



**PROPOSED MULTI-STOREY CAR PARK DEVELOPMENT
WELLINGTON WAY, WATERLOOVILLE**

**DRAINAGE STRATEGY
& SUDS STATEMENT-**

OCTOBER 2019

Document Control Sheet

Project name: Wellington Way- Multi-Storey Car Park

Project ref: RPL/E4832

Report Title Drainage Strategy &
SuDS Statement

Doc. ref: TRS/E4832/17518

Date: 07th October 2019

	Name	Position	Signature	Date
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Reviewed by:	Terry Seymour	Director		Oct 2019
Approved by:	Terry Seymour	Director		Oct 2019

Revision	Date	Description	Prepared	Approved

Contents

1.0	Introduction.....	2
2.0	Existing Site	3
	<i>Geotechnical</i>	<i>3</i>
	<i>Ground Conditions</i>	<i>4</i>
3.0	Existing Surface Water Drainage.....	4
	<i>Existing Site Drainage</i>	<i>4</i>
4.0	Surface Water Management	5
	<i>Design Principles</i>	<i>5</i>
	<i>Sustainable Drainage Systems</i>	<i>6</i>
	<i>Surface Water Drainage Strategy</i>	<i>6</i>
	<i>Water Quality</i>	<i>7</i>
	<i>Long Term Maintenance</i>	<i>10</i>
	<i>Exceedance</i>	<i>10</i>
5.0	Conclusion.....	10

Appendices

Appendix A	Geotechnical Information (Extract)
Appendix B	Existing Surface Water Drainage
Appendix C	Proposed Surface Water Strategy
Appendix D	Micro Drainage Calculations

1.0 Introduction

Rogers Cory Partnership Limited have been instructed on behalf of CPM Wellington Way 2 Ltd to prepare an outline Surface Water Drainage Strategy and SuDS Statement to support the redevelopment of the existing car park into a multi-storey car park at Waterloooville, Havant.

2.0 Existing Site

The site is located in the centre of Waterloooville (Refer to **Figure 1** below). The development is bounded to the north by Maurepas Way and an existing access road along the western, southern and eastern boundary.

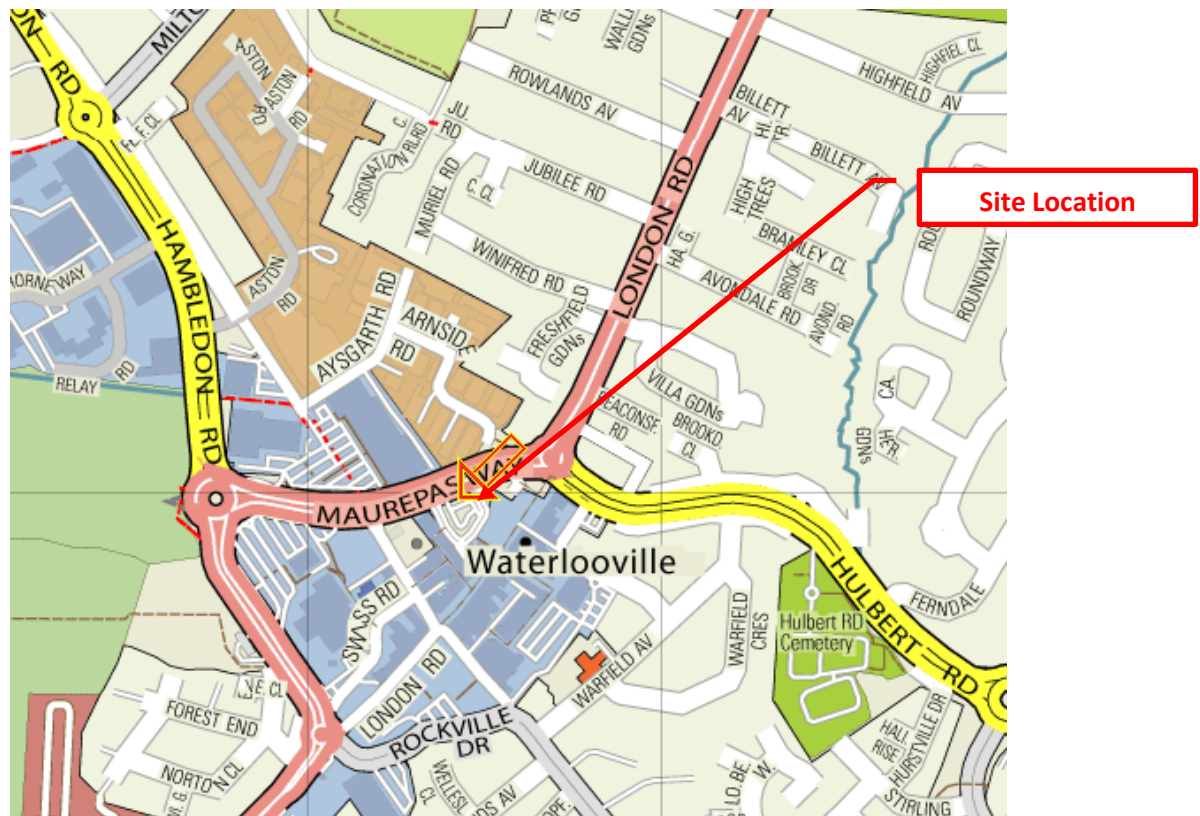


Figure 1: Site Location

The existing site proposed for development covers approximately 0.32ha of brownfield land comprising of an existing Council Car Park. The approximate centre of the site is at Ordnance Survey (OS) Grid Reference 468211; 109489.

Geotechnical

The current review of the geotechnical aspects of the site are based on the following documents:

- British Geological Survey (BGS) – Historic Borehole Logs and geology maps;

Ground Conditions

BGS geological maps indicate that the site is underlain by the London Clay Formation with no identified Superficial Deposits

Historical Boreholes are available on the BGS for the site which indicate depths of MADE GROUND to 4.07mbgl overlying the London Clay Formation proven to 8.08mbgl. An extract of this is provided in **Appendix A** for information. Based on the depth of MADE GROUND over the London Clay, infiltration drainage techniques are considered to be unfeasible on this site.

3.0 Existing Surface Water Drainage

This report reviews the existing risk of flooding to the site and requirements for a compliant drainage strategy by interrogating the following information:

- Available topographic survey information;
- INSEWER Drainage Survey (September 2019)

Existing Site Drainage

A review of the existing topographic information, sewer records and the drainage survey has been carried out to assess the existing surface water drainage regime of the site.

The drainage survey proves that all the surface water runoff from the existing car park is collected via gullies and discharges to a below ground 225mm diameter surface water sewer which connects to the existing Southern Water Surface Water manhole located north west of the site.

An assessment of the existing Brownfield Run-off from the site has been carried out for the overall area as well as the net area proposed for redevelopment to ensure that the run-off from the retained access road can still be accommodated within the existing Southern Water surface water network.

Details of the drainage survey, existing drainage regime and brownfield assessment is provided in **Appendix B** of this report.

The Brownfield run off rates for the varies storm events from the existing site for a net existing impermeable area of 0.2637ha is tabled below:

Storm Event	Discharge Rate (l/s)
1 in 1 year	33.3
1 in 30 year	81.8
1 in 100 year	104

Table 1: Brownfield Discharge Rates

4.0 Surface Water Management

Hampshire County Council (HCC) are the Lead Local Flood Authority for Havant Borough Council (HBC) and the statutory consultee on surface water management on all planning applications within the County.

The surface water management section should ensure that there is no adverse impact on flood risk elsewhere as a result of a change in the surface water runoff regime from the re-development.

Design Principles

Key design principles in the following guidance documents steer the approach to managing surface water runoff at sites:

- Building Regulations hierarchy of drainage (H3);
- Interim Code of Practice for SuDS; and
- CIRIA best practice guidance, including the use of the 'SuDS management train'.

Building Regulations hierarchy of drainage outlines the preferred methods for the disposal of surface water with infiltration methods being the preferred option. If this is not possible the next favoured option is to drain to an existing watercourse. If neither of these options are feasible, the regulations state that rainwater discharge should be directed to a sewer.

The Interim Code of Practice for SuDS provides guidance about the hydraulic design criteria for Sustainable drainage systems. This in general refers to both peak rate of runoff and the volume of runoff, post development. Prior to mitigation measures such as the use of SuDS attenuation features, both the volume and peak rate of runoff may increase post development.

The design principles for surface water management extend beyond simple hydraulic criteria. CIRIA guidance promotes the use of the SuDS management train,

a concept where SuDS techniques are used to treat, convey and store surface water runoff. This approach is considered as part of the SuDS selection methodology.

Sustainable Drainage Systems

To drain the development in a sustainable manner whilst complying with the requirements of the NPPF, the scheme should seek to adopt an appropriate form(s) of sustainable urban drainage systems (SuDS).

SuDS techniques comprise of implementation of permeable paving at the “open” roof car parking level and green roof systems over stair cores and other ancillary roof areas.

