

Nolan Associates

consulting civil and structural engineers

54 Hagley Road, Birmingham B16 8PE
Tel: 0121- 454 3099 e-mail: enquiries@nolanassociates.co.uk

Dogs Trust Merseyside

Flood Risk Assessment & Drainage Strategy

Project No.	2022-192
Date:	June 2023
Revision:	1
Checked by:	K.A.P



Directors: Prof. John Nolan CBE, BSc, MSc, DEng(Hon), CEng, F.I.StructE, F.I.C.E Andrew Williams BSc (Hons) CEng MStructE Valerie Nolan
Cormac Kennedy BE (Civils)(Hons) CEng MStructE Nick Warwick BEng (Hons) CEng MStructE
Associates: James Lockley IEng AMStructE Chris Chrysostomou BEng (Hons) CEng MStructE
Karl Pritchard MEng(Hons) CEng MICE



CONTENTS

1.0	INTRODUCTION	3
1.1	Site Location	3
1.2	Description of Development	3
1.3	Scope of Report	4
2.0	FLOOD RISK AND PLANNING POLICY	4
2.1	National Planning Policy Framework (NPPF)	4
2.2	Local Planning Policy	4
2.3	Strategic Flood Risk Assessment	4
3.0	SITE SPECIFIC FLOOD RISK	5
3.1	Flood Risk from Rivers and Sea	6
3.2	Flood Risk from Land (Surface Water Flooding)	6
3.3	Groundwater	7
3.4	Historic/Sewer flooding	8
3.5	Flood Risk from Reservoirs/ Artificial sources	10
4.0	APPLICATION OF FLOOD RISK POLICY	12
4.1	Development Proposals	12
4.2	Flood Risk Zone, Vulnerability & Classification	12
4.3	Summary of Flood Risk & Mitigation Measures	12
4.4	Flood emergency planning.	13
5.0	DRAINAGE STRATEGY	14
5.1	Existing Site Description	14
5.2	Geology and Hydrogeology	14
5.3	Existing Surface Water Features and Drainage	17
5.4	Hierarchy of Disposal	18
5.5	Peak Rainfall Intensity Climate Change Allowances	22
5.6	Discharge Rates	22
5.7	Surface Water Drainage Proposals	23
5.8	Flooding and Exceedance Flows	23
5.9	Water Quality	23
5.10	Maintenance of Drainage & SuDS Features	24
5.11	Foul Water Drainage Proposals	24
6.0	CONCLUSIONS	24

1.0 Introduction

1.1 Site Location

The site is an existing Dogs Rescue rehoming centre off Whiston Ln, Huyton, Whiston, Liverpool L36 6HP situated approximately 11km east of Liverpool city centre. The site comprises a car park to the front with kennels, training and administrative buildings to the rear interspersed with extensive green spaces between.

The site is rectangular in shape, extending to approximately 2.59ha with the long dimension running NE-SW. The frontage of the site is to the south west with the site entrance off Whiston Lane. On the north western boundary is a steep railway embankment carrying the Liverpool to Wigan line with Huyton and Prescott golf course beyond. The south eastern boundary adjoins Stadt Moors Park with Stadt Moors allotments at the southern end. The North eastern boundary adjoins the M57 motorway.

The site generally flat at the north eastern end, then falling steeply southwest towards Whiston Lane. Site levels range from 40.5m down to 33.0m at the site entrance.

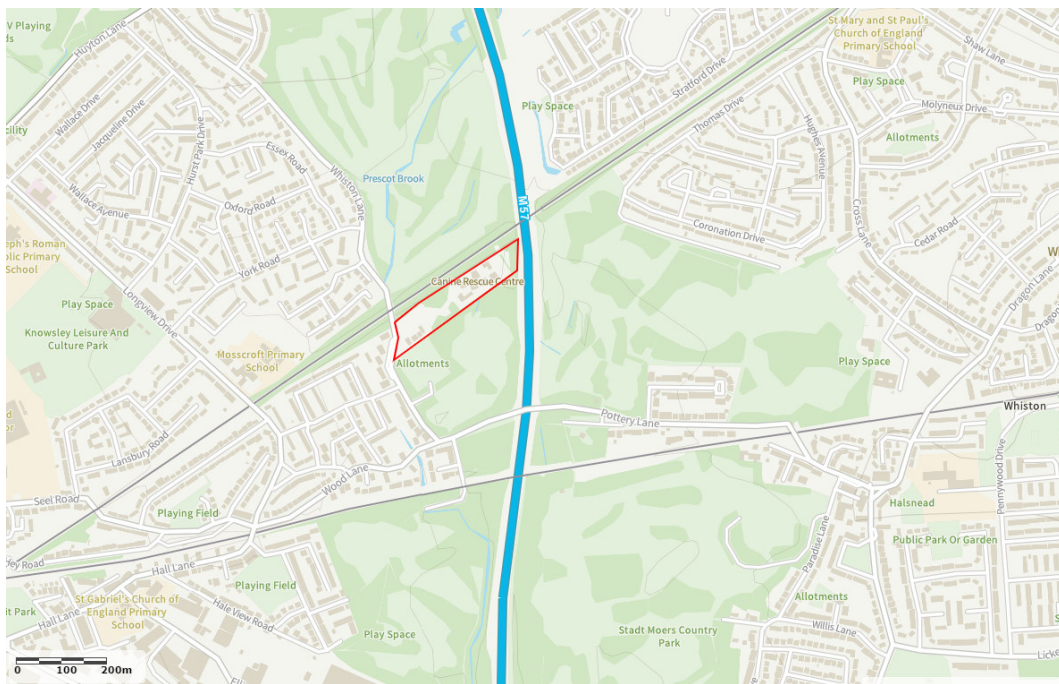


Figure 1 - Site Location

1.2 Description of Development

The Proposed Development seeks to redevelop the existing Rescue and Rehoming Centre. The proposals consist of demolishing all existing buildings on Site except the existing reception block which will be retained and improved as part of the Scheme. It is proposed to reconfigure the existing visitor car park and to include a new internal road that runs along the northern boundary and connects to the rest of the Site. The proposed site plan is at Appendix A.

1.3 Scope of Report

The scope of this report is to assess flood risk to the development and to propose a storm water sewerage (SWS) scheme which minimizes flood risk elsewhere in accordance with the provisions of the NPPF, incorporating Sustainable Drainage Systems (SuDS) as may be appropriate and practicable.

2.0 Flood Risk and Planning Policy

2.1 National Planning Policy Framework (NPPF)

Government policy with respect to development and flood risk in England is contained within the Department of Communities and Local Government NPPF.

The NPPF implements the Sequential and an Exception test - a risk based approach to the location of development to avoid, where possible, flood risk to people and property and manage any residual risk, taking into account the impacts of climate change. The NPPF stresses the importance of steering new development towards areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding.

The NPPF states that Local Plans should be supported by a Strategic Flood Risk Assessment (SFRA), which refines information regarding the probability of flooding, taking other sources of flooding and the impacts of climate change into account. SFRAs provide the footing for applying the sequential test, on the basis of flood zones.

Under the Environment Agency's (EA) standing advice for NPPF, sites larger than 1 hectare or located in Flood Zones 2 and/or 3, must have a site specific Flood Risk Assessment (FRA) to assess the risks of all forms of flooding to and from the development taking climate change into account.

2.2 Local Planning Policy

The Knowsley Local Plan Core Strategy sets out the vision and strategy for sustainable development. Policy CS24 deals with Managing Flood Risk and requires developments to reduce and manage flood risk whilst promoting the use of SuDS.

2.3 Strategic Flood Risk Assessment

Knowsley Council (KC) are the Lead Local Flood Authority (LLFA) under the Flood and Water Management Act 2010. They have produced a Strategic Flood Risk Assessment which provides the detail on all types of flood risk to enable the Local Planning Authority (LPA)

- to apply the Sequential and, where necessary, Exception Tests in determining land use allocations;
- fully understand flood risk from all sources within its area and also the risks to and from surrounding areas in the same catchment;

KC are a statutory consultee for all major planning applications and provide a response on all surface water drainage proposals. Their Sustainable Drainage and Surface Water Management Technical Guidance (SDSWMTG) document provides information for developers on requirements for peak flow and volume control, water quality and a check list for drainage submission documents.

3.0 Site Specific Flood Risk

In areas at risk of flooding or for sites of 1 hectare or more, a site-specific FRA is carried out to assess the flood risk to and from a development site. The assessment should demonstrate how flood risk will be managed now and over the development's lifetime, taking climate change into account, and with regard to the vulnerability of its users.

A FRA should demonstrate:

- whether any proposed development is likely to be affected by current or future flooding from any source;
- whether it will increase flood risk elsewhere; and whether the measures proposed to deal with these effects and risks are appropriate;
- the evidence for the local planning authority to apply (if necessary) the Sequential Test, and;
- whether the development will be safe and pass the Exception Test, if applicable.

In the preparation of this report, flood maps and other salient information / data / guidance have been obtained from:

- Knowsley Council & Sefton Council Strategic Flood Risk Assessment – 2009
- Knowsley Preliminary Flood Risk Assessment 2011
- Knowsley MBC Level 2 Strategic Flood Risk Assessment 2012
- Knowsley MBC Local Flood Risk Management Strategy.
- Sustainable Drainage & Surface Water Management Technical Guidance For Developers
- Flood maps (for planning) – EA website.
- Long term flood risk information – EA website.
- Other online open source information, e.g. magic website

A detailed review of the flood risk on the subject site is undertaken in the following sections.

3.1 Flood Risk from Rivers and Sea

The Environment Agency is responsible for the provision of information pertaining to flood risk from tidal and main watercourses throughout England and Wales. The EA provides current online information service through its flood map data.

The detailed flood map for this site is given in Figure 2. The flood map shows that the site is in Flood Zone 1. In any year, the land has a less than 0.1% chance of flooding from rivers or the sea. The map also identifies a main river (the culverted Prescott Brook) in Whiston Lane at the front of the site.

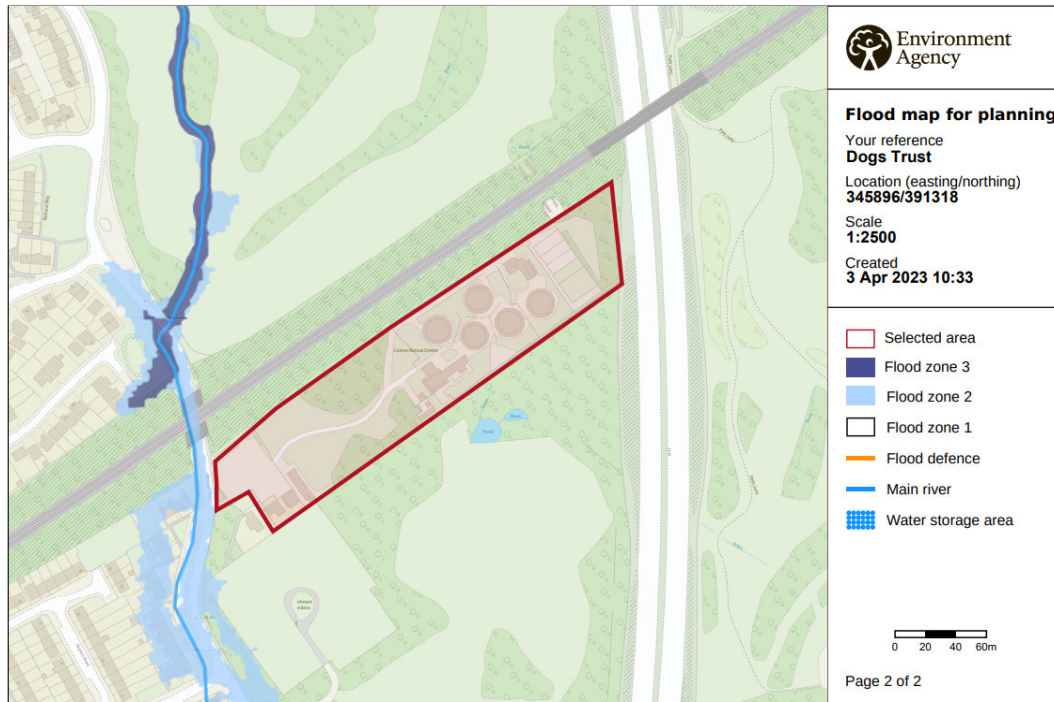


Figure 2 - Environment Agency Flood Map for Planning

3.2 Flood Risk from Land (Surface Water Flooding)

Surface water flooding can occur when heavy rainfall overwhelms the local drainage and depends on ground levels, rainfall and the local drainage network.

The Environment Agency website contains long term flood risk mapping of areas believed vulnerable to surface water flooding. The EA map in Figure 3 is indicative of the extent of surface water (overland) flow, depth of water and velocity of flow for the following levels of risk:

- High Risk – Annual probability of flooding greater than 3.3%;
- Medium Risk – Annual probability of flooding between 1% and 3.3%; and
- Low Risk – Annual probability of flooding between 0.1% and 1%.
- Very Low Risk – Annual probability less than 0.1%.

It can be seen from the Environment Agency mapping that there is generally a very low risk of surface water flood with a small low risk area in the NE corner of the site associated with local topography.

The site development will result in some minor changes to site levels. Overland flows, both within the site and those coming from off site, will be managed as part of a sustainable surface water drainage strategy.

The overall risk of surface water flooding is considered low.



Figure 3 - Extent of Flooding from Surface Water

3.3 Groundwater

The DEFRA Groundwater Flooding Scoping Study Report and Groundwater Emergence Maps (GEM) identify areas where ground water is rising and may therefore lead to an increase in flood risk. The combined risk matrix map in the Knowsley SFRA is based on this data and shows that the site is not shown to be an areas susceptible to groundwater risk. An extract of the maps is shown in Figure 4.

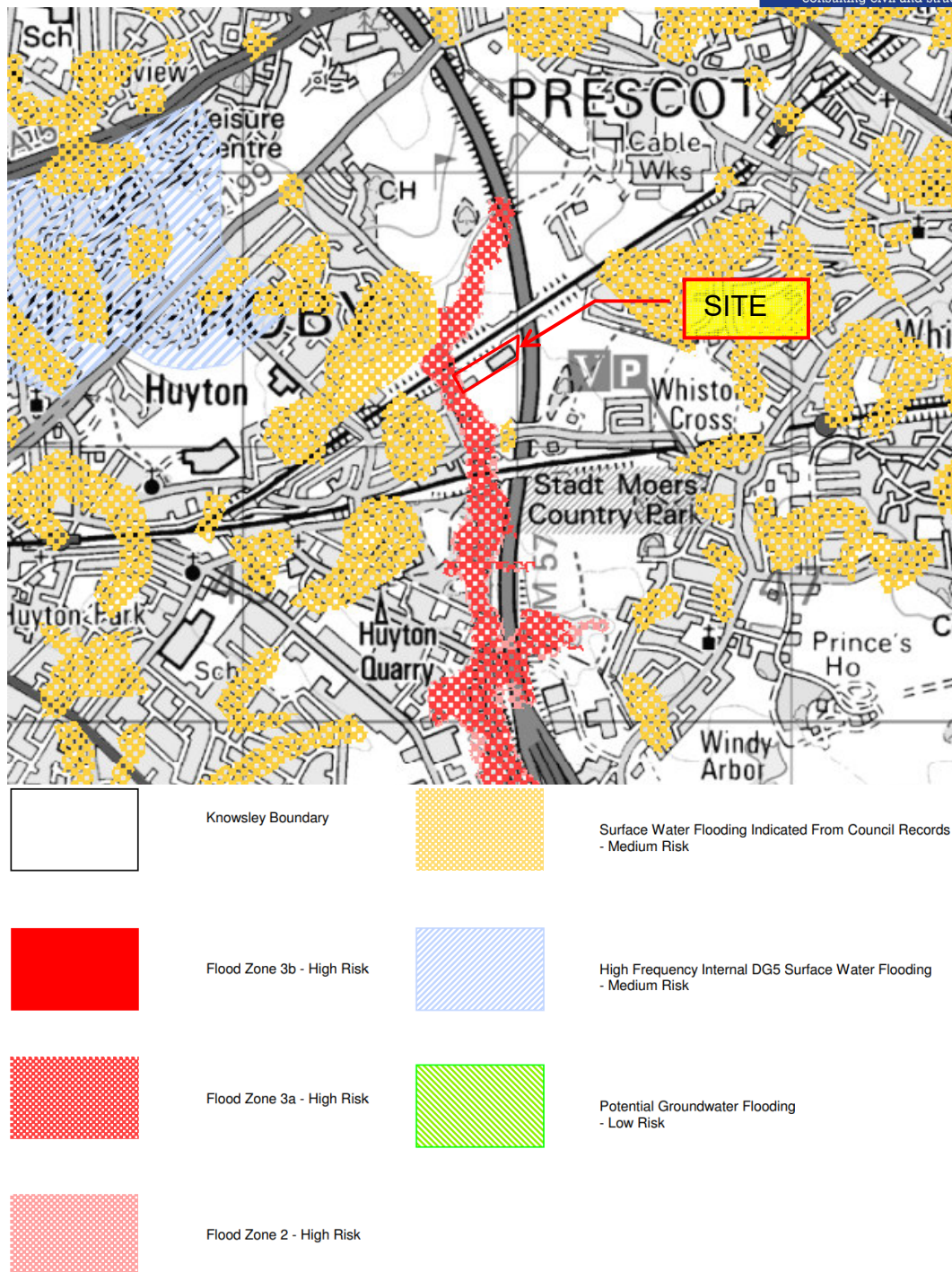


Figure 4 - Combined Risk Matrix Map

3.4 Historic/Sewer flooding

Sewer flooding occurs when surface water or foul sewage escapes from the sewerage system due to either hydraulic inadequacy or other causes (blockage, collapse or equipment failure).

The sewerage undertaker for Knowsley Borough, United Utilities, holds records of flooding issues relating to surface and foul water sewers in a record system called the DG5 register.

The SFRA identified the location and number of sewer related flooding incidents. The extract below in shows that there were no recorded incidents at or near the subject site.

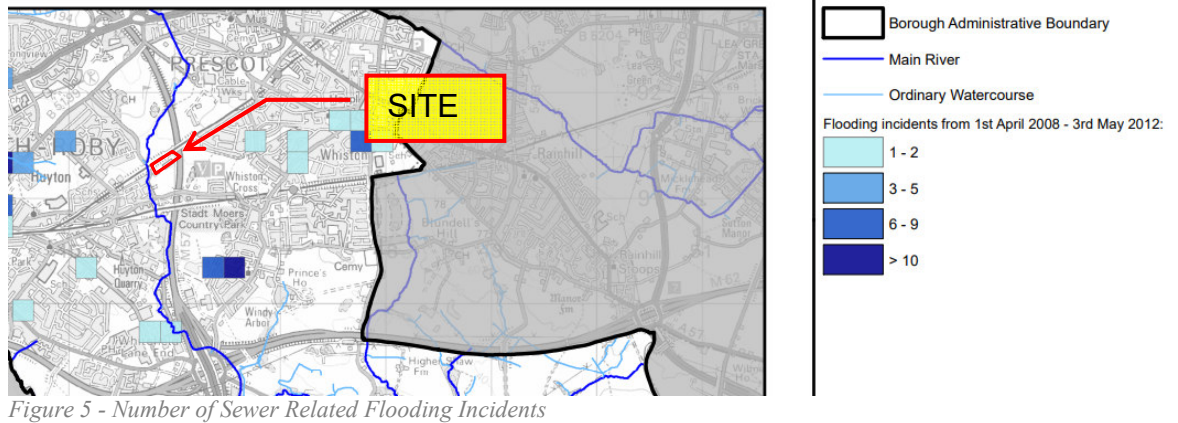
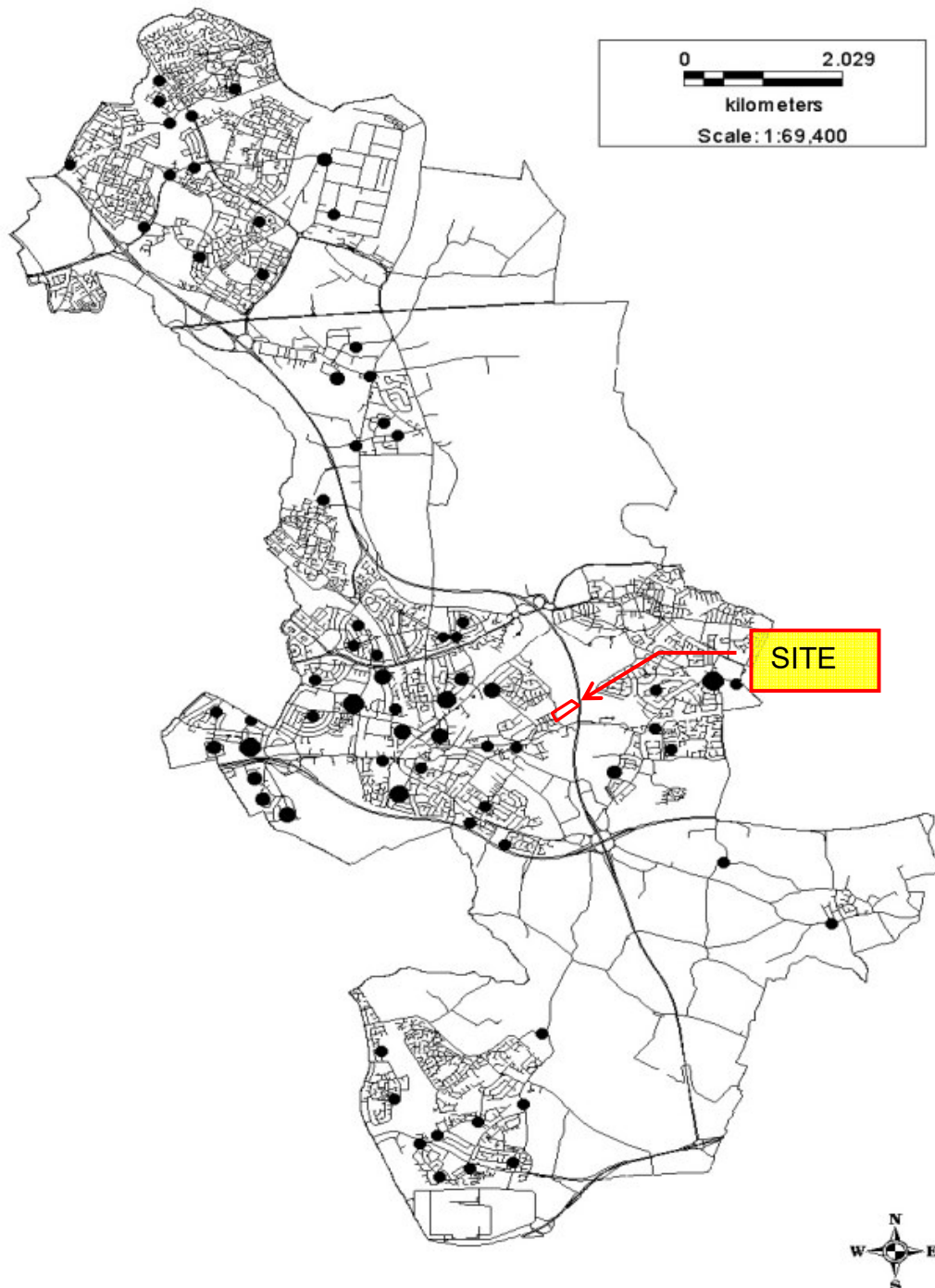


Figure 5 - Number of Sewer Related Flooding Incidents

The Knowsley Preliminary SFRA also shows a spatial distribution of flood events across the borough and this is shown below in Figure 6.



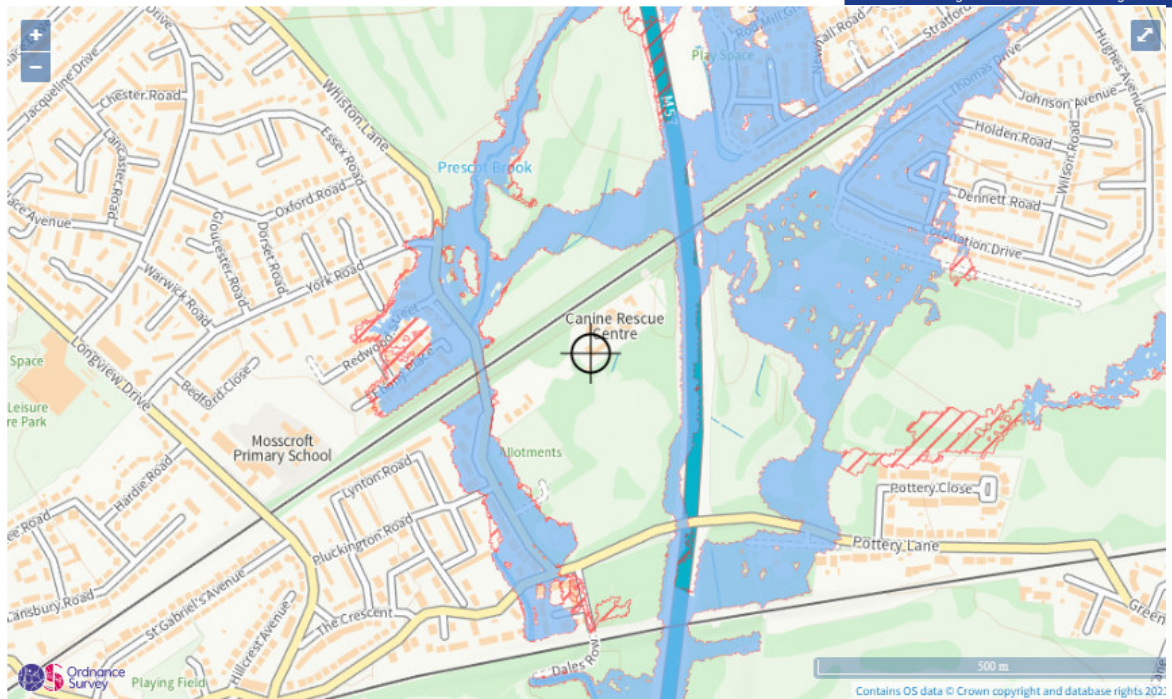
© Crown Copyright Knowsley MBC 100017855, 2011

Figure 6 - Spatial Distribution of Historic Flood Events

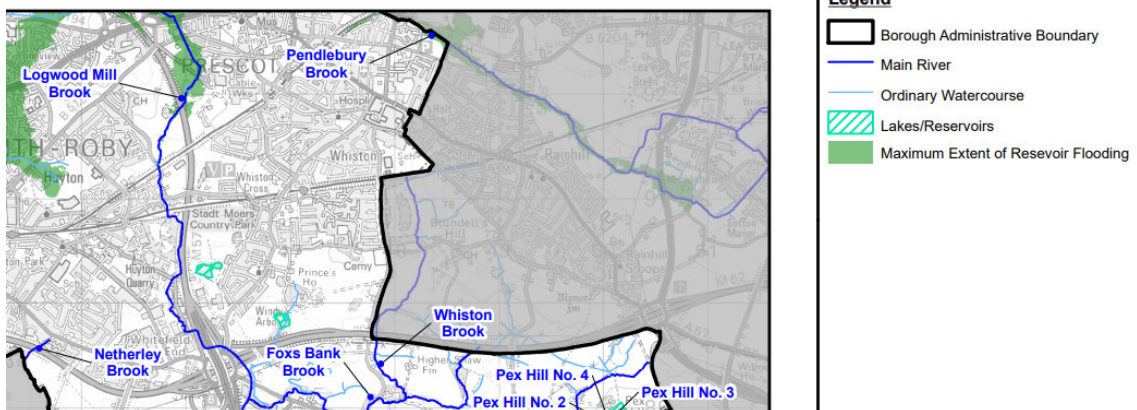
The site does not appear to be associated with areas of historic/ sewer flooding. The risk of the site being susceptible to sewer flooding is therefore assessed as being low.

3.5 Flood Risk from Reservoirs/ Artificial sources

The Environment Agency mapping resource confirms that there is no risk of flooding from Reservoirs/artificial sources, Figure 7.



The Knowlsey SFRA also records the risk from reservoirs and the maximum extent of flooding from reservoirs is shown in Figure 8.



The risk of flooding from artificial sources is considered very low.

4.0 Application of Flood Risk Policy

4.1 Development Proposals

The Proposed Development seeks to redevelop the existing Rescue and Rehoming Centre. The proposals consist of demolishing all existing buildings on Site except the existing reception block which will be retained and improved as part of the Scheme. It is proposed to reconfigure the existing visitor car park and to include a new internal road that runs along the northern boundary and connects to the rest of the Site.

4.2 Flood Risk Zone, Vulnerability & Classification

Based on the EA's flood maps it is possible to undertake an initial site flood risk compatibility assessment to ascertain whether the proposed development site is presently suitable for development by referring to the flood zone compatibility matrix (Table 1).

Flood Zones	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required	✗	Exception Test required	✓	✓
Zone 3b	Exception Test required	✗	✗	✗	✓

Table 1- Environment Agency Flood Risk Vulnerability and Flood Zone 'compatibility'

The site is in flood zone 1. The proposed commercial development is classed as less vulnerable and so the site is therefore suitable for development and an exception test is not required.

