mm (Low Level Aco)		(Constr) 0
		JN	Junction from 3 O'Clock diameter: 100 mm		(Constr) 0
		B	Broken pipe, from 12 to 12 o'clock	27_27_232_A.jpg	(Struct) 4
		H	Hole in drain/sewer, from 11 to 1 o'clock	27_27_586_A.jpg	(Struct) 4
		FC	Fracture, circumferential, from 12 to 12 o'clock		(Struct) 3
		RM	Roots, mass 10 % cross-sectional area loss		(Serv) 3
		OBI	Other obstacles protruding through wall, from 12 to 6 o'clock, 95% cross-sectional area loss	27_27_236_A.jpg	(Serv) 5
		SA	Survey abandoned - unable to continue due to obstruction		(Misc) 0

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
3	200	29.81	200	5	2	14	2.09	14	5

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 20/06/2019	Section number : 26	PLR Suffix : X
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Photo: 27_27_232_A.jpg, 00:00:56
6.46m, Broken pipe, from 12 to 12 o'clock



Photo: 27_27_236_A.jpg, 00:01:03
6.46m, Other obstacles protruding through wall, from 12 to 6 o'clock, 95% cross-sectional area loss



Photo: 27_27_586_A.jpg, 00:00:59
6.46m, Hole in drain/sewer, from 11 to 1 o'clock

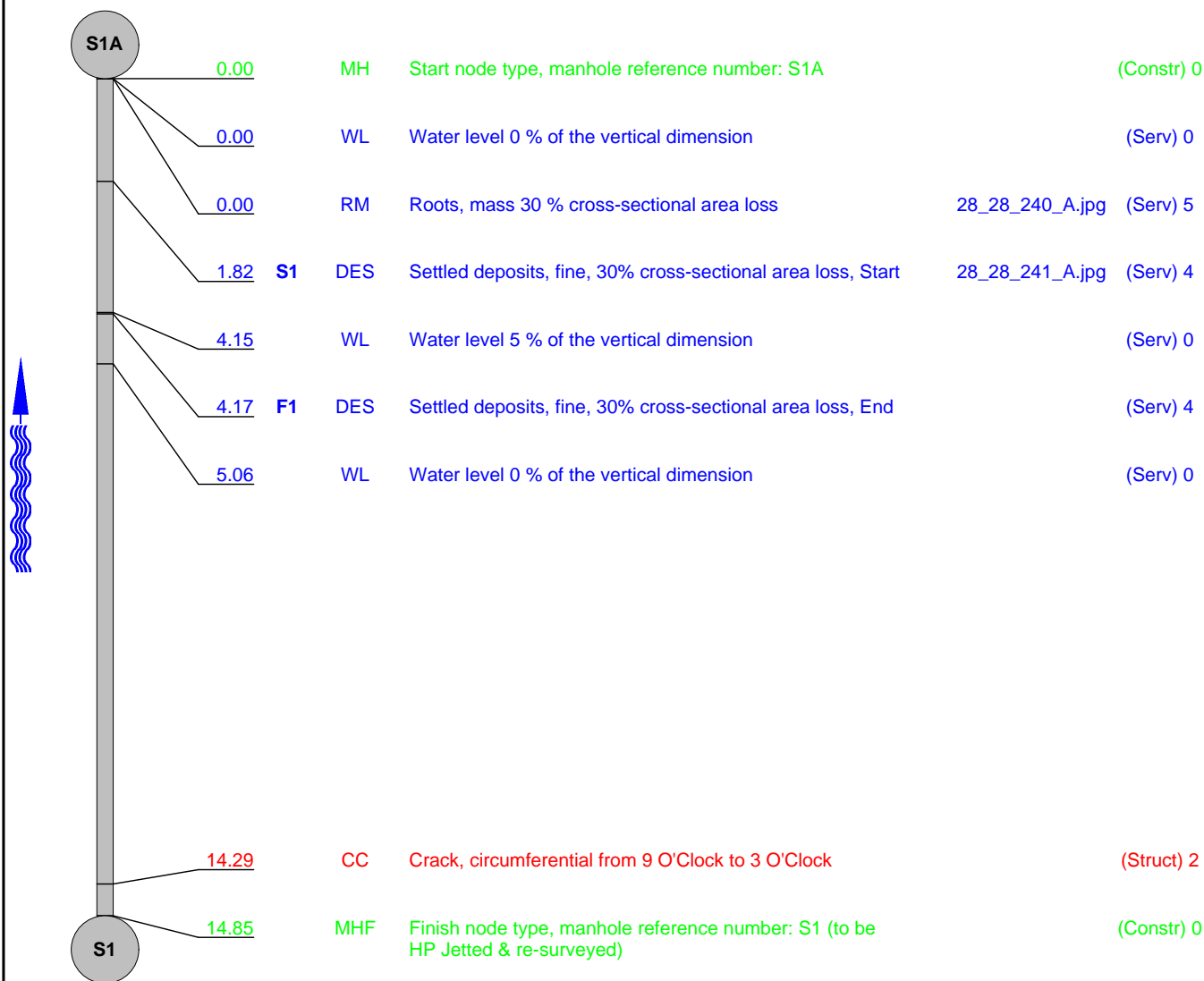
Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 27	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Verge S1A (U/S) S1	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	S1 1.04 S1A 1.26
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 14.85 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 150 mm Vitrified clay 	