Surface Water Drainage Strategy

In view of the requirements of the NPPF, PPG, HCC, HBC the design parameters and constraints associated with redeveloping this site, a surface water drainage strategy design has been devised and hydraulically modelled to demonstrate that the scheme can be suitably implemented without increasing the level of flood risk, when the surface water drainage system experiences a 1:100-year rainfall event (including climate change).

The surface water drainage scheme has been designed to ensure:

- A reduction in the pre development site discharge for peak storm events.
- Sustainable Urban Drainage systems are wholly incorporated within the scheme.
- Consideration is given for the improvement of water quality within the design.
- The designed drainage scheme can satisfactorily retain a critical 1 in 100 Year storm event with climate change.

Access Roads, Shared Surfaces, Private Drives and Roof Drainage

The proposed run-off from the roof level car park will be captured and conveyed via a lined permeable paving system, providing a level of SuDS treatment prior to discharging to the below ground network. Green roofs are proposed in all areas over stair cores and ancillary buildings. Key attenuation will be provided via a below ground storage tank

The surface water network will convey the flows, under gravity, north westwards towards the existing surface water sewer where the flows will be restricted prior to discharging into the downstream Southern Water Surface Water network.

The undercroft parking areas will be covered and thus will not receive direct rainfall and do not fall part of the surface water drainage strategy. Any drainage from these undercroft parking areas will be conveyed to the foul drainage system via a full retention petrol interceptor.

Flow Control

A maximum overall development discharge is proposed to be limited to 33l/s which meets the 1-year brownfield discharge rate. This represents a significant betterment to the calculated brownfield rates for 1 in 30 year and 1 in 100-year events

The hydraulic models of the proposed surface water networks, incorporating the SUDs attenuation basins and flow control devices can be found in **Appendix D**.

The hydraulic calculations have been simulated under various scenarios up to and included the critical 1 in 100 Year storm event with additional 40% allowance for climate change and an additional 10% to account for urban creep. The simulations confirm that the storm can be managed and maintained within the site without flooding.

Impermeable Development Area (Ha)	Q1 Year (L/sec)	Q30 Year (L/Sec)	Q100 Year Plus Climate (L/Sec)
0.2637	16.6	30.5	32.9

Table 3: Summary of Post Development Runoff with mitigation measures

Water Quality

It is important to address issues with regards to quality when considering surface water management. As part of the surface water is proposed to be discharge to the existing surface water sewer, treatment is proposed as part of a SuDS Management Train in accordance with the recommendations of the SuDS Manual (CIRIA 753) and as required by the LLFA.

This SuDS management train will be achieved through use of the permeable paving at roof level and green roof systems on all other roofs.

Chapter 26 of the CIRIA SuDS Manual (2015) provides guidance on methods that should be used to design SuDS to meet the water quality design criteria and good practice design standards. Diffuse urban pollution is a significant factor in compromising groundwater and receiving water standards that are required under the EA Water Framework Directive. Chapter 4 of the SuDS Manual summarises factors, which influence pollution levels in urban run-off. This summary is presented in **Table 4 below:**

Factors influencing pollution levels in urban run-off
The amount and type of pollution washed off a surface will depend on many things including: • Planning activities on, above and adjacent to the surface that affect the deposition of pollutants, their retention on the surface and the extent to which they are mixed with runoff (including pollution prevention strategies) • Unplanned activities (accidents and spillages) that can cause temporary unexpected high pollution concentrations • The surface location and type, affecting wash-off rates and contaminant movement mechanisms • The drainage path • The length of the dry weather period before the rainfall event • The intensity and the duration of the rainfall, and the associated flow velocities Any further pollutant transformations occurring during residence and conveyance within gullies, chambers, pipe or channel networks, gravels, soils and vegetation and quiescent bodies of water.

Table 4: Extract of Box 4.1 of the SuDS Manual (CIRIA 753)

Table 4.3 of the SuDS Manual classifies the pollution hazard level for commercial car parking sites as being “medium” and thus only requiring a “Simple index approach” in terms of the requirements for the discharge to surface waters, including coasts and estuaries.

The SuDS Manual summarises the steps for the simple index approach:

Step 1 – *Allocate suitable pollution hazard indices for the proposed land use*

Step 2 – *Select SuDS with a total pollution mitigation index that equals or exceeds the pollution index*

Step 3 – *Where the discharge to a protected surface waters or groundwater, consider the need for a more precautionary approach*

The SuDS Manual describes “protected surface waters” as protected surface water resources, which include those designated for drinking water abstraction or for other environmental protection reasons

Table 26.2 of the SuDS manual notes the following pollution hazard indices for residential land use development:

Land Use	Pollution Hazard Level	Total suspended solids (TSS)	Metals	Hydrocarbons
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk/motorways	Medium	0.7	0.6	0.7

Table 5: Extract of Table 26.2 of SuDS Manual (2015)

Table 26.3 of the SuDS Manual provides details of the SuDS pollution mitigation indices for various types of SuDS components

	Mitigation indices		
Type of SuDS component	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 Paving	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

Table 6: Extract of Table 26.3 of SuDS Manual (2015)

As such the total SuDS mitigation index (figure 5) must be greater than the pollution hazard index (figure 4), furthermore when used in combination of two or more SuDS components, a factor of 0.5 is used to account for the reduced performance of the secondary or tertiary components associated with the already reduced inflow of concentration, therefore:

Total SuDS mitigation index = mitigation index₁ + 0.5 (mitigation index₂)

The use of the permeable paving and green roofs as an initial stage of treatment of surface water will provide the minimum required level of SuDS mitigation index to the run off from the car park.

Long Term Maintenance

Consideration will need to be given to the long-term maintenance of the proposed drainage structures. Permeable paving and all associated external pipework, will fall under the responsibility of the Car Parking operators.

Exceedance

Whilst the drainage system has been designed to a very high standard (1 in 100 Year storm event including climate change), it is possible that a more extreme event will occur and that the design standard for the system will be exceeded. It is best practice to design the drainage system to shed water, primarily into landscaped and other areas, therefore reducing the risk of flooding areas of built development during extreme events.

A strategy for directing overland flows for the site will be confirmed as part of the detailed design, though it should be noted that based on the existing sites surrounding drainage network and proposed usage the residual risk to future users from exceedance flows is considered low.

5.0 Conclusion

An outline surface water drainage strategy has been prepared and demonstrates that the multi-storey car park development proposal can be successfully implemented and designed to withstand the impact of a 1:100-year rainfall event (including climate change), in accordance with the NPPF, PPG, HCC and HBC requirements.

In view of this assessment, the report concludes that:

- i. The Development can be drained in a sustainable manner utilizing SuDS techniques;
- ii. The Development will satisfactorily manage and maintain a 1 in 100 Year storm event with allowance for climate change;
- iii. The findings of this report identify the opportunity to promote the sustainable re-use of existing resources and potential to implement an appropriate SuDS strategy.

Appendix (A)

Geotechnical Information (Extract)

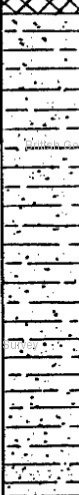
ACCURATE SOIL SURVEYS

BOREHOLE RECORD SHEET

Job No. _____

Date _____

Location WATERLOOVILLECarried out for HAVANT & WATERLOO UDCBorehole No. 35Diameter 0.152Ground Level 47.876Scale 1:50

Description	M/C %	O.S.D.	Legend	Depth	Thick-ness	Sample	S.P.T. "N" Value	Water Levels
SH. BRICK WOOD FILL				0.00				
						0.46	16	
						0.91		
						1.07	17	
						1.52		
(LONDON CLAY)				4.07		1.83	17	
						2.29		
						2.59		
						3.05	23	
SANDY MOTTLED CLAY (FIRM)						4.11		W.E. 4.47
						4.57		
						5.64		
						6.10		W.L. 6.10
						7.16		
				8.08		7.62		
					END	OF		BORE



**British
Geological Survey**
NATURAL ENVIRONMENT RESEARCH COUNCIL

Version 2.0.6

BGS ID: 420113 : BGS Reference:
SU60NE172
British National Grid (27700) :
468230,109490

[Report an issue with this borehole](#)