4.3 Summary of Flood Risk & Mitigation Measures

Table 2 contains a summary of flood risks to the application site. Mitigation measures to address the identified risks are discussed below

Flood Risk	Risk Level	Action Required
Tidal	Low	None
Rivers	Low	None
Groundwater	Low	None
Surface Water	Low	Mitigation – Control Run-off
Sewers	Low	Mitigation – Control Run-off
Artificial	Low	None

Table 2- Summary of Flood Risks

It can be concluded that there is a low risk to flooding on the development itself from surface water.

4.4 Flood emergency planning.

The SFRA provides mapping of emergency flood risk planning areas and flood warning/alert areas. The site does not lie within a flood warning/alert areas, the site has low risk of flooding and so there are no emergency planning requirements envisaged.

5.0 Drainage Strategy

5.1 Existing Site Description

The application area extends to approximately 2.59 hectares.

The site is brownfield currently accommodating a number of kennel and administrative buildings associated with the rehoming centre. There is also a car park to the area of site fronting the access off Whiston Lane.

A topographical and utility survey is at Appendix B.

5.2 Geology and Hydrogeology

A Geo-environment Investigation is to be carried out on the site to establish the site conditions and to determine the suitability of the ground for infiltration of surface water. Pending the results of the investigation we have determined the geological nature of the site using other available information.

The BGS Geology Viewer identifies:

- the Bedrock geology as the Pennine Middle Coal Measures Formation comprising Mudstone, siltstone and sandstone. Sedimentary bedrock formed between 318 and 309.5 million years ago during the Carboniferous period.
- Superficial deposits of Till, Devensian - Diamicton. Sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period.

The SFRA more specifically shows the site bedrock Geology as Triassic Mudstone (Figure 9).

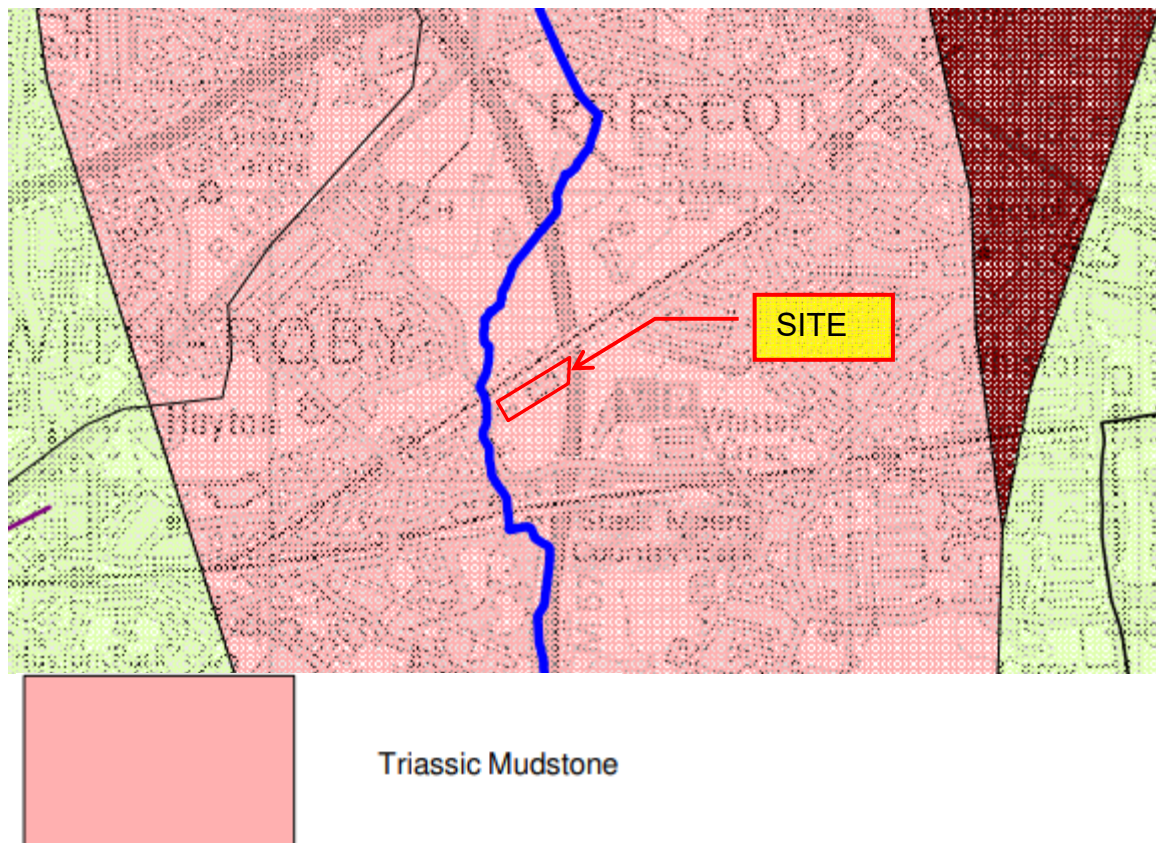


Figure 9- SFRA Extract showing site Geology

Superficial Deposits Aquifer Designation.

The superficial deposits' aquifer designation is classified as a Secondary Undifferentiated (Figure 10). In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

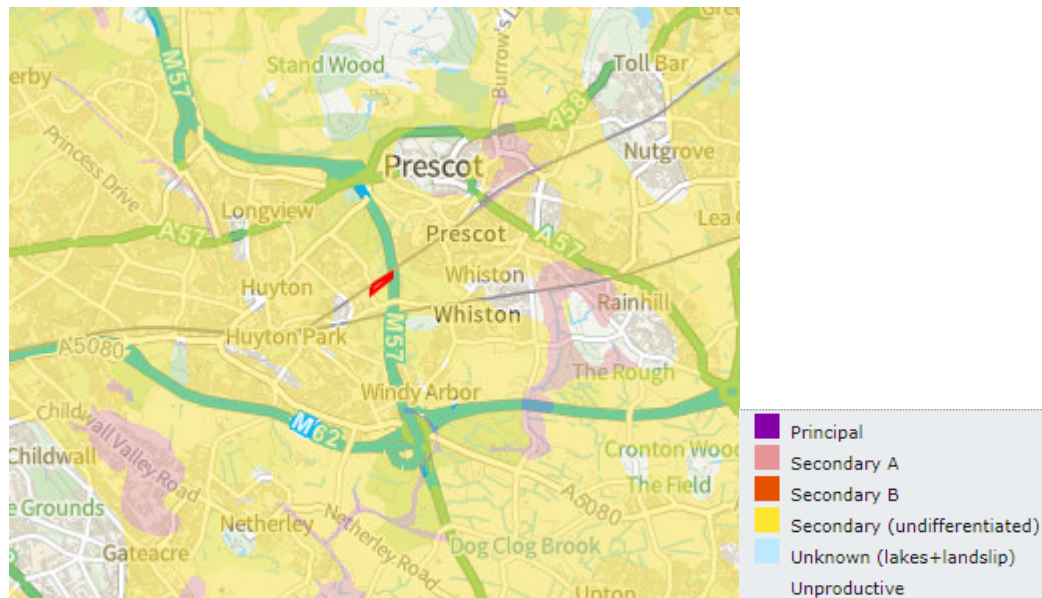


Figure 10 - Superficial Deposits Aquifer Designation

Bedrock Aquifer Designation

The bedrock aquifer designation is classified as Secondary A (Figure 11).comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers

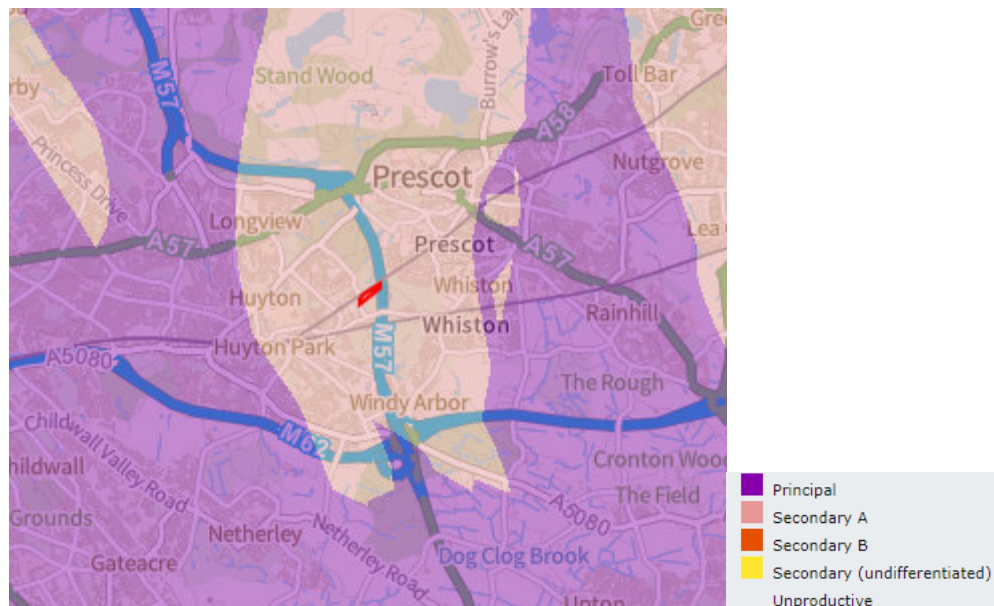


Figure 11 – Bedrock Deposits Aquifer Designation

Groundwater

The aquifers mentioned above are classified as medium vulnerability (Figure 12).

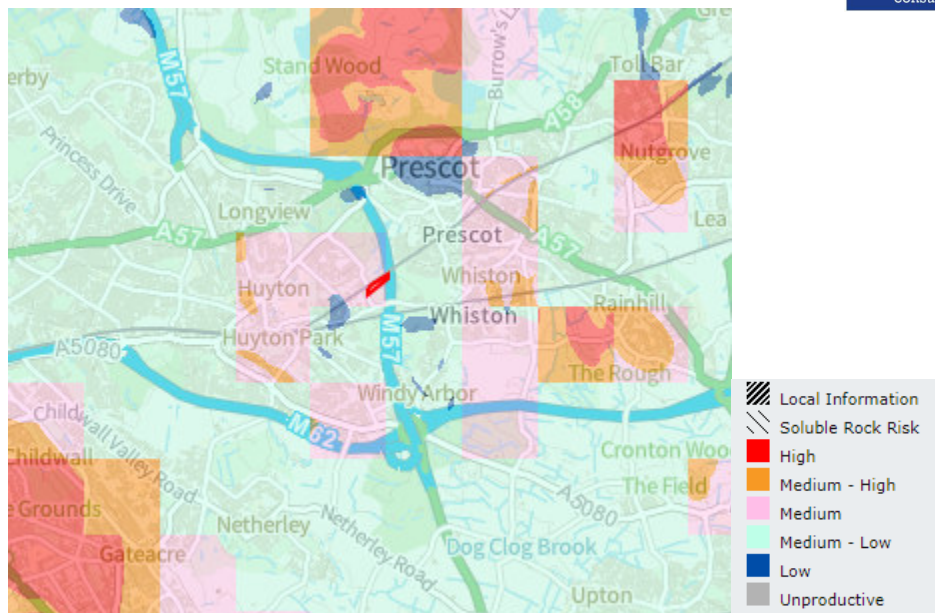


Figure 12 - Groundwater Vulnerability Map

The site does not lie within a Groundwater Source protection zone (Figure 13)

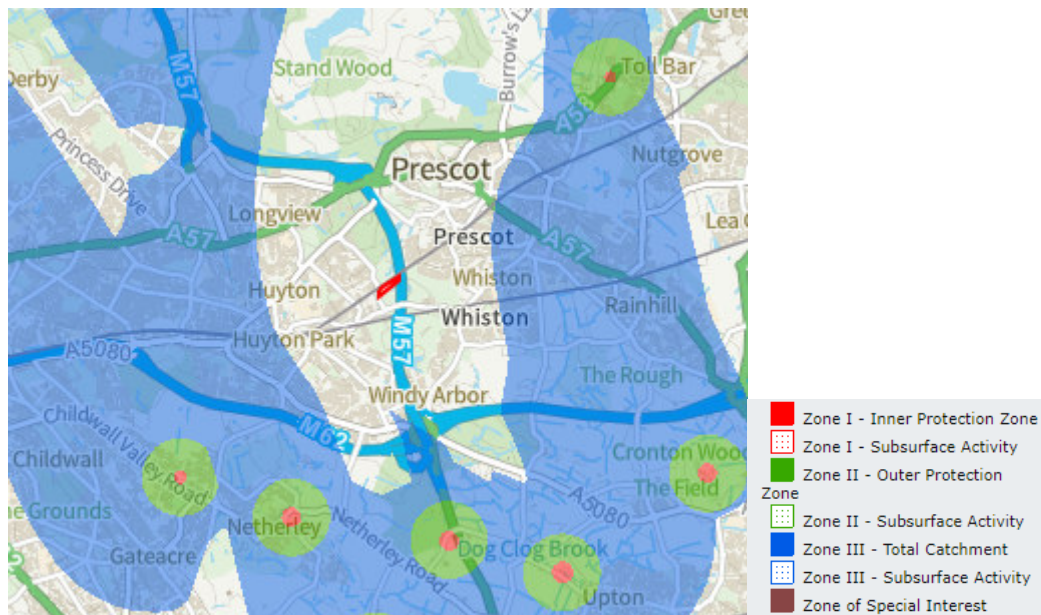


Figure 13 - Groundwater Source Protection Zones

The SFRA identifies potential areas suitable for SUDS based on the Geology. The site would appear to be in an area of low SUDS potential (Figure 14).

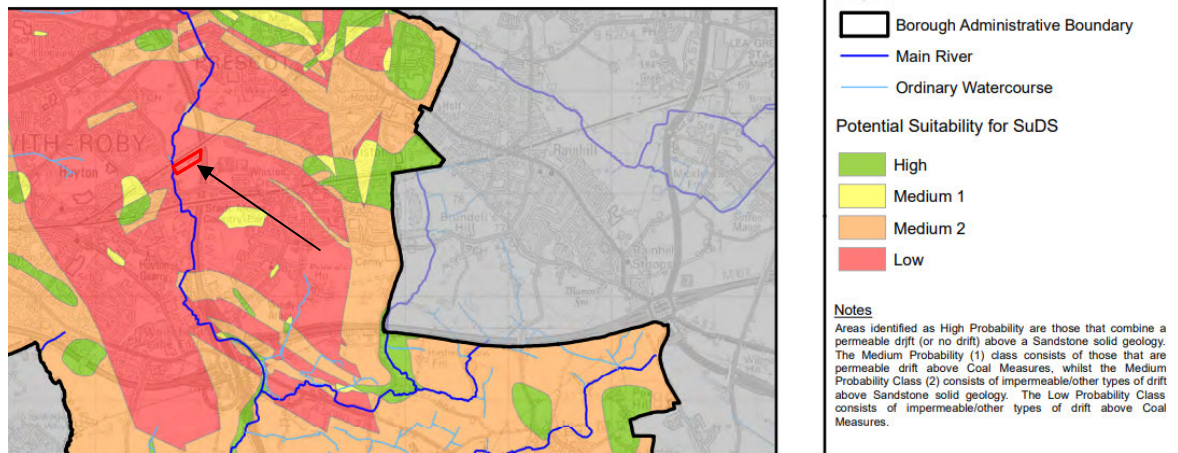


Figure 14 - SFRA SuDS Suitability

It can be concluded that SuDS using infiltration only are unlikely to be viable. However should the results of site testing permit some infiltration, there would be little or no risk to groundwater.

5.3 Existing Surface Water Features and Drainage

Surveys of existing drainage have been carried out on the site in order to determine the route and condition of existing sewerage and to identify current outfalls.

A CCTV condition survey of existing site drainage is at Appendix C. The results of these surveys indicate existing separate foul and surface water outfalls to the sewers in Whiston Lane.

Public Sewer Records have been obtained from United Utilities. A copy of the Sewer map is at Appendix D.

The sewer records identify the surface water sewer in Whiston Lane as a watercourse. This appears to be a designated Main River, the culverted Prescott Brook. Prescott Brook flows south as an open channel across the golf course to the north of the site before it is culverted under the railway bridge and down Whiston Lane, refer marked up extract of the sewer records below in Figure 15

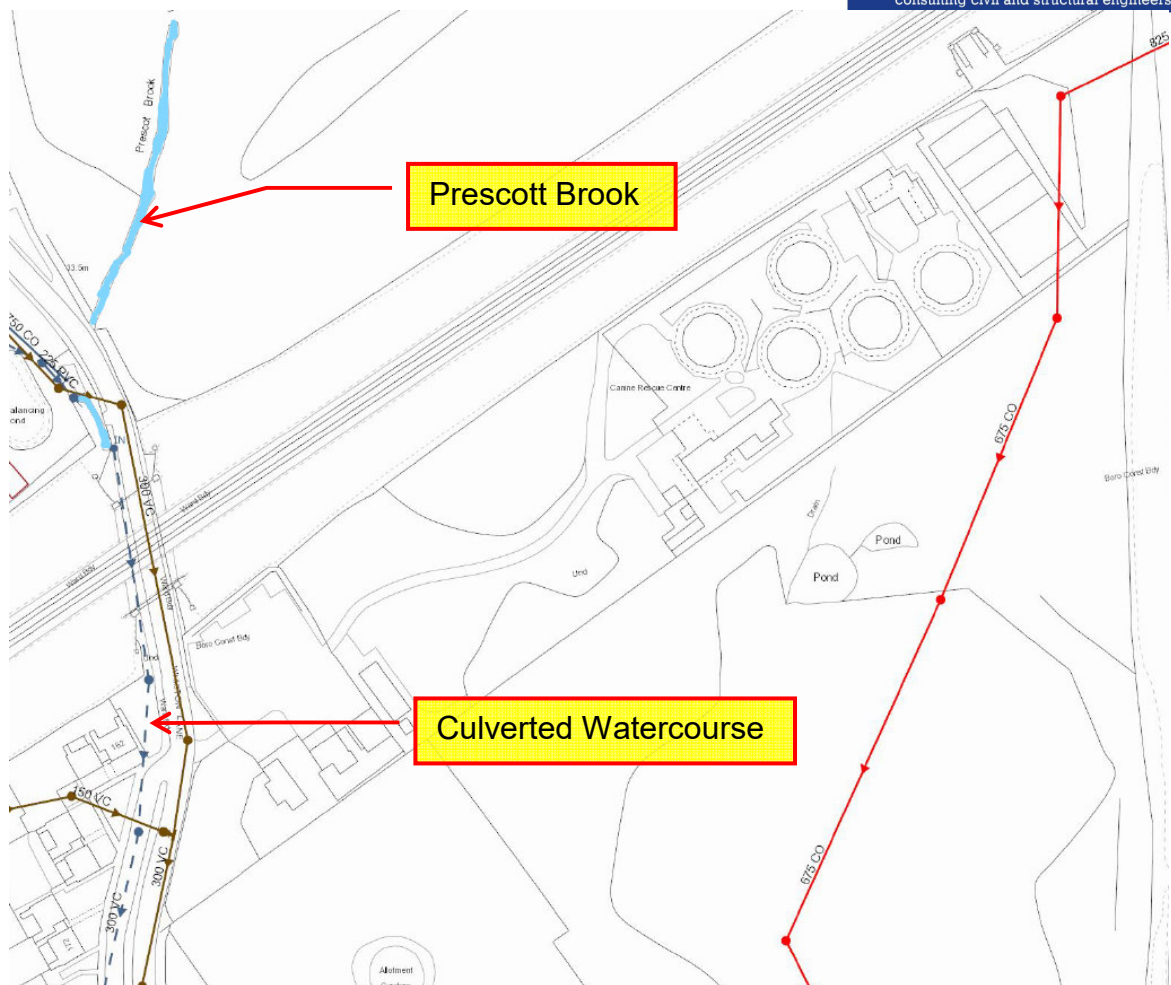


Figure 15 - Extract From Sewer Records Showing Watercourse

There appears to be an existing 675mm dia. combined public sewer crossing the eastern corner of the site, although the topographical survey has not picked up any surface features such as manhole covers on the site. Further investigation and consultation with United Utilities will be required to establish the location of the sewer and whether there are any associated easements / stand offs.

There are no other above ground water features or watercourse on or adjacent to the site.

5.4 Hierarchy of Disposal

Generally the aim should be to discharge surface water run-off as high up the following hierarchy of drainage options as reasonably practicable.

1. Rainwater use as a resource
2. Into the ground (infiltration).
3. To a surface water body.
4. To a surface water sewer, highway drain, or other drainage system.
5. To a combined sewer.

Rainwater Use

Rainwater harvesting is proposed to capture rainwater from the roofs of the proposed Intake, Booked and TBA buildings. This will be utilised for the daily washdown of kennels, reducing the overall volume of surface water discharged off site and also reduces potable water usage.

An estimate of potential washdown usage has been based existing water bills as follows:

Total billed usage 170m³ / month, equivalent to 5.6m³/d or 5600 litres day.

Staffing levels will be maximum 37 equivalent full time staff on site per day.
Domestic usage based on 50 l/pers/day¹, will be 1850 litres/day.

Visitors comprising, say 40 toilet uses @ 5 litres. = 20 litres/day

Laundry @ 20 cycles/day and 60 l/cycle = 1200 litres/day.

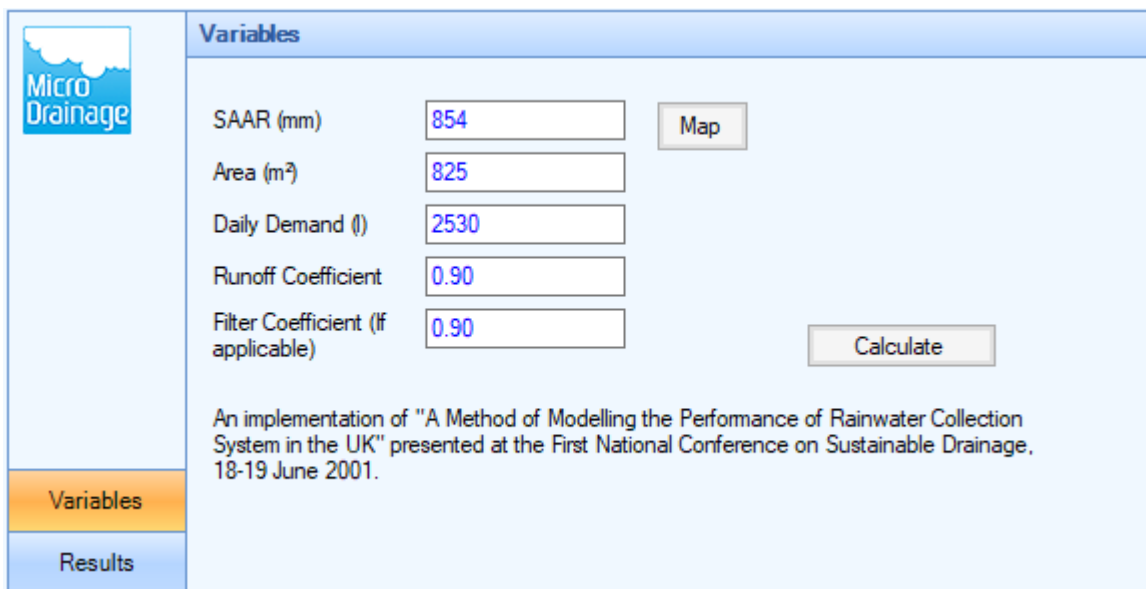
The balance can therefore be approximately attributed to washdown usage.
Washdown water usage = 5600-1850-20-1200 = 2530 litres/day

Annual Demand 923,450 litres

or 923 m³

Roof Area draining to tank 825m²

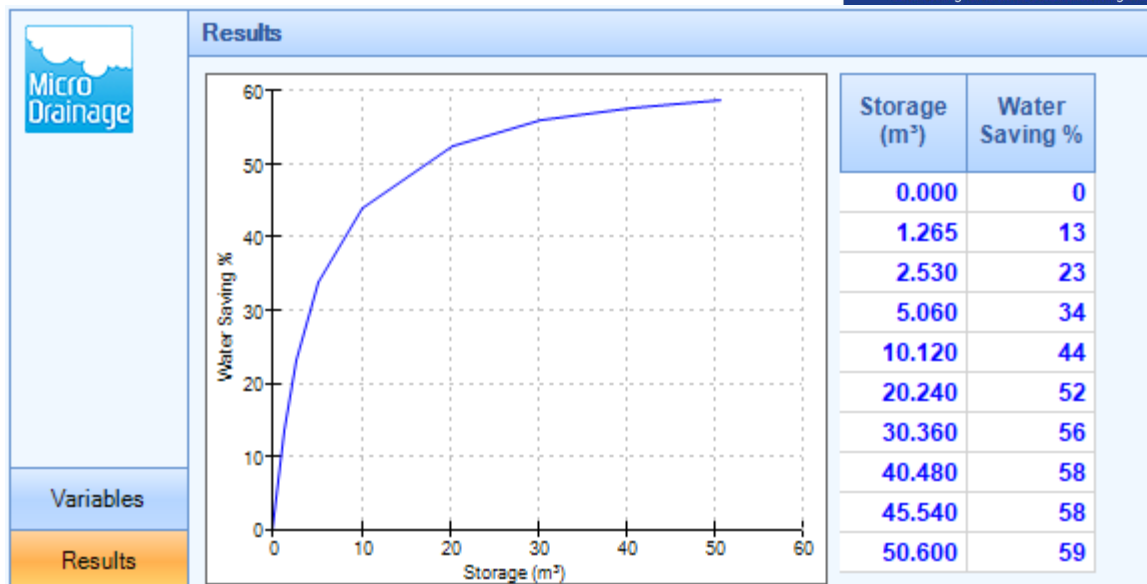
Using 'Source Control' software the above figures have been used to estimate the water saving potential.



The screenshot shows the 'Micro Drainage' software interface. On the left is a sidebar with a logo and two tabs: 'Variables' (selected) and 'Results'. The main area is titled 'Variables' and contains a list of input fields with their values: SAAR (mm) is 854, Area (m²) is 825, Daily Demand (l) is 2530, Runoff Coefficient is 0.90, and Filter Coefficient (If applicable) is 0.90. There is a 'Map' button next to the SAAR field and a 'Calculate' button at the bottom right. Below the input fields, a text box states: 'An implementation of "A Method of Modelling the Performance of Rainwater Collection System in the UK" presented at the First National Conference on Sustainable Drainage, 18-19 June 2001.'

Variable	Value
SAAR (mm)	854
Area (m ²)	825
Daily Demand (l)	2530
Runoff Coefficient	0.90
Filter Coefficient (If applicable)	0.90

¹ Flows & Loads 4



The demand is greater than the rainfall yield. Therefore the rainwater harvesting tank can also feasibly be used for stormwater control.

Annual Demand/Yield

Annual Demand

Daily requirement per person (l)

Number of persons

Annual Yield

Collection area (m²)

Runoff Coefficient

AAR (mm)

Hydraulic Filter Efficiency

Depression Storage (mm)

Number of Rainfall Events/Year

Feasibility

Annual non-potable water demand (l)

Annual rainfall yield (l)

Demand exceeds rainfall yield, rainwater harvesting is feasible for storm water control under BS8515:2009+A1:2013 detailed design approach. Select Volume tab to size stormwater control section of tank.

Annual Demand/Yield

Volume

The results below indicate that a 42,000 litre rainwater harvesting tank can provide 40m³ of effective attenuation storage for the 1 in 5 year storm.

Volume	
Return Period (years)	5
Region	England and Wales
Map	M5-60 (mm) 20.000
	Ratio R 0.399
Storm Duration (mins)	360
Normal rainwater harvesting (%)	5.0
Results	
Total Rainfall Depth (mm)	30
CS	1.000
Additional Rainfall Depth Allowance (Ad)	21.464
Effective proportion of additional storage available for increasing tank size from 1m ³ (CP50)	1.000
Rainfall depth for 1m ³ of storage tank (sP50)	1.212
Total Storage Volume (m ³)	42.052
Available Stormwater Control Storage Volume (m ³)	39.949
Annual Demand/Yield	
Volume	

Infiltration

The proposed drainage strategy incorporates swales and rain gardens as part of the surface water design to maximise the potential for infiltration. However, with reference to section 5.2, the likelihood of infiltration being possible as the primary means of surface water disposal feasibility is considered low (Figure 14).

Figure 14 - SFRA SuDS Suitability A Site Investigation will be carried out and BRE soakaway testing undertaken to verify this. For the purposes of this report infiltration has been assumed to be negligible in the design. Should the results of the soakaway testing be favourable, the swales and rain gardens will allow infiltration and thus it may be feasible to reduce the proposed attenuation volumes and /or discharge rates.

Water Body

There is culverted watercourse in Whiston Lane at the front of the site and it is understood that the site currently discharges to this watercourse via an existing surface water outfall. It is proposed to connect surface water from the development to the existing surface water drainage outfall, mimicking the existing scenario.

Surface Water Sewer/Combined Sewer

There are no public surface water sewers on or adjacent to the site. Discharge of surface water will go to the culverted watercourse.

