

Project

## **Naylor's Office, Barugh Green**

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Title

## **Drainage Strategy**

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Client

## **Naylor**

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MSJ Job No 221070

Document No

221070 GEN 0002 – Drainage Strategy

Rev P2

Date 31/05/22

## Issue Record

Status	Rev	Description	By	Chk		Date
S2	P1	Initial Drainage Strategy	LW	MH		26/11/21
S2	P2	Soakaway testing amendment	LW	MH		31/05/22

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Project <b>Naylor's Office</b> <b>Barugh Green</b>	By <b>LW</b>	Checked <b>MH</b>	Job No. <b>221070</b>
	Date <b>23-11-21</b>	Date <b>23-11-21</b>	Sheet No. <b>/ 1</b>

## **Introduction**

This design document is for the foul and surface water drainage for the proposed Naylor's Office. It should be read in conjunction with the existing Flood Risk Assessment 221070 GEN 0001-P1 [Flood Risk Assessment], produced by Melia Smith and Jones.

## **Existing Drainage Infrastructure**

See Existing Drainage Plans (Appendix A and B)

The existing site is a large irregular shaped piece of land. It has some changes in level. The site falls approximately 0.75m from west to east and approximately 0.75m from south to north. The site has a maximum level of approximately +72.75m AOD and a minimum of approximately +71.8m AOD. An existing culverted watercourse (>50m long) passes the site approximately 450m to the north of the site. There is an abandoned canal 750m north beyond the rail lines and the River Dearne is approximately 1km north and east of the site.

There are recorded Yorkshire Water sewers adjacent north of the site. Private foul and surface water sewers have been built in the entrance road and drainage tails have been built to accommodate the site. It is understood that these sewers connect into the adopted network further downstream and that they have been provided to service this site and adjoining plots. The surface water sewer has been built with oversized pipes and a Hydrobrake flow control device. It is not known however if these sewers have the capacity to accept surface water flow from this development.

Foul water from the existing buildings drained to an onsite manhole which discharged to the existing Yorkshire Water sewer outside of the site. The foul system currently takes foul water from the other sites it is surrounded by, via a 150Ø pipe.

## **Drainage Investigations**

See Drawing Drainage Investigation Results (Appendix B and C)

A survey of the existing off site sewer network has been carried out where possible. The network has generally been constructed in accordance with the existing drainage drawing. The current drainage is relatively new and is in good condition so it is reusable for the proposed development.

## **Existing Drainage**

The existing surface water system discharges off site and into the Yorkshire Water network via a flow control (15l/s sec). Attenuated flow is stored in an oversized pipe located in the access road to the existing Naylor factory. The existing site access road and the existing Wordsworth office buildings currently discharge into the existing system. See appendix B.

An analysis of the existing system has been carried out and the following results have been obtained.

- No surcharge for 1in2 year
- No flooding for 1in30 year
- 70m<sup>3</sup> of flooding for 1in100 year of which 39m<sup>3</sup> occurs in the existing office car park and 31m<sup>3</sup> adjacent to the Naylor's Factory.

See Appendix D for more information.

Given that the existing system already floods for 100 year storms, it is considered that the existing system has no extra capacity to accept additional surface water flow without some form of mitigation.

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## **Proposed Drainage Design**

In accordance with the Approved Document H, adequate consideration has been taken to discharge via the following listed in priority.

1. Discharge via a soakaway or some other infiltration system
2. Discharge into a watercourse
3. Discharge into a sewer

Soakaway tests have been carried out at the neighbouring Wordsworth crushing site by Byrne Looby. The adjacent Wordsworth offices have also had soakaway tests carried out. Correspondence from Byrne Looby states that in their professional opinion, since both Wordsworth sites failed soakaway tests it is considered that soakaways will not work for this site or any between Whaley Road and the railway tracks. See appendix H.

There are no watercourses in the immediate locality of the site, so discharge to a watercourse is not considered viable.

It is proposed to limit run off to IH124 Greenfield runoff. The attached (See FRA) analysis shows Greenfield runoff to be:

Annual Probability (Return Period, years)	Greenfield Runoff (l/s) IH124*
Q <sub>BAR</sub>	0.35
1 in 1 yr	0.3
1 in 30 yr	0.62
1 in 100 yr	0.73

These limits are very low and to limit how to flow to these amounts is likely to need an orifice which would be liable to blockage. It is proposed therefore to limit surface water discharge to 5l/s, with a minimum orifice of 75mm. Attenuated water will be stored in an underground tank under the car park. See appendix E and F. Silt traps will be used upstream of the attenuation tank.

Preliminary calculations demonstrated that this additional flow into the existing network increased the amount of existing flooding during extreme events. This occurred near the existing attenuation tank adjacent to the existing Naylor's factory. It is proposed to add an extension to the existing Naylor's factory attenuation tank to provide mitigation.

The calculations show that when the new offices are added and additional mitigation storage, the existing Naylor's drainage system is not unacceptably affected.

In addition, the new Naylor's office development will be designed so that the system will:

- Not surcharge for 1in2 year
- Not flood for 1in30 year
- Flood for 1in100 year however the flood water will be managed so that property is not at risk on or off site.

See Appendix G for further information.

## **Foul Drainage**

Discharge Unit Method adopted for calculation of flow within foul runs.

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$k\sqrt{\Sigma}$  DU's

k = Frequency Factor

$\Sigma$  DU's = Sum of Discharge Units

Frequency factor adopted = 0.7 for frequent use e.g Hospital, School, Restaurant

DU's

Toilet 1.5

Urinal 0.4

Wash Hand Basin 0.3

Kitchen Sink 1.3

### **Proposed Building**

5 x Toilets 7.5 DU's

2 x Urinals 0.8 DU's

9 x Wash Hand Basin 3 DU's

2 x Kitchen Sink 2.6 DU's

$\Sigma$  DU's = 13.9

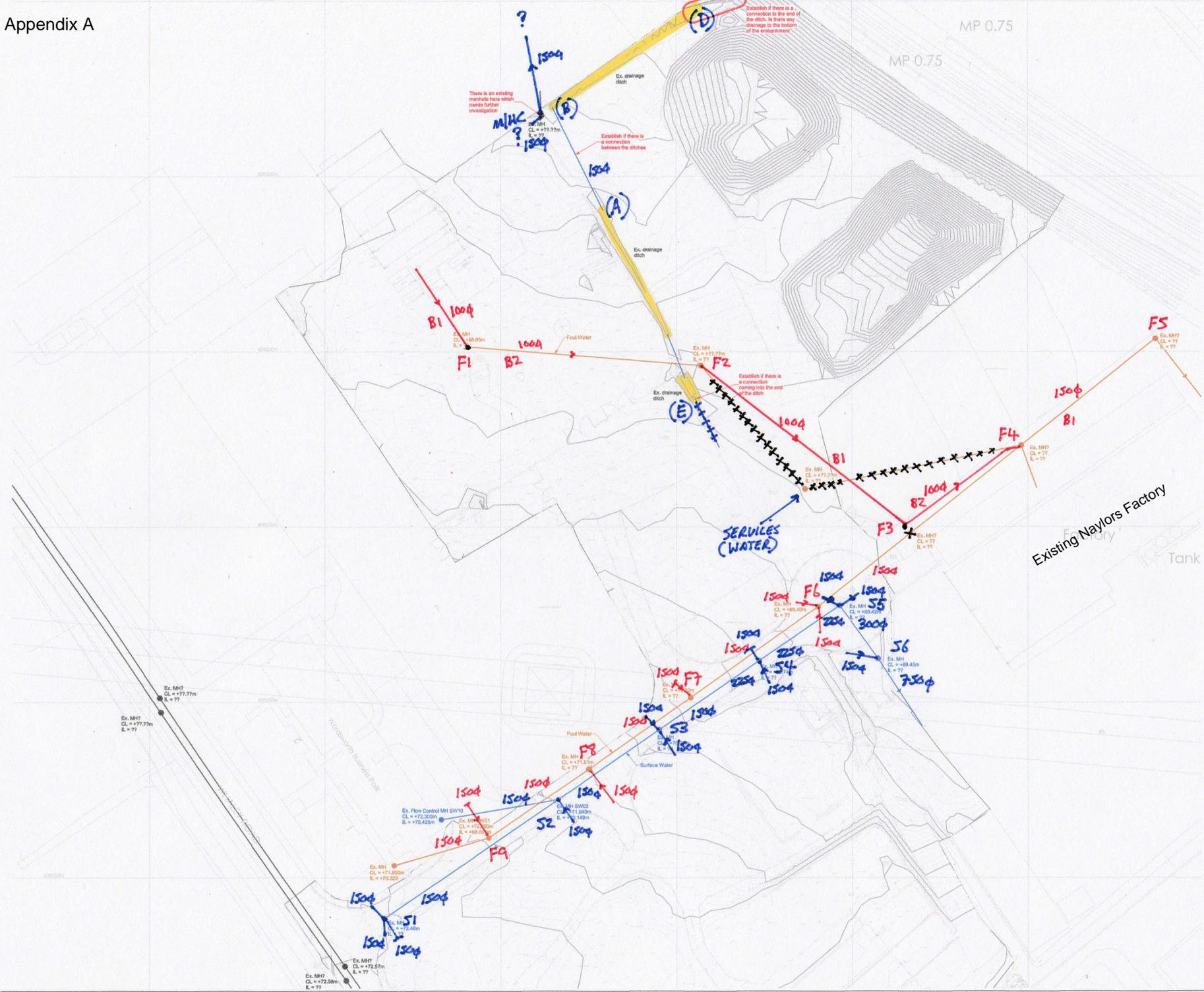
$0.7\sqrt{13.9} = 2.61$  l/sec

Flattest pipe in run is 100dia at 1:40

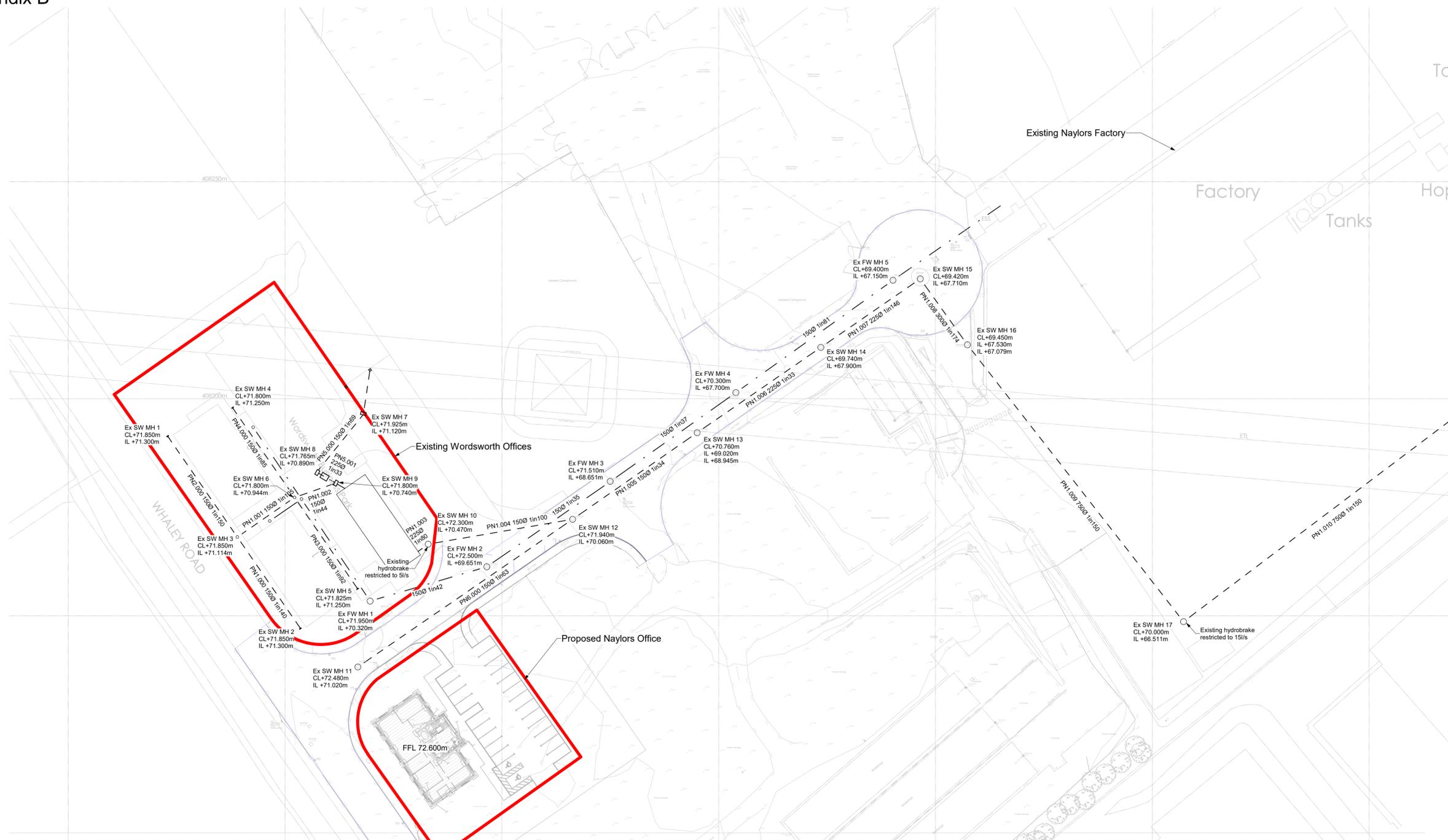
Capacity of 100dia at 1:40 (K = 1.5,  $\frac{3}{4}$  cap) = 9 l/sec therefore OK

# Appendix A

- Survey Requirements:**
- Manhole Cover levels, invert levels & depths
  - Pipe sizes
  - Direction of flow
  - Chamber diagrams & photos
  - Connectivity from point to point by dye tracing or CCTV surveys where possible



## Appendix B



1 Existing Drainage Layout  
1 : 500

**KEY**  
 Existing Surface Water - - - - -  
 Existing Foul Water - . - . - .

P1	First Issue	LW	MH	26.11.21
Rev	Revision Description	By	Chk	Date
SCALE @ A1	ISSUING OFFICE	MSJ PROJECT NUMBER		
1 : 500	Leeds	221070		
STATUS	PURPOSE OF ISSUE			
S0	WORK IN PROGRESS			
 Melia Smith & Jones Consulting Civil & Structural Engineers Vinery Court 58 Cardigan Lane Leeds LS4 2LD 0113 2366889 www.msj.co.uk				
PROJECT				
Naylors Office, Barugh Green				
TITLE				
Existing Drainage Layout				
CLIENT				
Martin Walsh Architectural				
DRAWING NUMBER				REV
221070-MSJ-ZZ-XX-DR-D-4001				P1

## Appendix C

# G.P. DRAIN SURVEYS

CLEANING, JETTING, RE-LINING, REPAIRS & SURVEYS

REGISTERED OFFICE:  
THORNY CROFT  
56 B SCATCHERD LANE  
MORLEY  
LEEDS  
LS27 OJJ

TEL\FAX: 0113 2533154  
MOBILE: 07973 834690

Our Ref : GMP/lhg/2805

Your Ref : Mark Holmes / Ben Mabbs

13<sup>th</sup> October 2021

Melia Smith & Jones Ltd  
Vinery Court  
58 Cardigan Lane  
Leeds  
LS4 2LD

For the attention of : Mark Holmes / Ben Mabbs.

## C.C.T.V. DRAINAGE SURVEY.

### Site at Wordsworth Crushing Barugh Green.

Manhole	Invert	Pipe Size	Material	Service
F1	790mm	4"	Plastic	Foul
F2	1090mm	4"	Plastic	Foul
F3	2250mm	4"	Plastic	Foul
	To top of biscuit			
F4	2240mm	4" & 6"	Clay	Foul
F5	Concealed	6"	Clay	Foul
F6	2250mm	6"	Clay	Foul
F7	2600mm	6"	Clay	Foul
F8	2850mm	6"	Clay	Foul
F9	2860mm	6"	Clay	Foul
S1	1460mm	6"	Clay	Surface Water
S2	1880mm	6"	Clay	Surface Water
S3	1740mm	6"	Clay	Surface Water
S4	1840mm	6" & 9"	Clay	Surface Water
S5	1710mm	6" 9" & 12"	Clay & concrete	Surface Water
S6	2340mm	6" 12" & 30"	Clay & concrete	Surface Water
	1920mm Invert of pipe from S5			
Open Ditch A		6"	Plastic	Surface Water
Open Ditch B		9"	Clay	Surface Water
M/HC	1250mm	6"	Clay	Surface Water
	To cover level – not raised concrete ring			

M/HF1 – B1

00.0 – Start scan  
23.9 – Line of the drain deviates right  
25.2 – Line of the drain deviates right  
25.2 – Enter a soil stack – horizontal  
25.2 – Blind branch 12.0'clock  
28.7 – Line of the drain deviates right  
29.4 – Line of the drain deviates left  
35.5 – Line of the drain deviates right  
35.7 – End of survey

Conclusion

This drainage run serves the yards toilet block cabins, no further action required.