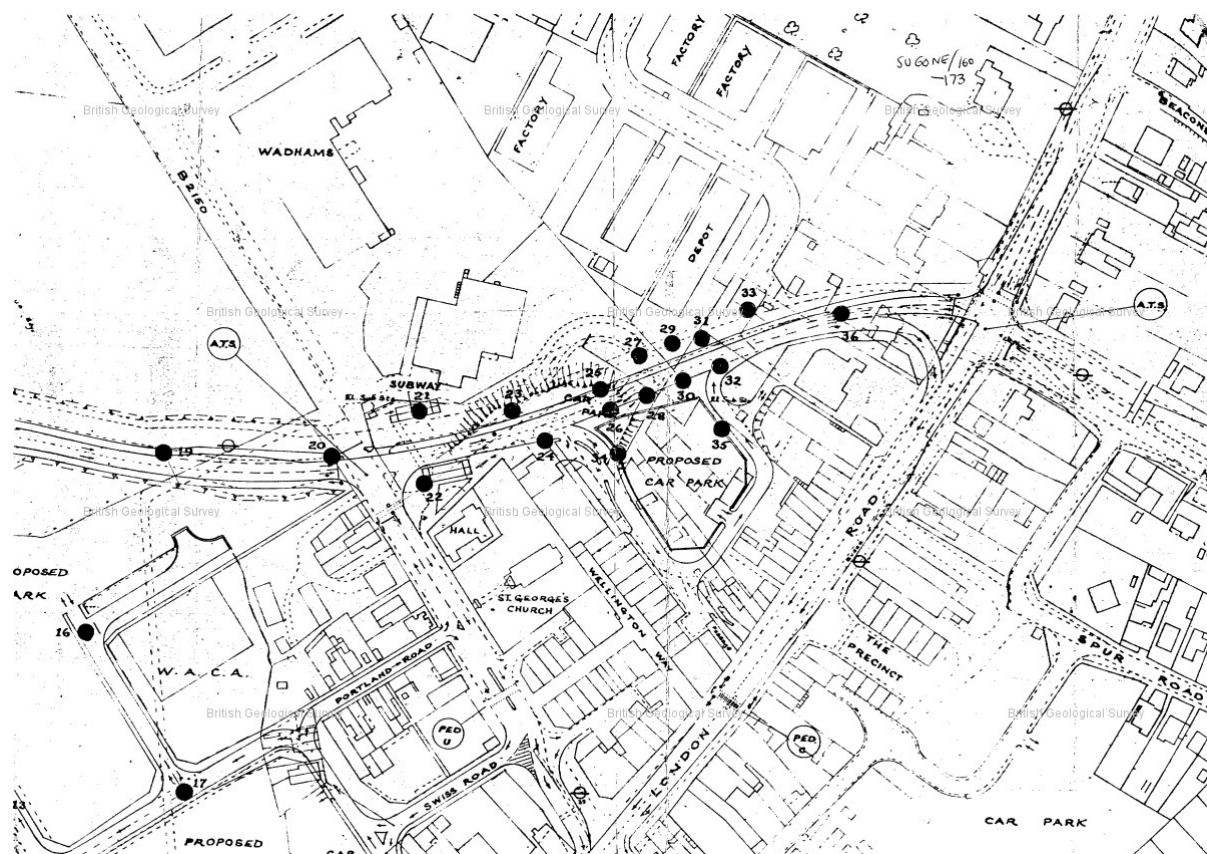
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Page 4 of 5

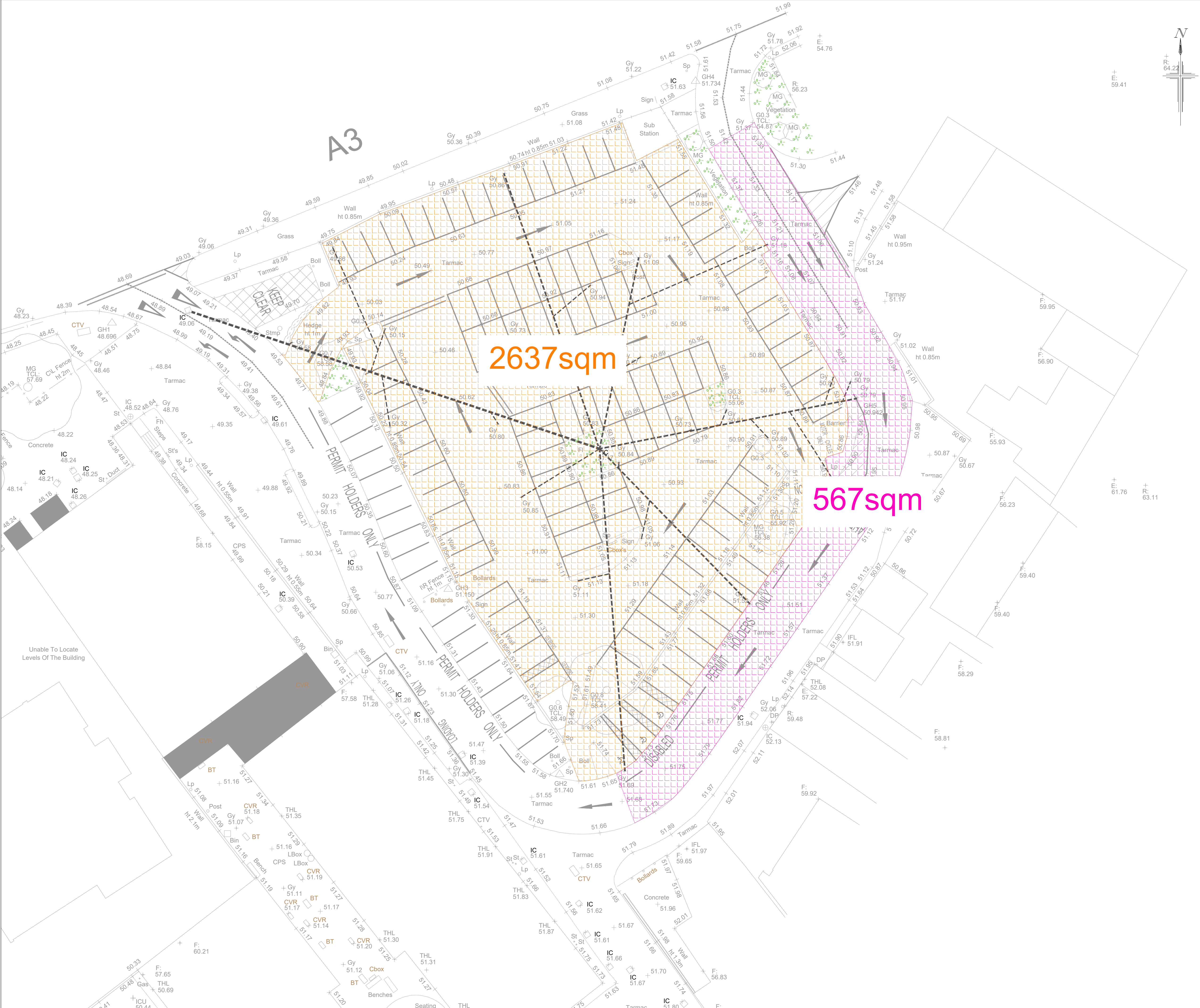
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Appendix (B)

Existing Surface Water Drainage



NOTES

- Existing impermeable area within area of redevelopment
- Existing impermeable area - retained
- Existing surface water drainage per INsewer Drainage Survey (September 2019)

Rev.	Date	Details	By	Chkd/Appd
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Client:-
Radcliffes

Site:-
**Wellington Way
Havant**

Drawing Title:-
**Car Park
Existing Drainage
Strategy**

Date:	October 2019	Scales:	1:200@A1
Drawn:	TRS	Checked:	TRS
Drawing No.		Approved: TRS	

RPL/E4832/004

PRELIMINARY

**RCP**
ARCHITECTURE & CIVIL ENGINEERING

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Architectural and Civil Consultants
The Old School Old School Road
Hook Hampshire RG27 9NJ
T: 01256 769269 E: mail@rcpconsultants.co.uk W: rcpconsultants.co.uk

Rogers Cory Partnership		Page 1
The Old School Old School Road Hook Hampshire RG27 9NJ		
Date 09/10/2019 19:43 File Existing-redevelopment ...	Designed by Terry Checked by	
Innovyze	Network 2017.1.2	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.200	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	48.000	2.609	18.4	0.263	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	5.000	0.030	166.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	I.Area (ha)	Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.26	49.589	0.263	0.0	0.0	0.0	3.07	121.9	35.6
1.001	50.00	5.34	46.980	0.263	0.0	0.0	0.0	1.01	40.2	35.6

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.001		49.000	46.950	0.000	0	0

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The Old School Old School Road Hook Hampshire RG27 9NJ		
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Innovyze		Network 2017.1.2
<u>Simulation Criteria for Storm</u> Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 2.000 Hot Start (mins) 0 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Storage Structures 0 Number of Online Controls 0 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FSR Profile Type Summer Return Period (years) 2 Cv (Summer) 0.750 Region England and Wales Cv (Winter) 0.840 M5-60 (mm) 19.200 Storm Duration (mins) 30 Ratio R 0.350		
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The Old School Old School Road Hook Hampshire RG27 9NJ		
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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.200	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	1	+0%					49.672
1.001	2	15 Winter	1	+0%	1/15 Summer				47.222

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.142	0.000	0.28		33.2	OK	
1.001	2	0.017	0.000	1.14		33.3	SURCHARGED	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region England and Wales	Cv (Summer)		0.750
M5-60 (mm)	19.200 Cv (Winter)		0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	30	+0%					49.730
1.001	2	15 Winter	30	+0%	1/15 Summer				47.512

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.084	0.000	0.70		81.4	OK	
1.001	2	0.307	0.000	2.79		81.8	SURCHARGED	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region England and Wales	Cv (Summer)		0.750
M5-60 (mm)	19.200	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	100	+0%					49.793
1.001	2	15 Winter	100	+0%	1/15 Summer				47.708