5.5 Peak Rainfall Intensity Climate Change Allowances

The NPPF emphasises the need for addressing climate change impacts to deal with the increased and new risks of flooding within the lifetime of planned development. The Environment Agency's online document Flood risk assessment: climate change allowances, first published in February 2016 and subjected to regular updates, provides advice on predictions of anticipated change for peak river flow, peak rainfall, sea level rise and offshore wind speed and extreme wave height to support the NPPF. These changes need to be accounted for when demonstrating how flood risk will be managed now and over the development's lifetime.

The latest version used for this report is the 27 May 2022 update.

The current climate change allowances are based management catchments and site falls within the Lower Mersey Management Catchment.

The Lower Mersey Management Catchment peak rainfall allowances obtained from the DeFRA peak rainfall allowances map are:

3.3% annual exceedance rainfall event		
Epoch	Central allowance	Upper end allowance
2050s	20%	35%
2070s	30%	40%
1% annual exceedance rainfall event		
Epoch	Central allowance	Upper end allowance
2050s	25%	40%
2070s	30%	45%

The development is assumed to have a lifetime up to 2060. In this scenario the 2070's central allowance should be used for the purposes of design.

There should be no flooding on site for the 1 in 30 year rainfall event.

On site flooding for the 1 in 100 year + climate change should be managed safely on site and also ensure there is no increase in flood risk elsewhere.

The on plot drainage and attenuation system has been assessed for 30% climate change.

5.6 Discharge Rates

A topographical survey and CCTV drainage survey confirms a surface water drainage outfall. It is proposed the discharge surface water from site at greenfield rates.

The Greenfield rates for 1 Ha have been calculated from the UK Suds website (Appendix E) as follows:

Qbar	6.28 l/s
1 in 1 year	5.47 l/s
1 in 30 year	10.68 l/s
1 in 100 year	13.07 l/s
1 in 200 year	14.90 l/s

Based on the proposed positively drained impermeable area of 0.61Ha, the permitted discharge rate will be the Qbar rate of $6.28 \times 0.61 = 3.83$ l/s

5.7 Surface Water Drainage Proposals

The design principles for the surface water system are:

- To maximize the use of rainwater harvesting system to provide kennel washdown and therefore reduce the volume of surface water flowing off site.
- Where possible, utilise swales and raingardens to manage surface water run off from paved areas,
- To ensure no flooding on site for the 1 in 30 year storm event.
- Flooding on site for the 1 in 100 year rainfall event +30% should be contained on site with no risk to the development or increased risk off site.

The Drainage Strategy Drawing 2022-192 100 in Appendix F shows the existing and proposed site drainage together with details of sustainable drainage features including rainwater harvesting tank, swales, raingardens, permeable paving, cellular attenuation storage and flow controls.

Full Microdrainage drainage calculations and results are appendix G

5.8 Flooding and Exceedance Flows

The Building FFLs are set above the external areas and the proposed levels direct overland flows away from buildings. In the event of storm events greater than the design storm event of 1 in 100 year plus 30% (a sensitivity check has been done for the upper end climate change allowance of 45% climate change) surface water will be contained on site as far as practicable with additional storage capacity available within swales and in low points of the car parks.

The development site exceedance flow routes are indicated on drawing 2022-192-100 with the flood volumes for the extreme storm events summarized on the drawing and below:

1 in 30 Year

No Flooding

1 in 100 year + 20%

Short term flooding of 2m^3 for the 15 minute 100 year + 30% at MH S18 (pipe 1.009); this can safely be directed back to the adjacent paved area (there should be capacity to contain this within the proposed raingardens as no infiltration or volume storage has been modelled for these features).

There are no other modelled flood scenarios.

5.9 Water Quality

The north east part of the site is effectively flat and contains the Intake, TBA, Booked and Maintenance buildings. Clean rainwater from the roofs of these buildings is collected in a rainwater harvesting tank for re-use as kennel wash-

down. The associated paved areas, staff car park and site road can all drain to shallow swales for treatment and conveyance.

The south western end of the site falls quite steeply towards the main site entrance. Here the site is more developed and the topography precludes the use of green SuDS for water quality treatment. The car park run off therefore will pass through a Class 1 full retention interceptor.

5.10 Maintenance of Drainage & SuDS Features

Maintenance of any SuDS features will be considered in the detailed design and information will be provided to the end user in the form of Operation and Maintenance Manuals to ensure that the SuDS features continue to operate in the manner intended. Typically the SuDS features will be maintained in accordance with the Outline Maintenance Plan at Appendix G.

5.11 Foul Water Drainage Proposals

Subject to S106 application to United Utilities for an indirect connection, foul water will be discharged to the existing foul water outfall

6.0 Conclusions

The Dogs Trust propose to redevelopment their Merseyside Rehoming Centre off Whiston Lane.

A site specific flood risk assessment has been carried out and this demonstrates that the development is not at risk of flooding, nor will it increase flood risk elsewhere.

The existing site is currently served by separate foul and surface water connections to sewers in Whiston Lane. It is proposed to re-use the existing drainage connection following redevelopment but with surface water discharge rates reduced to the greenfield equivalent of 3.83 l/s.

The Rehoming centre has a significant demand for water for the daily wash down of kennels. This can feasibly be met with a 40,000 litre capacity rainwater harvesting tank which will also provide attenuation and reduce the volume of surface water discharged from site.

Other sustainable drainage systems such as swales/ raingardens and permeable paving will also be provided, providing treatment of runoff from paved areas and slowing down surface water runoff at source.

The calculation and drawings appended demonstrate that flows are reduced to greenfield rates for all rainfall events up to the 1 in 100 year plus 30% allowance for climate change. There is no flooding on site for the 1 in 30 year rainfall event and that for the 1 in 100 year rainfall event + 30% allowance for climate change there is only minor flooding that can be diverted to landscaped areas away from buildings.

Nolan Associates

consulting civil and structural engineers

54 Hagley Road, Birmingham B16 8PE

Tel: 0121- 454 3099 e-mail: enquiries@nolanassociates.co.uk

APPENDICES

Appendix A – Proposed Site Plan

Appendix B – Topographical Survey

Appendix C – CCTV drainage Survey

Appendix D – Public Sewer Records

Appendix E – Greenfield Runoff Rates

Appendix F – Drainage Strategy Plan

Appendix G – Microdrainage Calculations

Appendix H – Outline Drainage and SuDS Maintenance Plan



Directors: Prof. John Nolan CBE, BSc, MSc, DEng(Hon), CEng, F.I.StructE, F.I.C.E. Andrew Williams BSc (Hons) CEng MStructE Valerie Nolan
Cormac Kennedy BE (Civils)(Hons) CEng MStructE Nick Warwick BEng (Hons) CEng MStructE
Associates: James Lockley IEng AMStructE Chris Chrysostomou BEng (Hons) CEng MStructE
Karl Pritchard MEng(Hons) CEng MICE



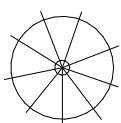
Appendix A – Proposed Site Plan

KEY

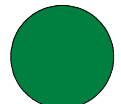
Refer to Landscape Architect drawings for exact specification.

- Brushed Finish Concrete.
- Artificial Grass
- Sand
- Grass / natural planting.
Refer to landscape plan for further detail.
- Hogging / gravel walking path.
Refer to landscape plan for further detail.
- Loose Gravel
Refer to landscape plan for further detail.
- Natural Stone Gabion (Retaining Structure)
- Road / Tarmac.
Details to be progressed during detailed design stage.
Refer to Civils for specification.

V - Ditch. Refer to Civil Engineer's & Landscape Architect's layout.



Indicative tree location. Refer to Landscape Architect's layout.



Existing Tree location to be retained. Recommended action: No repair required.



Proposed Fire Hydrant Locations.

Boundary Treatments

- A Combination of below fence types used as boundary for dog exercise areas.
- 1 Type 2: 1.1m High timber fence with 0.9m weld mesh & weld mesh cranked top.
Note: No cranked top required when depicted by light green
- 2 Type 3: 2m High weld mesh fence with weld mesh cranked top.
- B Existing 2m High weld mesh fence
- C 2m High weld mesh fence with 100x150mm timber posts. (Note: No crank top required)

A1

This drawing must not be scaled.
Figured dimensions and levels to be used.
Any inaccuracies must be notified to the architect.
Detail drawings and large scale drawings take precedence over smaller drawings.

Rev:		Chk'd:
A	Combined Booked & TBA building split into two separate buildings - JS	10.03.23
B	Site plan amended following development of buildings. Additional grass areas indicated on plan-JS	22.03.23
C	Site plan amended to vehicle tracking feedback. Proposed Fire Hydrant locations shown - JS	29.03.23
D	Entrance courtyard amended following design development - JS	21.04.23
E	Boundary treatments indicated on site plan. Drop off size increased to accommodate large vehicle turning circle. Paved walkway shown to front entrance. New swale locations indicated - JS	14.06.23
F	Bike store noted on site plan. Accessible parking space introduced into secondary staff car park - JS	16.06.23

THIS DRAWINGS IS COPYRIGHT ©



STATUS

S2 - Issued for Information

powelldobson
ARCHITECTS

Cardiff, Swansea, London

t +44 (0)33 33 201 001

www.powelldobson.com

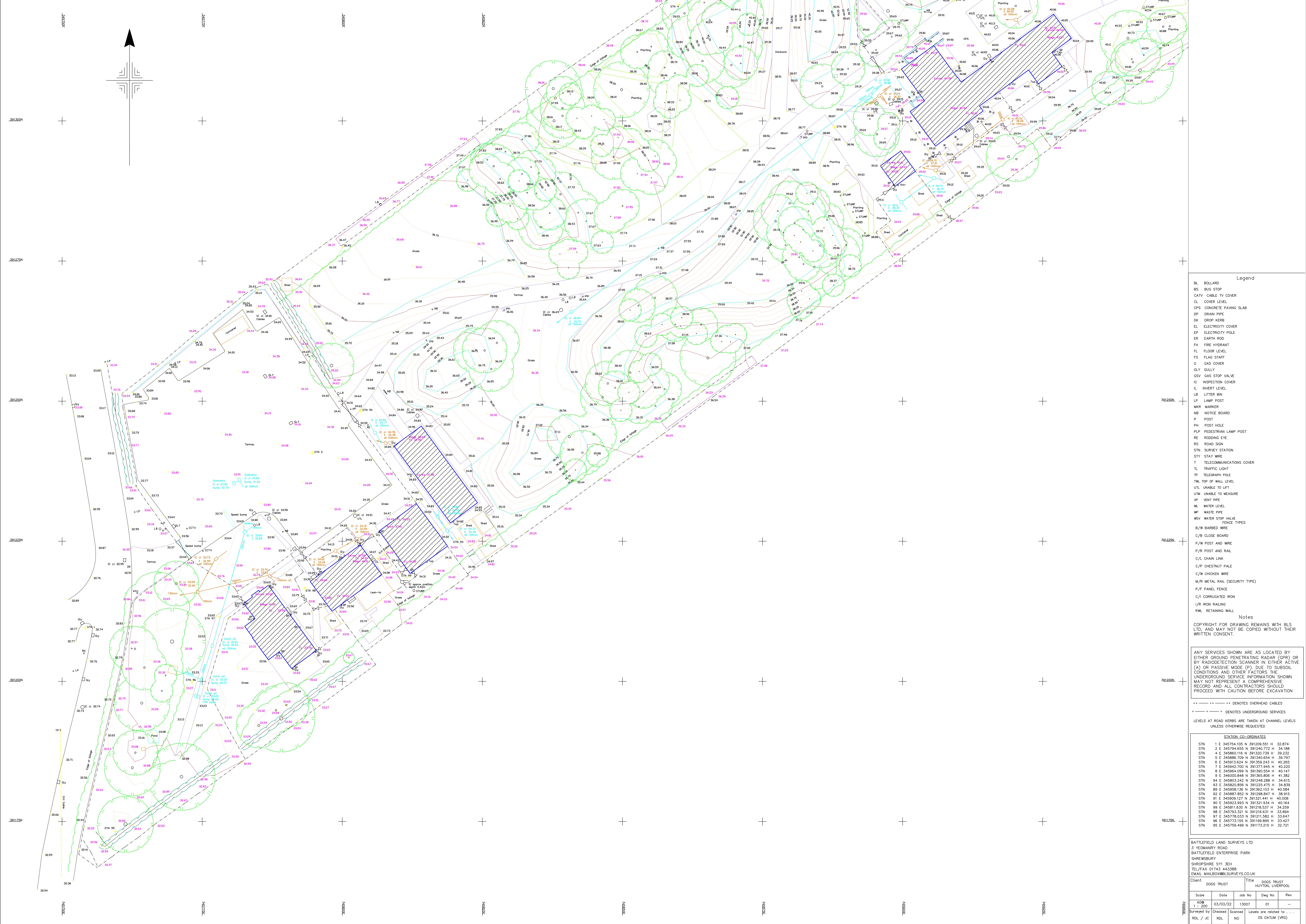
@PDArchitects

PDA Job No: 22013						
PDA - EX - 00 - GA - A - (90) 9000						REV F
ORIGINATOR	VOLUME	LEVEL	TYPE	ROLE	NUMBER	

Contract: Dogs Trust
Merseyside Rehoming Centre
Title: Site Plan

Scale: 1 : 500
Date: 07.03.23
Drawn: JS
Checked: OSRH

Appendix B – Topographical Survey



Legend

BL BOLLARD
BUS STOP
CATV CABLE TV COVER
CL COVER LEVEL
CPS CONCRETE PAVING SLAB
DP DRAIN PIPE
DK DROP KERB
EL ELECTRICITY COVER
EP ELECTRICITY POLE
ER EARTH ROD
FH FIRE HYDRANT
FL FLOOR LEVEL
FS FLAG STAFF
G GAS COVER
GUY GULLY
GSV GAS STOP VALVE
IC INSPECTION COVER
IL INVERT LEVEL
LB LITTER BIN
LP LAMP POST
MKR MARKER
NB NOTICE BOARD
P POST
PH POST HOLE
PLP PEDESTRIAN LAMP POST
RE RODDING EYE
RS ROAD SIGN
STN SURVEY STATION
STY STAY WIRE
T TELECOMMUNICATIONS COVER
TL TRAFFIC LIGHT
TP TELEGRAPH POLE
TWL TOP OF WALL LEVEL
UTL UNABLE TO LIFT
UTM UNABLE TO MEASURE
VP VENT PIPE
WL WATER LEVEL
WP WASTE PIPE
WSV WATER STOP VALVE
FENCE TYPES
B/W BARBED WIRE
C/B CLOSE BOARD
P/W POST AND WIRE
P/R POST AND RAIL
C/L CHAIN LINK
C/P CHESTNUT PALE
C/W CHICKEN WIRE
M/R METAL RAIL (SECURITY TYPE)
P/F PANEL FENCE
C/I CORRUGATED IRON
I/R IRON RAILING
RWL RETAINING WALL

Notes

COPYRIGHT FOR DRAWING REMAINS WITH BLS LTD. AND MAY NOT BE COPIED WITHOUT THEIR WRITTEN CONSENT.

ANY SERVICES SHOWN ARE AS LOCATED BY EITHER GROUND PENETRATING RADAR (GPR) OR BY RADIO DETECTION SCANNER IN EITHER ACTIVE (A) OR PASSIVE MODE (P). DUE TO SUBSOIL CONDITIONS AND OTHER FACTORS THE UNDERGROUND SERVICE INFORMATION SHOWN MAY NOT REPRESENT A COMPREHENSIVE RECORD AND ALL CONTRACTORS SHOULD PROCEED WITH CAUTION BEFORE EXCAVATION

--- DENOTES OVERHEAD CABLES
--- DENOTES UNDERGROUND SERVICES

LEVELS AT ROAD KERBS ARE TAKEN AT CHANNEL LEVELS UNLESS OTHERWISE REQUESTED

STATION CO-ORDINATES

STN	1	E	345754.105	N	391209.551	H	32.874
STN	2	E	345794.655	N	391245.772	H	34.188
STN	4	E	345860.116	N	391320.739	H	39.232
STN	5	E	345886.709	N	391340.654	H	39.797
STN	6	E	345913.624	N	391359.243	H	40.265
STN	7	E	345942.700	N	391377.945	H	40.220
STN	8	E	345964.099	N	391390.054	H	40.147
STN	9	E	346000.846	N	391365.806	H	41.362
STN	94	E	345803.242	N	391248.288	H	34.615
STN	93	E	345820.856	N	391225.475	H	34.839
STN	88	E	345958.136	N	391362.103	H	40.584
STN	92	E	345887.852	N	391298.847	H	38.915
STN	91	E	345909.127	N	391321.441	H	40.008
STN	90	E	345923.993	N	391321.634	H	40.164
STN	99	E	345911.630	N	391218.537	H	34.259
STN	98	E	345793.321	N	391216.631	H	33.894
STN	97	E	345778.033	N	391211.582	H	33.647
STN	96	E	345773.155	N	391199.895	H	33.427
STN	95	E	345758.499	N	391173.215	H	32.721

BATTLEFIELD LAND SURVEYS LTD

3 YEOMANNY ROAD
BATTLEFIELD ENTERPRISE PARK
SHREWSBURY
SHROPSHIRE SY1 3EH
TEL/FAX 01743 443388
EMAIL MAILBOX@BLSURVEYS.CO.UK

Client	DOGS TRUST	Title	DOGS TRUST HUYTON, LIVERPOOL
Scale	1:200	Date	03/03/22
Job No	13007	Dwg No	01
Rev.	—	Rev.	—
Survised by	RD	Checked	RD
Scanned	NO	Scanned	NO
Levels are related to	OS DATUM (VRS)		

- Notes
- COPYRIGHT FOR DRAWING REMAINS WITH BLS LTD, AND MAY NOT BE COPIED WITHOUT THEIR WRITTEN CONSENT.

xx ——— xx ——— xx DENOTES OVERHEAD CABLES
* ——— * ——— * DENOTES UNDERGROUND SERVICES
LEVELS AT ROAD KERBS ARE TAKEN AT CHANNEL LEVELS

STATION CO-ORDINATES

BATTLEFIELD LAND SURVEYS LTD
3 YEOMANRY ROAD
BATTLEFIELD ENTERPRISE PARK
SHREWSBURY
SHROPSHIRE SY1 3EH
TEL/FAX 01743 443388
EMAIL MAILBOX@BLSURVEYS.CO.UK

Client DOGS TRUST		Title DOGS TRUST HUYTON, LIVERPOOL		
Scale A00 1 : 200	Date 03/03/22	Job No 13007	Dwg No 02	Rev. —
Surveyed by RDL / JC	Checked RDL	Scanned NO	Levels are related to . . . OS DATUM (VRS)	

Appendix C – CCTV drainage Survey

Project

Project Name: 004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside

Project Date: 19/04/2023

Inspection Standard: MSCC4 Sewers & Drainage GB (SRM4 Scoring)





Table of Contents

Project Name	Project Number	Project Date
004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside		19/04/2023

Project Information	P-1
Scoring Summary	P-2
Section Profile	P-3
Section Summary	P-4
Project Summary	P-10
Section Item 1: MH3 > MH1 (MH3X)	1
Section Item 2: GY1 > MH1 (GY1X)	2
Section Item 3: MH1 > MH4 (MH1X)	3
Section Item 4: IC2 > MH4 (IC2X)	4
Section Item 5: MH4 > D/S (MH4X)	5
Section Item 8: U/S > MH8 (U/SX)	6
Section Item 9: U/S > MH8 (U/SY)	7
Section Item 10: MH8 > CP1 (MH8X)	8
Section Item 11: U/SB > MH8 (U/SBX)	9
Section Item 12: MH5A > MH7 (MH5AX)	10
Section Item 13: MH7 > MH9 (MH7X)	11
Section Item 14: MH2A > MH5 (MH2AX)	12
Section Item 15: MH5 > MH5A (MH5X)	13
Section Item 16: MH5A > DOWNSTREAM (MH5AX)	14
Section Item 17: UPSTREAM > MH7 (UPSTREAMX)	15
Section Item 18: MH7 > MH9 (MH7X)	17
Section Item 19: MH9 > EXMH (MH9X)	18
Section Item 20: UPSTREAM > MH8 (UPSTREAMX)	19
Section Item 21: MH4 > DOWNSTREAM (MH4X)	20
Section Item 22: ICF1 > ICF2 (ICF1X)	21
Section Item 23: ICF3 > MH2A (ICF3 X)	22
Section Item 24: MH4 > MH8 (MH4X)	23

Project Information

Project Name	Project Number	Project Date
004051 - McPhillips (Wellington) Ltd - Dogs Trust Merseyside		19/04/2023

Client

Company: McPhillips Wellington Ltd
Street: Horton House Hortonwood 50
Town or City: Hadley
County: Telford
Post Code: TF1 7FG
Phone:



Site

Company: McPhillips Ltd
Description: Dogs Trust Merseyside
Street: Whiston Lane
Town or City: Huyton
Post Code: L36 6HP

Contractor

Company: RAM Utility Solutions
Contact: Peter Forber
Department: Contracts Supervisor
Street: 3 Pitt Street
Town or City: Widnes
County: Cheshire
Post Code: WA8 0TG
Phone:
Mobile:
Email:



Scoring Summary

Project Name 004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside	Project Number	Project Date 19/04/2023
--	-----------------------	-----------------------------------

Structural Defects

Section	PLR	Grade	Description
All inspected pipes are in an acceptable structural condition (< grade 3).			

Service / Operational Condition

Grade 3: Best practice suggests consideration should be given to maintenance activities in the medium term.

Grade 4: Best practice suggests consideration should be given to maintenance activity to avoid potential blockages.

Grade 5: Best practice suggests that this pipe is at a high risk of backing up or causing flooding.

Section	PLR	Grade	Description
11	U/S BX	3	Settled deposits, coarse, 10% cross-sectional area loss
12	MH5AX	5	Roots, mass, 30% cross-sectional area loss
17	UPSTREAMX	4	Connection defective, connecting pipe is intruding at 12 o'clock, 150mm dia intrusion: 40%
19	MH9X	5	Roots, mass, 90% cross-sectional area loss

Abandoned Surveys

Section	PLR	Description
5	MH4X	Survey abandoned
8	U/SX	Survey abandoned
9	U/SY	Survey abandoned
12	MH5AX	Survey abandoned
16	MH5AX	Survey abandoned
17	UPSTREAMX	Survey abandoned
19	MH9X	Survey abandoned
20	UPSTREAMX	Survey abandoned
21	MH4X	Survey abandoned
24	MH4X	Survey abandoned

Information

These scoring summaries are based on the SRM grading from the WRc.

Section Profile

Project Name

004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside

Project Number
Project Date

19/04/2023

C, 100 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Pipe Material	Total Length	Inspected Length
1	MH3	MH1	19/04/2023	Whiston Lane	PVC	26.60 m	26.60 m
2	GY1	MH1	19/04/2023	Whiston Lane	PVC	7.57 m	7.57 m
3	MH1	MH4	19/04/2023	Whiston Lane	PVC	21.56 m	21.56 m
4	IC2	MH4	19/04/2023	Whiston Lane	PVC	1.25 m	1.25 m
11	U/S B	MH8	19/04/2023	Whiston Lane	PVC	26.29 m	26.29 m
14	MH2A	MH5	20/04/2023	WHISTON LANE	VC	22.54 m	22.54 m
22	ICF1	ICF2	21/04/2023	WHISTON LANE	PVC	12.64 m	12.64 m
23	ICF3	MH2A	21/04/2023	WHISTON LANE	PVC	4.65 m	4.65 m

Total: 8 Inspections x C 100 mm = 123.10 m Total Length and 123.09 m Inspected Length

C, 150 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Pipe Material	Total Length	Inspected Length
10	MH8	CP1	19/04/2023	Whiston Lane	PVC	19.39 m	19.39 m
13	MH7	MH9	19/04/2023	Whiston Lane	PVC	7.13 m	7.13 m
15	MH5	MH5A	20/04/2023	WHISTON LANE	PVC	67.16 m	67.16 m
18	MH7	MH9	20/04/2023	WHISTON LANE	PVC	6.77 m	6.77 m
20	UPSTREAM	MH8	20/04/2023	WHISTON LANE	PVC	34.10 m	34.10 m

Total: 5 Inspections x C 150 mm = 134.54 m Total Length and 134.54 m Inspected Length
Total: 13 Inspections = 257.64 m Total Length and 257.63 m Inspected Length

Section Summary

Project Name 004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside	Project Number	Project Date 19/04/2023
--	-----------------------	-----------------------------------

Number of sections	22
Total length of sections	602.84 m
Total length of inspected sections	602.82 m
Total length of not inspected sections	0.01 m
Number of abandoned inspections	9
Number of section inspection photos	1
Number of section inspection videos	22
Number of section inspection scans	0
Number of section inclination measurements	0

PLR:	MH3X	Upstream Node:	MH3
Inspection Direction:	2	Downstream Node:	MH1
Inspected Length:	26.60 m	Dia/Height:	100 mm
Total Length:	26.60 m	Pipe Material:	PVC

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH1
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.40	LL	Line deviates left
4	9.76	JN	Junction at 2 o'clock, diameter: 100mm
5	10.04	JN	Junction at 10 o'clock, diameter: 100mm
6	26.60	MHF	Finish node type, manhole, reference number: U/S

PLR:	GY1X	Upstream Node:	GY1
Inspection Direction:	2	Downstream Node:	MH1
Inspected Length:	7.57 m	Dia/Height:	100 mm
Total Length:	7.57 m	Pipe Material:	PVC

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH1
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.40	LR	Line deviates right
4	0.40	LU	Line deviates up
5	6.57	LR	Line deviates right
6	6.57	LU	Line deviates up
7	7.57	GYF	Finish node type, gully, reference number: GY1

Section Summary

Project Name 004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside	Project Number	Project Date 19/04/2023
--	-----------------------	-----------------------------------

PLR:	MH1X	Upstream Node:	MH1
Inspection Direction:	1	Downstream Node:	MH4
Inspected Length:	21.56 m	Dia/Height:	100 mm
Total Length:	21.56 m	Pipe Material:	PVC
No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH1
2	0.00	WL	Water level, 5% of the vertical dimension
3	21.41	JN	Junction at 6 o'clock, diameter: 100mm
4	21.56	MHF	Finish node type, manhole, reference number: D/S
PLR:	IC2X	Upstream Node:	IC2
Inspection Direction:	2	Downstream Node:	MH4
Inspected Length:	1.25 m	Dia/Height:	100 mm
Total Length:	1.25 m	Pipe Material:	PVC
No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH4
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.40	JN	Junction at 6 o'clock, diameter: 100mm
4	1.25	ICF	Finish node type, inspection chamber, reference number: IC2
PLR:	MH4X	Upstream Node:	MH4
Inspection Direction:	1	Downstream Node:	D/S
Inspected Length:	49.51 m	Dia/Height:	150 mm
Total Length:	49.51 m	Pipe Material:	PVC
No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH4
2	0.00	WL	Water level, 5% of the vertical dimension
3	33.55	JN	Junction at 2 o'clock, diameter: 150mm
4	49.51	SA	Survey abandoned
PLR:	U/SX	Upstream Node:	U/S
Inspection Direction:	2	Downstream Node:	MH8
Inspected Length:	25.45 m	Dia/Height:	150 mm
Total Length:	25.45 m	Pipe Material:	PVC
No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH8
2	0.00	WL	Water level, 5% of the vertical dimension
3	25.45	SA	Survey abandoned
PLR:	U/SY	Upstream Node:	U/S
Inspection Direction:	2	Downstream Node:	MH8
Inspected Length:	40.85 m	Dia/Height:	150 mm
Total Length:	40.85 m	Pipe Material:	PVC
No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH8
2	0.00	WL	Water level, 5% of the vertical dimension
3	27.74	JN	Junction at 10 o'clock, diameter: 100mm

Section Summary

Project Name 004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside	Project Number	Project Date 19/04/2023
--	-----------------------	-----------------------------------

No.	m+	Code	Observation
4	40.85	SA	Survey abandoned

PLR:	MH8X	Upstream Node:	MH8
Inspection Direction:	1	Downstream Node:	CP1
Inspected Length:	19.39 m	Dia/Height:	150 mm
Total Length:	19.39 m	Pipe Material:	PVC

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH8
2	0.00	WL	Water level, 5% of the vertical dimension
3	19.39	CPF	Finish node type, catchpit, reference number: D/S

PLR:	U/S BX	Upstream Node:	U/S B
Inspection Direction:	2	Downstream Node:	MH8
Inspected Length:	26.29 m	Dia/Height:	100 mm
Total Length:	26.29 m	Pipe Material:	PVC

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH8
2	0.00	WL	Water level, 5% of the vertical dimension
3	2.04	JN	Junction at 9 o'clock, diameter: 100mm
4	2.39	JN	Junction at 3 o'clock, diameter: 100mm
5	2.68	LR	Line deviates right
6	8.48	JN	Junction at 10 o'clock, diameter: 100mm
7	12.82	JN	Junction at 10 o'clock, diameter: 100mm
8	12.96	JN	Junction at 2 o'clock, diameter: 100mm
9	14.11	DER	Settled deposits, coarse, 10% cross-sectional area loss
10	24.13	LU	Line deviates up
11	26.29	GYF	Finish node type, gully, reference number: U/S B