Comment :

1:120 Position Code Observation Photo Grade
Depth: 1.26



Depth: 1.04

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
1	10	0.67	10	2	2	10	1.45	21.5	5

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 20/06/2019	Section number : 27	PLR Suffix : X
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Photo: 28_28_240_A.jpg, 00:00:03
0m, Roots, mass 30 % cross-sectional area loss



Photo: 28_28_241_A.jpg, 00:00:16
1.82m, Settled deposits, fine, 30% cross-sectional area loss,
Start

Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 28	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Verge S1A (D/S) S2 Br1	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	S1A 1.26 S2 Br1 1.22
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 21.70 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 225 mm Vitrified clay 	

Comment :

1:180 Depth: 1.26	Position	Code	Observation	Photo	Grade
	S1A				
0.00		MH	Start node type, manhole reference number: S1A		(Constr) 0
0.00		WL	Water level 0 % of the vertical dimension		(Serv) 0
10.93		LD	Line deviates down		(Serv) 0
21.70		MHF	Finish node type, manhole reference number: S2 Br1		(Constr) 0
S2 Br1					
Depth: 1.22					

Structural Defects

Constructional Features

Service Defects

Miscellaneous Features

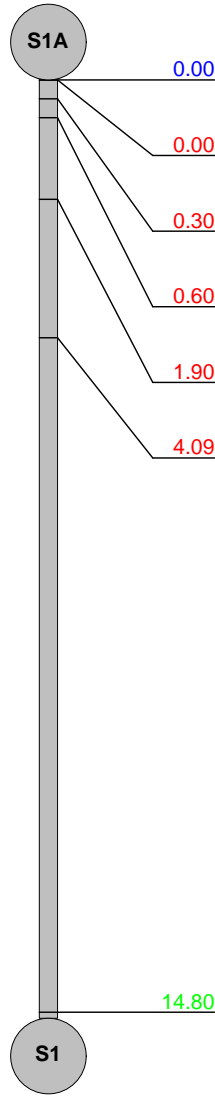
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 29	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Verge S1A (U/S) S1	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	S1 1.04 S1A 1.26
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 14.89 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 150 mm Vitrified clay 	

Comment :