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.021	0.000	0.89		104.0	OK	
1.001	2	0.503	0.000	3.55		104.0	SURCHARGED	

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*Sewer Inspection,
Cleaning and Repair*

Project ref:TV190924

20th September 2019

CCTV Survey Report

CLIENT : CPI WELLINGTON WAY 2 LIMITED

SITE: Wellington Way

Waterlooville

Hampshire

PO7 7ED

www.insewer.co.uk

Tel : 01634 861 768



InSewer Surveys
 16a Revenge Road
 Lordwood Industrial Estate
 Tel: 01634 861 768
 Fax: 01634 201 376
 Email: liam@insewer.co.uk

Project-information

Project name :
TV190924

Contract Number :

Contact :

Date :
20/09/2019

Client: **CPI Wellington Way 2 Limited**
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 Town: **Hook**
 County: **Hampshire RG27 9NJ**
 Telephone: **01256 769 269**
 Fax:
 Mobile: **07462 134 576**
 E-mail:

Site:
 Contact Name:
 Department:
 Road: **Wellington Way**
 Town: **Waterlooville**
 County: **Hampshire, PO7 7ED**
 Telephone:
 Fax:
 Mobile:
 E-mail:

Contractor **InSewer Surveys**
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 Telephone: **01634 861 768**
 Fax: **01634 201 376**
 Mobile: **07802 660 752**
 E-mail: **liam@insewer.co.uk**



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IC1



LOCATION OF IC1



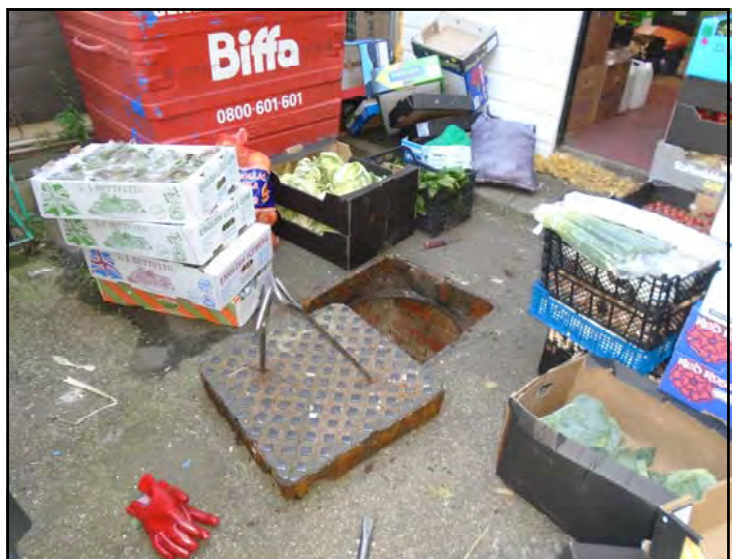
IC2



LOCATION OF IC2



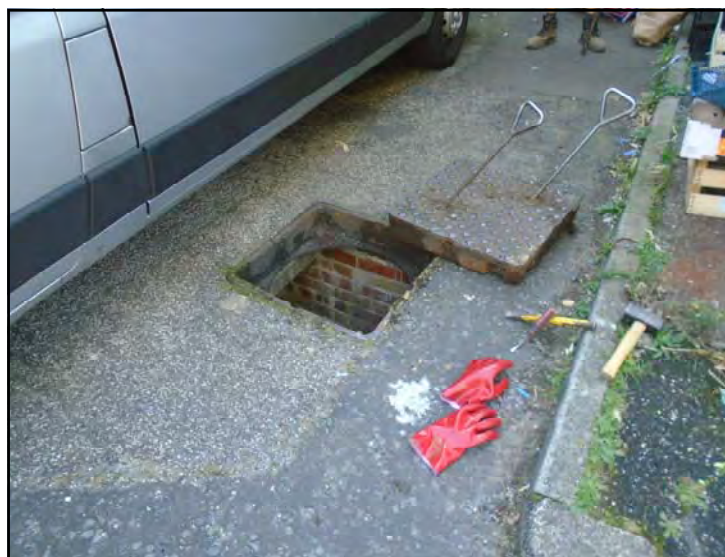
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LOCATION OF IC3



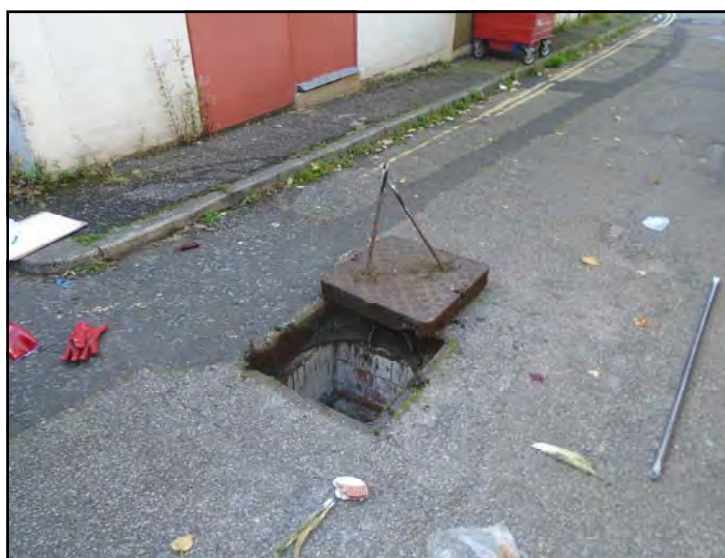
IC4



LOCATION OF IC4



IC5



LOCATION OF IC5



IC6



LOCATION OF IC6



IC7



LOCATION OF IC7



IC8 (1303)



LOCATION OF IC8



IC9 (1360)



LOCATION OF IC9



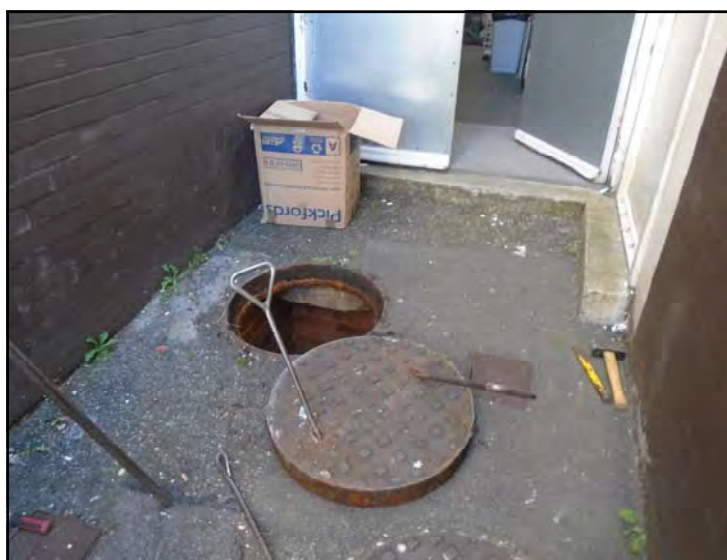
IC10 (1356)