PLR:	MH5AX	Upstream Node:	MH5A
Inspection Direction:	2	Downstream Node:	MH7
Inspected Length:	35.49 m	Dia/Height:	150 mm
Total Length:	35.49 m	Pipe Material:	PVC

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH7
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.40	WL	Water level, 10% of the vertical dimension
4	1.65	WL	Water level, 5% of the vertical dimension
5	8.59	WL	Water level, 10% of the vertical dimension
6	35.49	SA	Survey abandoned
7	35.49	CXI	Connection defective, connecting pipe is intruding at 12 o'clock, diameter: 150mm, intrusion: 40%
8	35.49	RM	Roots, mass, 30% cross-sectional area loss

PLR:	MH7X	Upstream Node:	MH7
Inspection Direction:	1	Downstream Node:	MH9
Inspected Length:	7.13 m	Dia/Height:	150 mm
Total Length:	7.13 m	Pipe Material:	PVC

Section Summary

Project Name 004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside	Project Number	Project Date 19/04/2023
--	-----------------------	-----------------------------------

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH7
2	0.00	WL	Water level, 10% of the vertical dimension
3	7.13	CUW	Loss of vision, camera under water
4	7.13	MHF	Finish node type, manhole, reference number: MH9

PLR:	MH2AX	Upstream Node:	MH2A
Inspection Direction:	2	Downstream Node:	MH5
Inspected Length:	22.54 m	Dia/Height:	100 mm
Total Length:	22.54 m	Pipe Material:	VC

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: MH5
2	0.00	WL	Water level, 10% of the vertical dimension
3	22.54	MHF	Finish node, manhole, reference: MH2A

PLR:	MH5X	Upstream Node:	MH5
Inspection Direction:	1	Downstream Node:	MH5A
Inspected Length:	67.16 m	Dia/Height:	150 mm
Total Length:	67.16 m	Pipe Material:	PVC

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: MH5
2	0.00	WL	Water level, 5% of the vertical dimension
3	67.16	MHF	Finish node, manhole, reference: MH5A

PLR:	MH5AX	Upstream Node:	MH5A
Inspection Direction:	1	Downstream Node:	DOWNSTREAM
Inspected Length:	42.51 m	Dia/Height:	150 mm
Total Length:	42.51 m	Pipe Material:	PVC

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: MH5A
2	0.00	WL	Water level, 5% of the vertical dimension
3	42.51	SA	Survey abandoned

PLR:	UPSTREAMX	Upstream Node:	UPSTREAM
Inspection Direction:	2	Downstream Node:	MH7
Inspected Length:	37.59 m	Dia/Height:	150 mm
Total Length:	37.59 m	Pipe Material:	PVC

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: MH7
2	0.00	WL	Water level, 5% of the vertical dimension
3	37.59	CXI	Connection defective, connecting pipe is intruding at 12 o'clock, 150mm dia, intrusion: 40%
4	37.59	SA	Survey abandoned

PLR:	MH7X	Upstream Node:	MH7
Inspection Direction:	1	Downstream Node:	MH9
Inspected Length:	6.77 m	Dia/Height:	150 mm
Total Length:	6.77 m	Pipe Material:	PVC

Section Summary

Project Name 004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside	Project Number	Project Date 19/04/2023
--	-----------------------	-----------------------------------

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: MH7
2	0.00	WL	Water level, 5% of the vertical dimension
3	6.77	MHF	Finish node, manhole, reference: MH9

PLR:	MH9X	Upstream Node:	MH9
Inspection Direction:	1	Downstream Node:	EXMH
Inspected Length:	7.05 m	Dia/Height:	150 mm
Total Length:	7.05 m	Pipe Material:	VC

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: MH9
2	0.00	WL	Water level, 5% of the vertical dimension
3	6.16	RM	Roots, mass, 90% cross-sectional area loss
4	7.05	SA	Survey abandoned

PLR:	UPSTREAMX	Upstream Node:	UPSTREAM
Inspection Direction:	2	Downstream Node:	MH8
Inspected Length:	34.10 m	Dia/Height:	150 mm
Total Length:	34.10 m	Pipe Material:	PVC

No.	m+	Code	Observation
1	0.00	WL	Water level, 5% of the vertical dimension
2	0.00	MH	Start node, manhole, reference: MH8
3	29.59	JN	Junction at 10 o'clock, 150mm dia
4	34.10	SA	Survey abandoned

PLR:	MH4X	Upstream Node:	MH4
Inspection Direction:	1	Downstream Node:	DOWNSTREAM
Inspected Length:	58.01 m	Dia/Height:	150 mm
Total Length:	58.01 m	Pipe Material:	PVC

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: MH4
2	0.00	WL	Water level, 5% of the vertical dimension
3	33.55	JN	Junction at 2 o'clock, 100mm dia
4	58.01	SA	Survey abandoned

PLR:	ICF1X	Upstream Node:	ICF1
Inspection Direction:	1	Downstream Node:	ICF2
Inspected Length:	12.64 m	Dia/Height:	100 mm
Total Length:	12.64 m	Pipe Material:	PVC

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: ICF1
2	0.00	WL	Water level, 5% of the vertical dimension
3	12.61	LR	Line deviates right
4	12.64	ICF	Finish node, inspection chamber, reference: ICF2

Project Summary

Project Name 004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside	Project Number	Project Date 19/04/2023
--	-----------------------	-----------------------------------

Pipe Summary

No.	Type	PLR	Upstream Node	Downstream Node	Road	Town	Use	Mat.	Profile	Length
1	SEC	MH3X	MH3	MH1	Whiston Lane	Huyton	S	PVC	Circular 100mm	26.60 m
2	SEC	GY1X	GY1	MH1	Whiston Lane	Huyton	S	PVC	Circular 100mm	7.57 m
3	SEC	MH1X	MH1	MH4	Whiston Lane	Huyton	S	PVC	Circular 100mm	21.56 m
4	SEC	IC2X	IC2	MH4	Whiston Lane	Huyton	S	PVC	Circular 100mm	1.25 m
5	SEC	MH4X	MH4	D/S	Whiston Lane	Huyton	S	PVC	Circular 150mm	49.51 m
6	SEC	U/SX	U/S	MH8	Whiston Lane	Huyton	S	PVC	Circular 150mm	25.45 m
7	SEC	U/SY	U/S	MH8	Whiston Lane	Huyton	S	PVC	Circular 150mm	40.85 m
8	SEC	MH8X	MH8	CP1	Whiston Lane	Huyton	S	PVC	Circular 150mm	19.39 m
9	SEC	U/S BX	U/S B	MH8	Whiston Lane	Huyton	S	PVC	Circular 100mm	26.29 m
10	SEC	MH5AX	MH5A	MH7	Whiston Lane	Huyton	F	PVC	Circular 150mm	35.49 m
11	SEC	MH7X	MH7	MH9	Whiston Lane	Huyton	F	PVC	Circular 150mm	7.13 m
12	SEC	MH2AX	MH2A	MH5	Whiston Lane	Huyton	F	VC	Circular 100mm	22.54 m
13	SEC	MH5X	MH5	MH5A	Whiston Lane	Huyton	F	PVC	Circular 150mm	67.16 m
14	SEC	MH5AX	MH5A	DOWNSTREAM	Whiston Lane	Huyton	F	PVC	Circular 150mm	42.51 m
15	SEC	UPSTREAMX	UPSTREAM	MH7	Whiston Lane	Huyton	F	PVC	Circular 150mm	37.59 m
16	SEC	MH7X	MH7	MH9	Whiston Lane	Huyton	F	PVC	Circular 150mm	6.77 m
17	SEC	MH9X	MH9	EXMH	Whiston Lane	Huyton	F	VC	Circular 150mm	7.05 m
18	SEC	UPSTREAMX	UPSTREAM	MH8	Whiston Lane	Huyton	F	PVC	Circular 150mm	34.10 m
19	SEC	MH4X	MH4	DOWNSTREAM	Whiston Lane	Huyton	F	PVC	Circular 150mm	58.01 m
20	SEC	ICF1X	ICF1	ICF2	Whiston Lane	Huyton	F	PVC	Circular 100mm	12.64 m
21	SEC	ICF3 X	ICF3	MH2A	Whiston Lane	Huyton	F	PVC	Circular 100mm	4.65 m
22	SEC	MH4X	MH4	MH8	Whiston Lane	Huyton	S	PVC	Circular 150mm	48.74 m
Total:										602.84 m

Pipe Levels

No.	PLR	Upstream Node	Upstream C.L.	Upstream I.L.	Upstream I.D.	Downstream Node	Downstream C.L.	Downstream I.L.	Downstream I.D.
1	MH3X	MH3			0.000 m	MH1			0.000 m

Project Summary

Project Name 004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside	Project Number	Project Date 19/04/2023
--	-----------------------	-----------------------------------

No.	PLR	Upstream Node	Upstream C.L.	Upstream I.L.	Upstream I.D.	Downstream Node	Downstream C.L.	Downstream I.L.	Downstream I.D.
2	GY1X	GY1			0.000 m	MH1			0.000 m
3	MH1X	MH1			0.000 m	MH4			0.000 m
4	IC2X	IC2			0.000 m	MH4			0.000 m
5	MH4X	MH4			0.000 m	D/S			0.000 m
6	U/SX	U/S			0.000 m	MH8			0.000 m
7	U/SY	U/S			0.000 m	MH8			0.000 m
8	MH8X	MH8			0.000 m	CP1			0.000 m
9	U/S BX	U/S B			0.000 m	MH8			0.000 m
10	MH5AX	MH5A			0.000 m	MH7			0.000 m
11	MH7X	MH7			0.000 m	MH9			0.000 m
12	MH2AX	MH2A			0.000 m	MH5			0.000 m
13	MH5X	MH5			0.000 m	MH5A			0.000 m
14	MH5AX	MH5A			0.000 m	DOWNSTREAM			0.000 m
15	UPSTREAMX	UPSTREAM			0.000 m	MH7			0.000 m
16	MH7X	MH7			0.000 m	MH9			0.000 m
17	MH9X	MH9			0.000 m	EXMH			0.000 m
18	UPSTREAMX	UPSTREAM			0.000 m	MH8			0.000 m
19	MH4X	MH4			0.000 m	DOWNSTREAM			0.000 m
20	ICF1X	ICF1			0.000 m	ICF2			0.000 m
21	ICF3 X	ICF3			0.000 m	MH2A			0.000 m
22	MH4X	MH4			0.000 m	MH8			0.000 m

Pipe Summary by Profile

Profile	Total Length	No. Pipes
Circular 100mm	26.60 m	
Circular 100mm	7.57 m	
Circular 100mm	21.56 m	
Circular 100mm	1.25 m	
Circular 100mm	26.29 m	
Circular 100mm	22.54 m	
Circular 100mm	12.64 m	
Circular 100mm	4.65 m	
Circular 100mm =	123.10 m	8

Project Summary

Project Name 004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside	Project Number	Project Date 19/04/2023
--	-----------------------	-----------------------------------

Profile	Total Length	No. Pipes
Circular 150mm	49.51 m	
Circular 150mm	25.45 m	
Circular 150mm	40.85 m	
Circular 150mm	19.39 m	
Circular 150mm	35.49 m	
Circular 150mm	7.13 m	
Circular 150mm	67.16 m	
Circular 150mm	42.51 m	
Circular 150mm	37.59 m	
Circular 150mm	6.77 m	
Circular 150mm	7.05 m	
Circular 150mm	34.10 m	
Circular 150mm	58.01 m	
Circular 150mm	48.74 m	
Circular 150mm =	479.74 m	14
Total =	602.84 m	22

Inspection Summary

Pipe No.	Insp. No.	Upstream Node	Downstream Node	Dir.	Operator	Insp. Date	Insp. Time	Str	Ser	Final Observation	Length
1	1	MH3	MH1	US	M.Sampson	19/04/2023	8:22	1	1	MHF	26.60 m
2	1	GY1	MH1	US	M.Sampson	19/04/2023	8:46	1	1	GYF	7.57 m
3	1	MH1	MH4	DS	M.Sampson	19/04/2023	8:53	1	1	MHF	21.56 m
4	1	IC2	MH4	US	M.Sampson	19/04/2023	9:33	1	1	ICF	1.25 m
5	1	MH4	D/S	DS	M.Sampson	19/04/2023	9:46	1	1	SA, NO TRACTION OVERLAP TO BE COMPLETE	49.51 m
6	1	U/S	MH8	US	M.Sampson	19/04/2023	11:47	1	1	SA, NO TRACTION	25.45 m
7	1	U/S	MH8	US	M.Sampson	19/04/2023	11:54	1	1	SA, JETTING REQ	40.85 m
8	1	MH8	CP1	DS	M.Sampson	19/04/2023	12:04	1	1	CPF	19.39 m
9	1	U/S B	MH8	US	M.Sampson	19/04/2023	12:10	1	3	GYF	26.29 m
10	1	MH5A	MH7	US	M.Sampson	19/04/2023	12:28	1	5	RM, FROM AROUND INTRUDING CONNECTION	35.49 m
11	1	MH7	MH9	DS	M.Sampson	19/04/2023	12:53	1	1	MHF	7.13 m
12	1	MH2A	MH5	US	L.Sullivan	20/04/2023	10:40	1	1	MHF	22.54 m
13	1	MH5	MH5A	DS	L.Sullivan	20/04/2023	11:40	1	1	MHF	67.16 m
14	1	MH5A	DOWNSTREAM	DS	L.Sullivan	20/04/2023	12:28	1	1	SA, DUE TO INTRUDING CONNECTION	42.51 m
15	1	UPSTREAM	MH7	US	L.Sullivan	20/04/2023	12:54	1	4	SA, DUE TO CXI	37.59 m

Project Summary

Project Name 004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside	Project Number	Project Date 19/04/2023
--	-----------------------	-----------------------------------

Pipe No.	Insp. No.	Upstream Node	Downstream Node	Dir.	Operator	Insp. Date	Insp. Time	Str	Ser	Final Observation	Length
16	1	MH7	MH9	DS	L.Sullivan	20/04/2023	13:40	1	1	MHF	6.77 m
17	1	MH9	EXMH	DS	L.Sullivan	21/04/2023	10:17	1	5	SA, DUE TO ROOT MASS	7.05 m
18	1	UPSTREAM	MH8	US	L.Sullivan	20/04/2023	14:16	1	1	SA, DUE TO NO TRACTION	34.10 m
19	1	MH4	DOWNSTREAM	DS	L.Sullivan	20/04/2023	14:36	1	1	SA, DUE TO LACK OF TRACTION	58.01 m
20	1	ICF1	ICF2	DS	L.Sullivan	21/04/2023	9:10	1	1	ICF	12.64 m
21	1	ICF3	MH2A	DS	L.Sullivan	21/04/2023	9:29	1	1	MHF	4.65 m
22	1	MH4	MH8	US	L.Sullivan	21/04/2023	10:29	1	1	SA, UNABLE TO PUSH	48.74 m
Total:											602.82 m

Inspection Summary by Profile

Profile	Total Length	No. Inspections
Circular 100mm	26.60 m	
Circular 100mm	7.57 m	
Circular 100mm	21.56 m	
Circular 100mm	1.25 m	
Circular 100mm	26.29 m	
Circular 100mm	22.54 m	
Circular 100mm	12.64 m	
Circular 100mm	4.65 m	
Circular 100mm =	123.09 m	8
Circular 150mm	49.51 m	
Circular 150mm	25.45 m	
Circular 150mm	40.85 m	
Circular 150mm	19.39 m	
Circular 150mm	35.49 m	
Circular 150mm	7.13 m	
Circular 150mm	67.16 m	
Circular 150mm	42.51 m	
Circular 150mm	37.59 m	
Circular 150mm	6.77 m	
Circular 150mm	7.05 m	
Circular 150mm	34.10 m	
Circular 150mm	58.01 m	
Circular 150mm	48.74 m	
Circular 150mm =	479.73 m	14

Project Summary

Project Name 004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside	Project Number	Project Date 19/04/2023
--	-----------------------	-----------------------------------

Profile	Total Length	No. Inspections
Total =	602.82 m	22

Defect Summary				CCTV Drainage Survey Observation Count																				
				General				Structural Condition								Service Condition						Misc		
Sect. No.	Insp. No.	Upstream Node	Downstream Node	Insp. Length (m)	No. Grade 4/5 Obs.	Survey Abandoned	Camera Under Water	Cracks	Fractures	Broken	Deformed	Collapsed	Holes	Surface Damage	Displaced Joints	Open Joints	Roots	Infiltration	Encrustation	Silt	Grease	Obstruction	Water Level	Line Deviates
1	1	MH3	MH1	26.6																			1	1
2	1	GY1	MH1	7.6																			1	4
3	1	MH1	MH4	21.6																			1	
4	1	IC2	MH4	1.2														1					1	
5	1	MH4	D/S	49.5		1																	1	
6	1	U/S	MH8	25.4		1																	1	
7	1	U/S	MH8	40.8		1																	1	
8	1	MH8	CP1	19.4																			1	
9	1	U/S B	MH8	26.3																			1	2
10	1	MH5A	MH7	35.5		1											1						4	
11	1	MH7	MH9	7.1			1																1	
12	1	MH2A	MH5	22.5																			1	
13	1	MH5	MH5A	67.2																			1	
14	1	MH5A	DOWNSTREAM	42.5		1																	1	
15	1	UPSTREAM	MH7	37.6		1																	1	
16	1	MH7	MH9	6.8																			1	
17	1	MH9	EXMH	7.1		1											1						1	
18	1	UPSTREAM	MH8	34.1		1																	1	
19	1	MH4	DOWNSTREAM	58.0		1																	1	
20	1	ICF1	ICF2	12.6														1					1	1
21	1	ICF3	MH2A	4.6														1					1	1
22	1	MH4	MH8	48.7		1																	1	

Project Summary

Project Name 004051 - McPhilips (Wellington) Ltd - Dogs Trust Merseyside	Project Number	Project Date 19/04/2023
--	-----------------------	-----------------------------------

Sect. No.	Insp. No.	Upstream Node	Downstream Node	Insp. Length (m)	No. Grade 4/5 Obs.	Survey Abandoned	Camera Under Water	Cracks	Fractures	Broken	Deformed	Collapsed	Holes	Surface Damage	Displaced Joints	Open Joints	Roots	Infiltration	Encrustation	Silt	Grease	Obstruction	Water Level	Line Deviates
Total:				602.8		10	1										2	3					25	9

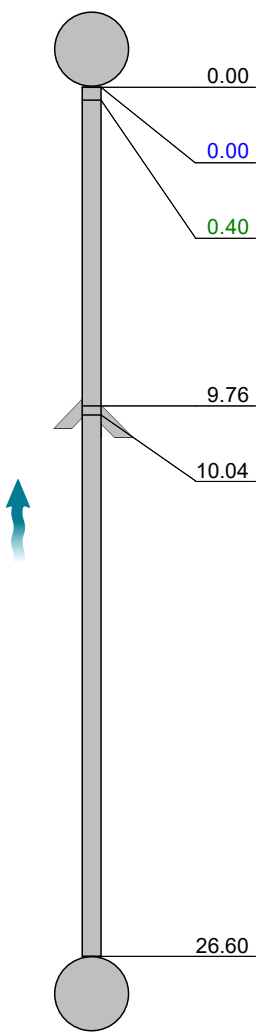
Section Inspection - 19/04/2023 - MH3X

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
1	1	19/04/23	8:22	Not Specified	No Rain Or Snow	No	MH3X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
M.Sampson		Y30 RSS		Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Huyton	Inspection Direction:	Upstream	Upstream Node:	MH3
Road:	Whiston Lane	Inspected Length:	26.60 m	Upstream Pipe Depth:	
Location:	Other pedestrian area	Total Length:	26.60 m	Downstream Node:	MH1
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:		Dia/Height:	100 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:231	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH1  0.00 0.00 0.40 9.76 10.04 26.60 MH WL LL JN JN MHF Start node type, manhole, reference number: MH1 Water level, 5% of the vertical dimension Line deviates left Junction at 2 o'clock, diameter: 100mm Junction at 10 o'clock, diameter: 100mm Finish node type, manhole, reference number: U/S 00:00:01 00:00:01 00:00:06 00:01:06 00:01:13 00:05:07							

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 19/04/2023 - GY1X

Item No. 2	Insp. No. 2	Date 19/04/23	Time 8:46	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR GY1X
Operator M.Sampson		Vehicle Y30 RSS		Camera Not Specified	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Town or Village:	Huyton	Inspection Direction:	Upstream	Upstream Node:	GY1
Road:	Whiston Lane	Inspected Length:	7.57 m	Upstream Pipe Depth:	
Location:	Other pedestrian area	Total Length:	7.57 m	Downstream Node:	MH1
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:		Dia/Height:	100 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:66	Position [m]	Code	Observation	MPEG	Photo	Grade
	0.00	MH	Start node type, manhole, reference number: MH1	00:00:00			
	0.00	WL	Water level, 5% of the vertical dimension	00:00:01			
	0.40	LR	Line deviates right	00:00:05			
	0.40	LU	Line deviates up	00:00:05			
	6.57	LR	Line deviates right	00:00:45			
	6.57	LU	Line deviates up	00:00:46			
	7.57	GYF	Finish node type, gully, reference number: GY1	00:01:20			

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	00	00	00	10	0	00	00	00	10

Section Inspection - 19/04/2023 - MH1X

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
3	3	19/04/23	8:53	Not Specified	No Rain Or Snow	No	MH1X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
M.Sampson		Y30 RSS		Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Huyton	Inspection Direction:	Downstream	Upstream Node:	MH1
Road:	Whiston Lane	Inspected Length:	21.56 m	Upstream Pipe Depth:	
Location:	Other pedestrian area	Total Length:	21.56 m	Downstream Node:	MH4
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:		Dia/Height:	100 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:187	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH1 0.00 0.00 21.41 21.56 MH4 Depth: m							
		0.00	MH	Start node type, manhole, reference number: MH1	00:00:00		
		0.00	WL	Water level, 5% of the vertical dimension	00:00:01		
		21.41	JN	Junction at 6 o'clock, diameter: 100mm: DROP SHAFT	00:02:41		
		21.56	MHF	Finish node type, manhole, reference number: D/S	00:02:50		

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

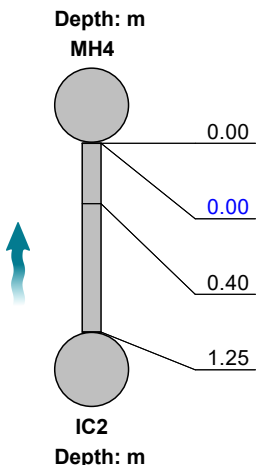
Section Inspection - 19/04/2023 - IC2X

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
4	4	19/04/23	9:33	Not Specified	No Rain Or Snow	No	IC2X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
M.Sampson		Y30 RSS		Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Huyton	Inspection Direction:	Upstream	Upstream Node:	IC2
Road:	Whiston Lane	Inspected Length:	1.25 m	Upstream Pipe Depth:	
Location:	Other pedestrian area	Total Length:	1.25 m	Downstream Node:	MH4
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:		Dia/Height:	100 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:50	Position [m]	Code	Observation	MPEG	Photo	Grade
							
		0.00	MH	Start node type, manhole, reference number: MH4	00:00:00		
		0.00	WL	Water level, 5% of the vertical dimension	00:00:02		
		0.40	JN	Junction at 6 o'clock, diameter: 100mm: DROP SHAFT	00:00:08		
		1.25	ICF	Finish node type, inspection chamber, reference number: IC2	00:00:53		

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 19/04/2023 - MH4X

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
5	5	19/04/23	9:46	Not Specified	No Rain Or Snow	No	MH4X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
M.Sampson		Y30 RSS		Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Huyton	Inspection Direction:	Downstream	Upstream Node:	MH4
Road:	Whiston Lane	Inspected Length:	49.51 m	Upstream Pipe Depth:	
Location:	Other pedestrian area	Total Length:	49.51 m	Downstream Node:	D/S
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:		Dia/Height:	150 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:429	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH4 0.00 0.00 33.55 49.51 49.51 D/S Depth: m							
			MH	Start node type, manhole, reference number: MH4	00:00:04		
			WL	Water level, 5% of the vertical dimension	00:00:04		
			JN	Junction at 2 o'clock, diameter: 150mm	00:04:31		
			SA	Survey abandoned: NO TRACTION OVERLAP TO BE COMPLETED	00:23:10		
				End of pipe			

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

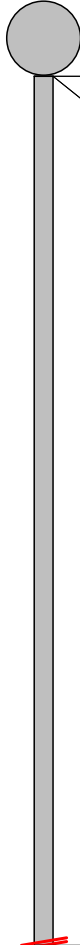
Section Inspection - 19/04/2023 - U/SX

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
8	8	19/04/23	11:47	Not Specified	No Rain Or Snow	No	U/SX
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
M.Sampson		Y30 RSS		Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Huyton	Inspection Direction:	Upstream	Upstream Node:	U/S
Road:	Whiston Lane	Inspected Length:	25.45 m	Upstream Pipe Depth:	
Location:	Other pedestrian area	Total Length:	25.45 m	Downstream Node:	MH8
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:		Dia/Height:	150 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:221	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH8 							
		0.00	MH	Start node type, manhole, reference number: MH8	00:00:02		
		0.00	WL	Water level, 5% of the vertical dimension	00:00:02		
		25.45	SA	Survey abandoned: NO TRACTION	00:03:11		

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 19/04/2023 - U/SY

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
9	9	19/04/23	11:54	Not Specified	No Rain Or Snow	No	U/SY
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
M.Sampson		Y30 RSS		Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Huyton	Inspection Direction:	Upstream	Upstream Node:	U/S
Road:	Whiston Lane	Inspected Length:	40.85 m	Upstream Pipe Depth:	
Location:	Other pedestrian area	Total Length:	40.85 m	Downstream Node:	MH8
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:		Dia/Height:	150 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:354	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH8 0.00 0.00 27.74 40.85 40.85 U/S Depth: m							
		0.00	MH	Start node type, manhole, reference number: MH8	00:00:00		
		0.00	WL	Water level, 5% of the vertical dimension	00:00:00		
		27.74	JN	Junction at 10 o'clock, diameter: 100mm	00:02:32		
		40.85	SA	Survey abandoned: JETTING REQ	00:07:12		
		40.85		End of pipe			

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 19/04/2023 - MH8X

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
10	10	19/04/23	12:04	Not Specified	No Rain Or Snow	No	MH8X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
M.Sampson		Y30 RSS		Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Huyton	Inspection Direction:	Downstream	Upstream Node:	MH8
Road:	Whiston Lane	Inspected Length:	19.39 m	Upstream Pipe Depth:	
Location:	Other pedestrian area	Total Length:	19.39 m	Downstream Node:	CP1
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:		Dia/Height:	150 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	Lining Material:	No Lining		

Comments:	
Recommendations:	

Scale:	1:168	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH8 0.00 0.00 19.39 CP1 Depth: m							
			MH	Start node type, manhole, reference number: MH8	00:00:02		
			WL	Water level, 5% of the vertical dimension	00:00:07		
			CPF	Finish node type, catchpit, reference number: D/S	00:02:33		

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

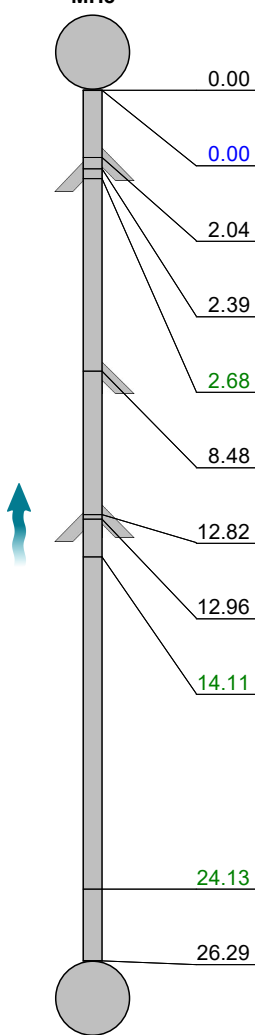
Section Inspection - 19/04/2023 - U/S BX