1:120 Depth: 1.26	Position	Code	Observation	Photo	Grade
		RF	Roots, fine		(Serv) 2
0.00	F1	FM	Fracture, multiple, from 6 to 11 o'clock, End		(Struct) 4
0.30		FM	Fracture, multiple, from 12 to 12 o'clock	30_30_498_A.jpg	(Struct) 4
0.60		D	Deformed sewer/drain, 5%	30_30_499_A.jpg	(Struct) 2
1.90	S1	FM	Fracture, multiple, from 6 to 11 o'clock, Start	30_30_257_A.jpg	(Struct) 4
4.09	F1	FM	Fracture, multiple, from 6 to 11 o'clock, End		(Struct) 4
14.80	MHF		Finish node type, manhole reference number: S1		(Constr) 0
Depth: 1.04					

Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
5	81	23.44	349	4	0	0	0	0	1

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 20/06/2019	Section number : 29	PLR Suffix : X
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Photo: 30_30_498_A.jpg, 00:00:30
0.3m, Fracture, multiple, from 12 to 12 o'clock



Photo: 30_30_499_A.jpg, 00:00:36
0.6m, Deformed sewer/drain, 5%



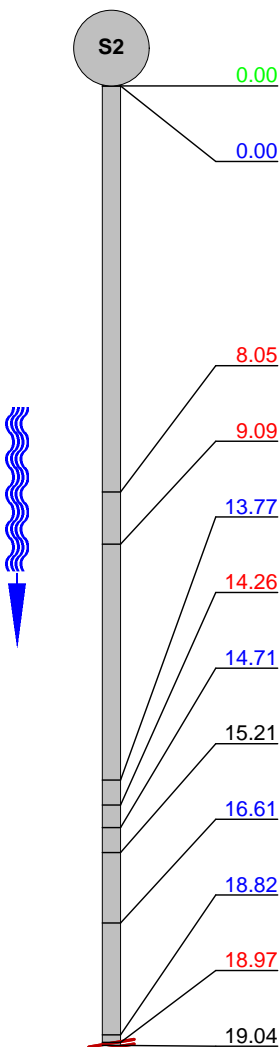
Photo: 30_30_257_A.jpg, 00:00:47
1.9m, Fracture, multiple, from 6 to 11 o'clock, Start

Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 30	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Verge S2 (D/S) S3	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	S2 1.22 S3 1.45
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 19.04 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 225 mm Vitrified clay 	

Comment :

1:150 Depth: 1.22	Position	Code	Observation	Photo	Grade
					
0.00	MH	Start node type, manhole reference number: S2			(Constr) 0
0.00	WL	Water level 0 % of the vertical dimension			(Serv) 0
8.05	FL	Fracture, longitudinal, at 12 o'clock			(Struct) 3
9.09	CL	Crack, longitudinal, at 3 o'clock			(Struct) 2
13.77	WL	Water level 10 % of the vertical dimension			(Serv) 0
14.26	FM	Fracture, multiple from 12 O'Clock to 3 O'Clock		31_31_264_A.jpg	(Struct) 4
14.71	WL	Water level 30 % of the vertical dimension			(Serv) 0
15.21	CUW	Loss of vision, camera under water			(Misc) 0
16.61	RM	Roots, mass 10 % cross-sectional area loss			(Serv) 3
18.82	RM	Roots, mass, 50% cross-sectional area loss		31_31_506_A.jpg	(Serv) 5
18.97	FL	Fracture, longitudinal, at 1 o'clock			(Struct) 3
19.04	SA	Survey abandoned (to be HP Jetted & re-surveyed)			(Misc) 0

Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
4	80	8.93	170	4	3	10	1.26	24	5

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 20/06/2019	Section number : 30	PLR Suffix : X
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Photo: 31_31_264_A.jpg, 00:01:02
14.26m, Fracture, multiple from 12 O'Clock to 3 O'Clock



Photo: 31_31_506_A.jpg, 00:02:11
18.82m, Roots, mass, 50% cross-sectional area loss

Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 31	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Verge S3 (U/S) S2	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	S2 1.22 S3 1.45
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 3.90 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 225 mm Vitrified clay 	

Comment :