LOCATION OF IC10



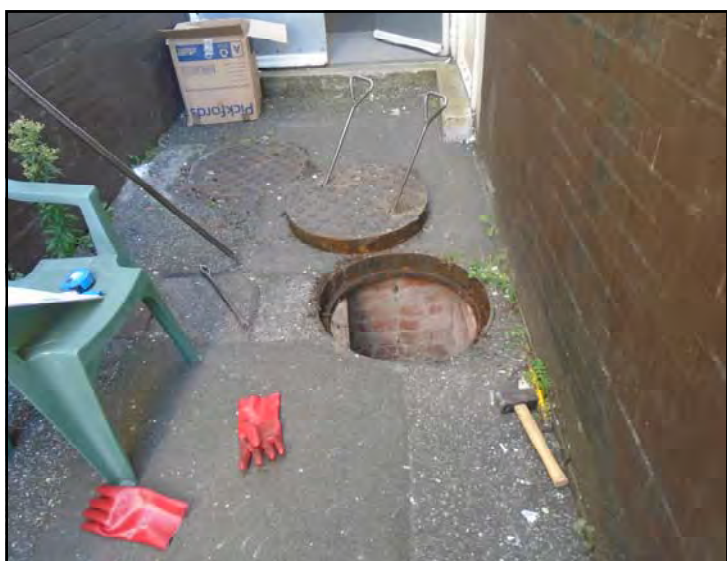
IC11



LOCATION OF IC11



IC12



LOCATION OF IC12



IC13



LOCATION OF IC13



IC14



LOCATION OF IC14



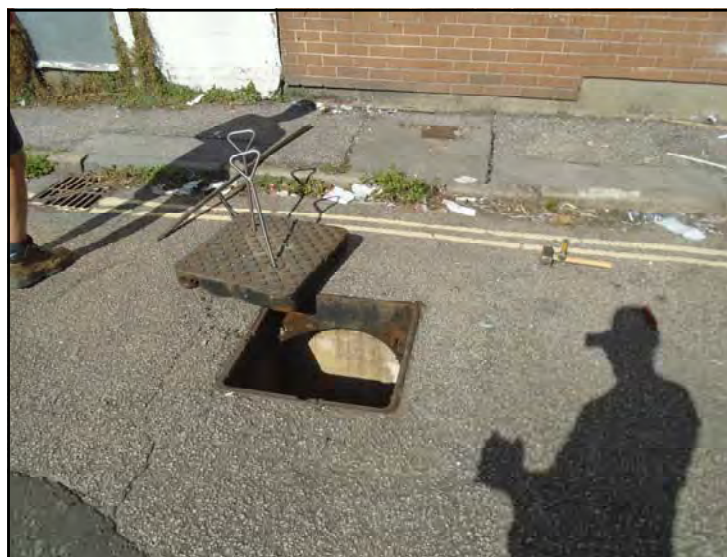
IC15



LOCATION OF IC15



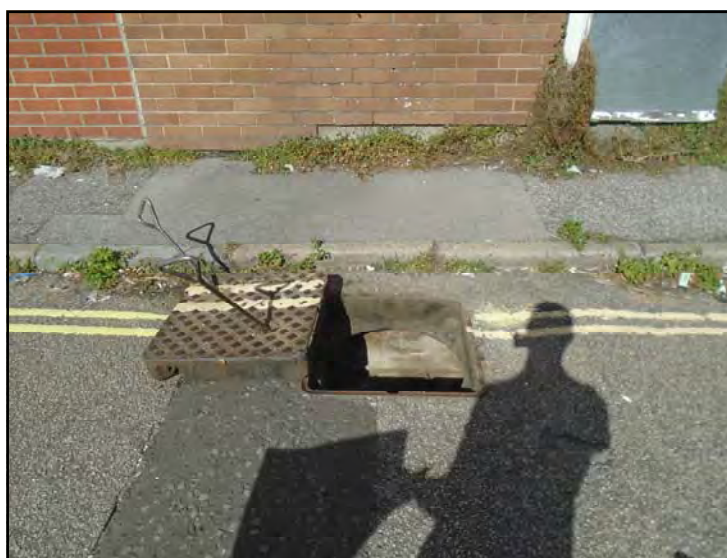
IC16



LOCATION OF IC16



IC17



LOCATION OF IC17



IC18



LOCATION OF IC18



IC19



LOCATION OF IC19



IC20 (1301)



LOCATION OF IC20



IC21



LOCATION OF IC21



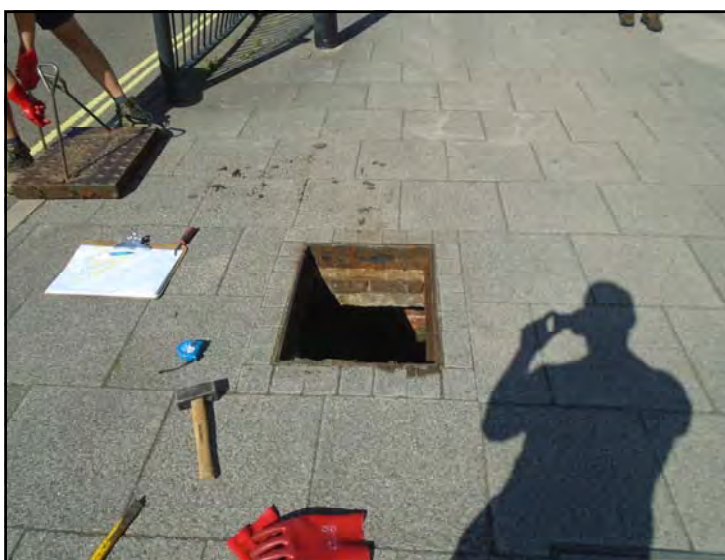
IC22(1354)



LOCATION OF IC22



IC23 (1355)



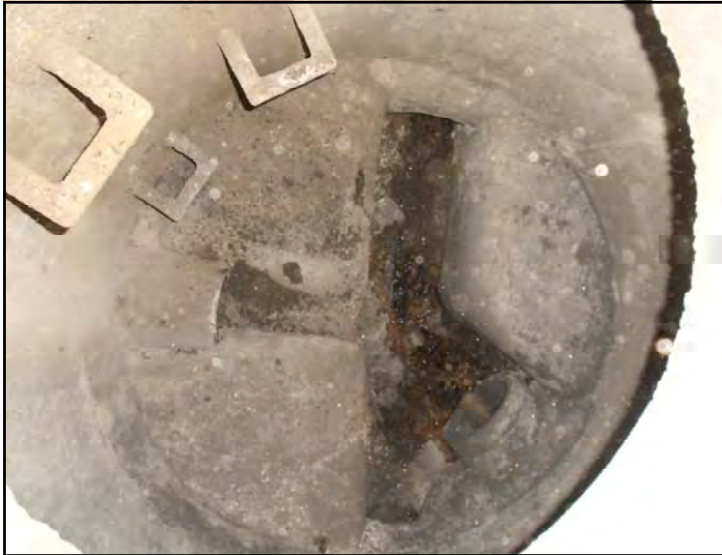
LOCATION OF IC23



IC24



LOCATION OF IC24



IC25



LOCATION OF IC25



GULLY 1



GULLY 2



GULLY 3



GULLY 4



GULLY 5



GULLY 7



GULLY 8



GULLY 9 UNABLE TO LIFT



GULLY 10



GULLY 11



GULLY 12



GULLY 13



GULLY 14



GULLY 15



GULLY 16



GULLY 17



GULLY 18



GULLY 19



GULLY 20

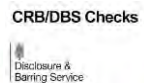


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Site Plan

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NOTES

Survey Brief

1. existing foul and survey connections to be prove demonstrate positive con
2. final lateral connections surface water network to
3. Existing depths of cham sewers to be recorded
4. Any traffic management Surveyors
5. The Drainage Surveyors access existing Southern

Extent o
drainage

Rev. Date Details

Client:-

radcliff

Site:-

Wellington
Way
Havant

Date: September 2019

Drawn: IRS Cher

Drawing No.

FOR INFO

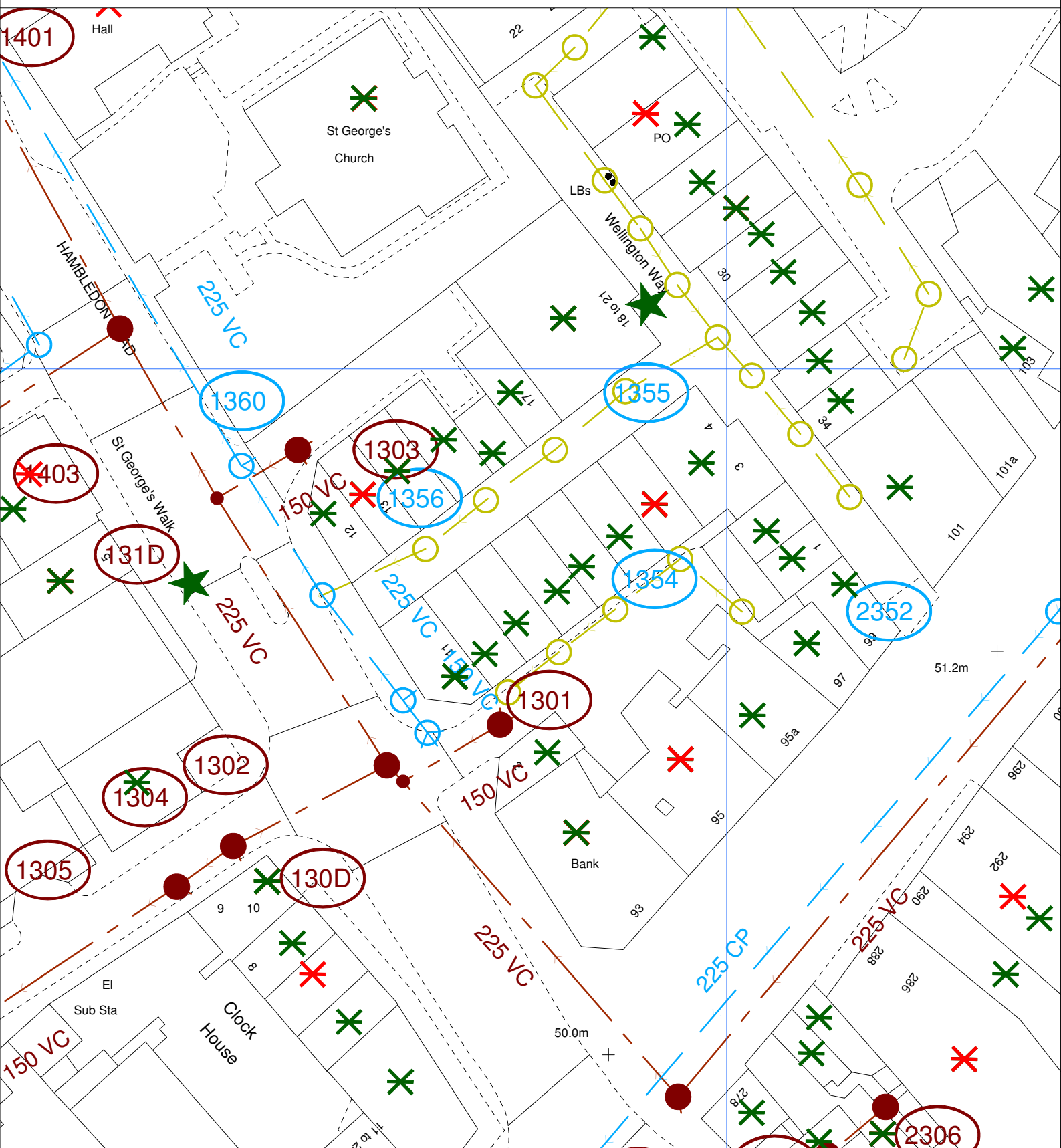
.Logos



Disclaimer

Detail shown on this plan is for reference only.
The positions of the pipes have been traced electronically and their route and location are believed to be correct.
InSewer Surveys accept no responsibility in the event of inaccuracy.
Before mechanical plant is used the actual position and route of the drainage system should be verified on site.