M/HF1 – B2

00.0 – Start scan  
67.7 – End survey at M/HF2

Conclusion

No action required.

M/HF3 – B1

00.0 – Start scan  
70.4 – End survey at M/HF2

Conclusion

No action required.

M/HF3 – B2

00.0 – Start scan  
48.0 – Drain increases in size from 4" plastic to 6" clay  
48.6 – Line of the drain deviates right  
49.1 – End survey at M/HF4

Conclusion

No action required.

M/HF4 – B1

00.0 – Start scan  
51.4 – Enter concealed M/HF5 – Under a mass of concrete

Conclusion

We only surveyed this Sewer because we were unable to raise M/HF5 because it is buried under a mass of concrete and we wanted to prove that the outfall was not on a back-drop due to us being able to gain an invert of M/HF5.

M/HC – B1

00.0 – Start scan  
00.4 – Survey abandoned at a mass of rubble

Conclusion

We are unsure if this drainage run is even in use, it seemed extremely dry and maybe used to serve something in the past. We would suggest that this not be used as an outfall chamber for the proposed development.

OPEN DITCH PIPE A – B1

00.0 – Start scan  
 00.0 to 34.0 – Drain full of silt & mud  
 33.8 – Material changes from 6” plastic to 9” clay  
 34.0 – End survey at OPEN DITCH PIPE B  
 34.0 – Clean camera and film in reverse  
 00.0 – End survey back at OPEN DITCH PIPE A

Conclusion

We only surveyed this drainage system to prove the connectivity of the two ditches, no further action required

M/HC – B2

00.0 – Start scan  
 00.0 to 14.0 – Rubble and silt within the drain  
 00.5 – Material changes from clay to plastic  
 14.0 – Survey abandoned at a mass of debris & silt

Conclusion

We are unsure if this drainage run is even in use, it seemed extremely dry and maybe used to serve something in the past. We would suggest that this not be used as an outfall chamber for the proposed development.

**COMMENTS ON OUT FINDINGS.**

We were instructed to attend site to carry out a connectivity survey on the open ditches and to gain inverts of existing foul and surface water chambers around the proposed development.

We have proved that the two ditches (A) & (B) are connected together with an underground drainage system although this is only 6” in diameter. We were unable to prove any positive connection marked (D) on the drawing where the open ditches actually discharge. It appears that any water just soaks away to ground at that point and also the whole length of the ditch.

We were asked to check if there was a connection coming into the open ditch marked (E) on the drawing. There is no sign of any drainage system entering the ditch at that position. Please note that there is a large hard standing area where there were a load of wagon trailers parked up and it looks as though this area just allows the surface water to fall into the open ditch at position (E).

Please see drawing for reference.

**END OF SURVEY.**

## Appendix D

Melia Smith and Jones		Page 1									
Vinery Court 58 Cardigan Lane Leeds LS4 2LD	Naylor Naylor's Office, Barugh Green Existing Calculations										
Date 25/11/2021 11:51 File 221070 - Existing Drain...	Designed by LW Checked by MH										
Innovyze	Network 2020.1										
<u>STORM SEWER DESIGN by the Modified Rational Method</u>											
<u>Design Criteria for Storm</u>											
Pipe Sizes STANDARD Manhole Sizes STANDARD											
FSR Rainfall Model - England and Wales											
Return Period (years)	30	PIMP (%) 100									
M5-60 (mm)	19.000	Add Flow / Climate Change (%) 0									
Ratio R	0.352	Minimum Backdrop Height (m) 0.200									
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m) 1.500									
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m) 1.200									
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s) 1.00									
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X) 500									
Designed with Level Soffits											
<u>Time Area Diagram for Storm</u>											
<b>Time (mins)</b>	<b>Area (ha)</b>	<b>Time (mins)</b> <b>Area (ha)</b> <b>Time (mins)</b> <b>Area (ha)</b>									
0-4	0.027	4-8 0.376	8-12 0.099								
Total Area Contributing (ha) = 0.501											
Total Pipe Volume (m <sup>3</sup> ) = 52.722											
<u>Network Design Table for Storm</u>											
# - Indicates pipe length does not match coordinates « - Indicates pipe capacity < flow											
<b>PN</b>	<b>Length (m)</b>	<b>Fall (m)</b>	<b>Slope (1:X)</b>	<b>I.Area (ha)</b>	<b>T.E. (mins)</b>	<b>Base Flow (l/s)</b>	<b>k (mm)</b>	<b>HYD SECT</b>	<b>DIA (mm)</b>	<b>Section Type</b>	<b>Auto Design</b>
S1.000	28.000	0.186	150.5	0.017	5.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	26.000	0.186	139.8	0.017	5.00	0.0	0.600	o	150	Pipe/Conduit	
<u>Network Results Table</u>											
<b>PN</b>	<b>Rain (mm/hr)</b>	<b>T.C. (mins)</b>	<b>US/IL (m)</b>	<b>Σ I.Area (ha)</b>	<b>Σ Base Flow (l/s)</b>	<b>Foul (l/s)</b>	<b>Add Flow (l/s)</b>	<b>Vel (m/s)</b>	<b>Cap (l/s)</b>	<b>Flow (l/s)</b>	
S1.000	50.00	5.57	71.300	0.017	0.0	0.0	0.0	0.82	14.4	2.3	
S2.000	50.00	5.51	71.300	0.017	0.0	0.0	0.0	0.85	15.0	2.3	
©1982-2020 Innovyze											

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Date 25/11/2021 11:51 File 221070 - Existing Drain...	Designed by LW Checked by MH	
Innovyze	Network 2020.1	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.001	18.000	0.170	105.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S3.000	28.000	0.306	91.5	0.017	5.00	0.0	0.600	o	150	Pipe/Conduit	
S4.000	26.000	0.306	85.0	0.017	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	9.000	0.204	44.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S5.000	16.000#	0.230	69.6	0.041	5.00	0.0	0.600	o	150	Pipe/Conduit	
S5.001	5.000	0.150	33.3	0.140	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	8.000	0.100	80.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	32.000	0.321	99.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S6.000	60.023	0.960	62.5	0.037	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.005	34.904	1.039	33.6	0.035	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.006	34.659	1.044	33.2	0.039	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.007	27.792	0.190	146.3	0.040	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.008	18.645	0.107	174.3	0.084	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.009	85.160	0.568	149.9	0.017	0.00	0.0	0.600	o	750	Pipe/Conduit	
S1.010	97.602	0.651	149.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	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)
S1.001	50.00	5.88	71.114	0.034	0.0	0.0	0.0	0.98	17.3	4.6
S3.000	50.00	5.44	71.250	0.017	0.0	0.0	0.0	1.05	18.6	2.3
S4.000	50.00	5.40	71.250	0.017	0.0	0.0	0.0	1.09	19.3	2.3
S1.002	50.00	5.98	70.944	0.068	0.0	0.0	0.0	1.52	26.8	9.2
S5.000	50.00	5.22	71.120	0.041	0.0	0.0	0.0	1.21	21.3	5.6
S5.001	50.00	5.26	70.890	0.181	0.0	0.0	0.0	2.27	90.4	24.5
S1.003	50.00	6.07	70.570	0.249	0.0	0.0	0.0	1.46	58.2	33.7
S1.004	50.00	6.60	70.470	0.249	0.0	0.0	0.0	1.01	17.8<	33.7
S6.000	50.00	5.79	71.020	0.037	0.0	0.0	0.0	1.27	22.5	5.0
S1.005	50.00	6.93	70.060	0.321	0.0	0.0	0.0	1.74	30.8<	43.5
S1.006	50.00	7.19	68.945	0.360	0.0	0.0	0.0	2.28	90.6	48.7
S1.007	50.00	7.62	67.901	0.400	0.0	0.0	0.0	1.08	42.9<	54.2
S1.008	50.00	7.88	67.636	0.484	0.0	0.0	0.0	1.19	84.0	65.5
S1.009	50.00	8.50	67.079	0.501	0.0	0.0	0.0	2.28	1008.7	67.8
S1.010	50.00	10.03	66.511	0.501	0.0	0.0	0.0	1.07	42.4<	67.8

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Innovyze	Network 2020.1	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.011	50.042	0.334	149.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	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)
S1.011	50.00	10.81	65.860	0.501	0.0	0.0	0.0	1.07	42.4	67.8

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m <sup>3</sup> /ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	1.000
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	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		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SW Ex 10, DS/PN: S1.004, Volume (m³): 1.7

Unit Reference MD-SHE-0098-5000-1500-5000  
Design Head (m) 1.500  
Design Flow (l/s) 5.0  
Flush-Flo™ Calculated  
Objective Minimise upstream storage  
Application Surface  
Sump Available Yes  
Diameter (mm) 98  
Invert Level (m) 70.470  
Minimum Outlet Pipe Diameter (mm) 150  
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	5.0
Flush-Flo™	0.431	4.9
Kick-Flo®	0.878	3.9
Mean Flow over Head Range	-	4.3

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)						
0.100	3.2	1.200	4.5	3.000	6.9	7.000	10.3
0.200	4.4	1.400	4.8	3.500	7.4	7.500	10.7
0.300	4.8	1.600	5.1	4.000	7.9	8.000	11.0
0.400	4.9	1.800	5.4	4.500	8.4	8.500	11.3
0.500	4.9	2.000	5.7	5.000	8.8	9.000	11.6
0.600	4.8	2.200	6.0	5.500	9.2	9.500	11.9
0.800	4.3	2.400	6.2	6.000	9.6		
1.000	4.1	2.600	6.5	6.500	10.0		

Hydro-Brake® Optimum Manhole: SW Ex 17, DS/PN: S1.010, Volume (m³): 45.7

Unit Reference MD-SHE-0146-1500-3000-1500  
Design Head (m) 3.000  
Design Flow (l/s) 15.0  
Flush-Flo™ Calculated  
Objective Minimise upstream storage  
Application Surface  
Sump Available Yes  
Diameter (mm) 146  
Invert Level (m) 66.511  
Minimum Outlet Pipe Diameter (mm) 225  
Suggested Manhole Diameter (mm) 1500

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Hydro-Brake® Optimum Manhole: SW Ex 17, DS/PN: S1.010, Volume (m³): 45.7

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	3.000	15.0
Flush-Flo™	0.636	12.9
Kick-Flo®	1.307	10.1
Mean Flow over Head Range	-	12.0

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)						
0.100	5.3	1.200	11.1	3.000	15.0	7.000	22.5
0.200	10.4	1.400	10.4	3.500	16.1	7.500	23.2
0.300	11.7	1.600	11.1	4.000	17.2	8.000	24.0
0.400	12.4	1.800	11.8	4.500	18.2	8.500	24.7
0.500	12.7	2.000	12.4	5.000	19.1	9.000	25.4
0.600	12.8	2.200	12.9	5.500	20.0	9.500	26.0
0.800	12.7	2.400	13.5	6.000	20.9		
1.000	12.2	2.600	14.0	6.500	21.7		

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Storage Structures for Storm

Cellular Storage Manhole: SW Ex 10, DS/PN: S1.004

Invert Level (m) 70.475 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 <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	180.0	0.0	0.300	180.0	0.0
0.100	180.0	0.0	0.400	180.0	0.0
0.200	180.0	0.0	0.401	0.0	0.0

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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 \* 10m<sup>3</sup>/ha Storage 0.000  
Hot Start Level (mm)                      0                      Inlet Coefficient 1.000  
Manhole Headloss Coeff (Global) 0.500      Flow per Person per Day (l/per/day) 0.000  
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0      Number of Storage Structures 1  
Number of Online Controls 2      Number of Time/Area Diagrams 0  
Number of Offline Controls 0      Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model                      FSR                      Ratio R 0.400  
Region England and Wales Cv (Summer) 0.750  
M5-60 (mm)                      20.000 Cv (Winter) 0.840

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

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)                      2, 30, 100  
Climate Change (%)                      0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
S1.000	SW Ex 1	15 Winter	2	+0%	100/15 Summer	100/15 Winter	
S2.000	SW Ex 2	15 Winter	2	+0%	100/15 Summer		
S1.001	SW Ex 3	15 Winter	2	+0%	100/15 Summer		
S3.000	SW Ex 5	15 Winter	2	+0%	100/15 Summer		
S4.000	SW Ex 4	15 Winter	2	+0%	100/15 Summer		
S1.002	SW Ex 6	15 Winter	2	+0%	30/15 Summer		
S5.000	SW Ex 7	15 Winter	2	+0%	100/15 Summer		
S5.001	SW Ex 8	15 Winter	2	+0%	30/15 Summer		
S1.003	SW Ex Tank	15 Winter	2	+0%	30/15 Summer	100/30 Winter	
S1.004	SW Ex 10	120 Winter	2	+0%	2/60 Winter	100/30 Winter	
S6.000	SW Ex 11	15 Winter	2	+0%	100/15 Summer		
S1.005	SW Ex 12	15 Winter	2	+0%	100/15 Summer		
S1.006	SW Ex 13	15 Winter	2	+0%	100/15 Summer		
S1.007	SW Ex 14	15 Winter	2	+0%	30/15 Summer		
S1.008	SW Ex 15	15 Winter	2	+0%	30/15 Summer	100/15 Winter	
S1.009	SW Ex 16	15 Winter	2	+0%	100/15 Summer	100/15 Winter	
S1.010	SW Ex 17	30 Winter	2	+0%	2/15 Summer		

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

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	SW Ex 1		71.348	-0.102	0.000	0.22			3.0
S2.000	SW Ex 2		71.347	-0.103	0.000	0.21			3.0
S1.001	SW Ex 3		71.177	-0.087	0.000	0.37			6.0
S3.000	SW Ex 5		71.292	-0.108	0.000	0.17			3.0
S4.000	SW Ex 4		71.291	-0.109	0.000	0.16			3.0
S1.002	SW Ex 6		71.019	-0.075	0.000	0.51			11.9
S5.000	SW Ex 7		71.184	-0.086	0.000	0.37			7.4
S5.001	SW Ex 8		70.995	-0.120	0.000	0.44			28.6
S1.003	SW Ex Tank		70.733	-0.062	0.000	0.87			40.5
S1.004	SW Ex 10		70.629	0.009	0.000	0.24		84	4.2
S6.000	SW Ex 11		71.077	-0.093	0.000	0.29			6.5
S1.005	SW Ex 12		70.130	-0.080	0.000	0.43			12.9
S1.006	SW Ex 13		69.016	-0.154	0.000	0.22			18.6
S1.007	SW Ex 14		68.029	-0.097	0.000	0.61			24.2
S1.008	SW Ex 15		67.788	-0.148	0.000	0.50			36.2
S1.009	SW Ex 16		67.179	-0.650	0.000	0.04			38.5
S1.010	SW Ex 17		67.053	0.317	0.000	0.30			12.6

PN	US/MH Name	Status	Level Exceeded
S1.000	SW Ex 1	OK	1
S2.000	SW Ex 2	OK	
S1.001	SW Ex 3	OK	
S3.000	SW Ex 5	OK	
S4.000	SW Ex 4	OK	
S1.002	SW Ex 6	OK	
S5.000	SW Ex 7	OK	
S5.001	SW Ex 8	OK	
S1.003	SW Ex Tank	OK	17
S1.004	SW Ex 10	SURCHARGED	17
S6.000	SW Ex 11	OK	
S1.005	SW Ex 12	OK	
S1.006	SW Ex 13	OK	
S1.007	SW Ex 14	OK	
S1.008	SW Ex 15	OK	13
S1.009	SW Ex 16	OK	13
S1.010	SW Ex 17	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.011	SW Ex 18	60 Summer	2	+0%					65.946

PN	US/MH Name	Surcharged		Flooded		Half Drain		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Time (mins)				
S1.011	SW Ex 18	-0.139	0.000	0.31				12.6	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000      Additional Flow - % of Total Flow 0.000  
Hot Start (mins)                      0                      MADD Factor \* 10m<sup>3</sup>/ha Storage 0.000  
Hot Start Level (mm)                      0                      Inlet Coefficient 1.000  
Manhole Headloss Coeff (Global) 0.500      Flow per Person per Day (l/per/day) 0.000  
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0      Number of Storage Structures 1  
Number of Online Controls 2      Number of Time/Area Diagrams 0  
Number of Offline Controls 0      Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model                      FSR                      Ratio R 0.400  
Region England and Wales Cv (Summer) 0.750  
M5-60 (mm)                      20.000 Cv (Winter) 0.840