1:50 Depth: 1.45	Position	Code	Observation	Photo	Grade
		MH	Start node type, manhole reference number: S3		(Constr) 0
		WL	Water level 0 % of the vertical dimension		(Serv) 0
		RM	Roots, mass 50 % cross-sectional area loss	32_32_272_A.jpg	(Serv) 5
		FL	Fracture, longitudinal from 3 O'Clock		(Struct) 3
		H	Hole in drain/sewer, at 2 o'clock	32_32_274_A.jpg	(Struct) 4
		SA	Survey abandoned - Unable to continue due to roots (to be HP Jetted & re-surveyed)		(Misc) 0

Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
2	120	30.77	120	4	1	10	2.56	10	5

Inspection pictures

Place : Welwyn Garden city	Road : Campus West Car park	Date : 20/06/2019	Section number : 31	PLR Suffix : X
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Photo: 32_32_272_A.jpg, 00:00:20
3.86m, Roots, mass 50 % cross-sectional area loss



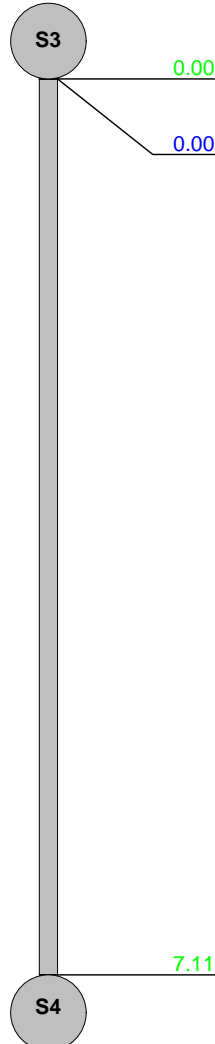
Photo: 32_32_274_A.jpg, 00:00:36
3.9m, Hole in drain/sewer, at 2 o'clock

Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 32	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Verge S3 (D/S) S4	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	S3 1.45 S4
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 7.11 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 225 mm Vitrified clay 	

Comment :

1:60 Depth: 1.45	Position	Code	Observation	Photo	Grade
		MH	Start node type, manhole reference number: S3		(Constr) 0
		WL	Water level 0 % of the vertical dimension		(Serv) 0
		MHF	Finish node type, manhole reference number: S4		(Constr) 0

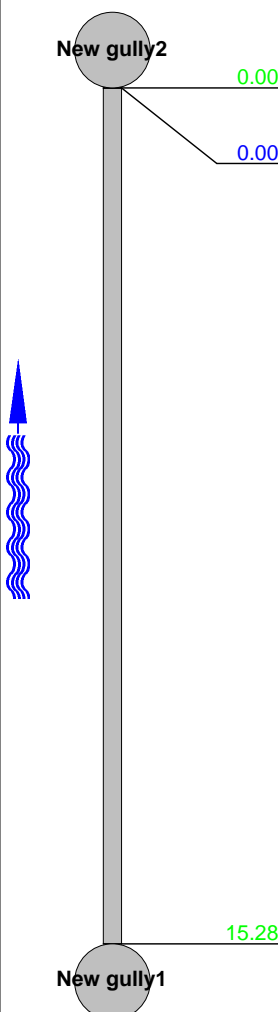
Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 33	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Road New gully2 (U/S) New gully1	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	New gully1 New gully2
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 15.28 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Polyvinyl chloride	

Comment :