SOUTHERN WATER



The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site.

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O.S. REF: SU6809SW

Scale: 1:625

Screen Print

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

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



Printed By: NadigaJ

Date: 27-6-2018

Southern Water MapGuide Browser

Requested By:





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Report

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Inspection report

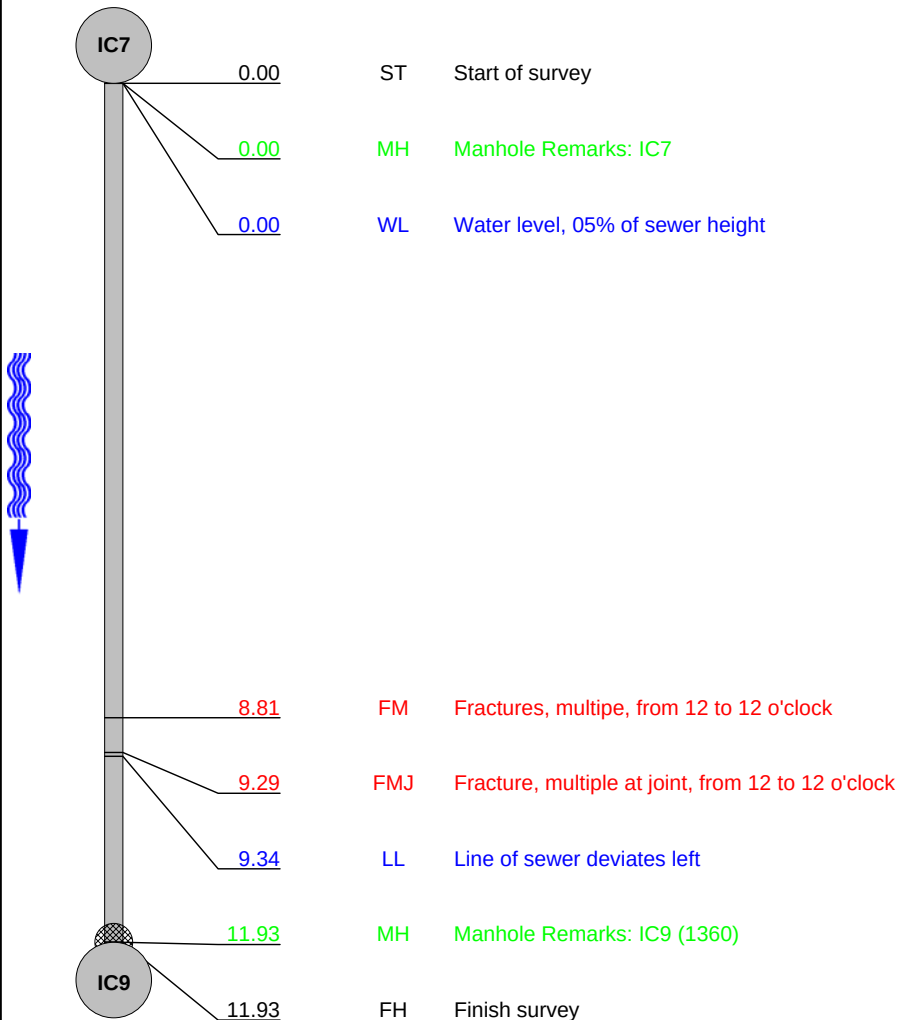
Date : 20/09/2019	Job number : TV190924	Weather : Dry	Sewer category:	Section number : 1	PLR suffix : X
Present :	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : InSewer DW

Place : Road : Location Inspection	WATERLOOVILLE WELLINGTON WAY IC7 (D/S) IC9	Location details: Catchment: Tape number : Pipe length :	U/S MH : U/S Depth : D/S MH : D/S Depth :	IC7 1.17 IC9 1.62
---	---	---	--	--

Use: Year laid : Purpose : Total length :	Surface water Condition and location	Pipe shape : Pipe size : Pipe material : Lining :	Circular 150 mm Vitrified clay
--	---	--	---

Comment :

1:105 Position Code Observation
Depth: 1.17



8.81 m



9.29 m

Depth: 1.62

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	80	6.71	80	4	0	0	0	0	1



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 Email: liam@insewer.co.uk

Inspection pictures

Client :	Road :	Date :	Section number :	PLR suffix :
CPI Wellington Way 2 Limited	WELLINGTON WAY	20/09/2019	1	X



Photo: 001.JPG, VCR No.: 00001
 8.81m, Fractures, multiple, from 12 to 12 o'clock



Photo: 002.JPG, VCR No.: 00001
 9.29m, Fracture, multiple at joint, from 12 to 12 o'clock



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Date : 20/09/2019	Job number : TV190924	Weather : Dry	Sewer category:	Section number : 2	PLR suffix : X
Present :	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : InSewer DW

Place : Road : Location Inspection	WATERLOOVILLE WELLINGTON WAY IC8 (D/S) 131D	Location details: Catchment: Tape number : Pipe length :	U/S MH : U/S Depth : D/S MH : D/S Depth :	IC8 1.23 131D
Use: Year laid : Purpose : Total length :	Foul Condition and location	Pipe shape : Pipe size : Pipe material : Lining :	Circular 150 mm Vitrified clay	

Comment :

1:105 Depth: 1.23	Position	Code	Observation						
	0.00	ST	Start of survey						
	0.00	MH	Manhole Remarks: IC8 (1303)						
	0.00	WL	Water level, 05% of sewer height						
	1.62	CM	Cracks, multiple, from 12 to 12 o'clock	1.62 m					
	4.92	FM	Fractures, multiple, from 12 to 12 o'clock						
	4.92	JX	Junction, defective, at 12 o'clock, 150mm diameter Remarks: Fractured						
	5.60	JN	Junction, at 12 o'clock, 150mm diameter	4.92 m					
	5.60	CC	Crack, circumferential, from 12 to 12 o'clock						
	6.91	WL	Water level, 15% of sewer height						
	7.42	DE	Debris, 20% cross-sectional area loss	4.92 m					
	10.17	WL	Water level, 05% of sewer height						
	10.17	LD	Line of sewer deviates down						
	11.09	LR	Line of sewer deviates right	5.6 m					
	11.09	LD	Line of sewer deviates down						
	11.91	FH	Finish survey Remarks: At saddle connection (131D - dummy manhole)						
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	80	10.92	130	4	1	5	0.42	5	4



Inspection pictures

Client :	Road :	Date :	Section number :	PLR suffix :
CPI Wellington Way 2 Limited	WELLINGTON WAY	20/09/2019	2	X



Photo: 003.JPG, VCR No.: 00002
 1.62m, Cracks, multiple, from 12 to 12 o'clock



Photo: 004.JPG, VCR No.: 00002
 4.92m, Fractures, multiple, from 12 to 12 o'clock



Photo: 005.JPG, VCR No.: 00002
 4.92m, Junction, defective, at 12 o'clock, 150mm diameter



Photo: 006.JPG, VCR No.: 00002
 5.6m, Crack, circumferential, from 12 to 12 o'clock



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Inspection pictures

Client :	Road :	Date :	Section number :	PLR suffix :
CPI Wellington Way 2 Limited	WELLINGTON WAY	20/09/2019	2	X