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
11	11	19/04/23	12:10	Not Specified	No Rain Or Snow	No	U/S BX
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
M.Sampson		Y30 RSS		Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Huyton	Inspection Direction:	Upstream	Upstream Node:	U/S B
Road:	Whiston Lane	Inspected Length:	26.29 m	Upstream Pipe Depth:	
Location:	Other pedestrian area	Total Length:	26.29 m	Downstream Node:	MH8
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:		Dia/Height:	100 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:228	Position [m]	Code	Observation	MPEG	Photo	Grade																																																												
Depth: m MH8  <table><tr><th>Position [m]</th><th>Code</th><th>Observation</th><th>MPEG</th><th>Grade</th></tr><tr><td>0.00</td><td>MH</td><td>Start node type, manhole, reference number: MH8</td><td>00:00:03</td><td></td></tr><tr><td>0.00</td><td>WL</td><td>Water level, 5% of the vertical dimension</td><td>00:00:07</td><td></td></tr><tr><td>2.04</td><td>JN</td><td>Junction at 9 o'clock, diameter: 100mm</td><td>00:01:09</td><td></td></tr><tr><td>2.39</td><td>JN</td><td>Junction at 3 o'clock, diameter: 100mm</td><td>00:01:21</td><td></td></tr><tr><td>2.68</td><td>LR</td><td>Line deviates right</td><td>00:01:35</td><td></td></tr><tr><td>8.48</td><td>JN</td><td>Junction at 10 o'clock, diameter: 100mm</td><td>00:02:14</td><td></td></tr><tr><td>12.82</td><td>JN</td><td>Junction at 10 o'clock, diameter: 100mm</td><td>00:02:59</td><td></td></tr><tr><td>12.96</td><td>JN</td><td>Junction at 2 o'clock, diameter: 100mm</td><td>00:02:34</td><td></td></tr><tr><td>14.11</td><td>DER</td><td>Settled deposits, coarse, 10% cross-sectional area loss</td><td>00:03:28</td><td>3</td></tr><tr><td>24.13</td><td>LU</td><td>Line deviates up</td><td>00:04:51</td><td></td></tr><tr><td>26.29</td><td>GYF</td><td>Finish node type, gully, reference number: U/S B</td><td>00:05:18</td><td></td></tr></table> U/S B Depth: m								Position [m]	Code	Observation	MPEG	Grade	0.00	MH	Start node type, manhole, reference number: MH8	00:00:03		0.00	WL	Water level, 5% of the vertical dimension	00:00:07		2.04	JN	Junction at 9 o'clock, diameter: 100mm	00:01:09		2.39	JN	Junction at 3 o'clock, diameter: 100mm	00:01:21		2.68	LR	Line deviates right	00:01:35		8.48	JN	Junction at 10 o'clock, diameter: 100mm	00:02:14		12.82	JN	Junction at 10 o'clock, diameter: 100mm	00:02:59		12.96	JN	Junction at 2 o'clock, diameter: 100mm	00:02:34		14.11	DER	Settled deposits, coarse, 10% cross-sectional area loss	00:03:28	3	24.13	LU	Line deviates up	00:04:51		26.29	GYF	Finish node type, gully, reference number: U/S B	00:05:18	
Position [m]	Code	Observation	MPEG	Grade																																																															
0.00	MH	Start node type, manhole, reference number: MH8	00:00:03																																																																
0.00	WL	Water level, 5% of the vertical dimension	00:00:07																																																																
2.04	JN	Junction at 9 o'clock, diameter: 100mm	00:01:09																																																																
2.39	JN	Junction at 3 o'clock, diameter: 100mm	00:01:21																																																																
2.68	LR	Line deviates right	00:01:35																																																																
8.48	JN	Junction at 10 o'clock, diameter: 100mm	00:02:14																																																																
12.82	JN	Junction at 10 o'clock, diameter: 100mm	00:02:59																																																																
12.96	JN	Junction at 2 o'clock, diameter: 100mm	00:02:34																																																																
14.11	DER	Settled deposits, coarse, 10% cross-sectional area loss	00:03:28	3																																																															
24.13	LU	Line deviates up	00:04:51																																																																
26.29	GYF	Finish node type, gully, reference number: U/S B	00:05:18																																																																
Construction Features				Miscellaneous Features																																																															
Structural Defects				Service & Operational Observations																																																															
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	0.0	0.0	1.0	1	2.0	0.1	2.0	3.0																																																										

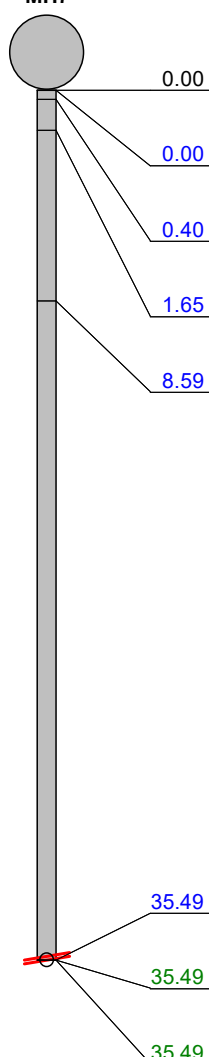
Section Inspection - 19/04/2023 - MH5AX

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
12	12	19/04/23	12:28	Not Specified	No Rain Or Snow	No	MH5AX
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
M.Sampson		Y30 RSS		Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Huyton	Inspection Direction:	Upstream	Upstream Node:	MH5A
Road:	Whiston Lane	Inspected Length:	35.49 m	Upstream Pipe Depth:	
Location:	Other pedestrian area	Total Length:	35.49 m	Downstream Node:	MH7
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:		Dia/Height:	150 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:308	Position [m]	Code	Observation	MPEG	Photo	Grade																																																								
Depth: m MH7  <table><tr><td>0.00</td><td>MH</td><td>Start node type, manhole, reference number: MH7</td><td>00:00:00</td><td></td><td></td><td></td></tr><tr><td>0.00</td><td>WL</td><td>Water level, 5% of the vertical dimension</td><td>00:00:00</td><td></td><td></td><td></td></tr><tr><td>0.40</td><td>WL</td><td>Water level, 10% of the vertical dimension</td><td>00:00:19</td><td></td><td></td><td></td></tr><tr><td>1.65</td><td>WL</td><td>Water level, 5% of the vertical dimension</td><td>00:00:28</td><td></td><td></td><td></td></tr><tr><td>8.59</td><td>WL</td><td>Water level, 10% of the vertical dimension</td><td>00:00:55</td><td></td><td></td><td></td></tr><tr><td>35.49</td><td>SA</td><td>Survey abandoned: UNABLE TO PASS INTRUDING CONNECTION AND ROOT MASS JETTING REQ</td><td>00:03:07</td><td></td><td></td><td></td></tr><tr><td>35.49</td><td>CXI</td><td>Connection defective, connecting pipe is intruding at 12 o'clock, diameter: 150mm, intrusion: 40%</td><td>00:03:04</td><td></td><td></td><td>4</td></tr><tr><td>35.49</td><td>RM</td><td>Roots, mass, 30% cross-sectional area loss: FROM AROUND INTRUDING CONNECTION</td><td>00:03:04</td><td></td><td></td><td>5</td></tr></table>								0.00	MH	Start node type, manhole, reference number: MH7	00:00:00				0.00	WL	Water level, 5% of the vertical dimension	00:00:00				0.40	WL	Water level, 10% of the vertical dimension	00:00:19				1.65	WL	Water level, 5% of the vertical dimension	00:00:28				8.59	WL	Water level, 10% of the vertical dimension	00:00:55				35.49	SA	Survey abandoned: UNABLE TO PASS INTRUDING CONNECTION AND ROOT MASS JETTING REQ	00:03:07				35.49	CXI	Connection defective, connecting pipe is intruding at 12 o'clock, diameter: 150mm, intrusion: 40%	00:03:04			4	35.49	RM	Roots, mass, 30% cross-sectional area loss: FROM AROUND INTRUDING CONNECTION	00:03:04			5
0.00	MH	Start node type, manhole, reference number: MH7	00:00:00																																																												
0.00	WL	Water level, 5% of the vertical dimension	00:00:00																																																												
0.40	WL	Water level, 10% of the vertical dimension	00:00:19																																																												
1.65	WL	Water level, 5% of the vertical dimension	00:00:28																																																												
8.59	WL	Water level, 10% of the vertical dimension	00:00:55																																																												
35.49	SA	Survey abandoned: UNABLE TO PASS INTRUDING CONNECTION AND ROOT MASS JETTING REQ	00:03:07																																																												
35.49	CXI	Connection defective, connecting pipe is intruding at 12 o'clock, diameter: 150mm, intrusion: 40%	00:03:04			4																																																									
35.49	RM	Roots, mass, 30% cross-sectional area loss: FROM AROUND INTRUDING CONNECTION	00:03:04			5																																																									
Construction Features				Miscellaneous Features																																																											
Structural Defects				Service & Operational Observations																																																											
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	0.0	0.0	1.0	2	15.0	0.4	15.0	5.0																																																						

Section Inspection - 19/04/2023 - MH7X

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
13	13	19/04/23	12:53	Not Specified	No Rain Or Snow	No	MH7X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
M.Sampson		Y30 RSS		Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Huyton	Inspection Direction:	Downstream	Upstream Node:	MH7
Road:	Whiston Lane	Inspected Length:	7.13 m	Upstream Pipe Depth:	
Location:	Other pedestrian area	Total Length:	7.13 m	Downstream Node:	MH9
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular	Dia/Height:	150 mm
Type of Pipe:		Pipe Material:	Polyvinyl chloride	Lining Type:	No Lining
Flow Control:	No flow control	Lining Material:	No Lining		
Year Constructed:	Not Specified				
Inspection Purpose:	Sample survey to determine asset condition				

Comments:

Recommendations:

Scale:	1:62	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH7 0.00 0.00 7.13 7.13 MH9 Depth: m							
			MH	Start node type, manhole, reference number: MH7	00:00:00		
			WL	Water level, 10% of the vertical dimension	00:00:00		
			CUW	Loss of vision, camera under water	00:00:29		
			MHF	Finish node type, manhole, reference number: MH9	00:00:30		

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 20/04/2023 - MH2AX

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
14	1	20/04/23	10:40	004051	No Rain Or Snow	Yes	MH2AX
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
L.SULLIVAN		Not Specified		Not Specified	Not Specified	Private Drain	Not Specified

Town or Village:	Huyton	Inspection Direction:	Upstream	Upstream Node:	MH2A
Road:	Whiston Lane	Inspected Length:	22.54 m	Upstream Pipe Depth:	
Location:	Property or buildings	Total Length:	22.54 m	Downstream Node:	MH5
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Flow Control:	No flow control	Pipe Material:	Vitrified clay		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:196	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH5 0.00 MH Start node, manhole, reference: MH5 00:00:02 0.00 WL Water level, 10% of the vertical dimension 00:00:03 22.54 MHF Finish node, manhole, reference: MH2A 00:01:10 MH2A Depth: m							

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 20/04/2023 - MH5X

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
15	1	20/04/23	11:40	004051	No Rain Or Snow	Yes	MH5X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
L.SULLIVAN		Not Specified		Not Specified	Not Specified	Private Drain	Not Specified

Town or Village:	Huyton	Inspection Direction:	Downstream	Upstream Node:	MH5
Road:	Whiston Lane	Inspected Length:	67.16 m	Upstream Pipe Depth:	
Location:	Property or buildings	Total Length:	67.16 m	Downstream Node:	MH5A
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:582	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH5 0.00 MH Start node, manhole, reference: MH5 00:00:00							
0.00 WL Water level, 5% of the vertical dimension 00:00:09							
67.16 MHF Finish node, manhole, reference: MH5A 00:08:15							
MH5A Depth: m							

Construction Features

Miscellaneous Features

Structural Defects

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

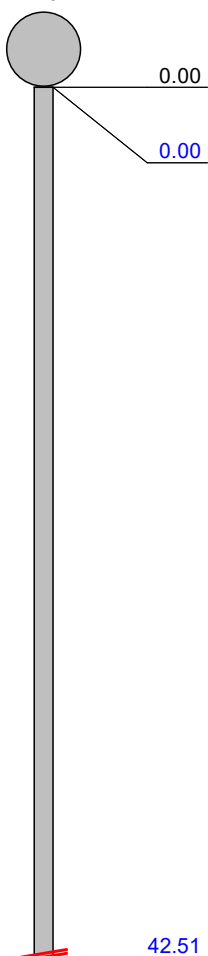
Section Inspection - 20/04/2023 - MH5AX

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
16	1	20/04/23	12:28	004051	No Rain Or Snow	Yes	MH5AX
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
L.SULLIVAN		Not Specified		Not Specified	Not Specified	Private Drain	Not Specified

Town or Village:	Huyton	Inspection Direction:	Downstream	Upstream Node:	MH5A
Road:	Whiston Lane	Inspected Length:	42.51 m	Upstream Pipe Depth:	
Location:	Property or buildings	Total Length:	42.51 m	Downstream Node:	DOWNSTREAM
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:369	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH5A 							
		0.00	MH	Start node, manhole, reference: MH5A	00:00:02		
		0.00	WL	Water level, 5% of the vertical dimension	00:00:03		
		42.51	SA	Survey abandoned: DUE TO INTRUDING CONNECTION	00:04:12		

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Item No. 17	Insp. No. 1	Date 20/04/23	Time 12:54	Client's Job Ref 004051	Weather No Rain Or Snow	Pre Cleaned Yes	PLR UPSTREAMX
Operator L.SULLIVAN		Vehicle Not Specified		Camera Not Specified	Preset Length Not Specified	Legal Status Private Drain	Alternative ID Not Specified

Scale: 1:326 Position [m] Code Observation MPEG Photo Grade

Depth: m
MH7

Code	Observation	MPEG	Photo	Grade
MH	Start node, manhole, reference: MH7	00:00:02		
WL	Water level, 5% of the vertical dimension	00:00:03		
CXI	Connection defective, connecting pipe is intruding at 12 o'clock, 150mm dia, intrusion: 40%	00:04:05	UPSTREA MX_b1998 0ce-3690-	4
SA	Survey abandoned: DUE TO CXI	00:04:08		

15

Section Pictures - 20/04/2023 - UPSTREAMX

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
17	Upstream	UPSTREAMX	004051	



UPSTREAMX_b19980ce-3690-44c3-b787-dd5b73327ac3_20
230421_130541_796.jpg, 00:04:05, 37.59 m

Connection defective, connecting pipe is intruding at 12
o'clock, 150mm dia, intrusion: 40%

Section Inspection - 20/04/2023 - MH7X

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
18	1	20/04/23	13:40	004051	No Rain Or Snow	Yes	MH7X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
L.SULLIVAN		Not Specified		Not Specified	Not Specified	Private Drain	Not Specified

Town or Village:	Huyton	Inspection Direction:	Downstream	Upstream Node:	MH7
Road:	Whiston Lane	Inspected Length:	6.77 m	Upstream Pipe Depth:	
Location:	Property or buildings	Total Length:	6.77 m	Downstream Node:	MH9
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:59	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH7 0.00 MH Start node, manhole, reference: MH7 00:00:03							
0.00 WL Water level, 5% of the vertical dimension 00:00:03							
6.77 MHF Finish node, manhole, reference: MH9 00:01:04							
MH9 Depth: m							

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

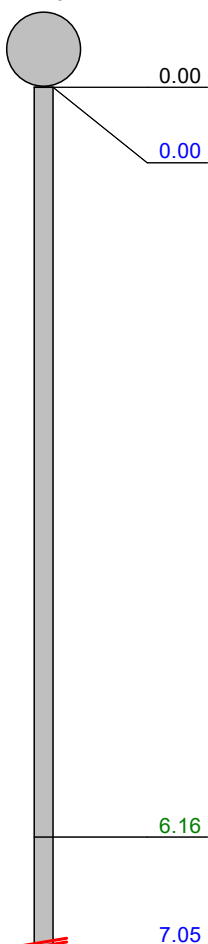
Section Inspection - 21/04/2023 - MH9X

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
19	1	21/04/23	10:17	004051	No Rain Or Snow	Yes	MH9X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
L.SULLIVAN		Not Specified		Not Specified	Not Specified	Private Drain	Not Specified

Town or Village:	Huyton	Inspection Direction:	Downstream	Upstream Node:	MH9
Road:	Whiston Lane	Inspected Length:	7.05 m	Upstream Pipe Depth:	
Location:	Property or buildings	Total Length:	7.05 m	Downstream Node:	EXMH
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Flow Control:	No flow control	Pipe Material:	Vitrified clay		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:62	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH9 							
		0.00	MH	Start node, manhole, reference: MH9	00:00:02		
		0.00	WL	Water level, 5% of the vertical dimension	00:00:03		
		6.16	RM	Roots, mass, 90% cross-sectional area loss	00:00:49		5
		7.05	SA	Survey abandoned: DUE TO ROOT MASS	00:01:07		

Construction Features

Miscellaneous Features

Structural Defects

Service & Operational Observations

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	0.0	0.0	1.0	1	20.0	2.8	20.0	5.0

Section Inspection - 20/04/2023 - UPSTREAMX

Item No. 20	Insp. No. 1	Date 20/04/23	Time 14:16	Client's Job Ref 004051	Weather No Rain Or Snow	Pre Cleaned Yes	PLR UPSTREAMX
Operator L.SULLIVAN		Vehicle Not Specified		Camera Not Specified	Preset Length Not Specified	Legal Status Private Drain	Alternative ID Not Specified

Town or Village:	Huyton	Inspection Direction:	Upstream	Upstream Node:	UPSTREAM
Road:	Whiston Lane	Inspected Length:	34.10 m	Upstream Pipe Depth:	
Location:	Property or buildings	Total Length:	34.10 m	Downstream Node:	MH8
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:296	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH8 0.00 0.00 29.59 34.10 34.10 UPSTREAM Depth: m							
		0.00	WL	Water level, 5% of the vertical dimension	00:00:03		
		0.00	MH	Start node, manhole, reference: MH8	00:00:04		
		29.59	JN	Junction at 10 o'clock, 150mm dia	00:03:15		
		34.10	SA	Survey abandoned: DUE TO NO TRACTION	00:00:00		
		34.10		End of pipe			

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

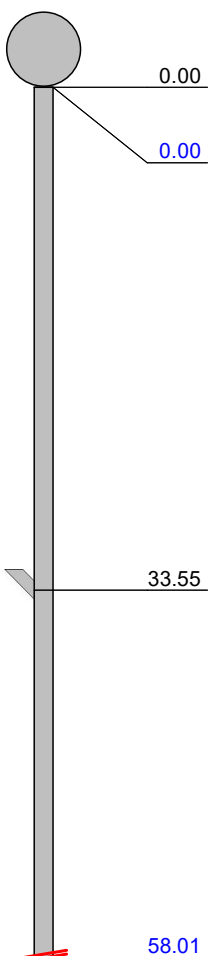
Section Inspection - 20/04/2023 - MH4X

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
21	1	20/04/23	14:36	004051	No Rain Or Snow	Yes	MH4X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
L.SULLIVAN		Not Specified		Not Specified	Not Specified	Private Drain	Not Specified

Town or Village:	Huyton	Inspection Direction:	Downstream	Upstream Node:	MH4
Road:	Whiston Lane	Inspected Length:	58.01 m	Upstream Pipe Depth:	
Location:	Property or buildings	Total Length:	58.01 m	Downstream Node:	DOWNSTREAM
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:503	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH4 							
		0.00	MH	Start node, manhole, reference: MH4	00:00:04		
		0.00	WL	Water level, 5% of the vertical dimension	00:00:06		
		33.55	JN	Junction at 2 o'clock, 100mm dia	00:03:16		
		58.01	SA	Survey abandoned: DUE TO LACK OF TRACTION	00:06:19		

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 21/04/2023 - ICF1X

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
22	1	21/04/23	9:10	004051	No Rain Or Snow	Yes	ICF1X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
L.SULLIVAN		Not Specified		Not Specified	Not Specified	Private Drain	Not Specified

Town or Village:	Huyton	Inspection Direction:	Downstream	Upstream Node:	ICF1
Road:	Whiston Lane	Inspected Length:	12.64 m	Upstream Pipe Depth:	
Location:	Property or buildings	Total Length:	12.64 m	Downstream Node:	ICF2
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:110	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m ICF1 0.00 MH Start node, manhole, reference: ICF1 00:00:04							
0.00 WL Water level, 5% of the vertical dimension 00:00:07							
12.61 LR Line deviates right 00:02:19							
12.64 ICF Finish node, inspection chamber, reference: ICF2 00:02:25							
ICF2 Depth: m							

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 21/04/2023 - ICF3 X

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
23	1	21/04/23	9:29	004051	No Rain Or Snow	Yes	ICF3 X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
L.SULLIVAN		Not Specified		Not Specified	Not Specified	Private Drain	Not Specified

Town or Village:	Huyton	Inspection Direction:	Downstream	Upstream Node:	ICF3
Road:	Whiston Lane	Inspected Length:	4.65 m	Upstream Pipe Depth:	
Location:	Property or buildings	Total Length:	4.65 m	Downstream Node:	MH2A
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:50	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m ICF3 0.00 0.00 3.74 4.65 MH2A Depth: m							
		0.00	IC	Start node, inspection chamber, reference: ICF3	00:00:04		
		0.00	WL	Water level, 5% of the vertical dimension	00:00:05		
		3.74	LR	Line deviates right	00:00:24		
		4.65	MHF	Finish node, manhole, reference: MH2A	00:00:40		

Construction Features

Miscellaneous Features

Structural Defects

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

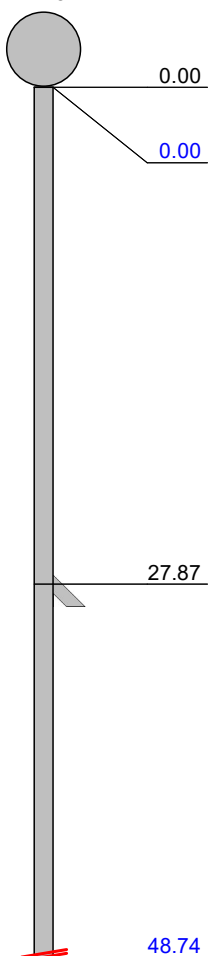
Section Inspection - 21/04/2023 - MH4X

Item No.	Insp. No.	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
24	1	21/04/23	10:29	004051	No Rain Or Snow	Yes	MH4X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
L.SULLIVAN		Not Specified		Not Specified	Not Specified	Private Drain	Not Specified

Town or Village:	Huyton	Inspection Direction:	Upstream	Upstream Node:	MH4
Road:	Whiston Lane	Inspected Length:	48.74 m	Upstream Pipe Depth:	
Location:	Property or buildings	Total Length:	48.74 m	Downstream Node:	MH8
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Flow Control:	No flow control	Pipe Material:	Polyvinyl chloride		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:423	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m MH8 							
		0.00	MH	Start node, manhole, reference: MH8	00:00:05		
		0.00	WL	Water level, 5% of the vertical dimension	00:00:06		
		27.87	JN	Junction at 10 o'clock, 100mm dia	00:02:26		
		48.74	SA	Survey abandoned: UNABLE TO PUSH	00:07:11		

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

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	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Appendix D – Public Sewer Records

Nolan Associates

FAO:

How to contact us:

**United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP**

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

**Your Ref: 2022-192
Our Ref: UUPS-ORD-477049
Date: 03/04/2023**

Dear Sirs

Location: Dogs Trust Merseyside

I acknowledge with thanks your request dated 31/03/2023 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. <http://www.unitedutilities.com/work-near-asset.aspx>.

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please [contact us](#).

Yours Faithfully,

Karen McCormack
Property Searches Manager

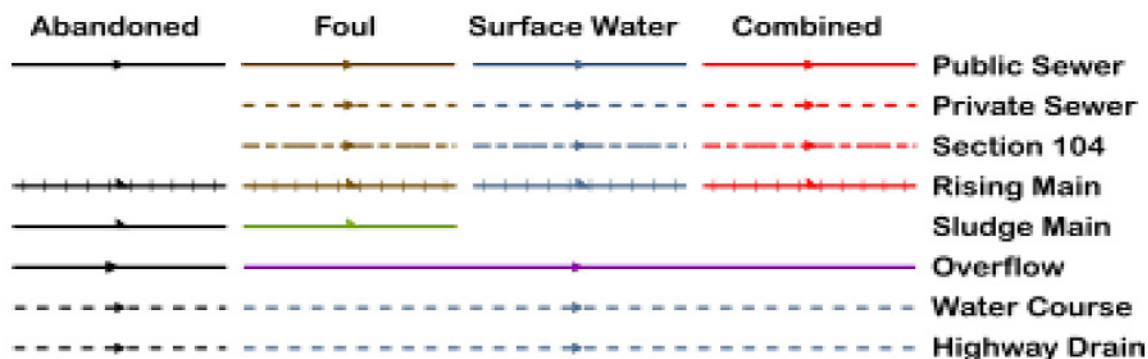
TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

TERMS AND CONDITIONS:

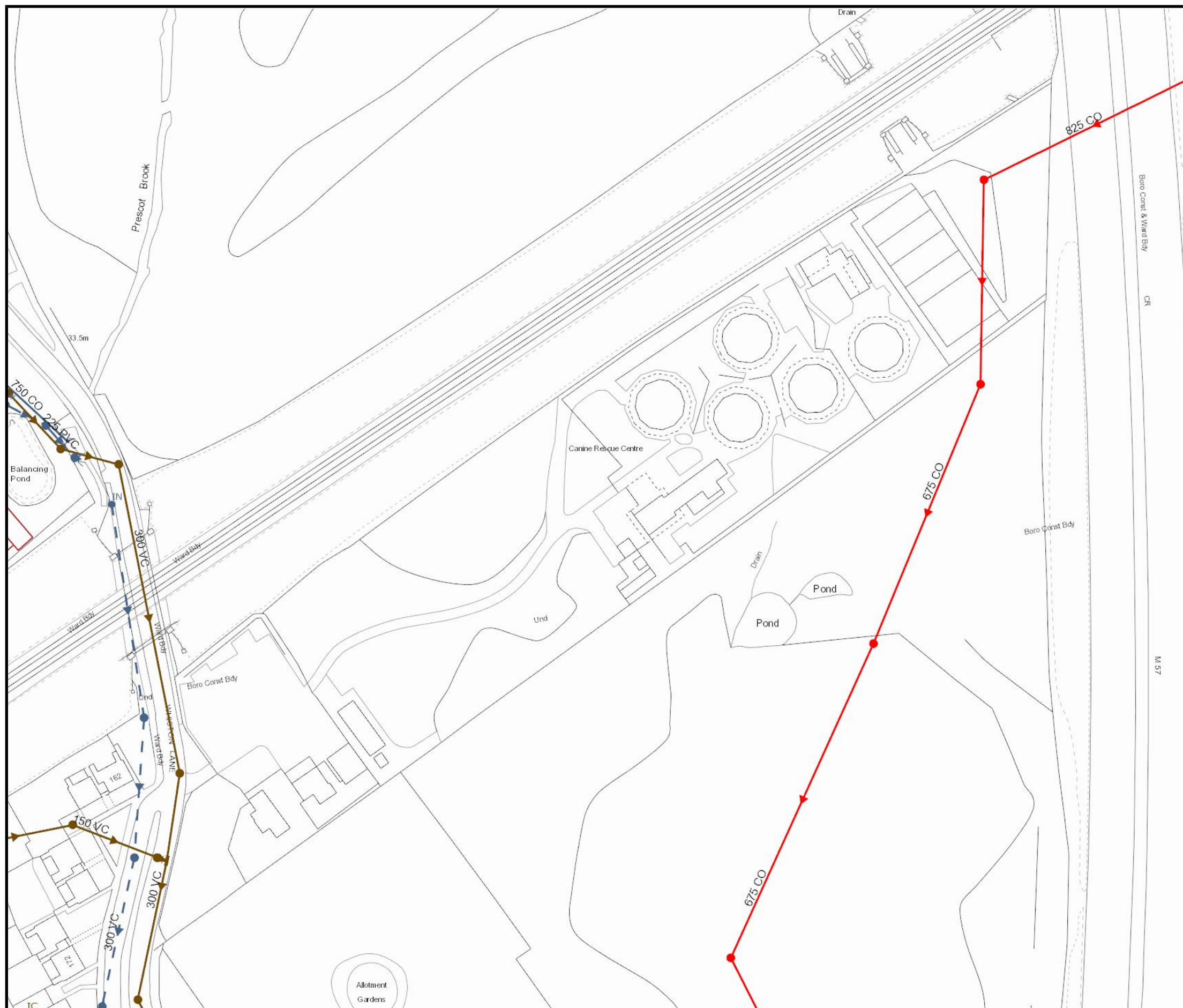
- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

Wastewater Symbolology



All point assets follow the standard colour convention: **red** – combined **brown** - foul
blue – surface water **purple** - overflow

Manhole	Side Entry Manhole
Head of System	Outfall
Extent of Survey	Screen Chamber
Rodding Eye	Inspection Chamber
Inlet	Bifurcation Chamber
Discharge Point	Lamp Hole
Vortex	T Junction / Saddle
Penstock	Catchpit
Washout Chamber	Valve Chamber
Valve	Vent Column
Air Valve	Vortex Chamber
Non Return Valve	Penstock Chamber
Soakaway	Network Storage Tank
Gully	Sewer Overflow
Cascade	Ww Treatment Works
Flow Meter	Ww Pumping Station
Hatch Box	Septic Tank
Oil Interceptor	Control Kiosk
Summit	
Drop Shaft	Change of Characteristic
Orifice Plate	



Water for the North West

SEWER RECORDS

Address or Site Reference

Dogs Trust Merseyside,

Scale: 1:1250
Date: 03/04/2023

Printed by: Property Searches

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

Crown copyright and database rights 2017
Ordnance Survey 100022432. Unauthorised reproduction will infringe these copyrights.