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

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)                      2, 30, 100  
Climate Change (%)                      0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
S1.000	SW Ex 1	15 Winter	30	+0%	100/15 Summer	100/15 Winter	
S2.000	SW Ex 2	15 Winter	30	+0%	100/15 Summer		
S1.001	SW Ex 3	15 Winter	30	+0%	100/15 Summer		
S3.000	SW Ex 5	15 Winter	30	+0%	100/15 Summer		
S4.000	SW Ex 4	15 Winter	30	+0%	100/15 Summer		
S1.002	SW Ex 6	15 Winter	30	+0%	30/15 Summer		
S5.000	SW Ex 7	15 Winter	30	+0%	100/15 Summer		
S5.001	SW Ex 8	15 Winter	30	+0%	30/15 Summer		
S1.003	SW Ex Tank	15 Winter	30	+0%	30/15 Summer	100/30 Winter	
S1.004	SW Ex 10	120 Winter	30	+0%	2/60 Winter	100/30 Winter	
S6.000	SW Ex 11	15 Winter	30	+0%	100/15 Summer		
S1.005	SW Ex 12	15 Winter	30	+0%	100/15 Summer		
S1.006	SW Ex 13	15 Winter	30	+0%	100/15 Summer		
S1.007	SW Ex 14	15 Winter	30	+0%	30/15 Summer		
S1.008	SW Ex 15	15 Winter	30	+0%	30/15 Summer	100/15 Winter	
S1.009	SW Ex 16	60 Winter	30	+0%	100/15 Summer	100/15 Winter	
S1.010	SW Ex 17	60 Winter	30	+0%	2/15 Summer		

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

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	SW Ex 1		71.368	-0.082	0.000	0.41			5.7
S2.000	SW Ex 2		71.367	-0.083	0.000	0.40			5.7
S1.001	SW Ex 3		71.215	-0.049	0.000	0.69			11.1
S3.000	SW Ex 5		71.309	-0.091	0.000	0.32			5.7
S4.000	SW Ex 4		71.308	-0.092	0.000	0.31			5.7
S1.002	SW Ex 6		71.141	0.047	0.000	1.03			24.3
S5.000	SW Ex 7		71.239	-0.031	0.000	0.71			14.1
S5.001	SW Ex 8		71.129	0.014	0.000	0.96			63.4
S1.003	SW Ex Tank		70.988	0.193	0.000	1.73			80.7
S1.004	SW Ex 10		70.796	0.176	0.000	0.28		115	4.8
S6.000	SW Ex 11		71.102	-0.068	0.000	0.56			12.3
S1.005	SW Ex 12		70.175	-0.035	0.000	0.91			27.1
S1.006	SW Ex 13		69.056	-0.114	0.000	0.47			40.1
S1.007	SW Ex 14		68.287	0.161	0.000	1.32			52.8
S1.008	SW Ex 15		67.946	0.010	0.000	1.09			79.4
S1.009	SW Ex 16		67.628	-0.201	0.000	0.05			47.8
S1.010	SW Ex 17		67.626	0.890	0.000	0.30			12.4

PN	US/MH Name	Status	Level Exceeded
S1.000	SW Ex 1	OK	1
S2.000	SW Ex 2	OK	
S1.001	SW Ex 3	OK	
S3.000	SW Ex 5	OK	
S4.000	SW Ex 4	OK	
S1.002	SW Ex 6	SURCHARGED	
S5.000	SW Ex 7	OK	
S5.001	SW Ex 8	SURCHARGED	
S1.003	SW Ex Tank	SURCHARGED	17
S1.004	SW Ex 10	SURCHARGED	17
S6.000	SW Ex 11	OK	
S1.005	SW Ex 12	OK	
S1.006	SW Ex 13	OK	
S1.007	SW Ex 14	SURCHARGED	
S1.008	SW Ex 15	SURCHARGED	13
S1.009	SW Ex 16	OK	13
S1.010	SW Ex 17	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.011	SW Ex 18	480 Summer	30	+0%					65.946

PN	US/MH Name	Surcharged Flooded		Half Drain Pipe			Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap. (l/s)	Time (mins)	Flow (l/s)		
S1.011	SW Ex 18	-0.139	0.000	0.31			OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m <sup>3</sup> /ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coefficient	1.000
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

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)	2, 30, 100
Climate Change (%)	0, 0, 40

**WARNING: Half Drain Time has not been calculated as the structure is too full.**

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
S1.000	SW Ex 1	15 Winter	100	+40%	100/15 Summer	100/15 Winter	
S2.000	SW Ex 2	15 Winter	100	+40%	100/15 Summer		
S1.001	SW Ex 3	60 Winter	100	+40%	100/15 Summer		
S3.000	SW Ex 5	60 Winter	100	+40%	100/15 Summer		
S4.000	SW Ex 4	60 Winter	100	+40%	100/15 Summer		
S1.002	SW Ex 6	60 Winter	100	+40%	30/15 Summer		
S5.000	SW Ex 7	15 Winter	100	+40%	100/15 Summer		
S5.001	SW Ex 8	60 Winter	100	+40%	30/15 Summer		
S1.003	SW Ex Tank	180 Winter	100	+40%	30/15 Summer	100/30 Winter	
S1.004	SW Ex 10	180 Winter	100	+40%	2/60 Winter	100/30 Winter	
S6.000	SW Ex 11	15 Winter	100	+40%	100/15 Summer		
S1.005	SW Ex 12	15 Winter	100	+40%	100/15 Summer		
S1.006	SW Ex 13	30 Winter	100	+40%	100/15 Summer		
S1.007	SW Ex 14	30 Winter	100	+40%	30/15 Summer		

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

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	SW Ex 1		71.850	0.400	0.002	0.62			8.5
S2.000	SW Ex 2		71.848	0.398	0.000	0.60			8.6
S1.001	SW Ex 3		71.831	0.567	0.000	0.65			10.5
S3.000	SW Ex 5		71.821	0.421	0.000	0.31			5.5
S4.000	SW Ex 4		71.821	0.421	0.000	0.30			5.5
S1.002	SW Ex 6		71.805	0.711	0.000	0.79			18.8
S5.000	SW Ex 7		71.922	0.652	0.000	1.40			27.7
S5.001	SW Ex 8		71.811	0.696	0.000	0.87			57.2
S1.003	SW Ex Tank		71.773	0.978	22.651	0.78			36.3
S1.004	SW Ex 10		71.767	1.147	16.788	0.28			4.8
S6.000	SW Ex 11		71.550	0.380	0.000	0.88			19.4
S1.005	SW Ex 12		70.795	0.585	0.000	1.19			35.5
S1.006	SW Ex 13		69.842	0.672	0.000	0.61			52.0
S1.007	SW Ex 14		69.666	1.540	0.000	1.77			70.5

PN	US/MH Name	Status	Level Exceeded
S1.000	SW Ex 1	FLOOD	1
S2.000	SW Ex 2	FLOOD RISK	
S1.001	SW Ex 3	FLOOD RISK	
S3.000	SW Ex 5	FLOOD RISK	
S4.000	SW Ex 4	FLOOD RISK	
S1.002	SW Ex 6	FLOOD RISK	
S5.000	SW Ex 7	FLOOD RISK	
S5.001	SW Ex 8	FLOOD RISK	
S1.003	SW Ex Tank	FLOOD	17
S1.004	SW Ex 10	FLOOD	17
S6.000	SW Ex 11	SURCHARGED	
S1.005	SW Ex 12	SURCHARGED	
S1.006	SW Ex 13	SURCHARGED	
S1.007	SW Ex 14	FLOOD RISK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.008	SW Ex 15	60	Winter	100	+40%	30/15 Summer	100/15 Winter	
S1.009	SW Ex 16	60	Summer	100	+40%	100/15 Summer	100/15 Winter	
S1.010	SW Ex 17	30	Winter	100	+40%	2/15 Summer		
S1.011	SW Ex 18	60	Winter	100	+40%			

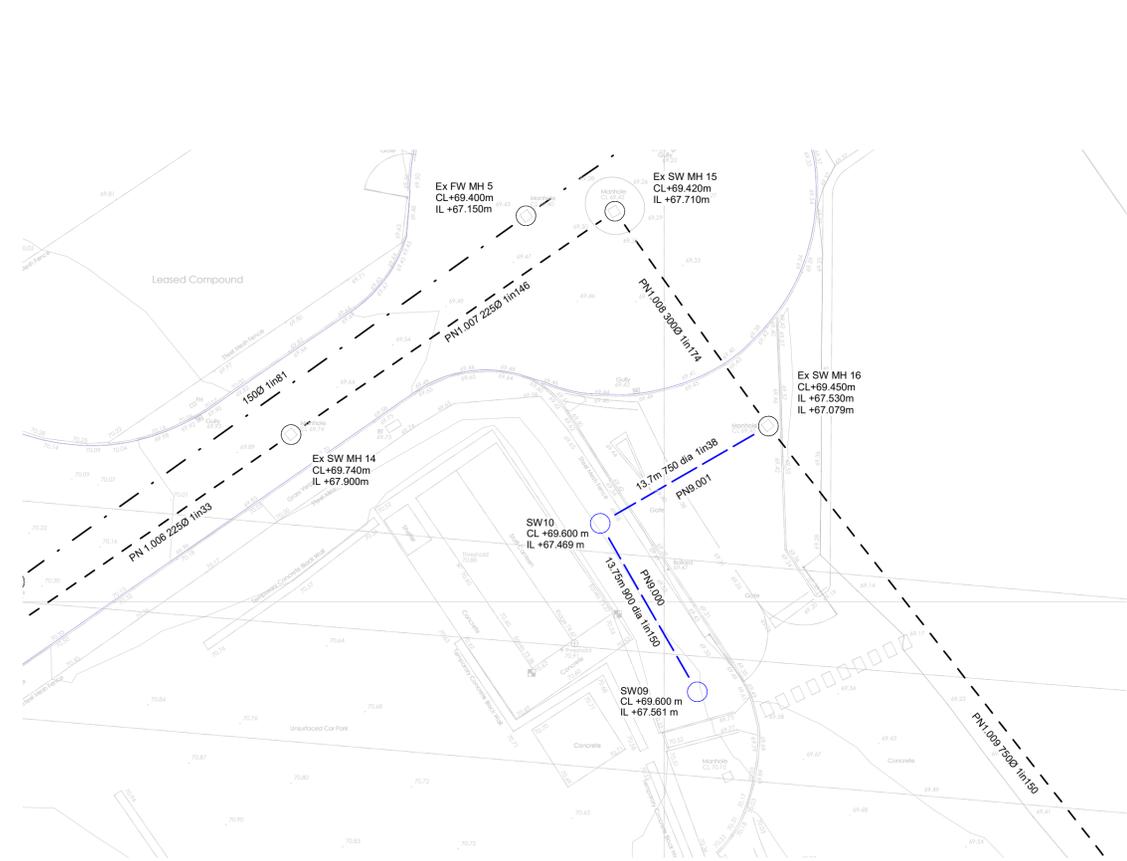
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.008	SW Ex 15	69.448	1.512	28.538	1.09		78.9	FLOOD
S1.009	SW Ex 16	69.451	1.622	1.148	0.10		94.5	FLOOD
S1.010	SW Ex 17	69.508	2.772	0.000	0.36		14.8	SURCHARGED
S1.011	SW Ex 18	65.954	-0.131	0.000	0.36		14.8	OK

PN	US/MH Name	Level Exceeded
S1.008	SW Ex 15	13
S1.009	SW Ex 16	13
S1.010	SW Ex 17	
S1.011	SW Ex 18	

## Appendix E



2 Drainage Layout 1  
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3 Drainage Layout 2  
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KEY

Surface Water Drainage	---
Foul Water Drainage	---
Existing Surface Water	---
Existing Foul Water	---

- Drainage Notes**
- Underground drains for foul and surface water drainage shall be as follows:-  
Twin wall plastic to BS 13476
  - Manhole covers to be as follows:-  
D400 in parking areas  
A15 in non-parking areas
  - Rainwater and foul outlet positions to be confirmed by Architect.
  - Drains passing through manhole walls to be built in. A flexible joint shall be provided within 150mm of the face of the wall with a further flexible joint within 600mm of the first joint.
  - All gullies, rest bends, drainage channels, rodding eyes and attachments are to be installed strictly in accordance with the manufacturers printed instructions.
  - The drainage shall be installed and tested strictly in accordance with the manufacturers printed instructions, BS 8000, BS 8301 and Local Authority byelaws.
  - All existing manhole positions, invert levels & pipe sizes are to be confirmed on site by the contractor prior to commencement of work on site and be reported to MSJ.
  - All in-situ concrete to comply with BS 8500.
  - All precast concrete items to comply with BS 5911.
  - Sulphate resisting cement (C20-DC2) and pre-cast concrete products must be used or a laboratory report provided proving that such measures are not necessary.
  - All private drainage works to comply with Approved Document 'H' of the Building Regulations.
  - All gullies and rainwater outlets are to be trapped.

**CDM Regulations - Drainage**

- All design work has been carried out with health & safety aspects given full consideration. Wherever possible risks have been eliminated from the design, however due to the nature of this type of work it is not possible to remove all risk.

The contractor shall provide satisfactory responses via suitable method statements as to the manner in which they propose to carry out the work and deal with any highlighted risk, in particular the following :-

- All trench excavations, regardless of depth.
- Guarding of edges of excavations to prevent injury.
- Guarding of the works outside normal working hours.
- Undermining of adjacent roads or structures.
- Confined spaces operations.
- Dealing with existing services.
- Traffic management on existing highways.
- Procedures to be followed in the event of an emergency.
- Methods of working where ground contamination may be present.
- Dealing with existing sewer flows.

The above list is by no means exhaustive, but does highlight operations that present a risk to both contractors and the general public.

P1	First Issue	LW	MH	26.11.21
Rev	Revision Description	By	Chk	Date
SCALE @ A1	ISSUING OFFICE	MSJ PROJECT NUMBER		
1 : 250	Leeds	221070		

STATUS: SO PURPOSE OF ISSUE: WORK IN PROGRESS

	Melia Smith & Jones Consulting Civil & Structural Engineers Vinery Court 58 Cardigan Lane Leeds LS4 2LD 0113 2306080 www.msj.co.uk
	PROJECT