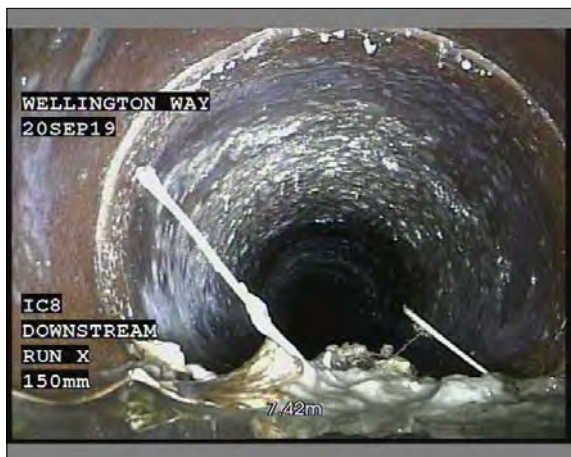


Photo: 007.JPG, VCR No.: 00002
7.42m, Debris, 20% cross-sectional area loss



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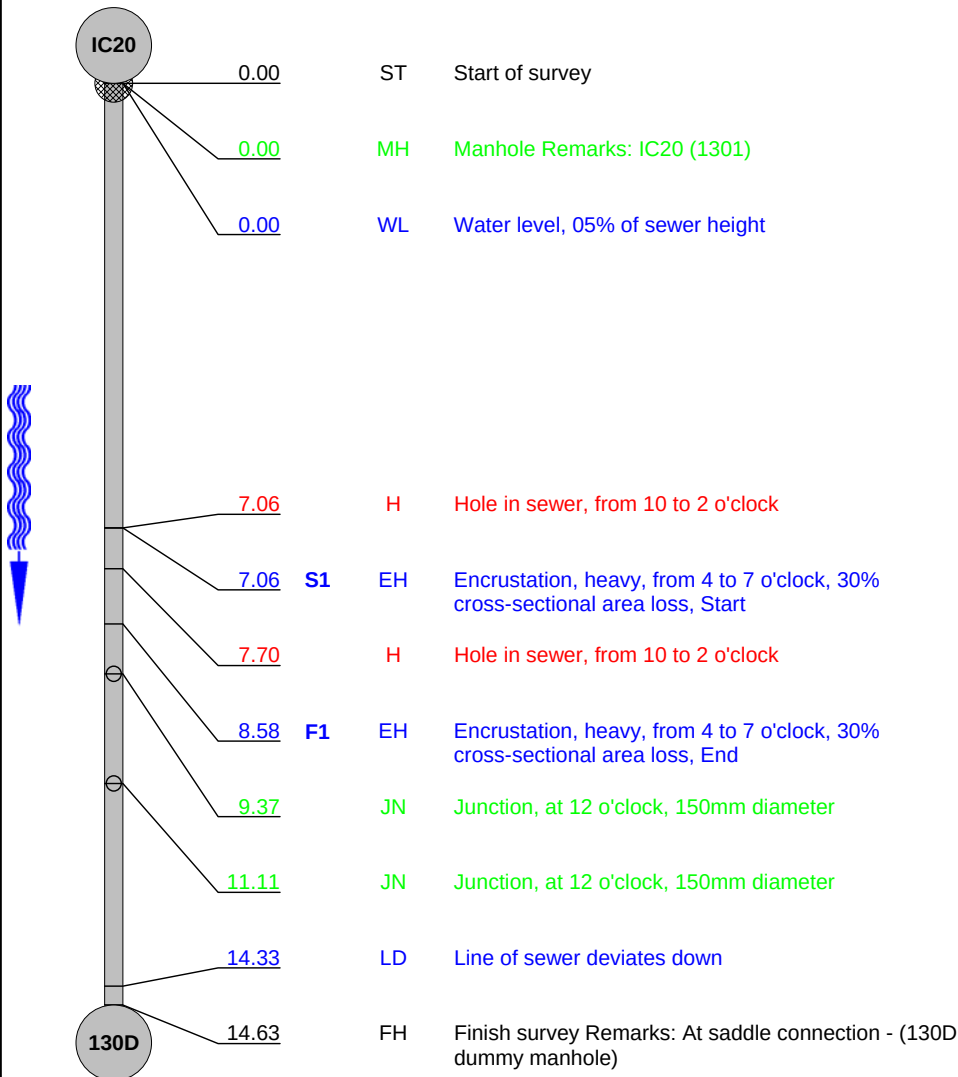
Inspection report

Date : 20/09/2019	Job number : TV190924	Weather : Dry	Sewer category:	Section number : 3	PLR suffix : X
Present :	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : InSewer DW

Place : Road : Location Inspection	WATERLOOVILLE WELLINGTON WAY IC20 (D/S) 130D	Location details: Catchment: Tape number : Pipe length :	U/S MH : U/S Depth : D/S MH : D/S Depth :	IC20 1.54 130D
Use: Year laid : Purpose : Total length :	Foul Condition and location	Pipe shape : Pipe size : Pipe material : Lining :	Circular 150 mm Vitrified clay	

Comment :

1:120 Position
Depth: 1.54



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	165	22.56	330	5	2	10	0.85	12.5	5



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Inspection pictures

Client :	Road :	Date :	Section number :	PLR suffix :
CPI Wellington Way 2 Limited	WELLINGTON WAY	20/09/2019	3	X



Photo: 008.JPG, VCR No.: 00003
 7.06m, Hole in sewer, from 10 to 2 o'clock



Photo: 009.JPG, VCR No.: 00003
 7.06m, Encrustation, heavy, from 4 to 7 o'clock, 30% cross-sectional area loss, Start



Photo: 010.JPG, VCR No.: 00003
 7.7m, Hole in sewer, from 10 to 2 o'clock



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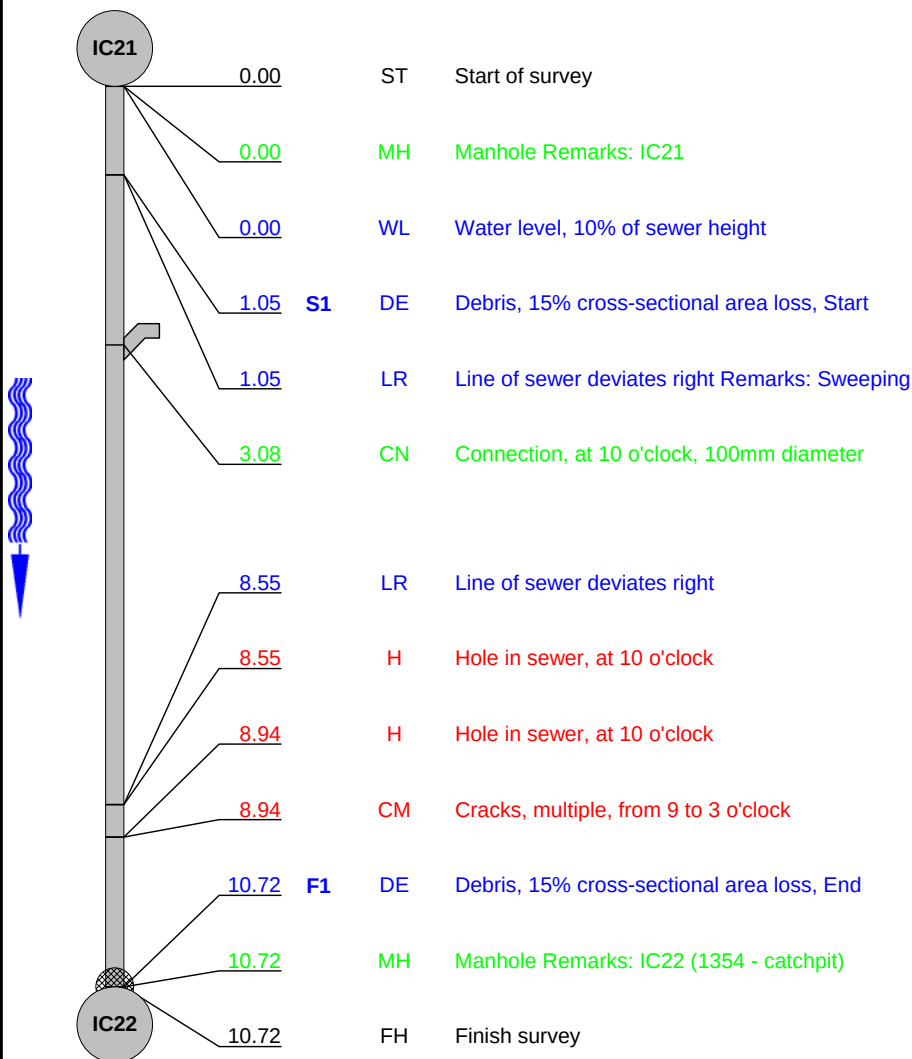
Inspection report

Date : 20/09/2019	Job number : TV190924	Weather : Dry	Sewer category:	Section number : 4	PLR suffix : X
Present :	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : InSewer DW

Place : Road : Location Inspection	WATERLOOVILLE WELLINGTON WAY IC21 (D/S) IC22	Location details: Catchment: Tape number : Pipe length :	U/S MH : U/S Depth : D/S MH : D/S Depth :	IC21 1.00 IC22 1.13
Use: Year laid : Purpose : Total length :	Surface water Condition and location	Pipe shape : Pipe size : Pipe material : Lining :	Circular 150 mm Vitrified clay	

Comment :

1:90 Position Code Observation
Depth: 1.00



8.55 m



8.94 m



8.94 m

Depth: 1.13

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	120	18.66	200	4	1	2	1.81	19.4	3



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Inspection pictures

Client :	Road :	Date :	Section number :	PLR suffix :
CPI Wellington Way 2 Limited	WELLINGTON WAY	20/09/2019	4	X