Appendix E– Greenfield Runoff Rates

Greenfield runoff rate estimation for sites

www.uksubs.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

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

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	877	877
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

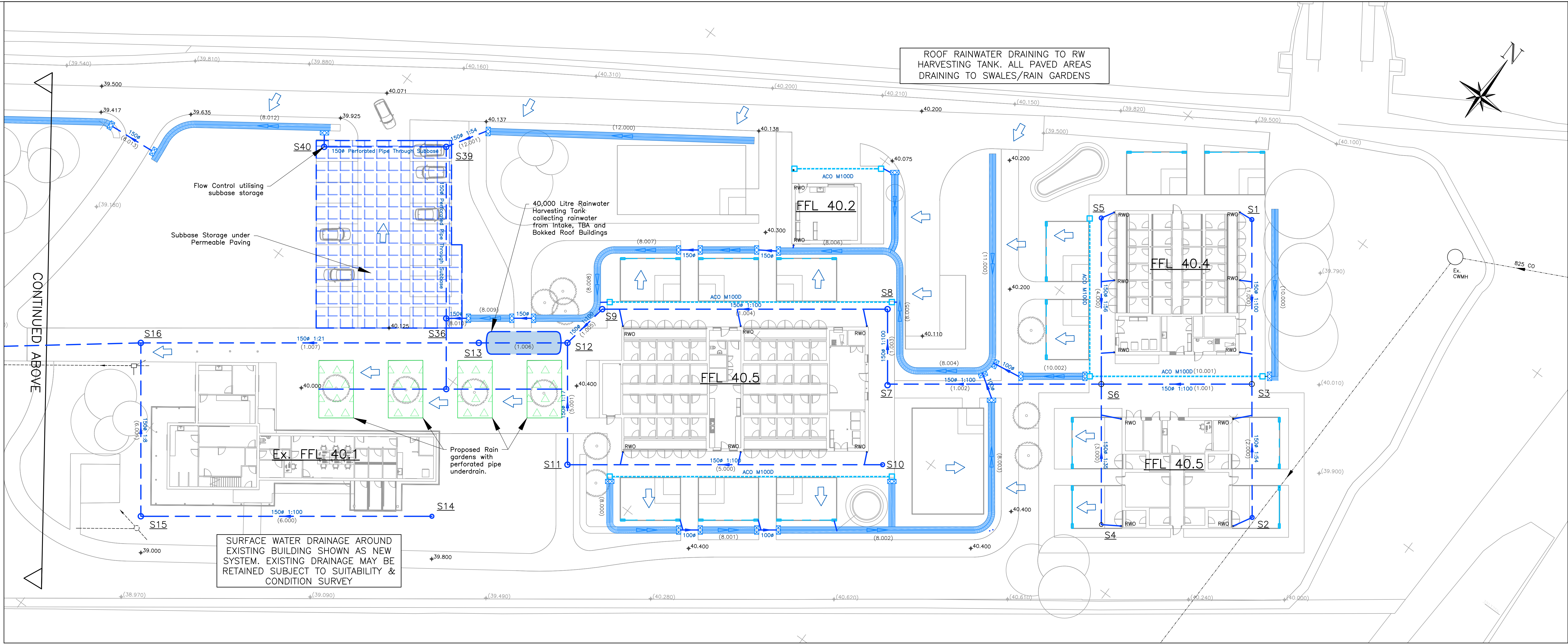
(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

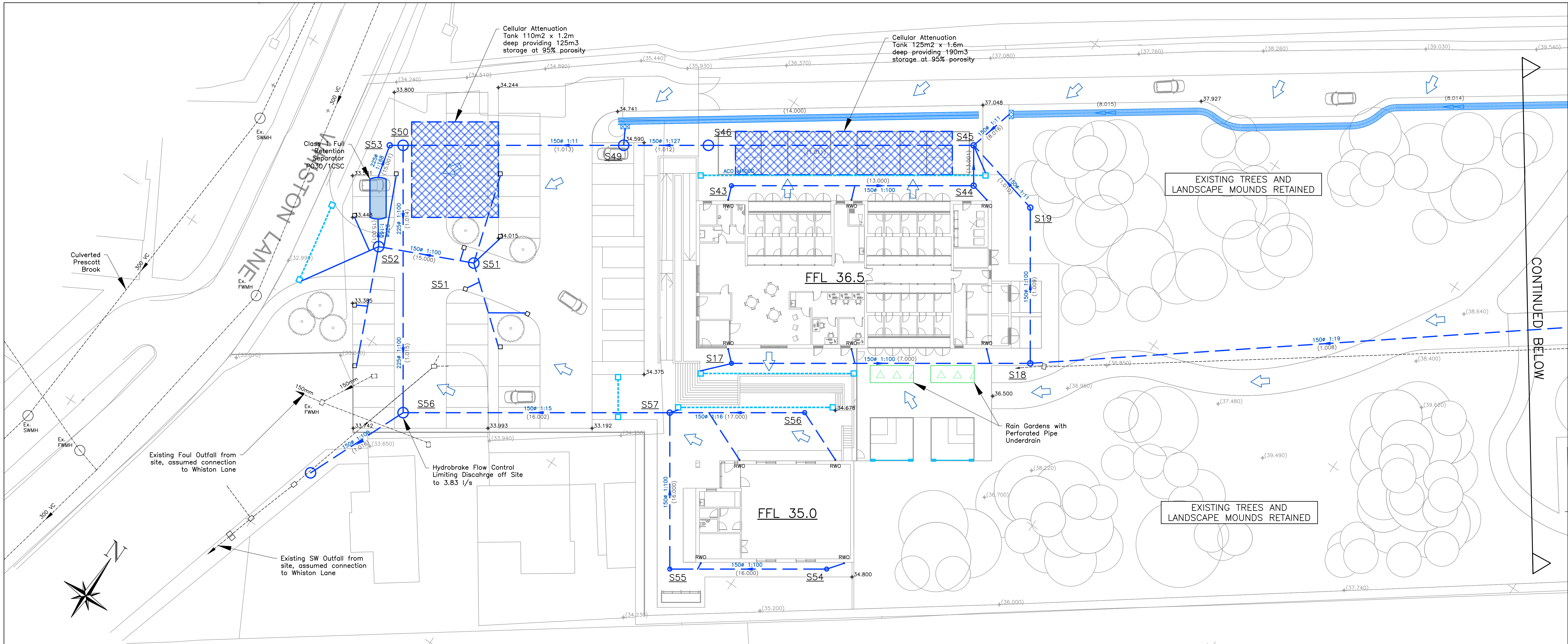
Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	6.28	6.28
1 in 1 year (l/s):	5.47	5.47
1 in 30 years (l/s):	10.68	10.68
1 in 100 year (l/s):	13.07	13.07
1 in 200 years (l/s):	14.9	14.9

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Appendix F – Drainage Strategy Plan



- KEY
- Proposed Surface Water Sewer
 - Proposed Foul Water Sewer
 - Proposed Swale
 - Existing SW Sewer
 - Existing FW Sewer
 - Existing Combined Sewer
 - Kerb Drain
 - Drainage Channel
 - Attenuation Tank
 - Rain Garden
 - Overland Flow Route
 - Flood Extents
 - (Existing) / Proposed Level



NOLAN ASSOCIATES
**PRELIMINARY
DRAWING**
NOT TO BE USED FOR CONSTRUCTION

P1	PRELIMINARY	...	KP	22.06.23
REV	DESCRIPTION	BY	CHKD	DATE

Dogs Trust
Merseyside Rehoming Centre

Surface Water Drainage Strategy

Dogs Trust

NOLAN ASSOCIATES
CONSULTING CIVIL & STRUCTURAL ENGINEERS
54 HAGLEY ROAD, EDGBASTON, BIRMINGHAM B16 8PE
TEL: 0121-454 3099 FAX: 0121-454 3059
E-MAIL: enquiries@nolanassociates.co.uk

Drawn by	Date	Plot Date	Scale
.	22.06.23	22.06.23	1:200@A0
Checked by	Project No	Dwg No	P1
	2022-192	100	

Appendix G – Microdrainage Calculations

Nolan Associates Ltd		Page 1
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	18.794	0.188	100.0	0.012	5.00	0.0	0.600		o	150	Pipe/Conduit	
2.000	15.533	0.288	53.9	0.008	5.00	0.0	0.600		o	150	Pipe/Conduit	
1.001	17.354	0.174	100.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
3.000	16.184	0.461	35.1	0.009	5.00	0.0	0.600		o	150	Pipe/Conduit	
4.000	20.367	0.361	56.3	0.012	5.00	0.0	0.600		o	150	Pipe/Conduit	
1.002	24.645	0.246	100.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.003	8.768	0.088	100.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.004	33.062	0.331	100.0	0.021	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.005	5.513	0.055	100.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
5.000	36.246	0.362	100.0	0.021	5.00	0.0	0.600		o	150	Pipe/Conduit	
5.001	14.068	0.819	17.2	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.006	10.339	0.200	51.7	0.000	0.00	0.0	0.600		o	2600	Pipe/Conduit	
1.007	38.959	1.819	21.4	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
6.000	33.328	0.900	37.0	0.011	5.00	0.0	0.600		o	150	Pipe/Conduit	
6.001	19.646	2.450	8.0	0.000	0.00	0.0	0.600		o	150	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	5.31	39.600	0.012	0.0	0.0	0.0	1.00	17.8	1.6
2.000	50.00	5.19	39.700	0.008	0.0	0.0	0.0	1.37	24.3	1.0
1.001	50.00	5.60	39.412	0.020	0.0	0.0	0.0	1.00	17.8	2.7
3.000	50.00	5.16	39.700	0.009	0.0	0.0	0.0	1.71	30.1	1.2
4.000	50.00	5.25	39.600	0.012	0.0	0.0	0.0	1.34	23.7	1.6
1.002	50.00	6.01	39.239	0.040	0.0	0.0	0.0	1.00	17.8	5.5
1.003	50.00	6.15	38.992	0.040	0.0	0.0	0.0	1.00	17.8	5.5
1.004	50.00	6.70	38.904	0.062	0.0	0.0	0.0	1.00	17.8	8.3
1.005	50.00	6.79	38.574	0.062	0.0	0.0	0.0	1.00	17.8	8.3
5.000	50.00	5.60	39.700	0.021	0.0	0.0	0.0	1.00	17.8	2.9
5.001	50.00	5.70	39.338	0.021	0.0	0.0	0.0	2.44	43.2	2.9
1.006	50.00	6.81	35.919	0.083	0.0	0.0	0.0	8.34	44285.0	11.2
1.007	50.00	7.11	38.319	0.083	0.0	0.0	0.0	2.19	38.6	11.2
6.000	50.00	5.33	39.850	0.011	0.0	0.0	0.0	1.66	29.3	1.5
6.001	50.00	5.43	38.950	0.011	0.0	0.0	0.0	3.58	63.3	1.5

Nolan Associates Ltd		Page 2
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

STORM SEWER DESIGN by the Modified Rational Method

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.008	68.411	1.144	59.8	0.015	0.00	0.0	0.600		o	150	Pipe/Conduit	
7.000	34.441	0.344	100.0	0.059	5.00	0.0	0.600		o	150	Pipe/Conduit	
1.009	20.211	0.202	100.1	0.006	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.010	7.457	0.679	11.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
8.000	9.326	0.019	490.8	0.006	5.00	0.0		0.035 →_/→			Swale	
8.001	31.659	0.063	502.5	0.008	0.00	0.0		0.035 →_/→			Swale	
8.002	14.437	0.029	497.8	0.006	0.00	0.0		0.035 →_/→			Swale	
9.000	6.259	0.111	56.4	0.007	5.00	0.0		0.035 →_/→			Swale	
8.003	18.230	0.036	506.4	0.000	0.00	0.0		0.035 →_/→			Swale	
10.000	18.323	0.030	610.8	0.009	5.00	0.0		0.035 →_/→			Swale	
10.001	20.459	0.050	409.2	0.007	0.00	0.0	0.600		o	100	Pipe/Conduit	
10.002	11.041	0.022	501.9	0.022	0.00	0.0		0.035 →_/→			Swale	
11.000	24.802	0.050	496.0	0.004	5.00	0.0		0.035 →_/→			Swale	
8.004	10.958	0.022	498.1	0.000	0.00	0.0		0.035 →_/→			Swale	
8.005	11.922	0.024	496.8	0.008	0.00	0.0		0.035 →_/→			Swale	
8.006	17.800	0.036	494.4	0.033	0.00	0.0		0.035 →_/→			Swale	
8.007	14.873	0.030	495.8	0.000	0.00	0.0		0.035 →_/→			Swale	

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)
1.008	50.00	7.99	36.500	0.109	0.0	0.0	0.0	1.30	23.0	14.8
7.000	50.00	5.57	35.700	0.059	0.0	0.0	0.0	1.00	17.8	7.9
1.009	50.00	8.32	35.356	0.174	0.0	0.0	0.0	1.00	17.8«	23.5
1.010	50.00	8.36	35.154	0.174	0.0	0.0	0.0	3.06	54.0	23.5
8.000	50.00	5.62	40.250	0.006	0.0	0.0	0.0	0.25	24.3	0.9
8.001	50.00	7.62	40.231	0.014	0.0	0.0	0.0	0.26	31.5	2.0
8.002	50.00	8.38	40.168	0.021	0.0	0.0	0.0	0.32	66.4	2.8
9.000	50.00	5.14	40.250	0.007	0.0	0.0	0.0	0.73	71.6	1.0
8.003	50.00	9.96	40.139	0.028	0.0	0.0	0.0	0.19	9.1	3.8
10.000	50.00	6.37	40.150	0.009	0.0	0.0	0.0	0.22	21.8	1.3
10.001	50.00	7.28	40.120	0.016	0.0	0.0	0.0	0.37	2.9	2.2
10.002	50.00	8.02	40.070	0.038	0.0	0.0	0.0	0.25	24.8	5.2
11.000	50.00	6.67	40.050	0.004	0.0	0.0	0.0	0.25	24.2	0.5
8.004	50.00	10.59	40.000	0.070	0.0	0.0	0.0	0.29	46.8	9.5
8.005	50.00	11.23	39.978	0.079	0.0	0.0	0.0	0.31	59.9	10.7
8.006	50.00	12.12	39.954	0.112	0.0	0.0	0.0	0.33	76.6	15.2
8.007	50.00	12.69	39.918	0.112	0.0	0.0	0.0	0.43	223.0	15.2

Nolan Associates Ltd		Page 3
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

STORM SEWER DESIGN by the Modified Rational Method

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
8.008	11.684	0.023	508.0	0.003	0.00	0.0		0.035	→_/→		Swale	
8.009	8.304	0.017	488.5	0.000	0.00	0.0		0.035	→_/→		Swale	
8.010	2.225	0.060	37.1	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
8.011	25.353	0.300	84.5	0.039	0.00	0.0	0.600		o	300	Pipe/Conduit	
12.000	29.605	0.059	500.0	0.017	5.00	0.0		0.035	→_/→		Swale	
12.001	4.924	0.091	54.1	0.003	0.00	0.0		0.035	→_/→		Swale	
12.002	13.797	0.060	230.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
8.012	21.652	0.043	500.0	0.006	0.00	0.0		0.035	→_/→		Swale	
8.013	7.130	0.100	71.3	0.010	0.00	0.0	0.600		o	150	Pipe/Conduit	
8.014	33.157	1.000	33.2	0.000	0.00	0.0		0.035	→_/→		Swale	
8.015	31.137	0.950	32.8	0.015	0.00	0.0		0.035	→_/→		Swale	
8.016	7.327	2.475	3.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
13.000	26.285	0.263	100.0	0.042	5.00	0.0	0.600		o	150	Pipe/Conduit	
13.001	3.580	0.962	3.7	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.011	30.213	0.180	168.0	0.014	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.012	9.078	0.327	27.8	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
14.000	37.589	2.100	17.9	0.011	5.00	0.0		0.035	→_/→		Swale	
14.001	4.524	1.057	4.3	0.003	0.00	0.0		0.045	o	150	Pipe/Conduit	
1.013	22.505	2.000	11.3	0.000	0.00	0.0	0.600		o	150	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)
8.008	50.00	13.18	39.888	0.115	0.0	0.0	0.0	0.40	159.5	15.6
8.009	50.00	13.56	39.865	0.115	0.0	0.0	0.0	0.37	110.7	15.6
8.010	50.00	13.58	39.600	0.115	0.0	0.0	0.0	1.66	29.3	15.6
8.011	50.00	13.83	39.540	0.154	0.0	0.0	0.0	1.71	121.0	20.8
12.000	50.00	7.00	39.950	0.017	0.0	0.0	0.0	0.25	24.1	2.3
12.001	50.00	7.09	39.891	0.020	0.0	0.0	0.0	0.91	157.4	2.7
12.002	50.00	7.44	39.300	0.020	0.0	0.0	0.0	0.66	11.6	2.7
8.012	50.00	14.71	39.240	0.180	0.0	0.0	0.0	0.41	187.4	24.3
8.013	50.00	5.10	39.000	0.000	10.0	0.0	0.0	1.19	21.1	10.0
8.014	50.00	5.42	38.900	0.000	10.0	0.0	0.0	1.73	997.1	10.0
8.015	50.00	5.72	37.900	0.015	10.0	0.0	0.0	1.74	1002.8	12.0
8.016	50.00	5.74	36.950	0.015	10.0	0.0	0.0	5.90	104.3	12.0
13.000	50.00	5.44	35.700	0.042	0.0	0.0	0.0	1.00	17.8	5.6
13.001	50.00	5.45	35.437	0.042	0.0	0.0	0.0	5.26	93.0	5.6
1.011	50.00	8.86	34.000	0.244	10.0	0.0	0.0	1.01	40.0<	43.1
1.012	50.00	5.08	33.820	0.000	10.0	0.0	0.0	1.92	33.9	10.0
14.000	50.00	5.27	36.650	0.011	0.0	0.0	0.0	2.35	1357.0	1.5
14.001	50.00	5.33	34.550	0.014	0.0	0.0	0.0	1.20	21.3	1.9
1.013	50.00	5.45	33.493	0.014	10.0	0.0	0.0	3.02	53.4	11.9

Nolan Associates Ltd		Page 4
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

STORM SEWER DESIGN by the Modified Rational Method

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
15.000	10.358	0.104	100.0	0.065	5.00	0.0	0.600		o	150	Pipe/Conduit	
15.001	10.609	0.063	168.0	0.054	0.00	0.0	0.600		o	225	Pipe/Conduit	
15.002	6.865	0.041	168.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.014	28.656	0.156	183.4	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
16.000	18.591	0.186	100.0	0.010	5.00	0.0	0.600		o	150	Pipe/Conduit	
16.001	18.491	0.814	22.7	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
17.000	16.067	1.000	16.1	0.019	5.00	0.0	0.600		o	150	Pipe/Conduit	
16.002	29.586	1.944	15.2	0.013	0.00	0.0	0.600		o	150	Pipe/Conduit	
1.015	14.034	0.140	100.0	0.000	0.00	0.0	0.600		o	150	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)
15.000	50.00	5.17	32.850	0.065	0.0	0.0	0.0	1.00	17.8	8.8
15.001	50.00	5.35	32.671	0.119	0.0	0.0	0.0	1.01	40.0	16.2
15.002	50.00	5.46	32.608	0.119	0.0	0.0	0.0	1.01	40.0	16.2
1.014	50.00	5.96	31.418	0.134	10.0	0.0	0.0	0.96	38.3	28.1
16.000	50.00	5.31	34.150	0.010	0.0	0.0	0.0	1.00	17.8	1.4
16.001	50.00	5.45	33.964	0.010	0.0	0.0	0.0	2.12	37.5	1.4
17.000	50.00	5.11	34.150	0.019	0.0	0.0	0.0	2.53	44.6	2.6
16.002	50.00	5.64	33.150	0.042	0.0	0.0	0.0	2.60	45.9	5.7
1.015	50.00	6.19	31.131	0.175	10.0	0.0	0.0	1.00	17.8«	33.8

Nolan Associates Ltd		Page 5
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o		1	40.350	39.600	0.600	Open Manhole	450
2.000	o	150	2	40.450	39.700	0.600	Open Manhole	450
1.001	o	150	3	40.420	39.412	0.858	Open Manhole	600
3.000	o	150	4	40.450	39.700	0.600	Open Manhole	450
4.000	o	150	5	40.350	39.600	0.600	Open Manhole	450
1.002	o	150	6	40.404	39.239	1.015	Open Manhole	600
1.003	o	150	7	40.400	38.992	1.258	Open Manhole	600
1.004	o	150	8	40.350	38.904	1.296	Open Manhole	600
1.005	o	150	9	40.511	38.574	1.787	Open Manhole	600
5.000	o	150	10	40.450	39.700	0.600	Open Manhole	450
5.001	o	150	11	40.350	39.338	0.863	Open Manhole	600
1.006	o	2600	12	40.403	35.919	1.884	Open Manhole	600
1.007	o	150	13	40.188	38.319	1.719	Open Manhole	600
6.000	o	150	14	40.000	39.850	0.000	Open Manhole	1200
6.001	o	150	15	39.100	38.950	0.000	Open Manhole	1200
1.008	o	150	16	39.180	36.500	2.530	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	18.794	100.0	3	40.420	39.412	0.858	Open Manhole	600
2.000	15.533	53.9	3	40.420	39.412	0.858	Open Manhole	600
1.001	17.354	100.0	6	40.404	39.239	1.015	Open Manhole	600
3.000	16.184	35.1	6	40.404	39.239	1.015	Open Manhole	600
4.000	20.367	56.3	6	40.404	39.239	1.015	Open Manhole	600
1.002	24.645	100.0	7	40.400	38.992	1.258	Open Manhole	600
1.003	8.768	100.0	8	40.350	38.904	1.296	Open Manhole	600
1.004	33.062	100.0	9	40.511	38.574	1.787	Open Manhole	600
1.005	5.513	100.0	12	40.403	38.519	1.734	Open Manhole	600
5.000	36.246	100.0	11	40.350	39.338	0.863	Open Manhole	600
5.001	14.068	17.2	12	40.403	38.519	1.734	Open Manhole	600
1.006	10.339	51.7	13	40.188	35.719	1.869	Open Manhole	600
1.007	38.959	21.4	16	39.180	36.500	2.530	Open Manhole	1200
6.000	33.328	37.0	15	39.100	38.950	0.000	Open Manhole	1200
6.001	19.646	8.0	16	39.180	36.500	2.530	Open Manhole	1200
1.008	68.411	59.8	18	36.450	35.356	0.944	Open Manhole	1200

Nolan Associates Ltd		Page 6
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
7.000	o	150	17	36.450	35.700	0.600	Open Manhole	1200
1.009	o	150	18	36.450	35.356	0.944	Open Manhole	1200
1.010	o	150	19	36.400	35.154	1.096	Open Manhole	1200
8.000	→_/→		20	40.400	40.250	0.000	Junction	
8.001	→_/→		21	40.400	40.231	0.000	Junction	
8.002	→_/→		22	40.400	40.168	0.000	Junction	
9.000	→_/→		23	40.400	40.250	0.000	Junction	
8.003	→_/→		24	40.400	40.139	0.164	Junction	
10.000	→_/→		25	40.300	40.150	0.000	Junction	
10.001	o	100	26	40.300	40.120	0.080	Junction	
10.002	→_/→		27	40.300	40.070	0.078	Junction	
11.000	→_/→		28	40.200	40.050	0.000	Junction	
8.004	→_/→		29	40.200	40.000	0.000	Junction	
8.005	→_/→		30	40.200	39.978	0.000	Junction	
8.006	→_/→		31	40.200	39.954	0.000	Junction	
8.007	→_/→		32	40.300	39.918	0.000	Junction	
8.008	→_/→		33	40.300	39.888	0.077	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
7.000	34.441	100.0	18	36.450	35.356	0.944	Open Manhole	1200
1.009	20.211	100.1	19	36.400	35.154	1.096	Open Manhole	1200
1.010	7.457	11.0	45	36.400	34.475	1.775	Open Manhole	1200
8.000	9.326	490.8	21	40.400	40.231	0.019	Junction	
8.001	31.659	502.5	22	40.400	40.168	0.063	Junction	
8.002	14.437	497.8	24	40.400	40.139	0.029	Junction	
9.000	6.259	56.4	24	40.400	40.139	0.111	Junction	
8.003	18.230	506.4	29	40.200	40.103	0.000	Junction	
10.000	18.323	610.8	26	40.300	40.120	0.030	Junction	
10.001	20.459	409.2	27	40.300	40.070	0.130	Junction	
10.002	11.041	501.9	29	40.200	40.048	0.000	Junction	
11.000	24.802	496.0	29	40.200	40.000	0.050	Junction	
8.004	10.958	498.1	30	40.200	39.978	0.022	Junction	
8.005	11.922	496.8	31	40.200	39.954	0.024	Junction	
8.006	17.800	494.4	32	40.300	39.918	0.136	Junction	
8.007	14.873	495.8	33	40.300	39.888	0.030	Junction	
8.008	11.684	508.0	34	40.200	39.865	0.000	Junction	

Nolan Associates Ltd		Page 7
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
8.009	→_/→		34	40.200	39.865	0.049	Junction	
8.010	o	150	35	40.134	39.600	0.384	Junction	
8.011	o	300	36	40.200	39.540	0.360	Junction	
12.000	→_/→		37	40.100	39.950	0.000	Junction	
12.001	→_/→		38	40.100	39.891	0.000	Junction	
12.002	o	150	39	40.025	39.300	0.575	Junction	
8.012	→_/→		40	39.900	39.240	0.357	Junction	
8.013	o	150	41	39.500	39.000	0.350	Junction	
8.014	→_/→		42	39.400	38.900	0.150	Junction	
8.015	→_/→		42.1	38.250	37.900	0.000	Junction	
8.016	o	150	42.2	37.300	36.950	0.200	Junction	
13.000	o	150	43	36.450	35.700	0.600	Open Manhole	1200
13.001	o	150	44	36.450	35.437	0.863	Open Manhole	1200
1.011	o	225	45	36.400	34.000	2.175	Open Manhole	1200
1.012	o	150	46	36.300	33.820	2.330	Open Manhole	1200
14.000	→_/→		47	37.000	36.650	0.000	Junction	
14.001	o	150	48	34.900	34.550	0.200	Open Manhole	1200
1.013	o	150	49	34.520	33.493	0.877	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
8.009	8.304	488.5	35	40.134	39.848	0.000	Junction	
8.010	2.225	37.1	36	40.200	39.540	0.510	Junction	
8.011	25.353	84.5	40	39.900	39.240	0.360	Junction	
12.000	29.605	500.0	38	40.100	39.891	0.059	Junction	
12.001	4.924	54.1	39	40.025	39.800	0.016	Junction	
12.002	13.797	230.0	40	39.900	39.240	0.510	Junction	
8.012	21.652	500.0	41	39.500	39.197	0.000	Junction	
8.013	7.130	71.3	42	39.400	38.900	0.350	Junction	
8.014	33.157	33.2	42.1	38.250	37.900	0.000	Junction	
8.015	31.137	32.8	42.2	37.300	36.950	0.000	Junction	
8.016	7.327	3.0	45	36.400	34.475	1.775	Open Manhole	1200
13.000	26.285	100.0	44	36.450	35.437	0.863	Open Manhole	1200
13.001	3.580	3.7	45	36.400	34.475	1.775	Open Manhole	1200
1.011	30.213	168.0	46	36.300	33.820	2.255	Open Manhole	1200
1.012	9.078	27.8	49	34.520	33.493	0.877	Open Manhole	1200
14.000	37.589	17.9	48	34.900	34.550	0.000	Open Manhole	1200
14.001	4.524	4.3	49	34.520	33.493	0.877	Open Manhole	1200
1.013	22.505	11.3	50	33.884	31.493	2.241	Open Manhole	1200

Nolan Associates Ltd		Page 8
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
15.000	o	150	51	33.900	32.850	0.900	Open Manhole	1200
15.001	o	225	52	33.499	32.671	0.603	Open Manhole	1200
15.002	o	225	53	33.562	32.608	0.729	Open Manhole	1200
1.014	o	225	50	33.884	31.418	2.241	Open Manhole	1200
16.000	o	150	54	34.900	34.150	0.600	Open Manhole	1200
16.001	o	150	55	34.900	33.964	0.786	Open Manhole	1200
17.000	o	150	56	34.900	34.150	0.600	Open Manhole	1200
16.002	o	150	57	34.600	33.150	1.300	Open Manhole	1200
1.015	o	150	58	33.792	31.131	2.511	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
15.000	10.358	100.0	52	33.499	32.746	0.602	Open Manhole	1200
15.001	10.609	168.0	53	33.562	32.608	0.729	Open Manhole	1200
15.002	6.865	168.0	50	33.884	32.567	1.092	Open Manhole	1200
1.014	28.656	183.4	58	33.792	31.262	2.305	Open Manhole	1200
16.000	18.591	100.0	55	34.900	33.964	0.786	Open Manhole	1200
16.001	18.491	22.7	57	34.600	33.150	1.300	Open Manhole	1200
17.000	16.067	16.1	57	34.600	33.150	1.300	Open Manhole	1200
16.002	29.586	15.2	58	33.792	31.206	2.436	Open Manhole	1200
1.015	14.034	100.0	59	33.510	30.991	2.369	Open Manhole	1200