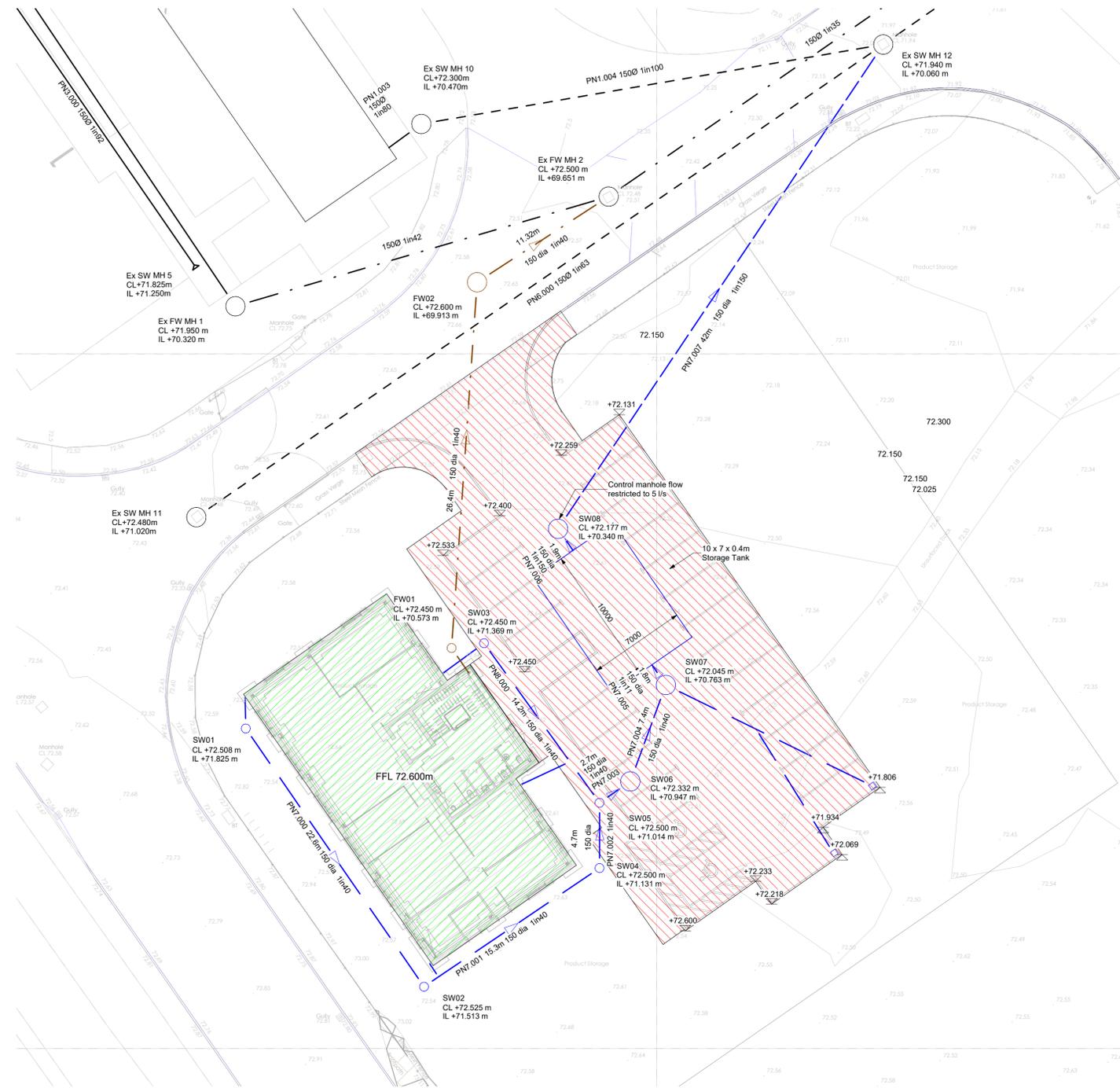
Naylor's Office,  
Barugh Green

TITLE  
Drainage Layout

CLIENT  
Martin Walsh Architectural

DRAWING NUMBER	REV
221070-MSJ-ZZ-XX-DR-D-4000	P1

## Appendix F



**1 Impermeable Area Plan**  
1 : 200

**KEY**

- Car Park 744m<sup>2</sup>
- Proposed Building 318m<sup>2</sup>

**Drainage Notes**

1. Underground drains for foul and surface water drainage shall be as follows:-  
Twin wall plastic to BS 13476
2. Manhole covers to be as follows:-  
DM400 in parking areas  
A15 in non-parking areas
3. Rainwater and foul outlet positions to be confirmed by Architect.
4. Drains passing through manhole walls to be built in. A flexible joint shall be provided within 150mm of the face of the wall with a further flexible joint within 600mm of the first joint.
5. All gullies, rest bends, drainage channels, rodding eyes and attachments are to be installed strictly in accordance with the manufacturers printed instructions.
6. The drainage shall be installed and tested strictly in accordance with the manufacturers printed instructions, BS 8000, BS 6301 and Local Authority byelaws.
7. All existing manhole positions, invert levels & pipe sizes are to be confirmed on site by the contractor prior to commencement of work on site and be reported to MSJ.
8. All in-situ concrete to comply with BS 8500.
9. All precast concrete items to comply with BS 5911.
10. Sulphate resisting cement (C20-DC2) and pre-cast concrete products must be used or a laboratory report provided proving that such measures are not necessary.
11. All private drainage works to comply with Approved Document 'H' of the Building Regulations.
12. All gullies and rainwater outlets are to be trapped.

**CDM Regulations - Drainage**

1. All design work has been carried out with health & safety aspects given full consideration. Wherever possible risks have been eliminated from the design, however due to the nature of this type of work it is not possible to remove all risk.

The contractor shall provide satisfactory responses via suitable method statements as to the manner in which they propose to carry out the work and deal with any highlighted risk, in particular the following :-

- All trench excavations, regardless of depth.
- Guarding to edges of excavations to prevent injury.
- Guarding of the works outside normal working hours.
- Undermining of adjacent roads or structures.
- Confined spaces operations.
- Dealing with existing services.
- Traffic management on existing highways.
- Procedures to be followed in the event of an emergency.
- Methods of working where ground contamination may be present.
- Dealing with existing sewer flows.

The above list is by no means exhaustive, but does highlight operations that present a risk to both contractors and the general public.

P1	First Issue	LW	MH	26.11.21
Rev	Revision Description	By	Chk	Date
SCALE @ A1	ISSUING OFFICE	MSJ PROJECT NUMBER		
1 : 200	Leeds	221070		

STATUS	PURPOSE OF ISSUE
SO	WORK IN PROGRESS

**Melia Smith & Jones**  
Consulting Civil & Structural Engineers  
Vinery Court  
58 Cardigan Lane  
Leeds LS4 2LD  
0113 2366889  
www.msj.co.uk

PROJECT  
**Naylor's Office,  
Barugh Green**

TITLE  
**Impermeable Area Plan**

CLIENT  
**Martin Walsh Architectural**

DRAWING NUMBER	REV
221070-MSJ-ZZ-XX-DR-D-4002	P1

## Appendix G

Melia Smith and Jones		Page 1									
Vinery Court 58 Cardigan Lane Leeds LS4 2LD	Naylor Naylor's Office, Barugh Green Proposed Calculations										
Date 25/11/2021 12:33 File 221070 Naylor's microdra...	Designed by LW Checked by MH										
Innovyze	Network 2020.1										
<u>STORM SEWER DESIGN by the Modified Rational Method</u>											
<u>Design Criteria for Storm</u>											
Pipe Sizes STANDARD Manhole Sizes STANDARD											
FSR Rainfall Model - England and Wales											
Return Period (years)	30	PIMP (%) 100									
M5-60 (mm)	19.000	Add Flow / Climate Change (%) 0									
Ratio R	0.352	Minimum Backdrop Height (m) 0.200									
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m) 1.500									
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m) 1.200									
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s) 1.00									
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X) 500									
Designed with Level Soffits											
<u>Time Area Diagram for Storm</u>											
<b>Time (mins)</b>	<b>Area (ha)</b>	<b>Time (mins)</b> <b>Area (ha)</b> <b>Time (mins)</b> <b>Area (ha)</b>									
0-4	0.027	4-8 0.451	8-12 0.129								
Total Area Contributing (ha) = 0.607											
Total Pipe Volume (m <sup>3</sup> ) = 69.512											
<u>Network Design Table for Storm</u>											
« - Indicates pipe capacity < flow											
<b>PN</b>	<b>Length (m)</b>	<b>Fall (m)</b>	<b>Slope (1:X)</b>	<b>I.Area (ha)</b>	<b>T.E. (mins)</b>	<b>Base Flow (l/s)</b>	<b>k (mm)</b>	<b>HYD SECT</b>	<b>DIA (mm)</b>	<b>Section Type</b>	<b>Auto Design</b>
S1.000	26.000	0.186	139.8	0.017	5.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	28.000	0.186	150.5	0.017	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	18.000	0.170	105.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
<u>Network Results Table</u>											
<b>PN</b>	<b>Rain (mm/hr)</b>	<b>T.C. (mins)</b>	<b>US/IL (m)</b>	<b>Σ I.Area (ha)</b>	<b>Σ Base Flow (l/s)</b>	<b>Foul (l/s)</b>	<b>Add Flow (l/s)</b>	<b>Vel (m/s)</b>	<b>Cap (l/s)</b>	<b>Flow (l/s)</b>	
S1.000	50.00	5.51	71.300	0.017	0.0	0.0	0.0	0.85	15.0	2.3	
S2.000	50.00	5.57	71.300	0.017	0.0	0.0	0.0	0.82	14.4	2.3	
S1.001	50.00	5.88	71.114	0.034	0.0	0.0	0.0	0.98	17.3	4.6	
©1982-2020 Innovyze											

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Vinery Court 58 Cardigan Lane Leeds LS4 2LD	Naylor Naylor's Office, Barugh Green Proposed Calculations	
Date 25/11/2021 12:33 File 221070 Naylor's microdra...	Designed by LW Checked by MH	
Innovyze	Network 2020.1	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S3.000	28.000	0.306	91.5	0.017	5.00	0.0	0.600	o	150	Pipe/Conduit	
S4.000	26.000	0.306	85.0	0.017	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	9.000	0.204	44.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S5.000	16.000	0.230	69.6	0.041	5.00	0.0	0.600	o	150	Pipe/Conduit	
S5.001	5.000	0.150	33.3	0.140	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	8.000	0.100	80.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	32.000	0.321	99.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S6.000	60.023	0.960	62.5	0.037	5.00	0.0	0.600	o	150	Pipe/Conduit	
S7.000	22.600	0.312	72.4	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S7.001	15.300	0.383	39.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.002	4.700	0.118	39.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S8.000	14.200	0.355	40.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S7.003	2.700	0.068	39.7	0.032	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)
S3.000	50.00	5.44	71.250	0.017	0.0	0.0	0.0	1.05	18.6	2.3
S4.000	50.00	5.40	71.250	0.017	0.0	0.0	0.0	1.09	19.3	2.3
S1.002	50.00	5.98	70.944	0.068	0.0	0.0	0.0	1.52	26.8	9.2
S5.000	50.00	5.22	71.120	0.041	0.0	0.0	0.0	1.21	21.3	5.6
S5.001	50.00	5.26	70.890	0.181	0.0	0.0	0.0	2.27	90.4	24.5
S1.003	50.00	6.07	70.570	0.249	0.0	0.0	0.0	1.46	58.2	33.7
S1.004	50.00	6.60	70.470	0.249	0.0	0.0	0.0	1.01	17.8«	33.7
S6.000	50.00	5.79	71.020	0.037	0.0	0.0	0.0	1.27	22.5	5.0
S7.000	50.00	5.32	71.825	0.000	0.0	0.0	0.0	1.18	20.9	0.0
S7.001	50.00	5.48	71.513	0.000	0.0	0.0	0.0	1.60	28.2	0.0
S7.002	50.00	5.53	71.130	0.000	0.0	0.0	0.0	1.60	28.3	0.0
S8.000	50.00	5.15	71.369	0.000	0.0	0.0	0.0	1.60	28.2	0.0
S7.003	50.00	5.56	71.012	0.032	0.0	0.0	0.0	1.60	28.3	4.3

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Vinery Court 58 Cardigan Lane Leeds LS4 2LD	Naylor Naylor's Office, Barugh Green Proposed Calculations	
Date 25/11/2021 12:33 File 221070 Naylor's microdra...	Designed by LW Checked by MH	
Innovyze	Network 2020.1	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S7.004	7.400	0.185	40.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.005	1.800	0.164	11.0	0.074	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.006	1.900	0.013	146.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.007	42.000	0.280	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.005	34.904	1.039	33.6	0.035	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.006	34.659	1.044	33.2	0.039	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.007	27.792	0.190	146.3	0.040	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.008	18.645	0.107	174.3	0.084	0.00	0.0	0.600	o	300	Pipe/Conduit	
S9.000	13.750	0.092	149.5	0.000	5.00	0.0	0.600	o	900	Pipe/Conduit	
S9.001	13.700	0.359	38.2	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S1.009	85.160	0.568	149.9	0.017	0.00	0.0	0.600	o	750	Pipe/Conduit	
S1.010	97.602	0.651	149.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.011	50.042	0.334	149.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	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)
S7.004	50.00	5.63	70.944	0.032	0.0	0.0	0.0	1.60	28.2	4.3
S7.005	50.00	5.64	70.759	0.106	0.0	0.0	0.0	3.06	54.1	14.4
S7.006	50.00	5.68	70.352	0.106	0.0	0.0	0.0	0.83	14.7	14.4
S7.007	50.00	6.54	70.339	0.106	0.0	0.0	0.0	0.82	14.5	14.4
S1.005	50.00	6.93	70.060	0.427	0.0	0.0	0.0	1.74	30.8<	57.8
S1.006	50.00	7.19	68.945	0.466	0.0	0.0	0.0	2.28	90.6	63.1
S1.007	50.00	7.62	67.901	0.506	0.0	0.0	0.0	1.08	42.9<	68.5
S1.008	50.00	7.88	67.636	0.590	0.0	0.0	0.0	1.19	84.0	79.9
S9.000	50.00	5.09	67.561	0.000	0.0	0.0	0.0	2.56	1629.2	0.0
S9.001	50.00	5.14	67.469	0.000	0.0	0.0	0.0	4.54	2005.1	0.0
S1.009	50.00	8.50	67.079	0.607	0.0	0.0	0.0	2.28	1008.7	82.2
S1.010	50.00	10.03	66.511	0.607	0.0	0.0	0.0	1.07	42.4<	82.2
S1.011	50.00	10.81	65.860	0.607	0.0	0.0	0.0	1.07	42.4<	82.2

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Innovyze	Network 2020.1	

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m <sup>3</sup> /ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	1.000
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	3	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	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		

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Date 25/11/2021 12:33 File 221070 Naylor's microdra...	Designed by LW Checked by MH	
Innovyze	Network 2020.1	

Online Controls for Storm

Hydro-Brake® Optimum Manhole: SW Ex 10, DS/PN: S1.004, Volume (m³): 1.7

```

Unit Reference MD-SHE-0098-5000-1500-5000
Design Head (m) 1.500
Design Flow (l/s) 5.0
  Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 98
Invert Level (m) 70.470
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

```

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	5.0
Flush-Flo™	0.431	4.9
Kick-Flo®	0.878	3.9
Mean Flow over Head Range	-	4.3

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)						
0.100	3.2	1.200	4.5	3.000	6.9	7.000	10.3
0.200	4.4	1.400	4.8	3.500	7.4	7.500	10.7
0.300	4.8	1.600	5.1	4.000	7.9	8.000	11.0
0.400	4.9	1.800	5.4	4.500	8.4	8.500	11.3
0.500	4.9	2.000	5.7	5.000	8.8	9.000	11.6
0.600	4.8	2.200	6.0	5.500	9.2	9.500	11.9
0.800	4.3	2.400	6.2	6.000	9.6		
1.000	4.1	2.600	6.5	6.500	10.0		

Hydro-Brake® Optimum Manhole: S8, DS/PN: S7.007, Volume (m³): 2.1

```

Unit Reference MD-SHE-0098-5000-1500-5000
Design Head (m) 1.500
Design Flow (l/s) 5.0
  Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 98
Invert Level (m) 70.339
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

```

Melia Smith and Jones		Page 6
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Innovyze	Network 2020.1	

Hydro-Brake® Optimum Manhole: S8, DS/PN: S7.007, Volume (m³): 2.1

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	5.0
Flush-Flo™	0.431	4.9
Kick-Flo®	0.878	3.9
Mean Flow over Head Range	-	4.3

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)						
0.100	3.2	1.200	4.5	3.000	6.9	7.000	10.3
0.200	4.4	1.400	4.8	3.500	7.4	7.500	10.7
0.300	4.8	1.600	5.1	4.000	7.9	8.000	11.0
0.400	4.9	1.800	5.4	4.500	8.4	8.500	11.3
0.500	4.9	2.000	5.7	5.000	8.8	9.000	11.6
0.600	4.8	2.200	6.0	5.500	9.2	9.500	11.9
0.800	4.3	2.400	6.2	6.000	9.6		
1.000	4.1	2.600	6.5	6.500	10.0		

Hydro-Brake® Optimum Manhole: SW Ex 17, DS/PN: S1.010, Volume (m³): 45.7

Unit Reference	MD-SHE-0146-1500-3000-1500
Design Head (m)	3.000
Design Flow (l/s)	15.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	146
Invert Level (m)	66.511
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	3.000	15.0
Flush-Flo™	0.636	12.9
Kick-Flo®	1.307	10.1
Mean Flow over Head Range	-	12.0

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)						
0.100	5.3	0.300	11.7	0.500	12.7	0.800	12.7
0.200	10.4	0.400	12.4	0.600	12.8	1.000	12.2

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Innovyze	Network 2020.1	

Hydro-Brake® Optimum Manhole: SW Ex 17, DS/PN: S1.010, Volume (m³): 45.7

Depth (m)	Flow (l/s)						
1.200	11.1	2.400	13.5	5.000	19.1	8.000	24.0
1.400	10.4	2.600	14.0	5.500	20.0	8.500	24.7
1.600	11.1	3.000	15.0	6.000	20.9	9.000	25.4
1.800	11.8	3.500	16.1	6.500	21.7	9.500	26.0
2.000	12.4	4.000	17.2	7.000	22.5		
2.200	12.9	4.500	18.2	7.500	23.2		

Vinery Court  
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 Leeds LS4 2LD

Naylor  
 Naylor's Office, Barugh Green  
 Proposed Calculations



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Innovyze

Network 2020.1

Storage Structures for Storm

Cellular Storage Manhole: SW Ex 10, DS/PN: S1.004

Invert Level (m) 70.475 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 <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	180.0	0.0	0.300	180.0	0.0
0.100	180.0	0.0	0.400	180.0	0.0
0.200	180.0	0.0	0.401	0.0	0.0