Photo: 011.JPG, VCR No.: 00004
 8.55m, Hole in sewer, at 10 o'clock



Photo: 012.JPG, VCR No.: 00004
 8.94m, Hole in sewer, at 10 o'clock



Photo: 013.JPG, VCR No.: 00004
 8.94m, Cracks, multiple, from 9 to 3 o'clock



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Inspection report

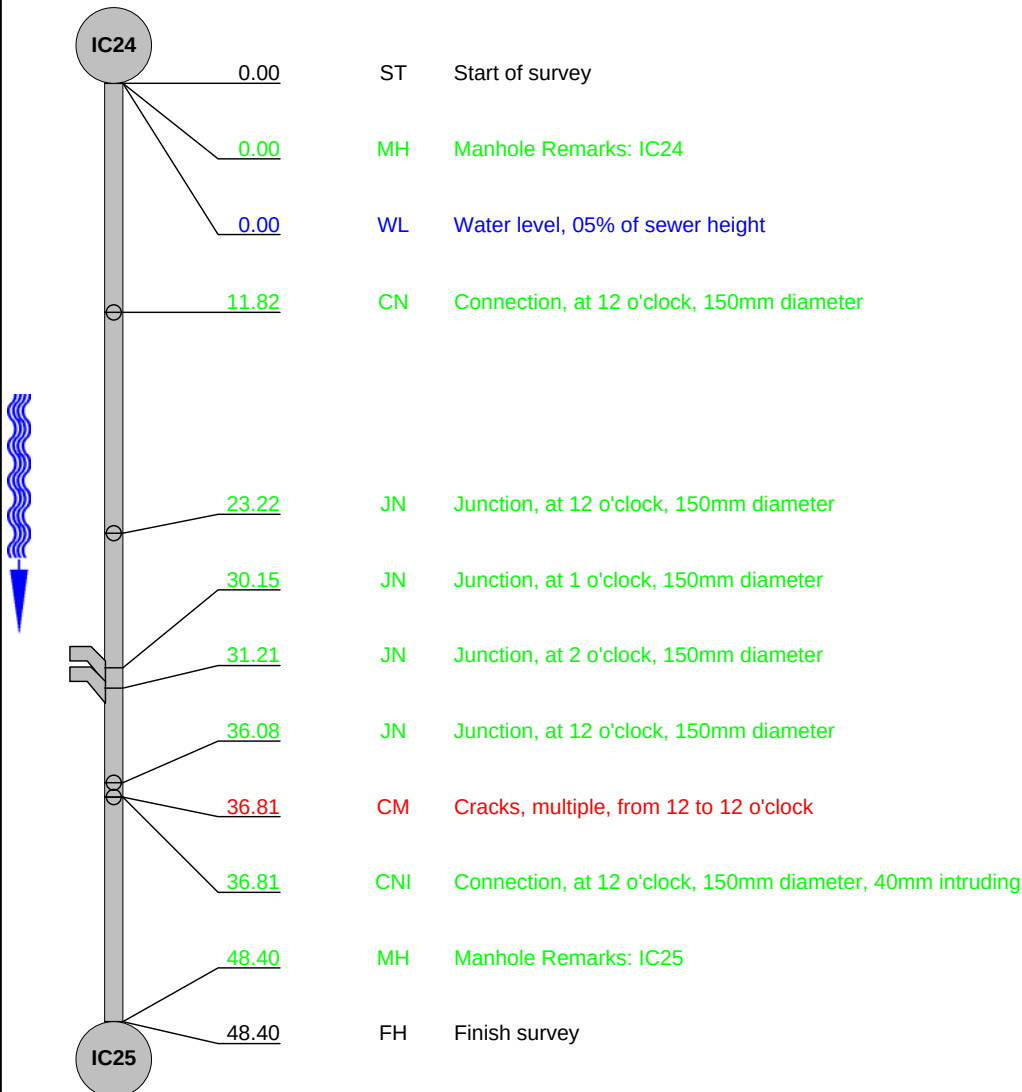
Date : 20/09/2019	Job number : TV190924	Weather : Dry	Sewer category:	Section number : 5	PLR suffix : X
Present :	Vehicle :	Camera :	Preset :	Cleaned : no	Operator : InSewer DW

Place : Road : Location Inspection	WATERLOOVILLE WELLINGTON WAY IC24 (D/S) IC25	Location details: Catchment: Tape number : Pipe length :	U/S MH : U/S Depth : D/S MH : D/S Depth :	IC24 1.59 IC25 2.08
---	---	---	--	--

Use: Year laid : Purpose : Total length :	Surface water Condition and location	Pipe shape : Pipe size : Pipe material : Lining :	Circular 150 mm Concrete
--	---	--	---

Comment :

1:390 Position
Depth: 1.59



36.81 m



36.81 m

Depth: 2.08

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	0.83	40	3	1	5	0.1	5	4



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Inspection pictures

Client :	Road :	Date :	Section number :	PLR suffix :
CPI Wellington Way 2 Limited	WELLINGTON WAY	20/09/2019	5	X



Photo: 014.JPG, VCR No.: 00005
 36.81m, Cracks, multiple, from 12 to 12 o'clock



Photo: 015.JPG, VCR No.: 00005
 36.81m, Connection, at 12 o'clock, 150mm diameter, 40mm intruding



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Recommendations

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	No.	Inspection direction	Recommendations
1	1	IC7 (D/S) IC9	Repair defect/s by lining
2	2	IC8 (D/S) 131D	Repair defect/s by lining
3	3	IC20 (D/S) 130D	Repair defect/s by lining
4	4	IC21 (D/S) IC22	Repair defect/s by lining
5	5	IC24 (D/S) IC25	Repair defect/s by lining



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- *Interceptor Cleaning*
- *Pump Station Cleaning*
- *Root and Scale Cutting*
- *Pipe Lining*
- *Trenchless Technology*
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Chatham, Kent ME5 8UD
Company Reg No: 1304128
VAT No. 573 7537 09



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Appendix (C)

Proposed Surface Water Strategy

Appendix (D)

Micro Drainage Hydraulic Model

Rogers Cory Partnership		Page 1
The Old School Old School Road Hook Hampshire RG27 9NJ		
Date 09/10/2019 20:39 File SW1.MDX	Designed by Terry Checked by	
Innovyze	Network 2017.1.2	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.200	Add Flow / Climate Change (%)	10
Ratio R	0.350	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	40.080	0.270	148.4	0.066	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	23.020	0.160	143.9	0.066	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	5.070	0.040	126.8	0.066	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	5.000	0.272	18.4	0.066	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.62	47.980	0.066	0.0	0.0	0.9	1.07	42.6	9.8
1.001	50.00	5.98	47.710	0.132	0.0	0.0	1.8	1.09	43.3	19.7
1.002	50.00	6.05	47.550	0.198	0.0	0.0	2.7	1.16	46.1	29.5
1.003	50.00	6.08	47.510	0.264	0.0	0.0	3.6	3.07	121.9	39.3

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall C. Level Name	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.003		50.000	47.238	0.000	0

Rogers Cory Partnership		Page 2
The Old School Old School Road Hook Hampshire RG27 9NJ		
Date 09/10/2019 20:39 File SW1.MDX	Designed by Terry Checked by	
Innovyze Network 2017.1.2		
<u>Simulation Criteria for Storm</u> Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 10.000 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 2.000 Hot Start (mins) 0 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Storage Structures 1 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FSR Profile Type Summer Return Period (years) 2 Cv (Summer) 0.750 Region England and Wales Cv (Winter) 0.840 M5-60 (mm) 19.200 Storm Duration (mins) 30 Ratio R 0.350		
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Rogers Cory Partnership		Page 3
The Old School Old School Road Hook Hampshire RG27 9NJ		
Date 09/10/2019 20:39 File SW1.MDX	Designed by Terry Checked by	
Innovyze	Network 2017.1.2	

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 4, DS/PN: 1.003, Volume (m³): 3.0

Unit Reference MD-SHE-0225-3300-2500-3300
Design Head (m) 2.500
Design Flow (l/s) 33.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 225
Invert Level (m) 47.510
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.500	33.0
Flush-Flo™	0.729	33.0
Kick-Flo®	1.539	26.1
Mean Flow over Head Range	-	28.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.5	1.200	31.2	3.000	36.0	7.000	54.2
0.200	22.4	1.400	29.0	3.500	38.8	7.500	56.0
0.300	29.0	1.600	26.6	4.000	41.3	8.000	57.8
0.400	31.0	1.800	28.2	4.500	43.7	8.500	59.5
0.500	32.2	2.000	29.6	5.000	46.0	9.000	61.2
0.600	32.8	2.200	31.0	5.500	48.2	9.500	62.8
0.800	32.9	2.400	32.3	6.000	50.3		
1.000	32.4	2.600	33.6	6.500	52.3		

Rogers Cory Partnership		Page 4
The Old School Old School Road Hook Hampshire RG27 9NJ		
Date 09/10/2019 20:39 File SW1.MDX	Designed by Terry Checked by	
Innovyze Network 2017.1.2		

Storage Structures for Storm

Tank or Pond Manhole: 3, DS/PN: 1.002

Invert Level (m) 47.550

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	70.0	0.400	70.0	0.800	70.0	0.801	0.0

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