Nolan Associates Ltd		Page 9
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.012	0.012	0.012
2.000	User	-	100	0.008	0.008	0.008
1.001	-	-	100	0.000	0.000	0.000
3.000	User	-	100	0.009	0.009	0.009
4.000	User	-	100	0.012	0.012	0.012
1.002	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
1.004	User	-	100	0.021	0.021	0.021
1.005	-	-	100	0.000	0.000	0.000
5.000	User	-	100	0.021	0.021	0.021
5.001	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
6.000	User	-	100	0.011	0.011	0.011
6.001	-	-	100	0.000	0.000	0.000
1.008	User	-	100	0.015	0.015	0.015
7.000	User	-	100	0.038	0.038	0.038
	User	-	100	0.021	0.021	0.059
1.009	User	-	100	0.006	0.006	0.006
1.010	-	-	100	0.000	0.000	0.000
8.000	User	-	100	0.006	0.006	0.006
8.001	User	-	100	0.008	0.008	0.008
8.002	User	-	100	0.004	0.004	0.004
	User	-	100	0.003	0.003	0.006
9.000	User	-	100	0.007	0.007	0.007
8.003	-	-	100	0.000	0.000	0.000
10.000	User	-	100	0.009	0.009	0.009
10.001	User	-	100	0.007	0.007	0.007
10.002	User	-	100	0.012	0.012	0.012
	User	-	100	0.010	0.010	0.022
11.000	User	-	100	0.004	0.004	0.004
8.004	-	-	100	0.000	0.000	0.000
8.005	User	-	100	0.005	0.005	0.005
	User	-	100	0.003	0.003	0.008
8.006	User	-	100	0.009	0.009	0.009
	User	-	100	0.007	0.007	0.017
	User	-	100	0.017	0.017	0.033
8.007	-	-	100	0.000	0.000	0.000
8.008	User	-	100	0.003	0.003	0.003
8.009	-	-	100	0.000	0.000	0.000
8.010	-	-	100	0.000	0.000	0.000
8.011	User	-	100	0.039	0.039	0.039
12.000	User	-	100	0.017	0.017	0.017
12.001	User	-	100	0.003	0.003	0.003
12.002	-	-	100	0.000	0.000	0.000
8.012	User	-	100	0.006	0.006	0.006
8.013	User	-	100	0.010	0.010	0.010
8.014	-	-	100	0.000	0.000	0.000
8.015	User	-	100	0.015	0.015	0.015
8.016	-	-	100	0.000	0.000	0.000
13.000	User	-	100	0.042	0.042	0.042
13.001	-	-	100	0.000	0.000	0.000
1.011	User	-	100	0.014	0.014	0.014
1.012	-	-	100	0.000	0.000	0.000
14.000	User	-	100	0.011	0.011	0.011
14.001	User	-	100	0.003	0.003	0.003
1.013	-	-	100	0.000	0.000	0.000
15.000	User	-	100	0.065	0.065	0.065
15.001	User	-	100	0.054	0.054	0.054
15.002	-	-	100	0.000	0.000	0.000

Nolan Associates Ltd		Page 10
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.014	-	-	100	0.000	0.000	0.000
16.000	User	-	100	0.010	0.010	0.010
16.001	-	-	100	0.000	0.000	0.000
17.000	User	-	100	0.019	0.019	0.019
16.002	User	-	100	0.011	0.011	0.011
	User	-	100	0.002	0.002	0.013
1.015	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.609	0.609	0.609

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)
---------------------	--------------	--------------	--------------	------------------	----------	--------

1.015	59	33.510	30.991	30.630	1200	0
-------	----	--------	--------	--------	------	---

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 23 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

Nolan Associates Ltd		Page 11
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

Online Controls for Storm

Orifice Manhole: 40, DS/PN: 8.012, Volume (m³): 2.0

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 39.240

Hydro-Brake® Optimum Manhole: 46, DS/PN: 1.012, Volume (m³): 4.0

Unit Reference MD-SHE-0074-3000-1600-3000
Design Head (m) 1.600
Design Flow (l/s) 3.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 74
Invert Level (m) 33.820
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	3.0	Kick-Flo®	0.661	2.0
Flush-Flo™	0.323	2.5	Mean Flow over Head Range	-	2.4

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)	Depth (m)	Flow (l/s)
0.100	2.0	0.800	2.2	2.000	3.3	4.000	4.6	7.000	6.0
0.200	2.4	1.000	2.4	2.200	3.5	4.500	4.9	7.500	6.2
0.300	2.5	1.200	2.6	2.400	3.6	5.000	5.1	8.000	6.4
0.400	2.5	1.400	2.8	2.600	3.8	5.500	5.3	8.500	6.5
0.500	2.4	1.600	3.0	3.000	4.0	6.000	5.6	9.000	6.7
0.600	2.2	1.800	3.2	3.500	4.3	6.500	5.8	9.500	6.9

Hydro-Brake® Optimum Manhole: 58, DS/PN: 1.015, Volume (m³): 4.6

Unit Reference MD-SHE-0085-3800-1500-3800
Design Head (m) 1.500
Design Flow (l/s) 3.8
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 85
Invert Level (m) 31.131
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	3.8	Kick-Flo®	0.761	2.8
Flush-Flo™	0.374	3.5	Mean Flow over Head Range	-	3.2

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

Nolan Associates Ltd		Page 12
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

Hydro-Brake® Optimum Manhole: 58, DS/PN: 1.015, Volume (m³): 4.6

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.6	0.800	2.8	2.000	4.3	4.000	6.0	7.000	7.8
0.200	3.2	1.000	3.2	2.200	4.5	4.500	6.3	7.500	8.1
0.300	3.4	1.200	3.4	2.400	4.7	5.000	6.7	8.000	8.3
0.400	3.5	1.400	3.7	2.600	4.9	5.500	7.0	8.500	8.6
0.500	3.4	1.600	3.9	3.000	5.2	6.000	7.3	9.000	8.8
0.600	3.3	1.800	4.1	3.500	5.6	6.500	7.5	9.500	9.0

Nolan Associates Ltd		Page 13
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

Storage Structures for Storm

Swale Pipe: 8.000

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	9.3
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	490.8
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	40.250	Cap Infiltration Depth (m)	0.000

Swale Pipe: 8.001

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	31.7
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	502.5
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	40.231	Cap Infiltration Depth (m)	0.000

Swale Pipe: 8.002

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	14.4
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	497.8
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	40.168	Cap Infiltration Depth (m)	0.000

Swale Pipe: 9.000

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	6.3
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	56.4
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	40.250	Cap Infiltration Depth (m)	0.000

Swale Pipe: 8.003

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	18.2
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	506.4
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	40.139	Cap Infiltration Depth (m)	0.000

Swale Pipe: 10.000

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	18.3
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	610.8
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	40.150	Cap Infiltration Depth (m)	0.000

Nolan Associates Ltd		Page 14
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions Network 2018.1.1		

Swale Pipe: 10.002

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	11.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	501.9
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	40.070	Cap Infiltration Depth (m)	0.000

Swale Pipe: 11.000

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	24.8
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	496.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	40.050	Cap Infiltration Depth (m)	0.000

Swale Pipe: 8.004

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	11.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	498.1
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	40.000	Cap Infiltration Depth (m)	0.000

Swale Pipe: 8.005

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	11.9
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	496.8
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	39.978	Cap Infiltration Depth (m)	0.000

Swale Pipe: 8.006

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	17.8
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	494.4
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	39.954	Cap Infiltration Depth (m)	0.000

Swale Pipe: 8.007

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	14.9
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	495.8
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	39.918	Cap Infiltration Depth (m)	0.000

Swale Pipe: 8.008

Manning's N	0.035	Invert Level (m)	39.888
Infiltration Coefficient Base (m/hr)	0.00000	Base Width (m)	0.2
Infiltration Coefficient Side (m/hr)	0.00000	Length (m)	11.7
Safety Factor	2.0	Side Slope (1:X)	3.0
Porosity	1.00	Slope (1:X)	508.0

Nolan Associates Ltd		Page 15
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

Swale Pipe: 8.008

Cap Volume Depth (m) 0.000 Cap Infiltration Depth (m) 0.000

Swale Pipe: 8.009

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	8.3
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	488.5
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	39.865	Cap Infiltration Depth (m)	0.000

Swale Pipe: 12.000

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	29.6
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	500.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	39.950	Cap Infiltration Depth (m)	0.000

Swale Pipe: 12.001

Manning's N	0.035	Base Width (m)	0.2
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	4.9
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	54.1
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	39.891	Cap Infiltration Depth (m)	0.000

Porous Car Park Manhole: 40, DS/PN: 8.012

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	16.0
Membrane Percolation (mm/hr)	1000	Length (m)	21.0
Max Percolation (l/s)	93.3	Slope (1:X)	1000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	39.240	Cap Volume Depth (m)	0.450

Swale Pipe: 8.012

Manning's N	0.035	Base Width (m)	0.6
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	21.7
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	500.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	39.240	Cap Infiltration Depth (m)	0.000

Swale Pipe: 8.014

Manning's N	0.035	Base Width (m)	0.6
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	33.2
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	33.2
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	38.900	Cap Infiltration Depth (m)	0.000

Nolan Associates Ltd		Page 16
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:12	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

Swale Pipe: 8.015

Manning's N	0.035	Base Width (m)	0.6
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	31.1
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	32.8
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	37.900	Cap Infiltration Depth (m)	0.000

Cellular Storage Manhole: 46, DS/PN: 1.012

Invert Level (m)	33.820	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	125.0	80.0	1.600	125.0	122.9	1.601	0.0	123.0

Swale Pipe: 14.000

Manning's N	0.035	Base Width (m)	0.6
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	37.6
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	17.9
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	36.650	Cap Infiltration Depth (m)	0.000

Cellular Storage Manhole: 50, DS/PN: 1.014

Invert Level (m)	31.493	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	110.0	40.0	1.200	110.0	70.4	1.201	0.0	70.4

Nolan Associates Ltd		Page 1
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:19	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 3 Number of Storage Structures 23 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.398 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status ON
 Inertia 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, 2, 30, 100
 Climate Change (%) 0, 0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged
									Level (m)	Depth (m)
1.000	1	15 Winter	1	+0%	100/15 Summer				39.632	-0.118
2.000	2	15 Winter	1	+0%	100/15 Winter				39.721	-0.129
1.001	3	15 Winter	1	+0%	100/15 Summer				39.453	-0.109
3.000	4	15 Winter	1	+0%					39.720	-0.130
4.000	5	15 Winter	1	+0%	100/15 Winter				39.627	-0.123
1.002	6	15 Winter	1	+0%	100/15 Summer				39.298	-0.090
1.003	7	15 Winter	1	+0%	30/15 Summer				39.053	-0.089
1.004	8	15 Winter	1	+0%	30/15 Summer				38.976	-0.078
1.005	9	15 Winter	1	+0%	30/15 Summer				38.652	-0.071
5.000	10	15 Winter	1	+0%					39.742	-0.108
5.001	11	15 Winter	1	+0%					39.364	-0.123
1.006	12	10080 Winter	1	+0%					37.372	-1.147
1.007	13	10080 Winter	1	+0%					37.372	-1.097
6.000	14	15 Winter	1	+0%					39.873	-0.127
6.001	15	15 Winter	1	+0%					38.966	-0.134
1.008	16	15 Winter	1	+0%					36.538	-0.112
7.000	17	15 Winter	1	+0%	30/15 Summer	100/15 Summer			35.773	-0.077
1.009	18	15 Winter	1	+0%	30/15 Summer				35.449	-0.057
1.010	19	15 Winter	1	+0%	100/360 Winter				35.205	-0.099
8.000	20	15 Winter	1	+0%					40.284	-0.116
8.001	21	15 Winter	1	+0%					40.273	-0.127
8.002	22	30 Winter	1	+0%					40.211	-0.189
9.000	23	15 Winter	1	+0%					40.268	-0.132
8.003	24	30 Winter	1	+0%	100/15 Summer				40.184	-0.216
10.000	25	15 Winter	1	+0%					40.192	-0.108
10.001	26	15 Winter	1	+0%	30/15 Winter				40.168	-0.052
10.002	27	15 Winter	1	+0%					40.134	-0.166
11.000	28	30 Winter	1	+0%					40.079	-0.121
8.004	29	30 Winter	1	+0%					40.077	-0.123
8.005	30	30 Winter	1	+0%					40.060	-0.140

Nolan Associates Ltd		Page 2
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:19 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
1.000	1	0.000	0.10		1.6	OK	
2.000	2	0.000	0.05		1.1	OK	
1.001	3	0.000	0.16		2.7	OK	
3.000	4	0.000	0.04		1.2	OK	
4.000	5	0.000	0.07		1.7	OK	
1.002	6	0.000	0.33		5.5	OK	
1.003	7	0.000	0.35		5.5	OK	
1.004	8	0.000	0.46		7.8	OK	
1.005	9	0.000	0.54		7.8	OK	
5.000	10	0.000	0.17		2.9	OK	
5.001	11	0.000	0.07		2.9	OK	
1.006	12	0.000	0.00		0.2	OK	
1.007	13	0.000	0.00		0.0	OK	
6.000	14	0.000	0.05		1.5	FLOOD RISK	
6.001	15	0.000	0.03		1.5	FLOOD RISK	
1.008	16	0.000	0.14		3.2	OK	
7.000	17	0.000	0.47		8.0	OK	4
1.009	18	0.000	0.69		11.6	OK	
1.010	19	0.000	0.25		11.7	OK	
8.000	20	0.000	0.03		0.7	FLOOD RISK*	
8.001	21	0.000	0.02		1.1	FLOOD RISK*	
8.002	22	0.000	0.02		1.4	FLOOD RISK*	
9.000	23	0.000	0.00		1.0	FLOOD RISK*	
8.003	24	0.000	0.17		1.6	FLOOD RISK*	
10.000	25	0.000	0.03		0.9	FLOOD RISK*	
10.001	26	0.000	0.46		1.4	FLOOD RISK*	
10.002	27	0.000	0.16		3.3	FLOOD RISK*	
11.000	28	0.000	0.01		0.3	FLOOD RISK*	
8.004	29	0.000	0.09		4.2	FLOOD RISK*	
8.005	30	0.000	0.08		4.5	FLOOD RISK*	

Nolan Associates Ltd		Page 3
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:19	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

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

PN	US/MH		Return Period	Climate Change	First (X) SurchARGE	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
8.006	31	30 Winter	1	+0%					40.042	-0.158
8.007	32	30 Winter	1	+0%					40.004	-0.296
8.008	33	30 Winter	1	+0%					39.971	-0.329
8.009	34	30 Winter	1	+0%					39.942	-0.258
8.010	35	30 Winter	1	+0%	30/30 Winter				39.664	-0.086
8.011	36	60 Winter	1	+0%					39.587	-0.253
12.000	37	15 Winter	1	+0%					40.002	-0.098
12.001	38	15 Winter	1	+0%					39.916	-0.184
12.002	39	120 Winter	1	+0%	30/30 Winter				39.352	-0.098
8.012	40	120 Winter	1	+0%	100/30 Summer				39.351	-0.549
8.013	41	120 Winter	1	+0%					39.042	-0.108
8.014	42	120 Winter	1	+0%					38.917	-0.483
8.015	42.1	120 Winter	1	+0%					37.918	-0.332
8.016	42.2	120 Winter	1	+0%					36.969	-0.131
13.000	43	15 Winter	1	+0%	100/15 Summer				35.761	-0.089
13.001	44	15 Winter	1	+0%					35.468	-0.119
1.011	45	15 Winter	1	+0%	30/15 Summer				34.124	-0.101
1.012	46	240 Winter	1	+0%	1/60 Winter				34.057	0.087
14.000	47	15 Winter	1	+0%					36.659	-0.341
14.001	48	15 Winter	1	+0%					34.581	-0.119
1.013	49	60 Winter	1	+0%					33.515	-0.128
15.000	51	15 Winter	1	+0%	30/15 Summer				32.932	-0.068
15.001	52	15 Winter	1	+0%	30/15 Summer				32.779	-0.117
15.002	53	15 Winter	1	+0%	30/15 Summer				32.723	-0.110
1.014	50	120 Winter	1	+0%	2/120 Winter				31.596	-0.047
16.000	54	15 Winter	1	+0%					34.179	-0.121
16.001	55	15 Winter	1	+0%					33.983	-0.131
17.000	56	15 Winter	1	+0%					34.175	-0.125
16.002	57	15 Winter	1	+0%					33.185	-0.115
1.015	58	120 Winter	1	+0%	1/15 Summer				31.588	0.307

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)			
8.006	31	0.000	0.03	6.0	FLOOD RISK*		
8.007	32	0.000	0.03	5.9	FLOOD RISK*		
8.008	33	0.000	0.05	5.9	OK		
8.009	34	0.000	0.06	5.9	FLOOD RISK*		
8.010	35	0.000	0.38	5.9	OK*		
8.011	36	0.000	0.06	7.1	OK*		
12.000	37	0.000	0.03	1.8	FLOOD RISK*		
12.001	38	0.000	0.01	2.0	FLOOD RISK*		
12.002	39	0.000	0.08	0.9	OK*		
8.012	40	0.000	0.02	3.5	OK		
8.013	41	0.000	0.18	3.5	OK*		
8.014	42	0.000	0.00	3.5	OK		
8.015	42.1	0.000	0.00	3.7	OK		
8.016	42.2	0.000	0.04	3.7	OK*		
13.000	43	0.000	0.34	5.7	OK		
13.001	44	0.000	0.09	5.7	OK		
1.011	45	0.000	0.58	21.7	OK		
1.012	46	0.000	0.08	2.4	SURCHARGED		
14.000	47	0.000	0.00	1.6	OK		
14.001	48	0.000	0.09	1.9	OK		
1.013	49	0.000	0.05	2.7	OK		

Nolan Associates Ltd		Page 4
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:19 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
15.000	51	0.000	0.56		8.9	OK	
15.001	52	0.000	0.46		15.4	OK	
15.002	53	0.000	0.52		15.4	OK	
1.014	50	0.000	0.13		4.7	OK	
16.000	54	0.000	0.08		1.4	OK	
16.001	55	0.000	0.04		1.4	OK	
17.000	56	0.000	0.06		2.6	OK	
16.002	57	0.000	0.12		5.5	OK	
1.015	58	0.000	0.21		3.5	SURCHARGED	

Nolan Associates Ltd		Page 5
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:19	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

2 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 3 Number of Storage Structures 23 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.398 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status ON
 Inertia 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, 2, 30, 100
 Climate Change (%) 0, 0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged
									Level (m)	Depth (m)
1.000	1	15 Winter	2	+0%	100/15 Summer				39.636	-0.114
2.000	2	15 Winter	2	+0%	100/15 Winter				39.724	-0.126
1.001	3	15 Winter	2	+0%	100/15 Summer				39.459	-0.103
3.000	4	15 Winter	2	+0%					39.723	-0.127
4.000	5	15 Winter	2	+0%	100/15 Winter				39.631	-0.119
1.002	6	15 Winter	2	+0%	100/15 Summer				39.307	-0.081
1.003	7	15 Winter	2	+0%	30/15 Summer				39.063	-0.079
1.004	8	15 Winter	2	+0%	30/15 Summer				38.988	-0.066
1.005	9	15 Winter	2	+0%	30/15 Summer				38.666	-0.057
5.000	10	15 Winter	2	+0%					39.748	-0.102
5.001	11	15 Winter	2	+0%					39.369	-0.119
1.006	12	10080 Winter	2	+0%					37.595	-0.924
1.007	13	10080 Winter	2	+0%					37.595	-0.873
6.000	14	15 Winter	2	+0%					39.876	-0.124
6.001	15	15 Winter	2	+0%					38.968	-0.132
1.008	16	15 Winter	2	+0%					36.544	-0.106
7.000	17	15 Winter	2	+0%	30/15 Summer	100/15 Summer			35.786	-0.064
1.009	18	15 Winter	2	+0%	30/15 Summer				35.468	-0.038
1.010	19	15 Winter	2	+0%	100/360 Winter				35.213	-0.091
8.000	20	15 Winter	2	+0%					40.290	-0.110
8.001	21	15 Winter	2	+0%					40.279	-0.121
8.002	22	30 Winter	2	+0%					40.219	-0.181
9.000	23	15 Winter	2	+0%					40.271	-0.129
8.003	24	30 Winter	2	+0%	100/15 Summer				40.192	-0.208
10.000	25	15 Winter	2	+0%					40.199	-0.101
10.001	26	15 Winter	2	+0%	30/15 Winter				40.177	-0.043
10.002	27	15 Winter	2	+0%					40.143	-0.157
11.000	28	30 Winter	2	+0%					40.092	-0.108
8.004	29	30 Winter	2	+0%					40.091	-0.109
8.005	30	30 Winter	2	+0%					40.074	-0.126

Nolan Associates Ltd		Page 6
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:19 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
1.000	1	0.000	0.13		2.1	OK	
2.000	2	0.000	0.06		1.4	OK	
1.001	3	0.000	0.21		3.5	OK	
3.000	4	0.000	0.06		1.6	OK	
4.000	5	0.000	0.10		2.2	OK	
1.002	6	0.000	0.42		7.2	OK	
1.003	7	0.000	0.46		7.1	OK	
1.004	8	0.000	0.59		10.1	OK	
1.005	9	0.000	0.69		10.1	OK	
5.000	10	0.000	0.22		3.8	OK	
5.001	11	0.000	0.10		3.8	OK	
1.006	12	0.000	0.00		0.2	OK	
1.007	13	0.000	0.00		0.0	OK	
6.000	14	0.000	0.07		2.0	FLOOD RISK	
6.001	15	0.000	0.03		2.0	FLOOD RISK	
1.008	16	0.000	0.18		4.1	OK	
7.000	17	0.000	0.60		10.3	OK	4
1.009	18	0.000	0.90		15.1	OK	
1.010	19	0.000	0.33		15.1	OK	
8.000	20	0.000	0.04		1.0	FLOOD RISK*	
8.001	21	0.000	0.02		1.5	FLOOD RISK*	
8.002	22	0.000	0.03		1.8	FLOOD RISK*	
9.000	23	0.000	0.00		1.3	FLOOD RISK*	
8.003	24	0.000	0.24		2.1	FLOOD RISK*	
10.000	25	0.000	0.04		1.2	FLOOD RISK*	
10.001	26	0.000	0.62		1.8	FLOOD RISK*	
10.002	27	0.000	0.21		4.4	FLOOD RISK*	
11.000	28	0.000	0.01		0.3	FLOOD RISK*	
8.004	29	0.000	0.12		5.7	FLOOD RISK*	
8.005	30	0.000	0.10		6.2	FLOOD RISK*	

Nolan Associates Ltd		Page 7
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:19	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

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

PN	US/MH		Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
8.006	31	30 Winter	2	+0%					40.056	-0.144
8.007	32	30 Winter	2	+0%					40.018	-0.282
8.008	33	30 Winter	2	+0%					39.986	-0.314
8.009	34	30 Winter	2	+0%					39.956	-0.244
8.010	35	30 Winter	2	+0%	30/30 Winter				39.678	-0.072
8.011	36	30 Winter	2	+0%					39.597	-0.243
12.000	37	15 Winter	2	+0%					40.009	-0.091
12.001	38	15 Winter	2	+0%					39.920	-0.180
12.002	39	120 Winter	2	+0%	30/30 Winter				39.377	-0.073
8.012	40	120 Winter	2	+0%	100/30 Summer				39.376	-0.524
8.013	41	120 Winter	2	+0%					39.049	-0.101
8.014	42	120 Winter	2	+0%					38.920	-0.480
8.015	42.1	120 Winter	2	+0%					37.920	-0.330
8.016	42.2	120 Winter	2	+0%					36.971	-0.129
13.000	43	15 Winter	2	+0%	100/15 Summer				35.770	-0.080
13.001	44	15 Winter	2	+0%					35.472	-0.115
1.011	45	360 Winter	2	+0%	30/15 Summer				34.149	-0.076
1.012	46	360 Winter	2	+0%	1/60 Winter				34.144	0.174
14.000	47	15 Winter	2	+0%					36.660	-0.340
14.001	48	15 Winter	2	+0%					34.585	-0.115
1.013	49	30 Winter	2	+0%					33.518	-0.125
15.000	51	15 Winter	2	+0%	30/15 Summer				32.947	-0.053
15.001	52	15 Winter	2	+0%	30/15 Summer				32.797	-0.099
15.002	53	15 Winter	2	+0%	30/15 Summer				32.743	-0.090
1.014	50	120 Winter	2	+0%	2/120 Winter				31.651	0.008
16.000	54	15 Winter	2	+0%					34.183	-0.117
16.001	55	15 Winter	2	+0%					33.986	-0.128
17.000	56	15 Winter	2	+0%					34.179	-0.121
16.002	57	15 Winter	2	+0%					33.191	-0.109
1.015	58	180 Winter	2	+0%	1/15 Summer				31.665	0.384

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)		
8.006	31	0.000	0.04		8.3	FLOOD RISK*	
8.007	32	0.000	0.04		8.2	FLOOD RISK*	
8.008	33	0.000	0.07		8.2	OK	
8.009	34	0.000	0.08		8.2	FLOOD RISK*	
8.010	35	0.000	0.53		8.2	OK*	
8.011	36	0.000	0.08		9.6	OK*	
12.000	37	0.000	0.05		2.4	FLOOD RISK*	
12.001	38	0.000	0.01		2.7	FLOOD RISK*	
12.002	39	0.000	0.09		1.1	OK*	
8.012	40	0.000	0.03		4.4	OK	
8.013	41	0.000	0.23		4.6	OK*	
8.014	42	0.000	0.00		4.6	OK	
8.015	42.1	0.000	0.00		4.8	OK	
8.016	42.2	0.000	0.05		4.8	OK*	
13.000	43	0.000	0.43		7.4	OK	
13.001	44	0.000	0.12		7.4	OK	
1.011	45	0.000	0.19		7.1	OK	
1.012	46	0.000	0.08		2.4	SURCHARGED	
14.000	47	0.000	0.00		2.0	OK	
14.001	48	0.000	0.12		2.5	OK	
1.013	49	0.000	0.07		3.4	OK	

Nolan Associates Ltd		Page 8
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:19 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
15.000	51	0.000	0.73		11.5	OK	
15.001	52	0.000	0.59		19.9	OK	
15.002	53	0.000	0.67		20.0	OK	
1.014	50	0.000	0.13		4.8	SURCHARGED	
16.000	54	0.000	0.11		1.8	OK	
16.001	55	0.000	0.05		1.8	OK	
17.000	56	0.000	0.08		3.4	OK	
16.002	57	0.000	0.16		7.1	OK	
1.015	58	0.000	0.21		3.5	SURCHARGED	

Nolan Associates Ltd		Page 9
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:19	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 3 Number of Storage Structures 23 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.398 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status ON
 Inertia 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, 2, 30, 100
 Climate Change (%) 0, 0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged
									Level (m)	Depth (m)
1.000	1	15 Winter	30	+0%	100/15 Summer				39.650	-0.100
2.000	2	15 Winter	30	+0%	100/15 Winter				39.734	-0.116
1.001	3	15 Winter	30	+0%	100/15 Summer				39.479	-0.083
3.000	4	15 Winter	30	+0%					39.733	-0.117
4.000	5	15 Winter	30	+0%	100/15 Winter				39.643	-0.107
1.002	6	15 Winter	30	+0%	100/15 Summer				39.342	-0.046
1.003	7	15 Winter	30	+0%	30/15 Summer				39.196	0.054
1.004	8	15 Winter	30	+0%	30/15 Summer				39.141	0.086
1.005	9	15 Winter	30	+0%	30/15 Summer				38.747	0.024
5.000	10	15 Winter	30	+0%					39.769	-0.081
5.001	11	15 Winter	30	+0%					39.381	-0.107
1.006	12	2880 Winter	30	+0%					38.321	-0.198
1.007	13	2880 Winter	30	+0%					38.321	-0.147
6.000	14	15 Winter	30	+0%					39.887	-0.113
6.001	15	15 Winter	30	+0%					38.975	-0.125
1.008	16	15 Winter	30	+0%					36.567	-0.083
7.000	17	15 Winter	30	+0%	30/15 Summer	100/15 Summer			36.023	0.173
1.009	18	15 Winter	30	+0%	30/15 Summer				35.732	0.226
1.010	19	15 Winter	30	+0%	100/360 Winter				35.231	-0.073
8.000	20	15 Winter	30	+0%					40.312	-0.088
8.001	21	15 Winter	30	+0%					40.304	-0.096
8.002	22	30 Winter	30	+0%					40.244	-0.156
9.000	23	15 Winter	30	+0%					40.279	-0.121
8.003	24	30 Winter	30	+0%	100/15 Summer				40.219	-0.181
10.000	25	15 Winter	30	+0%					40.234	-0.066
10.001	26	15 Winter	30	+0%	30/15 Winter				40.227	0.007
10.002	27	15 Winter	30	+0%					40.176	-0.124
11.000	28	30 Winter	30	+0%					40.129	-0.071
8.004	29	30 Winter	30	+0%					40.128	-0.072
8.005	30	30 Winter	30	+0%					40.111	-0.089

Nolan Associates Ltd		Page 10
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:19 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