Cellular Storage Manhole: STank, DS/PN: S7.006

Invert Level (m) 70.352 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 <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	70.0	0.0	0.300	70.0	0.0
0.100	70.0	0.0	0.400	70.0	0.0
0.200	70.0	0.0	0.401	0.0	0.0

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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 \* 10m<sup>3</sup>/ha Storage 0.000  
Hot Start Level (mm)                      0                      Inlet Coefficient 1.000  
Manhole Headloss Coeff (Global) 0.500      Flow per Person per Day (l/per/day) 0.000  
Foul Sewage per hectare (l/s) 0.000

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

Synthetic Rainfall Details

Rainfall Model                      FSR                      Ratio R 0.400  
Region England and Wales Cv (Summer) 0.750  
M5-60 (mm)                      20.000 Cv (Winter) 0.840

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

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)                      2, 30, 100  
Climate Change (%)                      0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
S1.000	SW Ex 2	15 Winter	2	+0%	100/15 Summer		
S2.000	SW Ex 1	15 Winter	2	+0%	100/15 Summer	100/15 Winter	
S1.001	SW Ex 3	15 Winter	2	+0%	100/15 Summer		
S3.000	SW Ex 5	15 Winter	2	+0%	100/15 Summer		
S4.000	SW Ex 4	15 Winter	2	+0%	100/15 Summer		
S1.002	SW Ex 6	15 Winter	2	+0%	30/15 Summer		
S5.000	SW Ex 7	15 Winter	2	+0%	100/15 Summer		
S5.001	SW Ex 8	15 Winter	2	+0%	30/15 Summer		
S1.003	SW Ex Tank	15 Winter	2	+0%	30/15 Summer	100/30 Winter	
S1.004	SW Ex 10	120 Winter	2	+0%	2/60 Winter	100/30 Winter	
S6.000	SW Ex 11	15 Winter	2	+0%	100/15 Summer		
S7.000	S1	15 Summer	2	+0%			
S7.001	S2	15 Summer	2	+0%	100/30 Winter		
S7.002	S4	15 Summer	2	+0%	100/15 Summer		
S8.000	S3	15 Summer	2	+0%	100/30 Winter		
S7.003	S5	15 Winter	2	+0%	100/15 Summer		
S7.004	S6	15 Winter	2	+0%	100/15 Summer		

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

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m <sup>3</sup> )	Flow / Cap. (l/s)	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	SW Ex 2		71.347	-0.103	0.000	0.21			3.0
S2.000	SW Ex 1		71.348	-0.102	0.000	0.22			3.0
S1.001	SW Ex 3		71.177	-0.087	0.000	0.37			6.0
S3.000	SW Ex 5		71.292	-0.108	0.000	0.17			3.0
S4.000	SW Ex 4		71.291	-0.109	0.000	0.16			3.0
S1.002	SW Ex 6		71.019	-0.075	0.000	0.51			11.9
S5.000	SW Ex 7		71.184	-0.086	0.000	0.37			7.4
S5.001	SW Ex 8		70.995	-0.120	0.000	0.44			28.6
S1.003	SW Ex Tank		70.733	-0.062	0.000	0.87			40.5
S1.004	SW Ex 10		70.629	0.009	0.000	0.24		85	4.2
S6.000	SW Ex 11		71.077	-0.093	0.000	0.29			6.5
S7.000	S1		71.825	-0.150	0.000	0.00			0.0
S7.001	S2		71.513	-0.150	0.000	0.00			0.0
S7.002	S4		71.130	-0.150	0.000	0.00			0.0
S8.000	S3		71.369	-0.150	0.000	0.00			0.0
S7.003	S5		71.062	-0.100	0.000	0.24			4.9
S7.004	S6		70.990	-0.104	0.000	0.20			4.9

PN	US/MH Name	Status	Level Exceeded
S1.000	SW Ex 2	OK	
S2.000	SW Ex 1	OK	1
S1.001	SW Ex 3	OK	
S3.000	SW Ex 5	OK	
S4.000	SW Ex 4	OK	
S1.002	SW Ex 6	OK	
S5.000	SW Ex 7	OK	
S5.001	SW Ex 8	OK	
S1.003	SW Ex Tank	OK	17
S1.004	SW Ex 10	SURCHARGED	17
S6.000	SW Ex 11	OK	
S7.000	S1	OK	
S7.001	S2	OK	
S7.002	S4	OK	
S8.000	S3	OK	
S7.003	S5	OK	
S7.004	S6	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.
S7.005	S7	15 Winter	2	+0%	30/15 Summer			
S7.006	STank	60 Winter	2	+0%	30/15 Summer	100/60 Winter		
S7.007	S8	60 Winter	2	+0%	30/15 Summer			
S1.005	SW Ex 12	15 Winter	2	+0%	100/15 Summer			
S1.006	SW Ex 13	15 Winter	2	+0%	100/15 Summer			
S1.007	SW Ex 14	15 Winter	2	+0%	30/15 Summer			
S1.008	SW Ex 15	15 Winter	2	+0%	30/15 Summer	100/30 Winter		
S9.000	S9	15 Summer	2	+0%	100/30 Summer			
S9.001	S10	15 Summer	2	+0%	100/15 Winter			
S1.009	SW Ex 16	15 Winter	2	+0%	30/120 Winter	100/30 Winter		
S1.010	SW Ex 17	60 Winter	2	+0%	2/15 Summer			
S1.011	SW Ex 18	180 Winter	2	+0%				

PN	US/MH Name	Water Surcharged Flooded			Half Drain Pipe			Status
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Time (mins)	
S7.005	S7	70.836	-0.073	0.000	0.51		16.1	OK
S7.006	STank	70.471	-0.031	0.000	0.42		33 4.9	OK
S7.007	S8	70.488	-0.001	0.000	0.28		3.9	OK
S1.005	SW Ex 12	70.135	-0.075	0.000	0.50		14.7	OK
S1.006	SW Ex 13	69.019	-0.151	0.000	0.23		20.0	OK
S1.007	SW Ex 14	68.034	-0.092	0.000	0.64		25.6	OK
S1.008	SW Ex 15	67.790	-0.146	0.000	0.51		37.3	OK
S9.000	S9	67.561	-0.900	0.000	0.00		0.0	OK
S9.001	S10	67.469	-0.750	0.000	0.00		0.0	OK
S1.009	SW Ex 16	67.180	-0.649	0.000	0.04		39.2	OK
S1.010	SW Ex 17	67.112	0.376	0.000	0.30		12.6	SURCHARGED
S1.011	SW Ex 18	65.946	-0.139	0.000	0.31		12.6	OK

PN	US/MH Name	Level Exceeded
S7.005	S7	
S7.006	STank	2
S7.007	S8	
S1.005	SW Ex 12	
S1.006	SW Ex 13	
S1.007	SW Ex 14	
S1.008	SW Ex 15	15
S9.000	S9	
S9.001	S10	
S1.009	SW Ex 16	14
S1.010	SW Ex 17	
S1.011	SW Ex 18	



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

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	SW Ex 2		71.367	-0.083	0.000	0.40			5.7
S2.000	SW Ex 1		71.368	-0.082	0.000	0.41			5.7
S1.001	SW Ex 3		71.215	-0.049	0.000	0.69			11.1
S3.000	SW Ex 5		71.309	-0.091	0.000	0.32			5.7
S4.000	SW Ex 4		71.308	-0.092	0.000	0.31			5.7
S1.002	SW Ex 6		71.141	0.047	0.000	1.03			24.3
S5.000	SW Ex 7		71.239	-0.031	0.000	0.71			14.1
S5.001	SW Ex 8		71.129	0.014	0.000	0.96			63.4
S1.003	SW Ex Tank		70.988	0.193	0.000	1.73			80.7
S1.004	SW Ex 10		70.797	0.177	0.000	0.28		114	4.8
S6.000	SW Ex 11		71.102	-0.068	0.000	0.56			12.3
S7.000	S1		71.825	-0.150	0.000	0.00			0.0
S7.001	S2		71.513	-0.150	0.000	0.00			0.0
S7.002	S4		71.130	-0.150	0.000	0.00			0.0
S8.000	S3		71.369	-0.150	0.000	0.00			0.0
S7.003	S5		71.094	-0.068	0.000	0.58			11.7
S7.004	S6		71.025	-0.069	0.000	0.48			11.6

PN	US/MH Name	Status	Level Exceeded
S1.000	SW Ex 2	OK	
S2.000	SW Ex 1	OK	1
S1.001	SW Ex 3	OK	
S3.000	SW Ex 5	OK	
S4.000	SW Ex 4	OK	
S1.002	SW Ex 6	SURCHARGED	
S5.000	SW Ex 7	OK	
S5.001	SW Ex 8	SURCHARGED	
S1.003	SW Ex Tank	SURCHARGED	17
S1.004	SW Ex 10	SURCHARGED	17
S6.000	SW Ex 11	OK	
S7.000	S1	OK	
S7.001	S2	OK	
S7.002	S4	OK	
S8.000	S3	OK	
S7.003	S5	OK	
S7.004	S6	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.
S7.005	S7	15 Winter	30	+0%	30/15 Summer			
S7.006	STank	60 Winter	30	+0%	30/15 Summer	100/60 Winter		
S7.007	S8	60 Winter	30	+0%	30/15 Summer			
S1.005	SW Ex 12	15 Winter	30	+0%	100/15 Summer			
S1.006	SW Ex 13	15 Winter	30	+0%	100/15 Summer			
S1.007	SW Ex 14	15 Winter	30	+0%	30/15 Summer			
S1.008	SW Ex 15	120 Winter	30	+0%	30/15 Summer	100/30 Winter		
S9.000	S9	120 Winter	30	+0%	100/30 Summer			
S9.001	S10	120 Winter	30	+0%	100/15 Winter			
S1.009	SW Ex 16	120 Winter	30	+0%	30/120 Winter	100/30 Winter		
S1.010	SW Ex 17	120 Winter	30	+0%	2/15 Summer			
S1.011	SW Ex 18	600 Winter	30	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Half Drain Flow / Cap. (l/s)	Pipe Overflow (l/s)	Time (mins)	Status
S7.005	S7	70.982	0.073	0.000	1.21	38.4		SURCHARGED
S7.006	STank	70.609	0.107	0.000	0.40	45	4.7	SURCHARGED
S7.007	S8	70.604	0.115	0.000	0.33		4.7	SURCHARGED
S1.005	SW Ex 12	70.197	-0.013	0.000	1.00		29.7	OK
S1.006	SW Ex 13	69.059	-0.111	0.000	0.49		42.2	OK
S1.007	SW Ex 14	68.315	0.189	0.000	1.37		54.5	SURCHARGED
S1.008	SW Ex 15	67.972	0.036	0.000	0.47		34.0	SURCHARGED
S9.000	S9	67.961	-0.500	0.000	0.00		0.4	OK
S9.001	S10	67.961	-0.258	0.000	0.00		1.8	OK
S1.009	SW Ex 16	67.961	0.132	0.000	0.04		35.0	SURCHARGED
S1.010	SW Ex 17	67.959	1.223	0.000	0.30		12.5	SURCHARGED
S1.011	SW Ex 18	65.946	-0.139	0.000	0.31		12.6	OK

PN	US/MH Name	Level Exceeded
S7.005	S7	
S7.006	STank	2
S7.007	S8	
S1.005	SW Ex 12	
S1.006	SW Ex 13	
S1.007	SW Ex 14	
S1.008	SW Ex 15	15
S9.000	S9	
S9.001	S10	
S1.009	SW Ex 16	14
S1.010	SW Ex 17	
S1.011	SW Ex 18	

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

Simulation Criteria

Areal Reduction Factor 1.000      Additional Flow - % of Total Flow 0.000  
Hot Start (mins)                      0                      MADD Factor \* 10m<sup>3</sup>/ha Storage 0.000  
Hot Start Level (mm)                      0                      Inlet Coefficient 1.000  
Manhole Headloss Coeff (Global) 0.500      Flow per Person per Day (l/per/day) 0.000  
Foul Sewage per hectare (l/s) 0.000

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

Synthetic Rainfall Details

Rainfall Model                      FSR                      Ratio R 0.400  
Region England and Wales Cv (Summer) 0.750  
M5-60 (mm)                      20.000 Cv (Winter) 0.840

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

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)                      2, 30, 100  
Climate Change (%)                      0, 0, 40

**WARNING: Half Drain Time has not been calculated as the structure is too full.**

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
S1.000	SW Ex 2	15 Winter	100	+40%	100/15 Summer		
S2.000	SW Ex 1	15 Winter	100	+40%	100/15 Summer	100/15 Winter	
S1.001	SW Ex 3	60 Winter	100	+40%	100/15 Summer		
S3.000	SW Ex 5	60 Winter	100	+40%	100/15 Summer		
S4.000	SW Ex 4	60 Winter	100	+40%	100/15 Summer		
S1.002	SW Ex 6	60 Winter	100	+40%	30/15 Summer		
<b>S5.000</b>	<b>SW Ex 7</b>	<b>15 Winter</b>	<b>100</b>	<b>+40%</b>	<b>100/15 Summer</b>		
S5.001	SW Ex 8	60 Winter	100	+40%	30/15 Summer		
S1.003	SW Ex Tank	180 Winter	100	+40%	30/15 Summer	100/30 Winter	
S1.004	SW Ex 10	180 Winter	100	+40%	2/60 Winter	100/30 Winter	
S6.000	SW Ex 11	15 Winter	100	+40%	100/15 Summer		
S7.000	S1	60 Winter	100	+40%			
S7.001	S2	60 Winter	100	+40%	100/30 Winter		
S7.002	S4	60 Winter	100	+40%	100/15 Summer		

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

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	SW Ex 2		71.848	0.398	0.000	0.60			8.6
S2.000	SW Ex 1		71.850	0.400	0.002	0.62			8.5
S1.001	SW Ex 3		71.831	0.567	0.000	0.65			10.5
S3.000	SW Ex 5		71.821	0.421	0.000	0.31			5.5
S4.000	SW Ex 4		71.821	0.421	0.000	0.30			5.5
S1.002	SW Ex 6		71.805	0.711	0.000	0.79			18.8
S5.000	SW Ex 7		71.922	0.652	0.000	1.40			27.7
S5.001	SW Ex 8		71.811	0.696	0.000	0.87			57.2
S1.003	SW Ex Tank		71.773	0.978	22.644	0.78			36.3
S1.004	SW Ex 10		71.767	1.147	16.781	0.28			4.8
S6.000	SW Ex 11		71.534	0.364	0.000	0.89			19.6
S7.000	S1		71.953	-0.022	0.000	0.03			0.5
S7.001	S2		71.953	0.290	0.000	0.05			1.4
S7.002	S4		71.953	0.673	0.000	0.08			1.9

PN	US/MH Name	Status	Level Exceeded
S1.000	SW Ex 2	FLOOD RISK	
S2.000	SW Ex 1	FLOOD	1
S1.001	SW Ex 3	FLOOD RISK	
S3.000	SW Ex 5	FLOOD RISK	
S4.000	SW Ex 4	FLOOD RISK	
S1.002	SW Ex 6	FLOOD RISK	
S5.000	SW Ex 7	FLOOD RISK	
S5.001	SW Ex 8	FLOOD RISK	
S1.003	SW Ex Tank	FLOOD	17
S1.004	SW Ex 10	FLOOD	17
S6.000	SW Ex 11	SURCHARGED	
S7.000	S1	OK	
S7.001	S2	SURCHARGED	
S7.002	S4	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.
S8.000	S3	60 Winter	100	+40%	100/30 Winter			
S7.003	S5	60 Winter	100	+40%	100/15 Summer			
S7.004	S6	60 Winter	100	+40%	100/15 Summer			
S7.005	S7	60 Winter	100	+40%	30/15 Summer			
S7.006	STank	60 Winter	100	+40%	30/15 Summer	100/60 Winter		
S7.007	S8	60 Winter	100	+40%	30/15 Summer			
S1.005	SW Ex 12	15 Winter	100	+40%	100/15 Summer			
S1.006	SW Ex 13	60 Winter	100	+40%	100/15 Summer			
S1.007	SW Ex 14	60 Winter	100	+40%	30/15 Summer			
S1.008	SW Ex 15	120 Winter	100	+40%	30/15 Summer	100/30 Winter		
S9.000	S9	180 Winter	100	+40%	100/30 Summer			
S9.001	S10	180 Winter	100	+40%	100/15 Winter			
S1.009	SW Ex 16	240 Winter	100	+40%	30/120 Winter	100/30 Winter		
S1.010	SW Ex 17	240 Summer	100	+40%	2/15 Summer			
S1.011	SW Ex 18	120 Winter	100	+40%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S8.000	S3	71.953	0.434	0.000	0.03		0.7	SURCHARGED
S7.003	S5	71.953	0.791	0.000	0.52		10.5	SURCHARGED
S7.004	S6	71.951	0.857	0.000	0.43		10.5	SURCHARGED
S7.005	S7	71.946	1.037	0.000	1.09		34.6	FLOOD RISK
S7.006	STank	71.940	1.438	0.368	1.04		12.3	FLOOD
S7.007	S8	71.938	1.449	0.000	0.37		5.1	FLOOD RISK
S1.005	SW Ex 12	70.768	0.558	0.000	1.18		35.0	SURCHARGED
S1.006	SW Ex 13	69.667	0.497	0.000	0.50		43.0	SURCHARGED
S1.007	SW Ex 14	69.559	1.433	0.000	1.39		55.5	FLOOD RISK
S1.008	SW Ex 15	69.448	1.512	27.726	0.76		55.1	FLOOD
S9.000	S9	69.450	0.989	0.000	0.00		2.6	FLOOD RISK
S9.001	S10	69.450	1.231	0.000	0.00		4.3	FLOOD RISK
S1.009	SW Ex 16	69.450	1.621	0.458	0.04		31.9	FLOOD
S1.010	SW Ex 17	69.461	2.725	0.000	0.36		14.8	SURCHARGED
S1.011	SW Ex 18	65.954	-0.131	0.000	0.36		14.8	OK