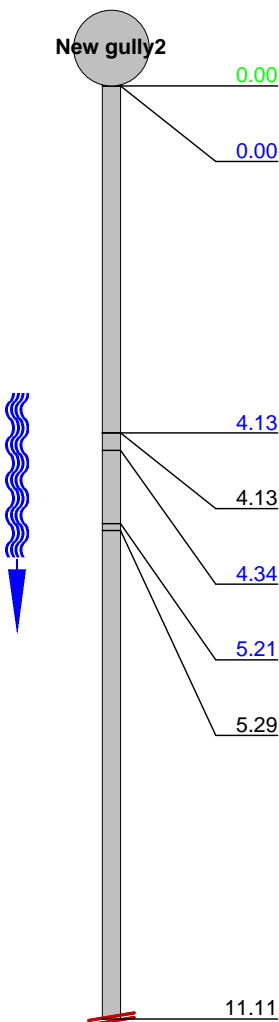
1:135	Position	Code	Observation	Photo	Grade				
		GY	Start node type, gully reference number: New gully2		(Constr) 0				
		WL	Water level 0 % of the vertical dimension		(Serv) 0				
			GYF	Finish node type, gully reference number: New gully1		(Constr) 0			
Structural Defects			Constructional Features						
Service Defects			Miscellaneous Features						
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 34	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Road New gully2 (D/S) Soakaway	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	New gully2 Soakaway
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 11.11 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 100 mm Polyvinyl chloride	

Comment :

1:90	Position	Code	Observation	Photo	Grade
					
	0.00	GY	Start node type, gully reference number: New gully2		(Constr) 0
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0
	4.13	WL	Water level 5 % of the vertical dimension		(Serv) 0
	4.13	SC	Dimension of drain/sewer changes 150 mm high 150 mm wide		0
	4.34	WL	Water level, 10% of the vertical dimension		(Serv) 0
	5.21	WL	Water level, 25% of the vertical dimension		(Serv) 0
	5.29	CUW	Loss of vision, camera under water		(Misc) 0
	11.11	SA	Survey abandoned - camera underwater with no view		(Misc) 0

Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

Inspection report

Date : 20/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 35	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Road New gully3 (D/S) Soakaway	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	New gully3 Soakaway
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 4.04 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 150 mm Polyvinyl chloride	

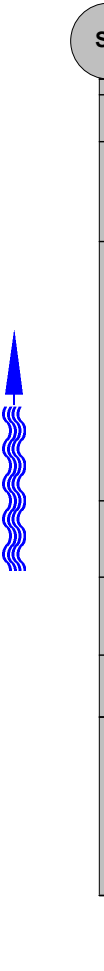
Comment :

Inspection report

Date : 21/06/2019	Job number : Whc	Weather : no rain or snow	Operator : Draincare	Section number : 36	PLR SUFFIX: X
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : Draincare

Place : Road : Location Inspection	Welwyn Garden city Campus West Car park Verge S2 (U/S) SF	Location details: Catchment: Tape number : Pipe Length	U/S MH : U/S Depth : D/S MH : D/S Depth :	SF 1 S2 1.22
Use: Year laid : Purpose : Total length :	Surface water Routine inspection of condition 20.10 m	Pipe shape : Pipe size : Pipe material : Lining :	Circular 225 mm Vitrified clay 	

Comment :

1:162 Depth: 1.22	Position	Code	Observation	Photo	Grade
	S2	MH	Start node type, manhole reference number: S2		(Constr) 0
	0.00	WL	Water level 0 % of the vertical dimension		(Serv) 0
	0.34	RMJ	Roots, mass at joint 20 % cross-sectional area loss		(Serv) 3
	1.34	RM	Roots, mass 20 % cross-sectional area loss		(Serv) 3
	3.48	S1 RM	Roots, mass 30 % cross-sectional area loss S1	37_37_297_A.jpg	(Serv) 5
	9.04	S2 DES	Settled deposits, fine 30 % cross-sectional area loss S2	37_37_298_A.jpg	(Serv) 4
	10.67	S3 FL	Fracture, longitudinal, at 3 o'clock, Start		(Struct) 3
	12.34	S4 FL	Fracture, longitudinal, at 12 o'clock, Start		(Struct) 3
	13.67	FM	Fracture, multiple from 12 O'Clock to 3 O'Clock		(Struct) 4
	13.67	CC	Crack, circumferential, from 12 to 4 o'clock		(Struct) 2
	17.50	F3 FL	Fracture, longitudinal, at 3 o'clock, End		(Struct) 3
	17.50	F4 FL	Fracture, longitudinal, at 12 o'clock, End		(Struct) 3