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

PN	US/MH Name	Flooded		Overflow (l/s)	Pipe	Status	Level
		Volume (m³)	Flow / Cap.		Flow (l/s)		Exceeded
1.000	1	0.000	0.24		4.0		OK
2.000	2	0.000	0.12		2.6		OK
1.001	3	0.000	0.40		6.6		OK
3.000	4	0.000	0.11		3.0		OK
4.000	5	0.000	0.18		4.1		OK
1.002	6	0.000	0.80		13.6		OK
1.003	7	0.000	0.85		13.3	SURCHARGED	
1.004	8	0.000	1.07		18.3	SURCHARGED	
1.005	9	0.000	1.24		18.2	SURCHARGED	
5.000	10	0.000	0.42		7.1		OK
5.001	11	0.000	0.18		7.2		OK
1.006	12	0.000	0.00		0.8		OK
1.007	13	0.000	0.00		0.1		OK
6.000	14	0.000	0.13		3.8	FLOOD RISK	
6.001	15	0.000	0.06		3.8	FLOOD RISK	
1.008	16	0.000	0.39		8.8		OK
7.000	17	0.000	0.93		16.0	SURCHARGED	4
1.009	18	0.000	1.46		24.4	SURCHARGED	
1.010	19	0.000	0.53		24.4		OK
8.000	20	0.000	0.08		2.0	FLOOD RISK*	
8.001	21	0.000	0.05		3.5	FLOOD RISK*	
8.002	22	0.000	0.06		4.0	FLOOD RISK*	
9.000	23	0.000	0.01		2.5	FLOOD RISK*	
8.003	24	0.000	0.56		5.1	FLOOD RISK*	
10.000	25	0.000	0.08		2.2	FLOOD RISK*	
10.001	26	0.000	1.10		3.2	FLOOD RISK*	
10.002	27	0.000	0.47		9.7	FLOOD RISK*	
11.000	28	0.000	0.01		0.7	FLOOD RISK*	
8.004	29	0.000	0.26		11.9	FLOOD RISK*	
8.005	30	0.000	0.22		12.9	FLOOD RISK*	

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

PN	US/MH		Return Period	Climate Change	First (X) SurchARGE	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
8.006	31	30 Winter	30	+0%					40.093	-0.107
8.007	32	30 Winter	30	+0%					40.054	-0.246
8.008	33	30 Winter	30	+0%					40.021	-0.279
8.009	34	30 Winter	30	+0%					39.990	-0.210
8.010	35	30 Winter	30	+0%	30/30 Winter				39.753	0.003
8.011	36	30 Winter	30	+0%					39.620	-0.220
12.000	37	15 Winter	30	+0%					40.032	-0.068
12.001	38	15 Winter	30	+0%					39.934	-0.166
12.002	39	60 Winter	30	+0%	30/30 Winter				39.491	0.041
8.012	40	60 Winter	30	+0%	100/30 Summer				39.489	-0.411
8.013	41	60 Winter	30	+0%					39.070	-0.080
8.014	42	60 Winter	30	+0%					38.929	-0.471
8.015	42.1	120 Winter	30	+0%					37.930	-0.320
8.016	42.2	120 Winter	30	+0%					36.981	-0.119
13.000	43	15 Winter	30	+0%	100/15 Summer				35.806	-0.044
13.001	44	15 Winter	30	+0%					35.486	-0.101
1.011	45	360 Winter	30	+0%	30/15 Summer				34.616	0.391
1.012	46	360 Winter	30	+0%	1/60 Winter				34.610	0.640
14.000	47	15 Winter	30	+0%					36.665	-0.335
14.001	48	15 Winter	30	+0%					34.600	-0.100
1.013	49	15 Winter	30	+0%					33.528	-0.115
15.000	51	15 Winter	30	+0%	30/15 Summer				33.132	0.132
15.001	52	15 Winter	30	+0%	30/15 Summer				32.950	0.054
15.002	53	15 Winter	30	+0%	30/15 Summer				32.860	0.027
1.014	50	360 Winter	30	+0%	2/120 Winter				31.930	0.287
16.000	54	15 Winter	30	+0%					34.196	-0.104
16.001	55	15 Winter	30	+0%					33.996	-0.118
17.000	56	15 Winter	30	+0%					34.190	-0.110
16.002	57	15 Winter	30	+0%					33.210	-0.090
1.015	58	360 Winter	30	+0%	1/15 Summer				31.982	0.701

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)			
8.006	31	0.000	0.09	16.8	FLOOD RISK*		
8.007	32	0.000	0.08	16.5	FLOOD RISK*		
8.008	33	0.000	0.13	16.4	FLOOD RISK*		
8.009	34	0.000	0.16	16.3	FLOOD RISK*		
8.010	35	0.000	1.07	16.4	SURCHARGED*		
8.011	36	0.000	0.15	18.6	OK*		
12.000	37	0.000	0.10	4.9	FLOOD RISK*		
12.001	38	0.000	0.03	5.3	FLOOD RISK*		
12.002	39	0.000	0.27	3.2	SURCHARGED*		
8.012	40	0.000	0.05	8.5	OK		
8.013	41	0.000	0.44	8.7	OK*		
8.014	42	0.000	0.01	8.7	OK		
8.015	42.1	0.000	0.01	9.2	OK		
8.016	42.2	0.000	0.09	9.2	OK*		
13.000	43	0.000	0.82	14.0	OK		
13.001	44	0.000	0.23	14.0	OK		
1.011	45	0.000	0.35	13.1	SURCHARGED		
1.012	46	0.000	0.08	2.4	SURCHARGED		
14.000	47	0.000	0.00	3.8	OK		
14.001	48	0.000	0.23	4.9	OK		
1.013	49	0.000	0.13	6.4	OK		

Nolan Associates Ltd		Page 12
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:19 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
15.000	51	0.000	1.33		21.2	SURCHARGED	
15.001	52	0.000	1.16		38.9	SURCHARGED	
15.002	53	0.000	1.31		39.0	SURCHARGED	
1.014	50	0.000	0.14		5.0	SURCHARGED	
16.000	54	0.000	0.20		3.4	OK	
16.001	55	0.000	0.10		3.4	OK	
17.000	56	0.000	0.16		6.5	OK	
16.002	57	0.000	0.32		14.3	OK	
1.015	58	0.000	0.21		3.5	SURCHARGED	

Nolan Associates Ltd		Page 13
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:19	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 3 Number of Storage Structures 23 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.398 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status ON
 Inertia 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, 2, 30, 100
 Climate Change (%) 0, 0, 0, 30

PN	US/MH		Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
1.000	1	15 Winter	100	+30%	100/15 Summer				39.876	0.126
2.000	2	15 Winter	100	+30%	100/15 Winter				39.865	0.015
1.001	3	15 Winter	100	+30%	100/15 Summer				39.852	0.290
3.000	4	15 Winter	100	+30%					39.824	-0.026
4.000	5	15 Winter	100	+30%	100/15 Winter				39.832	0.082
1.002	6	15 Winter	100	+30%	100/15 Summer				39.808	0.419
1.003	7	15 Winter	100	+30%	30/15 Summer				39.562	0.420
1.004	8	15 Winter	100	+30%	30/15 Summer				39.482	0.427
1.005	9	15 Winter	100	+30%	30/15 Summer				38.809	0.085
5.000	10	15 Winter	100	+30%					39.795	-0.055
5.001	11	15 Winter	100	+30%					39.395	-0.093
1.006	12	600 Winter	100	+30%					38.343	-0.176
1.007	13	600 Winter	100	+30%					38.343	-0.126
6.000	14	15 Winter	100	+30%					39.899	-0.101
6.001	15	15 Winter	100	+30%					38.983	-0.117
1.008	16	15 Winter	100	+30%					36.593	-0.057
7.000	17	15 Winter	100	+30%	30/15 Summer	100/15 Summer			36.452	0.602
1.009	18	15 Winter	100	+30%	30/15 Summer				36.129	0.623
1.010	19	600 Winter	100	+30%	100/360 Winter				35.431	0.127
8.000	20	15 Winter	100	+30%					40.334	-0.066
8.001	21	15 Winter	100	+30%					40.328	-0.072
8.002	22	15 Winter	100	+30%					40.271	-0.129
9.000	23	15 Winter	100	+30%					40.287	-0.113
8.003	24	30 Winter	100	+30%	100/15 Summer				40.245	-0.155
10.000	25	15 Winter	100	+30%					40.292	-0.008
10.001	26	15 Winter	100	+30%	30/15 Winter				40.288	0.068
10.002	27	15 Winter	100	+30%					40.202	-0.098
11.000	28	30 Winter	100	+30%					40.169	-0.031
8.004	29	30 Winter	100	+30%					40.167	-0.033
8.005	30	30 Winter	100	+30%					40.151	-0.049

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

PN	US/MH Name	Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Volume (m³)	Flow / Overflow Cap. (l/s)			
1.000	1	0.000	0.40	6.6	SURCHARGED	
2.000	2	0.000	0.20	4.4	SURCHARGED	
1.001	3	0.000	0.55	9.1	SURCHARGED	
3.000	4	0.000	0.18	5.0	OK	
4.000	5	0.000	0.31	6.8	SURCHARGED	
1.002	6	0.000	1.00	17.0	SURCHARGED	
1.003	7	0.000	1.12	17.4	SURCHARGED	
1.004	8	0.000	1.40	24.0	SURCHARGED	
1.005	9	0.000	1.63	23.9	SURCHARGED	
5.000	10	0.000	0.70	12.1	OK	
5.001	11	0.000	0.31	12.1	OK	
1.006	12	0.000	0.00	4.4	OK	
1.007	13	0.000	0.06	2.3	OK	
6.000	14	0.000	0.22	6.3	FLOOD RISK	
6.001	15	0.000	0.11	6.4	FLOOD RISK	
1.008	16	0.000	0.66	14.8	OK	
7.000	17	1.957	1.25	21.5	FLOOD	4
1.009	18	0.000	2.02	33.7	SURCHARGED	
1.010	19	0.000	0.10	4.9	SURCHARGED	
8.000	20	0.000	0.13	3.4	FLOOD RISK*	
8.001	21	0.000	0.10	6.4	FLOOD RISK*	
8.002	22	0.000	0.11	7.7	FLOOD RISK*	
9.000	23	0.000	0.02	4.1	FLOOD RISK*	
8.003	24	0.000	1.06	9.7	FLOOD RISK*	
10.000	25	0.000	0.10	3.1	FLOOD RISK*	
10.001	26	0.000	1.47	4.3	FLOOD RISK*	
10.002	27	0.000	0.76	15.9	FLOOD RISK*	
11.000	28	0.000	0.03	1.4	FLOOD RISK*	
8.004	29	0.000	0.44	20.5	FLOOD RISK*	
8.005	30	0.000	0.38	22.4	FLOOD RISK*	

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

PN	US/MH		Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
8.006	31	30 Winter	100	+30%					40.134	-0.066
8.007	32	30 Winter	100	+30%					40.094	-0.206
8.008	33	30 Winter	100	+30%					40.060	-0.240
8.009	34	30 Winter	100	+30%					40.028	-0.172
8.010	35	30 Winter	100	+30%	30/30 Winter				39.905	0.155
8.011	36	120 Winter	100	+30%					39.708	-0.132
12.000	37	15 Winter	100	+30%					40.055	-0.045
12.001	38	15 Winter	100	+30%					39.948	-0.152
12.002	39	120 Winter	100	+30%	30/30 Winter				39.700	0.250
8.012	40	120 Winter	100	+30%	100/30 Summer				39.696	-0.204
8.013	41	120 Winter	100	+30%					39.088	-0.062
8.014	42	120 Winter	100	+30%					38.937	-0.463
8.015	42.1	15 Winter	100	+30%					37.940	-0.310
8.016	42.2	15 Winter	100	+30%					36.989	-0.111
13.000	43	15 Winter	100	+30%	100/15 Summer				36.039	0.189
13.001	44	15 Winter	100	+30%					35.499	-0.088
1.011	45	600 Winter	100	+30%	30/15 Summer				35.428	1.203
1.012	46	600 Winter	100	+30%	1/60 Winter				35.420	1.450
14.000	47	15 Winter	100	+30%					36.671	-0.329
14.001	48	15 Winter	100	+30%					34.616	-0.084
1.013	49	15 Winter	100	+30%					33.539	-0.104
15.000	51	15 Winter	100	+30%	30/15 Summer				33.693	0.693
15.001	52	15 Winter	100	+30%	30/15 Summer				33.205	0.309
15.002	53	15 Winter	100	+30%	30/15 Summer				32.978	0.145
1.014	50	720 Winter	100	+30%	2/120 Winter				32.421	0.778
16.000	54	15 Winter	100	+30%					34.212	-0.088
16.001	55	15 Winter	100	+30%					34.005	-0.109
17.000	56	15 Winter	100	+30%					34.203	-0.097
16.002	57	15 Winter	100	+30%					33.231	-0.069
1.015	58	720 Winter	100	+30%	1/15 Summer				32.469	1.188

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Flow (l/s)			
8.006	31	0.000	0.16	30.4	FLOOD RISK*		
8.007	32	0.000	0.14	29.9	FLOOD RISK*		
8.008	33	0.000	0.24	29.8	FLOOD RISK*		
8.009	34	0.000	0.29	29.7	FLOOD RISK*		
8.010	35	0.000	1.93	29.5	FLOOD RISK*		
8.011	36	0.000	0.21	24.9	OK*		
12.000	37	0.000	0.17	8.7	FLOOD RISK*		
12.001	38	0.000	0.05	9.4	FLOOD RISK*		
12.002	39	0.000	0.30	3.4	SURCHARGED*		
8.012	40	0.000	0.07	12.5	FLOOD RISK*		
8.013	41	0.000	0.65	12.8	OK*		
8.014	42	0.000	0.01	12.8	OK		
8.015	42.1	0.000	0.01	15.0	OK		
8.016	42.2	0.000	0.15	15.1	OK*		
13.000	43	0.000	1.30	22.0	SURCHARGED		
13.001	44	0.000	0.36	22.1	OK		
1.011	45	0.000	0.44	16.4	SURCHARGED		
1.012	46	0.000	0.10	3.0	SURCHARGED		
14.000	47	0.000	0.00	6.5	OK		
14.001	48	0.000	0.39	8.2	FLOOD RISK		
1.013	49	0.000	0.20	10.3	OK		

Nolan Associates Ltd		Page 16
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:19 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

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

PN	US/MH Name	Flooded		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)		
15.000	51	0.000	2.18		34.5	FLOOD RISK
15.001	52	0.000	1.86		62.4	FLOOD RISK
15.002	53	0.000	2.08		62.3	SURCHARGED
1.014	50	0.000	0.15		5.2	SURCHARGED
16.000	54	0.000	0.34		5.7	OK
16.001	55	0.000	0.16		5.8	OK
17.000	56	0.000	0.26		11.0	OK
16.002	57	0.000	0.55		24.1	OK
1.015	58	0.000	0.22		3.5	SURCHARGED

Nolan Associates Ltd		Page 1
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:58	Designed by K.Pritchard	
File Planning3.MDX	Checked by	
XP Solutions	Network 2018.1.1	

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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 3 Number of Storage Structures 23 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.398 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status ON
 Inertia 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) 100
 Climate Change (%) 45

PN	US/MH		Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
1.000	1	15 Winter	100	+45%	100/15 Summer				40.106	0.356
2.000	2	15 Winter	100	+45%	100/15 Summer				40.096	0.246
1.001	3	15 Winter	100	+45%	100/15 Summer				40.082	0.520
3.000	4	15 Winter	100	+45%	100/15 Summer				40.047	0.197
4.000	5	15 Winter	100	+45%	100/15 Summer				40.056	0.306
1.002	6	15 Winter	100	+45%	100/15 Summer				40.029	0.641
1.003	7	15 Winter	100	+45%	100/15 Summer				39.738	0.595
1.004	8	15 Winter	100	+45%	100/15 Summer				39.621	0.566
1.005	9	15 Winter	100	+45%	100/15 Summer				38.836	0.112
5.000	10	15 Winter	100	+45%					39.803	-0.047
5.001	11	15 Winter	100	+45%					39.398	-0.089
1.006	12	360 Winter	100	+45%					38.351	-0.168
1.007	13	360 Winter	100	+45%					38.351	-0.118
6.000	14	15 Winter	100	+45%					39.901	-0.099
6.001	15	15 Winter	100	+45%					38.985	-0.115
1.008	16	15 Winter	100	+45%	100/15 Winter				36.677	0.027
7.000	17	15 Winter	100	+45%	100/15 Summer	100/15 Summer			36.453	0.603
1.009	18	360 Winter	100	+45%	100/15 Summer				36.347	0.841
1.010	19	480 Winter	100	+45%	100/180 Winter				36.335	1.031
8.000	20	15 Winter	100	+45%					40.340	-0.060
8.001	21	15 Winter	100	+45%					40.333	-0.067
8.002	22	15 Winter	100	+45%					40.276	-0.124
9.000	23	15 Winter	100	+45%					40.290	-0.110
8.003	24	30 Winter	100	+45%	100/15 Summer				40.249	-0.151
10.000	25	15 Winter	100	+45%		100/15 Winter			40.300	0.000
10.001	26	15 Winter	100	+45%	100/15 Summer	100/15 Winter			40.300	0.080
10.002	27	15 Winter	100	+45%					40.208	-0.092
11.000	28	30 Winter	100	+45%					40.183	-0.017
8.004	29	30 Winter	100	+45%					40.181	-0.019
8.005	30	30 Winter	100	+45%					40.161	-0.039

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
1.000	1	0.000	0.41		6.8	FLOOD RISK	
2.000	2	0.000	0.20		4.6	SURCHARGED	
1.001	3	0.000	0.55		9.1	SURCHARGED	
3.000	4	0.000	0.19		5.3	SURCHARGED	
4.000	5	0.000	0.32		7.1	FLOOD RISK	
1.002	6	0.000	1.09		18.4	SURCHARGED	
1.003	7	0.000	1.20		18.8	SURCHARGED	
1.004	8	0.000	1.52		26.0	SURCHARGED	
1.005	9	0.000	1.78		26.0	SURCHARGED	
5.000	10	0.000	0.78		13.5	OK	
5.001	11	0.000	0.34		13.5	OK	
1.006	12	0.000	0.00		7.3	OK	
1.007	13	0.000	0.10		3.8	OK	
6.000	14	0.000	0.25		7.0	FLOOD RISK	
6.001	15	0.000	0.12		7.1	FLOOD RISK	
1.008	16	0.000	0.69		15.6	SURCHARGED	
7.000	17	3.459	1.33		22.8	FLOOD	4
1.009	18	0.000	0.49		8.1	FLOOD RISK	
1.010	19	0.000	0.17		7.7	FLOOD RISK	
8.000	20	0.000	0.15		3.9	FLOOD RISK*	
8.001	21	0.000	0.11		7.3	FLOOD RISK*	
8.002	22	0.000	0.13		8.7	FLOOD RISK*	
9.000	23	0.000	0.02		4.6	FLOOD RISK*	
8.003	24	0.000	1.19		10.9	FLOOD RISK*	
10.000	25	0.282	0.13		3.9	FLOOD	2
10.001	26	0.007	1.52		4.5	FLOOD	1
10.002	27	0.000	0.84		17.6	FLOOD RISK*	
11.000	28	0.000	0.04		1.7	FLOOD RISK*	
8.004	29	0.000	0.48		22.5	FLOOD RISK*	
8.005	30	0.000	0.41		24.5	FLOOD RISK*	

Nolan Associates Ltd		Page 3
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:58 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

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

PN	US/MH		Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
8.006	31	30 Winter	100	+45%					40.143	-0.057
8.007	32	30 Winter	100	+45%					40.102	-0.198
8.008	33	30 Winter	100	+45%					40.068	-0.232
8.009	34	30 Winter	100	+45%					40.037	-0.163
8.010	35	60 Winter	100	+45%	100/15 Summer				39.993	0.243
8.011	36	60 Winter	100	+45%					39.840	0.000
12.000	37	15 Winter	100	+45%					40.061	-0.039
12.001	38	15 Winter	100	+45%					39.952	-0.148
12.002	39	120 Winter	100	+45%	100/15 Summer				39.911	0.461
8.012	40	120 Winter	100	+45%	100/15 Winter	100/60 Winter			39.907	0.007
8.013	41	120 Winter	100	+45%					39.091	-0.059
8.014	42	120 Winter	100	+45%					38.937	-0.463
8.015	42.1	15 Winter	100	+45%					37.942	-0.308
8.016	42.2	15 Winter	100	+45%					36.992	-0.108
13.000	43	480 Winter	100	+45%	100/15 Summer				36.333	0.483
13.001	44	480 Winter	100	+45%	100/240 Winter				36.330	0.743
1.011	45	480 Winter	100	+45%	100/15 Summer				36.329	2.104
1.012	46	600 Winter	100	+45%	100/15 Summer	100/360 Winter			36.318	2.348
14.000	47	15 Winter	100	+45%					36.672	-0.328
14.001	48	15 Winter	100	+45%					34.621	-0.079
1.013	49	15 Winter	100	+45%					33.541	-0.102
15.000	51	15 Winter	100	+45%	100/15 Summer				33.884	0.884
15.001	52	15 Winter	100	+45%	100/15 Summer				33.291	0.395
15.002	53	15 Winter	100	+45%	100/15 Summer				33.019	0.186
1.014	50	960 Winter	100	+45%	100/15 Summer				32.648	1.005
16.000	54	15 Winter	100	+45%					34.215	-0.085
16.001	55	15 Winter	100	+45%					34.008	-0.106
17.000	56	15 Winter	100	+45%					34.206	-0.094
16.002	57	15 Winter	100	+45%					33.236	-0.064
1.015	58	960 Winter	100	+45%	100/15 Summer				32.695	1.414

PN	US/MH Name	Flooded		Overflow (l/s)	Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Cap.		Flow (l/s)		
8.006	31	0.000	0.18		33.9	FLOOD RISK*	
8.007	32	0.000	0.16		33.2	FLOOD RISK*	
8.008	33	0.000	0.27		33.2	FLOOD RISK*	
8.009	34	0.000	0.32		33.0	FLOOD RISK*	
8.010	35	0.000	1.92		29.4	FLOOD RISK*	
8.011	36	0.000	0.31		37.2	SURCHARGED*	
12.000	37	0.000	0.19		9.8	FLOOD RISK*	
12.001	38	0.000	0.06		10.6	FLOOD RISK*	
12.002	39	0.000	0.33		3.8	FLOOD RISK*	
8.012	40	7.488	0.07		12.4	FLOOD	4
8.013	41	0.000	0.67		13.3	OK*	
8.014	42	0.000	0.01		13.3	OK	
8.015	42.1	0.000	0.02		16.7	OK	
8.016	42.2	0.000	0.17		16.9	OK*	
13.000	43	0.000	0.17		3.0	FLOOD RISK	
13.001	44	0.000	0.05		3.0	FLOOD RISK	
1.011	45	0.000	0.56		20.8	FLOOD RISK	
1.012	46	17.585	0.12		3.7	FLOOD	5
14.000	47	0.000	0.01		7.3	OK	
14.001	48	0.000	0.44		9.2	FLOOD RISK	
1.013	49	0.000	0.22		11.3	OK	

Nolan Associates Ltd		Page 4
54 Hagley Road Birmingham West Midlands B16 8PE		
Date 23/06/2023 15:58 File Planning3.MDX	Designed by K.Pritchard Checked by	
XP Solutions	Network 2018.1.1	

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

PN	US/MH Name	Flooded		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)		
15.000	51	0.000	2.40		38.0	FLOOD RISK
15.001	52	0.000	2.04		68.7	FLOOD RISK
15.002	53	0.000	2.29		68.4	SURCHARGED
1.014	50	0.000	0.16		5.5	SURCHARGED
16.000	54	0.000	0.38		6.4	OK
16.001	55	0.000	0.18		6.4	OK
17.000	56	0.000	0.30		12.2	OK
16.002	57	0.000	0.61		26.9	OK
1.015	58	0.000	0.23		3.8	SURCHARGED

Appendix H – Outline Drainage and SuDS Maintenance Plan

Nolan Associates

consulting civil and structural engineers

54 Hagley Road, Birmingham B16 8PE

Dogs Trust, Merseyside

Sustainable Drainage System Maintenance Plan

General Drainage Maintenance

Providing the safety guidelines herewith are followed inspections and simple maintenance from ground level can be carried out by non-skilled operatives.

It is strongly recommended that maintenance involving “man entry” is only carried out by specialist contractors, who will have the correct training and safety equipment.

It is usually worth lifting manhole covers periodically to keep the covers free and to look for debris and tell-tale signs of imminent problems. Regular inspections and periodic cleaning are required on Drainage Channels, Silt Pits, Catch Pits, Storage Attenuation, Manhole Chambers, Flow Control Devices and Grease Traps.

It is recommended that cause be investigated and the system cleaned by pressure jetting specialists (where required) if signs of the following are found:

- Ragging on step irons which usually mean that the pipes surcharge occasionally
- Mud or silt in a manhole which probably indicate a restriction downstream
- Detritus on the benching could be a sign of rats or of deterioration of the fabric of the manhole.
- Grease, which is a major cause of blockages.

The notes below will need to be read in conjunction with any manufacturer’s literature. Site specific maintenance information is contained within Appendix A

Drainage Safety Issues

Work on drainage systems expose personnel to serious Health and Safety Hazards. These include but may not be limited to the following:

- Lifting heavy loads (manhole covers)
- The risk of injury through dropping heavy loads
- The risk of falling into chambers
- Biohazards from pathogenic bacteria e.g. Weil’s disease
- Poisonous- asphyxiating- and explosive gasses.

- Drowning.

These hazards can be addressed by the following simple rules:

- Never work alone
- Never enter a confined space such as a manhole unless trained and equipped to do so with gas detectors, breathing equipment and a recovery team assisting.
- Always use well-fitting lifting keys etc.
- Always use the correct Personal Protective Equipment (PPE) e.g. gloves, goggles, coveralls etc.
- Always fence unattended open manholes.

In addition, it should be noted that the location of some drainage apparatus may expose maintenance personnel to other hazards e.g. vehicles manoeuvring. In general, it is advised that maintenance works (other than simple inspections) be carried out by specialist contractors unless specially trained personnel are available.

Drainage Channels

Open Channels with removable gratings

The outlet boxes trap silt and sometimes oil. They can be emptied by either a vacuum tanker or by hand with a ladle. These boxes are the first line of defence keeping the underground drains clean. It is therefore important and cost effective to clean them out regularly. Material removed from them is likely to be contaminated and will need to be disposed of at a suitably licensed tip.

The gratings act to stiffen the channel and the channel edging. It is therefore essential to check that all channel gratings are replaced (and fixed where appropriate). The fixings may be bolts or patent clips depending upon the range of channels installed.

Kerb Drains

Kerb drains are generally used where flat gradient prevent the use of traditional gullies for drainage. By necessity therefore the kerb drains are flat and prone to silting up over time and they will need period clearing/ jetting. It is recommended that this is done annually in the first instance to assess the level of silt build up with the frequency of jetting then adjusted as necessary.

Storage Tanks

Over a period of time all attenuation tanks will have a very gradual build-up of silt, the level of buildup needs to be monitored and from this information the frequency of inspection can be decided. A gully sucker can be used to remove any silt build up or this can be done manually. The tank inspection needs to be carried out by someone who has successfully completed a confined space training course.

Any specific requirements from the tank supplier will also need to be included within the final O and M Manual.

Flow Control Devices

It is recommended that flow control chambers will need to be inspected during Spring and after Autumn leaf fall and cleaned to ensure the flow control orifice is kept free of debris.

Any specific requirements from the flow control supplier will also need to be included within the final O and M Manual

Oil/Petrol Interceptor

Oil/Petrol interceptor will need to be cleaned and maintained in accordance with the manufacture's specifications. All relevant health and safety legislation, guidance, manufacturers specifications etc. along with potential hazards, will need to be taken into account and included in the Health and Safety File & Contractor's Manual. See Appendix A

Attenuation Basins/Swales

It is recommended that litter and debris is removed from the basins/swales monthly to prevent this flowing out of the outlet pipe and into the flow control chamber.

Grasses access routes should be mown monthly. Other vegetation should be managed and nuisance plants removed.

Inspect inlets outlets and overflows for blockages. If fitted with trash/security screens remove debris if required. Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.

Inspect banksides, structures, pipework etc for evidence of physical damage. Areas of poor vegetation growth should be re-seeded/replanted until established. The vegetation helps to prevent erosion and loss of topsoil to bank sides.

Ongoing Management

Residual Hazards and Provision for Safe Access for Inspection, Maintenance and Cleaning etc. – Site Works and Infrastructure.

Cleaning of drains, manholes attenuation tank and channel drains

- Only to be carried out by competent, suitably trained qualified and authorised persons.
- A Permit-to-Work system must be in place.
- All necessary checks for hazardous atmospheres must be carried out.
- All necessary protection to openings must be provided e.g. warning signs, lights, barriers etc.
- Attenuation tank and channel drains need to be maintained cleaned and inspected as per the manufacturer's guidance.
- All maintenance should be in accordance with the method statement as provided by the maintenance contractor.

All general, regular cleaning and maintenance is to be carried out in accordance with all relevant health and safety legislation, guidance, etc. and take into account the potential hazards identified in the Health and Safety File or Contractor's Manuals.

Care should be taken to safeguard the health and safety of the building occupiers' staff and the public. Where appropriate, emergency procedures and first aid facilities must be established and agreed with the building occupier prior to work commencing.

Appendix A