PN	US/MH Name	Level Exceeded
S8.000	S3	
S7.003	S5	
S7.004	S6	
S7.005	S7	
S7.006	STank	2
S7.007	S8	

Melia Smith and Jones		Page 18
Vinery Court 58 Cardigan Lane Leeds LS4 2LD	Naylor Naylors Office, Barugh Green Proposed Calculations	
Date 25/11/2021 12:33 File 221070 Naylors microdra...	Designed by LW Checked by MH	
Innovyze	Network 2020.1	

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

PN	US/MH Name	Level Exceeded
S1.005	SW Ex 12	
S1.006	SW Ex 13	
S1.007	SW Ex 14	
S1.008	SW Ex 15	15
S9.000	S9	
S9.001	S10	
S1.009	SW Ex 16	14
S1.010	SW Ex 17	
S1.011	SW Ex 18	

Appendix H

Mr. L Whitaker  
Melia, Smith and Jones  
Vinery Court,  
58 Cardigan Lane  
Leeds, LS4 2LD

Wednesday 1 June 2022

Ref: K0054/14/LT/01

Re: Naylor's Yard, Whaley Road, Barugh Green, Barnsley – K0054  
Surface Water Infiltration Drainage

Dear Luke,

Further to our discussion, please find below my assessment regarding the potential for surface water infiltration drainage at the aforementioned proposed development site.

The works we undertook for yourselves on the nearby Wordsworth Excavations site confirmed that the site was not suitable for the use of infiltration drainage. We consider that the similar appraisal will be applicable for the smaller industrial unit at the Naylor Concrete Products site which we reference as K0054. Information provided for the adjacent site has been attached to this correspondence for reference.

Please find attached for your records and information the following (as issued within the Ground Investigation Report, dated 18 March 2022, reference K0030-BLP-ENV-R-003):

- ByrneLooby window sample borehole logs reference WS1 to WS5, drilled 8 November 2021
- ByrneLooby trial pit logs, reference TP01 to TP07, excavated 9 November 2021
- ByrneLooby Site Plan, drawing number K0030-01-001
- ByrneLooby soakaway data reference SA1 and SA2

Having reviewed the depth of made ground (4m to 6.1m) present on site, it is not considered that traditional infiltration pits will be feasible for the discharge of surface water to ground in lieu of the adopted drainage system. Only 2 No. trial pits encountered natural stratum, and the depth was 3m (TP01) and 2m (TP02).

Infiltration pits/soakaways as part of sustainable urban drainage should not be installed within made ground. Underlying the made ground was a firm to very stiff natural clay which will have very poor infiltration rates.

ByrneLooby undertook 2 No. soakaway infiltration tests in accordance with BRE365 and both failed on their initial test (of three).

I trust the above is suitable for your current requirements; however, should you have any further queries, please do not hesitate in contacting me.

Yours sincerely  
For ByrneLooby,



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N Reynolds  
BSc(Hons), MSc, CGeol, CSci, MEnvSc, FGS.  
Associate

# Dynamic Sample Log

Borehole formation details:										Location details:	
Type: IP	From: 0.00	To: 1.20	Start date: 08-11-21	End date: 08-11-21	Crew: PM Sampling	Plant: Hand Tools	Logger: HW	Logged: 08-11-21	Remarks:	mE: 432172.00	mN: 408362.00
WS	0.00	5.45	08-11-21	08-11-21	PM Sampling	Terrier Rig	HW	08-11-21	Installed with 51mm HDPE wellscreen. Saturated at 4.1m bgl	Grid: OSGB	

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results
				0.10	MADE GROUND: Brown silty sandy, sub-angular to sub-rounded, fine to coarse GRAVEL of concrete, brick and limestone					
				0.15	MADE GROUND: Black TARMAC					
				0.25	MADE GROUND: Medium strength grey CONCRETE.					
				(0.45)	MADE GROUND: Brown silty gravelly SAND. Gravel is sub-angular to sub-rounded, fine to coarse of brick, concrete and coal fragments.			0.50	ES1	
				0.70	MADE GROUND: Soft brown slightly sandy gravelly CLAY. Gravel is sub-angular, fine to coarse of brick and mudstone.					
				(0.30)						
				1.00	MADE GROUND: Firm brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is sub-angular, fine to coarse of mudstone. (Reworked Natural).			1.00	ES2	
				(1.00)		Dry		1.20 - 1.65 1.20 1.30	SPT D3 D4	N=8 (1,2/2,2,2,2)
				2.00	MADE GROUND: Soft black sand gravelly SILT. Gravel is sub-angular, fine to coarse of brick, concrete, limestone, mudstone, coal with ash and pockets of silty sand. (Colliery Fill)			2.00 - 2.45 2.00 2.00 - 4.00	SPT D6 B5	N=24 (10,6/6,5,5,8)
				(3.45)		Dry		3.00 - 3.45 3.00	SPT D7	N=24 (5,6/6,6,6,6)
						Dry		4.00 - 4.45	SPT	N=8 (1,2/2,2,2,2)
						Dry		5.00 - 5.45 5.00	SPT D8	N=6 (0,0/0,2,2,2)

Groundwater entries:	Casing:	Depth related remarks:	Run details:
Struck: 4.10 Rose to: 4.10 Casing: Sealed:	Cased to: Diameter (mm):	From: to: Remarks	From: to: Ø Duration: Recovery:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: DRAFT Scale: 1:25</p>	<p>Project: Whaley Rd, Barugh Green Project No: K0030 Client: Melia Smith &amp; Jones Limited</p>	<p>Exploratory position reference: <b>WS01</b></p> <p>Sheet 1 of 2</p>
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# Dynamic Sample Log

Borehole formation details:										Location details:	
Type: IP	From: 0.00	To: 1.20	Start date: 08-11-21	End date: 08-11-21	Crew: PM Sampling	Plant: Hand Tools	Logger: HW	Logged: 08-11-21	Remarks:	mE: 432172.00	mN: 408362.00
WS	0.00	5.45	08-11-21	08-11-21	PM Sampling	Terrier Rig	HW	08-11-21	Installed with 51mm HDPE wellscreen. Saturated at 4.1m bgl	Grid: OSGB	

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results
			5.45		MADE GROUND: Soft black sand gravelly SILT. Gravel is sub-angular, fine to coarse of brick, concrete, limestone, mudstone, coal with ash and pockets of silty sand. (Colliery Fill)  Dynamic sample ends at 5.45 m (Unable to continue due to difficult drilling )					

Groundwater entries:	Casing:	Depth related remarks:	Run details:
Struck: Rose to: Casing: Sealed:	Cased to: Diameter (mm):	From to: Remarks	From: to: Ø Duration: Recovery:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: DRAFT Scale: 1:25</p>	<p>Project: Whaley Rd, Barugh Green Project No: K0030 Client: Melia Smith &amp; Jones Limited</p>	<p>Exploratory position reference: <b>WS01</b></p>
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# Dynamic Sample Log

### Borehole formation details:

Type: IP	From: 0.00	To: 1.20	Start date: 08-11-21	End date: 08-11-21	Crew: PM Sampling	Plant: Hand Tools	Logger: HW	Logged: 08-11-21	Remarks:	<b>Location details:</b>	
WS	0.00	4.25	08-11-21	08-11-21	g PM Sampling	Terrier Rig	HW	08-11-21	Installed with 51mm HDPE wellscreen. Saturated at 4.1mbgl	mE: 432193.00	mN: 408329.00
										Grid: OSGB	

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results
				0.20	MADE GROUND: Brown silty gravelly SAND. Gravel is sub-angular, fine to coarse of brick, concrete, limestone and coal fragments.					
				0.40	MADE GROUND: Weak red BRICKS					
				(0.80)	MADE GROUND: Black silty gravelly SAND. Gravel is sub-angular to angular, fine to coarse of brick and coal. (Colliery Fill).			0.70	ES1	
				1.20	MADE GROUND: Soft brown sandy gravelly CLAY. Gravel is sub-angular to angular, fine to coarse of coal, brick and ash. (Colliery Fill).	Dry		1.20 - 1.65 1.20 1.20 1.20 - 3.00	SPT D2 D3 B4	N=7 (1,1/1,2,2,2)
				(2.80)		Dry		2.00 - 2.45 2.00	SPT D5	N=22 (3,3/3,6,6,7)
								2.50	ES6	
						Dry		3.00 - 3.45 3.00	SPT D7	N=6 (2,1/1,2,1,2)
				4.00	Stiff to very stiff brown mottled grey slightly gravelly CLAY. Gravel is sub-angular, fine to medium of mudstone, becoming weak weathered MUDSTONE at 4.9m bgl. (PMCM)	Dry		4.00 - 4.45 4.00 4.10	SPT D8 D9	N=17 (2,2/3,3,4,7)
				(0.93)		Dry		4.50 - 4.92 4.50	SPT D10	50 (10,9/50 for 275mm)
				4.93	Dynamic sample ends at 4.93 m (Refusal in bedrock)					

<b>Groundwater entries:</b>		<b>Casing:</b>		<b>Depth related remarks:</b>		<b>Run details:</b>	
Struck: 4.10	Rose to: 4.10	Casing: Sealed:	Cased to:	Diameter (mm):	From:	to:	Remarks:
							From: to: Ø Duration: Recovery:

 Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.	Project: Whaley Rd, Barugh Green Project No: K0030 Client: Melia Smith & Jones Limited	Exploratory position reference: <h1>WS02</h1>
	Log issue: DRAFT Scale: 1:25	Sheet 1 of 1

# Dynamic Sample Log

Borehole formation details:										Location details:	
Type: IP	From: 0.00	To: 1.20	Start date: 08-11-21	End date: 08-11-21	Crew: PM Sampling	Plant: Hand Tools	Logger: HW	Logged: 08-11-21	Remarks:	mE: 432202.00	mN: 408356.00
WS	0.00	5.45	08-11-21	08-11-21	g PM Sampling	Terrier Rig	HW	08-11-21	Installed with 51mm HDPE wellscreen. Saturated at 2.0mbgl	Grid: OSGB	

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results
				0.15	MADE GROUND: Brown silty sandy, sub-angular to sub-rounded, fine to coarse GRAVEL of concrete, brick and limestone.					
				0.30	MADE GROUND: Medium strength grey CONCRETE.					
				(1.20)	MADE GROUND: Firm brown sandy gravelly CLAY. Gravel is sub-angular, fine to coarse of brick concrete, limestone and coal fragments.					
				1.50	MADE GROUND: Soft black slightly sandy slightly gravelly CLAY. Gravel is sub-angular, fine to medium of brick, tile, coal with ash. (Colliery Fill).					
				(3.10)		Dry		1.00	D1	
								1.20 - 1.65	SPT D2	N=13 (4,3/3,4,3,3)
								1.20		
								1.50	ES3	
								1.70	D4	
						Dry		2.00 - 2.45	SPT D5	N=5 (1,1/1,1,2,1)
								2.00		
								3.00 - 3.45	SPT D6	N=13 (2,3/4,3,3,3)
								3.00		
								3.50	D7	
								4.00 - 4.45	SPT	N=8 (1,1/2,2,2,2)
						Dry		4.70	ES8	
				4.60	Stiff to very stiff brown mottled grey slightly gravelly CLAY. Gravel is sub-angular, fine to medium of mudstone. Becoming weak weathered MUDSTONE at base. (PMCM)					
				(0.85)		Dry		5.00 - 5.45	SPT D9	N=19 (3,3/4,4,4,7)
								5.00		

Groundwater entries:	Casing:	Depth related remarks:	Run details:
Struck: 2.00 Rose to: 2.00 Casing: Sealed:	Cased to: Diameter (mm):	From: to: Remarks	From: to: Ø Duration: Recovery:

 Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres. Log issue: DRAFT Scale: 1:25	Project: Whaley Rd, Barugh Green Project No: K0030 Client: Melia Smith & Jones Limited	Exploratory position reference: <h1>WS03</h1> Sheet 1 of 2
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# Dynamic Sample Log

Borehole formation details:										Location details:	
Type: IP	From: 0.00	To: 1.20	Start date: 08-11-21	End date: 08-11-21	Crew: PM Sampling	Plant: Hand Tools	Logger: HW	Logged: 08-11-21	Remarks:	mE: 432202.00	mN: 408356.00
WS	0.00	5.45	08-11-21	08-11-21	PM Sampling	Terrier Rig	HW	08-11-21	Installed with 51mm HDPE wellscreen. Saturated at 2.0mbgl	Grid: OSGB	

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results
			5.45		Stiff to very stiff brown mottled grey slightly gravelly CLAY. Gravel is sub-angular, fine to medium of mudstone. Becoming weak weathered MUDSTONE at base. (PMCM)					
					Dynamic sample ends at 5.45 m (Reached required depth)					

Groundwater entries:	Casing:	Depth related remarks:	Run details:
Struck: Rose to: Casing: Sealed:	Cased to: Diameter (mm):	From to: Remarks	From: to: Ø Duration: Recovery:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: DRAFT</p> <p>Scale: 1:25</p>	<p>Project: Whaley Rd, Barugh Green</p> <p>Project No: K0030</p> <p>Client: Melia Smith &amp; Jones Limited</p>	<p>Exploratory position reference:</p> <h1>WS03</h1>
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# Dynamic Sample Log

Borehole formation details:										Location details:	
Type: IP	From: 0.00	To: 1.20	Start date: 08-11-21	End date: 08-11-21	Crew: PM Sampling	Plant: Hand Tools	Logger: HW	Logged: 08-11-21	Remarks:	mE: 432218.00	mN: 408343.00
WS	0.00	5.94	08-11-21	08-11-21	g PM Sampling	Terrier Rig	HW	08-11-21	Saturated at 3.8mbgl.	Grid: OSGB	

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results
				(1.00)	MADE GROUND: Stiff brown sandy gravelly CLAY. Gravel is sub-angular, fine to coarse of concrete, brick, limestone and coal fragments.					
				1.00	MADE GROUND: Weak red BRICKS					
				1.20	MADE GROUND: Soft dark brown to black sandy gravelly CLAY. Gravel is sub-angular, fine to coarse, brick concrete and coal with ash. (Colliery Fill). <i>1.20 - 1.50 m: Low recovery.</i>	Dry		1.20 - 1.65 1.20	SPT D1	N=41 (1,2/2,25,6,8)
					<i>2.00 - 3.80 m: Becomes very sandy.</i>			1.70	ES2	
						Dry		2.00 - 2.45 2.00 2.10	SPT D3 D4	N=6 (2,2/1,1,1,3)
				(3.40)		Dry		3.00 - 3.45 3.00 3.10	SPT D5 D6	N=8 (2,2/2,2,2,2)
						Dry		4.00 - 4.45 4.00	SPT D7	N=13 (2,3/3,3,3,4)
				4.60	Stiff to very stiff brown mottled grey slightly gravelly CLAY. Gravel is angular, fine to medium of mudstone. Becoming weak MUDSTONE at 5.8m. (PCMC)	Dry		4.70	D8	
						Dry		5.00 - 5.42 5.00	SPT D9	50 (4,6/50 for 275mm)

Groundwater entries:	Casing:	Depth related remarks:	Run details:
Struck: 3.80 Rose to: 3.80 Casing: Sealed:	Cased to: Diameter (mm):	From: to: Remarks	From: to: Ø Duration: Recovery:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: DRAFT Scale: 1:25</p>	<p>Project: Whaley Rd, Barugh Green Project No: K0030 Client: Melia Smith &amp; Jones Limited</p>	<p>Exploratory position reference: <b>WS04</b></p> <p>Sheet 1 of 2</p>
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# Dynamic Sample Log

Borehole formation details:										Location details:	
Type: IP	From: 0.00	To: 1.20	Start date: 08-11-21	End date: 08-11-21	Crew: PM Sampling	Plant: Hand Tools	Logger: HW	Logged: 08-11-21	Remarks:	mE: 432218.00	mN: 408343.00
WS	0.00	5.94	08-11-21	08-11-21	PM Sampling	Terrier Rig	HW	08-11-21	Saturated at 3.8mgl.	Grid: OSGB	

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results
			(1.34)		Stiff to very stiff brown mottled grey slightly gravelly CLAY. Gravel is angular, fine to medium of mudstone. Becoming weak MUDSTONE at 5.8m. (PCMC)			5.50	D10	
						Dry			SPT	50 (14,11/50 for 90mm)
			5.94		Dynamic sample ends at 5.94 m (Refusal refusal in bedrock)			6.00	D11	

Groundwater entries:	Casing:	Depth related remarks:	Run details:
Struck: Rose to: Casing: Sealed:	Cased to: Diameter (mm):	From to: Remarks	From: to: Ø Duration: Recovery:

 <small>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</small> Log issue: DRAFT Scale: 1:25	Project: Whaley Rd, Barugh Green Project No: K0030 Client: Melia Smith & Jones Limited	Exploratory position reference: <h1>WS04</h1>
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# Dynamic Sample Log

**Borehole formation details:**

Type: IP	From: 0.00	To: 1.20	Start date: 08-11-21	End date: 08-11-21	Crew: PM Samplin g PM Samplin	Plant: Hand Tools	Logger: HW	Logged: 08-11-21	Remarks:	<b>Location details:</b>	
WS	0.00	6.45	08-11-21	08-11-21		Terrier Rig	HW	08-11-21	Saturated from 4.7mbgl.	mE: 432190.00	mN: 408378.00
										Grid: OSGB	

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results
				(0.50)	MADE GROUND: Brown silty gravelly SAND. Gravel is sub-angular, fine to coarse of brick concrete, limestone and coal fragments.					
				0.50 (0.50)	MADE GROUND: Soft to firm, brown sandy gravelly CLAY. Gravel is sub-rounded to sub-angular, fine to coarse of brick, concrete, limestone and coal fragments.					
				1.00 (3.50)	MADE GROUND: Soft dark brown, slightly sandy, slightly gravelly CLAY. Gravel is sub-rounded to sub-angular, fine to medium of brick, limestone, coal and clinker.	Dry		1.10 1.20 - 1.65 1.20	ES1 SPT D2	N=6 (1,1/1,2,2,1)
						Dry		2.00 - 2.45 2.00	SPT D3	N=6 (1,1/1,1,2,2)
								2.50	D4	
						Dry		3.00 - 3.45 3.00	SPT D5	N=8 (3,2/2,2,2,2)
				4.50 (1.00)	MADE GROUND: Brown sandy clayey sub-angular, fine to coarse GRAVEL of brick and concrete.	Dry		4.00 - 4.45 4.00	SPT D6	N=11 (1,2/2,3,3,3)
						Dry		5.00 - 5.45	SPT	N=10 (3,1/3,3,2,2)

Groundwater entries:	Casing:	Depth related remarks:	Run details:
Struck: 4.70 Rose to: 4.70 Casing: Sealed:	Cased to: Diameter (mm):	From to: Remarks	From: to: Ø Duration: Recovery:

 Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres. Log issue: DRAFT Scale: 1:25	Project: Whaley Rd, Barugh Green Project No: K0030 Client: Melia Smith & Jones Limited	Exploratory position reference: <h2>WS05</h2>
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# Dynamic Sample Log

Borehole formation details:										Location details:	
Type: IP	From: 0.00	To: 1.20	Start date: 08-11-21	End date: 08-11-21	Crew: PM Sampling	Plant: Hand Tools	Logger: HW	Logged: 08-11-21	Remarks:	mE: 432190.00	mN: 408378.00
WS	0.00	6.45	08-11-21	08-11-21	g PM Sampling	Terrier Rig	HW	08-11-21	Saturated from 4.7mbgl.	Grid: OSGB	

Backfill/Instaln	Water-strike	Legend	Level	Depth (thickness)	Stratum Description	Samples & In Situ Testing				
						Water	Casing	Depth	Type & No	Results
				5.50	MADE GROUND: Brown sandy clayey sub-angular, fine to coarse GRAVEL of brick and concrete.					
				(0.60)	MADE GROUND: Brown mottled grey sandy gravelly, CLAY. Gravel is sub-angular, fine to coarse of brick and concrete.					
				6.10	Firm to stiff brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to medium of weathered mudstone.	Dry		6.00 - 6.45 6.00	SPT D7	N=11 (1,2/3,3,2,3)
				(0.35)						
				6.45	Dynamic sample ends at 6.45 m (Reached required depth)					

Groundwater entries:	Casing:	Depth related remarks:	Run details:
Struck: Rose to: Casing: Sealed:	Cased to: Diameter (mm):	From to: Remarks	From: to: Ø Duration: Recovery:

<p>Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres.</p> <p>Log issue: DRAFT Scale: 1:25</p>	<p>Project: Whaley Rd, Barugh Green Project No: K0030 Client: Melia Smith &amp; Jones Limited</p>	<p>Exploratory position reference: <b>WS05</b></p>
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# Trial Pit Log

<b>Personnel:</b>		<b>Equipment &amp; methods:</b>		<b>Dimensions:</b>		<b>Coordinates &amp; level:</b>		<b>Dates:</b>	
Logged by:	HW	Method:	Machine Excavated	Width:	1.00	Easting:	432119.00 m E	Start:	09/11/2021
Checked by:	JT	Plant:	Doosan Midi DX85	Length:	3.00	Northing:	408288.00 m N	End:	09/11/2021
Approved by:		Shoring:	None used	<b>Orientation:</b>		Level:		Logged:	09/11/2021
				Strike A - C = °		Grid:			

Backfill/ Instal'n	Water- strike	Legend	Level & Depth (Thickness)	Stratum Description	Samples & In Situ Testing		
					Depth	Type & No	Results
			(0.50)	MADE GROUND: Brown sandy clayey, sub-angular, fine to coarse GRAVEL of brick, concrete, limestone and coal.			
			0.50	MADE GROUND: Black silty gravelly SAND. Gravel is sub-angular to angular, fine to coarse of brick, mudstone and coal with pyrite. (Colliery Fill).			
			(2.50)		1.20	ES1	
					1.50	D2	
					2.00	B3	
			3.00	Stiff brown mottled grey CLAY.	3.00	HV	95 kPa
			(0.40)		3.00	HV	92 kPa
					3.00	HV	110 kPa
					3.10	D4	
			3.40	Trial pit ends at 3.40 m (Refusal)	3.30	ES5	
					Depth	Type & No	Results

<b>Groundwater entries:</b> Depth:      Rose      After to:        (mins):      Remarks:	<b>Depth related remarks:</b> From      to:      Remarks:	<b>General remarks:</b> Weather: Stability:      Stable Remarks:
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 Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres. Log issue:      DRAFT Scale:            1:25	Project:      Whaley Rd, Barugh Green Project No:    K0030 Client:        Melia Smith & Jones Limited	Exploratory position reference: <h2 style="text-align: center;">TP01</h2> Sheet 1 of 1
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# Trial Pit Log

<b>Personnel:</b>		<b>Equipment &amp; methods:</b>		<b>Dimensions:</b>		<b>Coordinates &amp; level:</b>		<b>Dates:</b>	
Logged by:	HW	Method:	Machine Excavated	Width:	1.00	Easting:	432131.00 m E	Start:	09/11/2021
Checked by:	JT	Plant:	Doosan Midi DX85	Length:	2.50	Northing:	408261.00 m N	End:	09/11/2021
Approved by:		Shoring:	None used	<b>Orientation:</b>		Level:		Logged:	09/11/2021
				Strike A - C = °		Grid:			

Backfill/ Instal'n	Water- strike	Legend	Level & Depth (Thickness)	Stratum Description	Samples & In Situ Testing		
					Depth	Type & No	Results
			(0.50)	MADE GROUND: Brown sandy clayey, sub-angular, fine to coarse GRAVEL of brick, concrete, limestone and coal.	0.40	ES1	
			0.50	MADE GROUND: Black silty gravelly SAND. Gravel is sub-angular to angular, fine to coarse of brick, mudstone, ash and coal with pyrite. (Colliery Fill).	1.00	D2	
			(1.50)				
			2.00	Stiff brown mottled grey CLAY. Becoming weak MUDSTONE at 3.4m.	2.00 2.00 2.00 2.00	D3 HV HV HV	91 kPa 105 kPa 102 kPa
			(1.50)				
					3.00 3.00 3.00 3.00	D4 HV HV HV	>120 kPa >120 kPa >120 kPa
			3.50	Trial pit ends at 3.50 m (Refusal)			
					Depth	Type & No	Results

<b>Groundwater entries:</b> Depth:      Rose      After to:        (mins):      Remarks:	<b>Depth related remarks:</b> From      to:        Remarks:	<b>General remarks:</b> Weather: Stability:      Stable Remarks:
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 Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres. Log issue:      DRAFT Scale:            1:25	Project:      Whaley Rd, Barugh Green Project No:    K0030 Client:        Melia Smith & Jones Limited	Exploratory position reference: <h1 style="text-align: center;">TP02</h1> Sheet 1 of 1
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# Trial Pit Log

<b>Personnel:</b>		<b>Equipment &amp; methods:</b>		<b>Dimensions:</b>		<b>Coordinates &amp; level:</b>		<b>Dates:</b>	
Logged by:	HW	Method:	Machine Excavated	Width:	1.00	Easting:	432104.00 m E	Start:	09/11/2021
Checked by:	JT	Plant:	Doosan Midi DX85	Length:	2.50	Northing:	408308.00 m N	End:	09/11/2021
Approved by:		Shoring:	None used	<b>Orientation:</b>	Strike A - C = °	Level:		Logged:	09/11/2021

Backfill/ Instal'n	Water- strike	Legend	Level & Depth (Thickness)	Stratum Description	Samples & In Situ Testing		
					Depth	Type & No	Results
			(1.00)	MADE GROUND Brown slightly clayey sandy GRAVEL. Gravel is sub-angular, fine to coarse, concrete brick, limestone and coal with high cobble content of concrete.	0.40 0.50	D1 B2	
			1.00	MADE GROUND: Black silty gravelly SAND. Gravel is sub-angular to angular, fine to coarse of brick, mudstone, ash and coal with pyrite. (Colliery Fill).	1.00	ES3	
			(3.00)		1.50	B4	
			4.00	Trial pit ends at 4.00 m (Reached required depth)			
					Depth	Type & No	Results

<b>Groundwater entries:</b> Depth:      Rose      After to:        (mins):      Remarks:	<b>Depth related remarks:</b> From      to:      Remarks:	<b>General remarks:</b> Weather: Stability:      Stable Remarks:
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 Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres. Log issue:      DRAFT Scale:            1:25	Project:      Whaley Rd, Barugh Green Project No:    K0030 Client:        Melia Smith & Jones Limited	Exploratory position reference: <h1>TP03</h1> Sheet 1 of 1
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# Trial Pit Log

<b>Personnel:</b>		<b>Equipment &amp; methods:</b>		<b>Dimensions:</b>		<b>Coordinates &amp; level:</b>		<b>Dates:</b>	
Logged by:	HW	Method:	Machine Excavated	Width:	0.60	Easting:	432157.00 m E	Start:	09/11/2021
Checked by:	JT	Plant:	Doosan Midi DX85	Length:	2.00	Northing:	408348.00 m N	End:	09/11/2021
Approved by:		Shoring:	None used	<b>Orientation:</b>	Strike A - C = °	Level:		Logged:	09/11/2021

Backfill/ Instal'n	Water- strike	Legend	Level & Depth (Thickness)	Stratum Description	Samples & In Situ Testing		
					Depth	Type & No	Results
			(0.30)	MADE GROUND: Brown slightly clayey sandy sub-angular, fine to coarse GRAVEL of concrete brick and limestone with medium cobble content of concrete.			
			0.30	MADE GROUND: Brown clayey gravelly SAND. Gravel is sub-angular, fine to coarse of concrete brick and limestone with low cobble content of concrete and brick.	0.50	B1	
			(0.70)				
			1.00	MADE GROUND: Soft black sandy gravelly SILT. Gravel is sub-angular, fine to coarse of brick concrete and coal. (Colliery Fill).	1.00	ES2	
			(1.50)				
			2.00		2.00	D3	
			2.50	Trial pit ends at 2.50 m (Reached required depth)			
					Depth	Type & No	Results

<b>Groundwater entries:</b> Depth:      Rose      After to:        (mins):      Remarks:	<b>Depth related remarks:</b> From      to:      Remarks:	<b>General remarks:</b> Weather: Stability:      Stable Remarks:      Soakaway test completed.
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 Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres. Log issue:      DRAFT Scale:            1:25	Project:      Whaley Rd, Barugh Green Project No:    K0030 Client:        Melia Smith & Jones Limited	Exploratory position reference: <h1 style="text-align: center;">TP04</h1> Sheet 1 of 1
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# Trial Pit Log

<b>Personnel:</b>		<b>Equipment &amp; methods:</b>		<b>Dimensions:</b>		<b>Coordinates &amp; level:</b>		<b>Dates:</b>	
Logged by:	HW	Method:	Machine Excavated	Width:	0.60	Easting:	432202.00 m E	Start:	09/11/2021
Checked by:	JT	Plant:	Doosan Midi DX85	Length:	2.00	Northing:	408386.00 m N	End:	09/11/2021
Approved by:		Shoring:	None used.	<b>Orientation:</b>	Strike A - C = °	Level:		Logged:	09/11/2021

Backfill/ Instal'n	Water- strike	Legend	Level & Depth (Thickness)	Stratum Description	Samples & In Situ Testing		
					Depth	Type & No	Results
			(1.00)	MADE GROUND: Soft brown sandy gravelly CLAY. Gravel is sub-angular, fine to coarse of concrete, brick, limestone and coal fragments.			
			1.00	MADE GROUND: Soft black sandy gravelly CLAY. Gravel is sub-angular, fine to coarse, of concrete, brick, coal, rare plastics metal and wooden trunks.	1.50	D1	
			(1.50)				
			2.50	Trial pit ends at 2.50 m (Reached required depth)			
					Depth	Type & No	Results

<b>Groundwater entries:</b> Depth:      Rose      After to:        (mins):      Remarks:	<b>Depth related remarks:</b> From      to:        Remarks:	<b>General remarks:</b> Weather: Stability:      Stable Remarks:      Soakaway test completed.
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 Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres. Log issue:      DRAFT Scale:            1:25	Project:      Whaley Rd, Barugh Green Project No:    K0030 Client:        Melia Smith & Jones Limited	Exploratory position reference: <h1>TP05</h1> Sheet 1 of 1
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# Trial Pit Log

<b>Personnel:</b>		<b>Equipment &amp; methods:</b>		<b>Dimensions:</b>		<b>Coordinates &amp; level:</b>		<b>Dates:</b>	
Logged by:	HW	Method:	Machine Excavated	Width:	1.00	Easting:	432191.00 m E	Start:	09/11/2021
Checked by:	JT	Plant:	Doosan Midi DX85	Length:	2.50	Northing:	408355.00 m N	End:	09/11/2021
Approved by:		Shoring:	None used.	<b>Orientation:</b>	Strike A - C = °	Level:		Logged:	09/11/2021

Backfill/ Instal'n	Water- strike	Legend	Level & Depth (Thickness)	Stratum Description	Samples & In Situ Testing		
					Depth	Type & No	Results
			(1.20)	MADE GROUND: Soft brown sandy gravelly CLAY. Gravel is sub-angular, fine to coarse of brick, concrete, wood, coal, clinker and rare plastics.			
			1.20	MADE GROUND: Black sandy gravelly CLAY. Gravel is sub-angular, fine to coarse of brick, concrete, coal, clinker, metal, plastic, demolition rubble and ash with high cobble content of brick and concrete. (Colliery Fill).	1.50	ES1	
			(1.80)		2.00	B2	
			3.00		2.50	D3	
				Trial pit ends at 3.00 m (Refusal)			
					Depth	Type & No	Results

<b>Groundwater entries:</b> Depth:      Rose      After to:        (mins):      Remarks:	<b>Depth related remarks:</b> From      to:      Remarks:	<b>General remarks:</b> Weather: Stability:      Stable Remarks:
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 Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres. Log issue:      DRAFT Scale:            1:25	Project:      Whaley Rd, Barugh Green Project No:    K0030 Client:        Melia Smith & Jones Limited	Exploratory position reference: <h1>TP06</h1> Sheet 1 of 1
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# Trial Pit Log

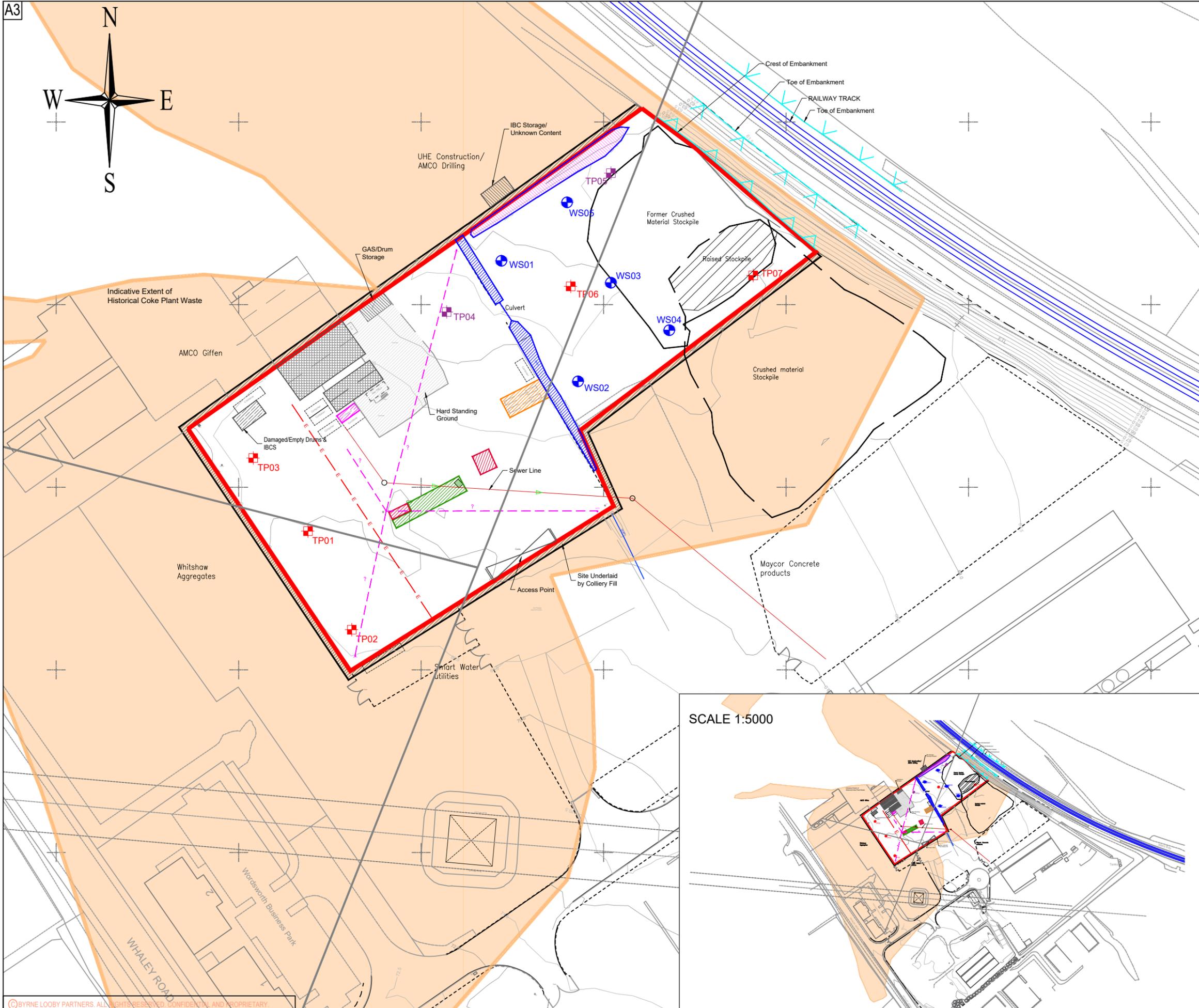
<b>Personnel:</b>		<b>Equipment &amp; methods:</b>		<b>Dimensions:</b>		<b>Coordinates &amp; level:</b>		<b>Dates:</b>	
Logged by:	HW	Method:	Machine Excavated	Width:	1.00	Easting:	432241.00 m E	Start:	09/11/2021
Checked by:	JT	Plant:	Doosan Midi DX85	Length:	2.50	Northing:	408358.00 m N	End:	09/11/2021
Approved by:		Shoring:	None used.	<b>Orientation:</b>	Strike A - C = °	Level:		Logged:	09/11/2021

Backfill/ Instal'n	Water- strike	Legend	Level & Depth (Thickness)	Stratum Description	Samples & In Situ Testing		
					Depth	Type & No	Results
			(2.70)	MADE GROUND: Brown sandy gravelly CLAY. Gravel is sub-angular fine to coarse of concrete, brick, limestone, coal, rebar, demolition rubble with high cobble content of brick and concrete.	0.50	ES1	
			2.70		1.50	B2	
			2.70	Trial pit ends at 2.70 m (Refusal)			

<b>Groundwater entries:</b> Depth:      Rose      After to:        (mins):      Remarks:	<b>Depth related remarks:</b> From      to:        Remarks:	<b>General remarks:</b> Weather: Stability:      Stable Remarks:
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 Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in metres. Log issue:      DRAFT Scale:            1:25	Project:      Whaley Rd, Barugh Green Project No:    K0030 Client:        Melia Smith & Jones Limited	Exploratory position reference: <h1>TP07</h1> Sheet 1 of 1
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A3



GENERAL NOTES

Notes

1. ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS IN METRES ABOVE ORDANCE DATUM.
2. DO NOT SCALE FROM THIS DRAWING.
3. ANY ANOMALIES IDENTIFIED WITH THE DETAILS SHOWN ON THIS DRAWING ARE TO BE BROUGHT TO THE ATTENTION OF BYRNE LOOBY

Legend

- Site Boundary
- Above Ground Fuel Storage Tanks
- Washdown Area
- Adblue and Fuel Bowser Storage
- Ditchlines/Standing Water
- Ditchlines/Dry
- Vehicle Lube Storage
- Site Underlaid by Colliery Fill
- Existing Buildings
- Damaged/Empty Drums & IBCS
- IBC Storage/ Unknown Content
- Hard Standing
- Shipping Container
- Site Office
- Culvert
- Indicative Extent of Historical Coke Plant Waste (Encompasses Whole Site) Taken from 1962 National Grid Historical map
- Indicative Location of Ditch Line Taken from 1893 County Series Historical Map
- EV Cable
- Indicative CCTV Line
- Manhole
- Sewer Line
- Trial Pits Excavated By Byrne Looby 09/11/21
- Soakaway Trial Pit Test By ByrneLooby on 08/11/21
- Window Sampler Boreholes Drilled By Byrne Looby 08/11/21
- Crest of Railway Cutting
- Toe of Railway Cutting

Rev	Date	Description	By	Chk	App

**BYRNE LOOBY**

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CLIENT  
**MELIA SMITH & JONES LTD**

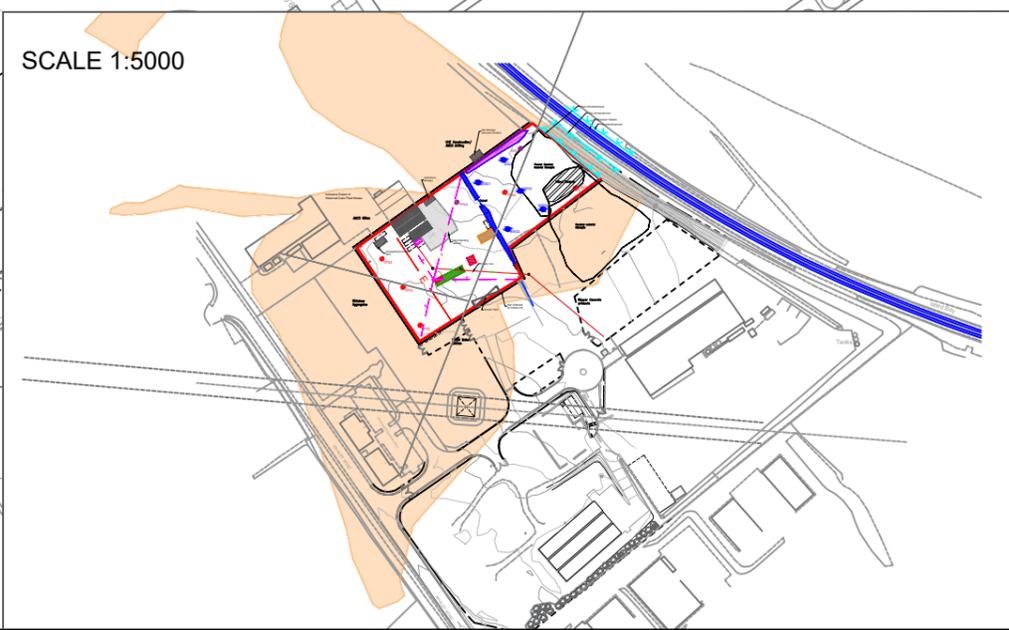
PROJECT  
**WHALEY ROAD**

DRAWING TITLE  
**SITE PLAN**

STATUS  
**FOR CONSTRUCTION**

Date: 03/22	Scale: 1:1000	Drawn: JM	Chk: AK	App:
Project No: 14-K0030	Drg. No: K0030-01-001	Rev:	00	

SCALE 1:5000



# Infiltration Test Report

Carried out by:	Date:	Method:			Trial pit dimensions:	Before:	After:	Location:	Grid: OSGB	
HW	09/11/21	BRE Digest DG 365: 2016 & BS6297:2007+A1:2008			Length (m):	1.30	1.30	mE:	432157.00	
Chkd by:	Test no:	Granular infill:	Datum height (m agl):	Depth to water: Start: End:		Width (m):	0.60	0.60	mN:	408348.00
JT	1	No	0.00	1.19	1.70	Depth (m):	2.50	2.50	m OD:	-

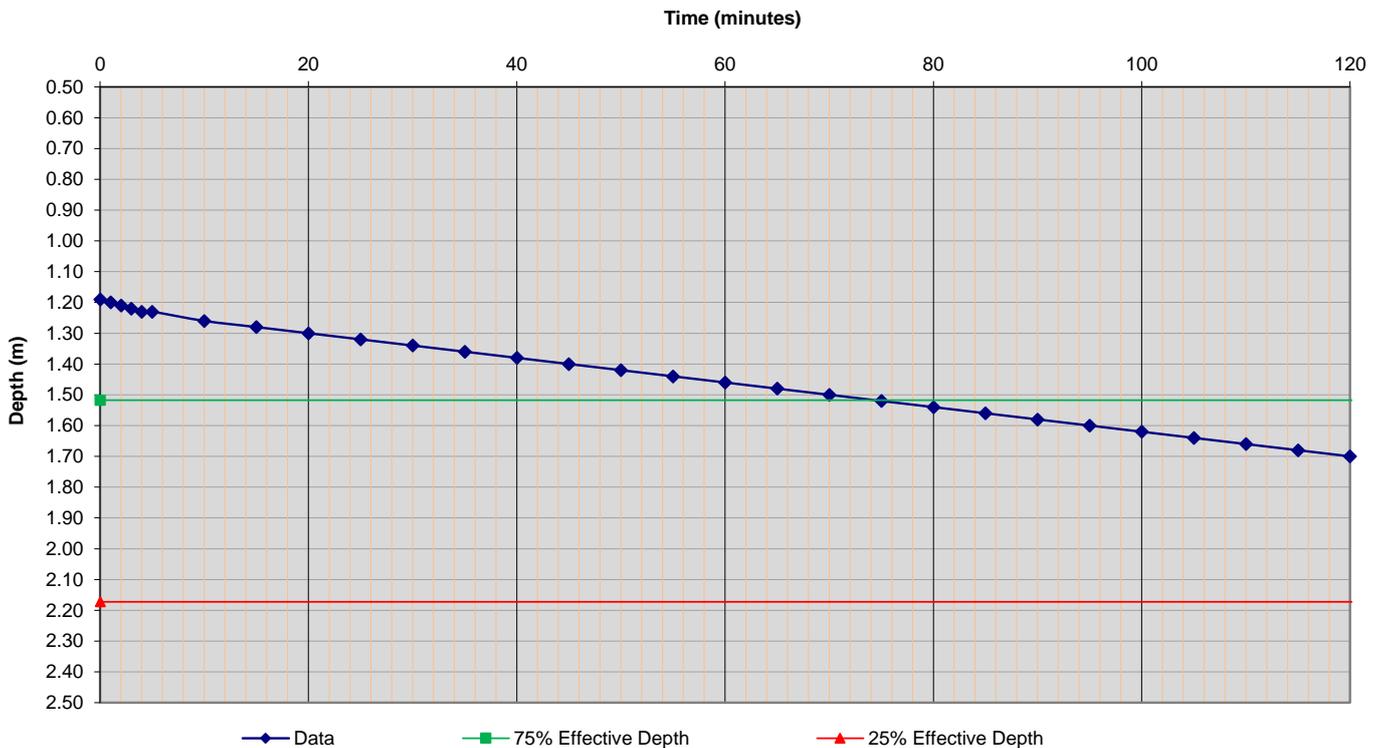
Elapsed time (mins):	Water depth (m below datum):	Elapsed time (mins):	Water depth (m below datum):
0	1.19	95	1.60
1	1.20	100	1.62
2	1.21	105	1.64
3	1.22	110	1.66
4	1.23	115	1.68
5	1.23	120	1.70
10	1.26		
15	1.28		
20	1.30		
25	1.32		
30	1.34		
35	1.36		
40	1.38		
45	1.40		
50	1.42		
55	1.44		
60	1.46		
65	1.48		
70	1.50		
75	1.52		
80	1.54		
85	1.56		
90	1.58		

Effective depth (m):		Elapsed time (mins) (from graph):	
75%	1.52	75%	35.00
50%	1.85	50%	100.00
25%	2.17	25%	190.00

Base area of pit	0.78	m <sup>2</sup>
Mean surface area through which outflow occurs	3.27	m <sup>2</sup>
Volume outflow between 75 and 25% effective depth	0.51	m <sup>3</sup>

Soil infiltration rate, f	1.68E-05	m <sup>3</sup> /m <sup>2</sup> /s
Soil infiltration rate, f	6.05E-02	m/hr
Percolation Value, vp	1.42E+01	s/mm

Notes: Coordinates are approximate  
Located at TP04



# Infiltration Test Report

Carried out by:	Date:	Method:			Trial pit dimensions:	Before:	After:	Location:	Grid: OSGB	
HW	09/11/21	BRE Digest DG 365: 2016 & BS6297:2007+A1:2008			Length (m):	0.60	0.60	mE:	432202.00	
Chkd by:	Test no:	Granular infill:	Datum height (m agl):	Depth to water: Start:      End:		Width (m):	1.50	1.50	mN:	408386.00
JT	1	No	0.00	1.46	1.47	Depth (m):	2.50	1.25	m OD:	-

Elapsed time (mins):	Water depth (m below datum):	Elapsed time (mins):	Water depth (m below datum):
0	1.46	95	1.47
1	1.47	100	1.47
2	1.47	105	1.47
3	1.47	110	1.47
4	1.47	115	1.47
5	1.47	120	1.47
10	1.47		
15	1.47		
20	1.47		
25	1.47		
30	1.47		
35	1.47		
40	1.47		
45	1.47		
50	1.47		
55	1.47		
60	1.47		
65	1.47		
70	1.47		
75	1.47		
80	1.47		
85	1.47		
90	1.47		

Effective depth (m):		Elapsed time (mins) (from graph):	
75%	1.72	75%	12.00
50%	1.98	50%	40.00
25%	2.24	25%	75.00

Base area of pit	0.90	m <sup>2</sup>
Mean surface area through which outflow occurs	3.08	m <sup>2</sup>
Volume outflow between 75 and 25% effective depth	0.47	m <sup>3</sup>

Soil infiltration rate, f	4.01E-05	m <sup>3</sup> /m <sup>2</sup> /s
Soil infiltration rate, f	1.45E-01	m/hr
Percolation Value, vp	7.27E+00	s/mm

Notes: Coordinates are approximate  
Located at TP05

