

REPORT
for
FOUL AND STORM WATER DRAINAGE STRATEGY
for a
RESIDENTIAL DEVELOPMENT
at
THE ODDFELLOWS ARMS
HIGHAM ON THE HILL

For:

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Prepared by:

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Date	Revised	Revision
15/10/2020	Issued	A
26/10/2020	Summary, 6.2 or 8.1	B
12/11/2020	Pre development enquiry	C
04/02/2022	Drainage layout amended	D
05/03/2024	Drainage layout amended	E

Reference: 81712-03

Revision: E

EXECUTIVE SUMMARY

This drainage strategy has been developed for A R Cartwright in support of the planning application for the proposed redevelopment of The Oddfellows Arms in Higham on the Hill. The existing public house will be partially demolished and converted into a semidetached house and the car park will be removed for the construction of 6 houses.

This report provides a description of the best means of providing foul and surface water drainage to the development along with an assessment of the present and future foul and surface water drainage flows.

A SuDS scheme utilising permeable paving, raised storm planters, water butts, filter strips, soft landscaping and large diameter pipes with a Hydrobrake chamber is proposed. This has been designed not to flood for all storms with a 100 year return period with an allowance of 40% for climate change. The site runoff rate will be restricted to 12.0/s for all storms with a 100 year return period plus a 40% allowance for climate change. This provides a 50.7% betterment on the existing brownfield runoff rate.

It is proposed that the foul drainage and surface water drainage will culminate in a combined chamber at the southern border of the site. This will discharge into the Seven Trent Water combined sewer (0401:9401) within Main Street.

In order to ensure that the surface water drainage scheme remains effective, a maintenance and action schedule specific to the site is included in this report.

With reference to the foregoing, the principles of SuDS have been fully taken into account for the proposed drainage system, therefore the development should be allowed to proceed accordingly.

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1. INTRODUCTION

- 1.1 This drainage strategy has been developed for A R Cartwright in support of the planning application for the proposed redevelopment of The Oddfellows Arms in Higham on the Hill. The existing public house will be partially demolished and converted into a semi detached house and the car park will be removed for the construction of 6 houses.
- 1.2 The purpose of the report is to establish the best means of providing foul and surface water drainage to the development taking into account statutory requirements. This report and its appendices will meet the requirements stipulated by the planning department at Hinckley and Bosworth Borough Council.
- 1.3 This report also has a maintenance and action schedule specific to the development (appendix VI).

2. THE SCOPE OF THE ASSESSMENT

2.1 The purpose of this strategy is to investigate and make recommendations regarding the best way to deal with both the foul and surface water drainage from the site.

2.2 In order to achieve the above, the following has been carried out:

- Desk top study to ascertain permeability
- Investigation into existing STW sewers adjacent to the site
- Assessment of future and present surface water flows
- Assessment of present and future foul water flows

3. EXISTING CONDITIONS AND THE LOCAL ENVIRONMENT

- 3.1 The site is located centrally within the village of Higham on the Hill and the existing land use around the site is a mixture of residential and open spaces.
- 3.2 The site is located at national grid reference of 438007, 295455. A site location plan is included in appendix I.
- 3.3 The site has an area of 0.209 hectares.
- 3.4 The site is presently developed in the form of a disused public house and accompanying a car park.
- 3.5 The immediate surrounding land uses were:

Direction	Description
North	Open green space
South	Main Street with residential properties beyond
East	Residential properties
West	Residential properties

4. INVESTIGATIONS INTO EXISTING DRAINAGE

- 4.1 Sewer records were purchased (appendix VIII). They show a combined sewer within Main Street which is situated to the south of the site.
- 4.2 A topographical survey was undertaken which showed surface water and foul water flowing through combined system towards a terminal inspection chamber on the southern border of the site. This connects into the combined sewer (0401:9401) situated within Main Street.
- 4.3 PRP previously submitted a developer enquiry to Severn Trent Water regarding a different development at this location. They responded initially stating they had capacity for the foul and surface water drainage within the combined sewer situated to the south of the proposed development, under Main Street. However, they required evidence showing the ground conditions were not suitable for soakaways, that there were no nearby watercourses to discharge into and the existing site connected into this combined sewer. The required information was provided and subsequently Severn Trent Water accepted the proposal to connect the foul and surface water from the future development into their combined sewer. This application has already expired and a new application will be made. Severn Trent Water have been recontacted, once a response has been received it will be appended to this report.

5. ASSESSMENT OF PRESENT AND FUTURE SURFACE WATER FLOWS

- 5.1 The current site area is 2087.6m² and presently 86.8% is covered in impermeable surfaces comprising the public house car park residing within the development boundary. The public house and car park are served by a combined sewer which is connected into the combined Severn Trent Water sewer (0401:9401) within Main Street, situated south of the site.
- 5.2 Calculations have been included (appendix IV) which shows the current brownfield runoff rate from site to be 24.32 l/s.
- 5.3 The hierarchy of surface water disposal as outlined in the building regulations is as follows:
- Soakaways
 - Discharge to a watercourse at an appropriate rate
 - Discharge to a sewer at an appropriate rate
- 5.4 Appendix IX has been included which shows the SuDS systems that were considered and justifications if they are suitable or not for the development.
- 5.5 According to the British Geological Survey maps the site is located on the boundary of two superficial deposits: Wolston Sand and Gravel and the Oadby Member. The bedrock here is Mercia Mudstone Group. The Wolston Sand and Gravel is predominantly comprised of sand and gravel. However, given the glacial nature of the deposits it is highly likely that these sands and gravels will have a high silt/clay content, therefore reducing the permeability. The Oadby Member is a clay with chalk and flint fragments and therefore will be practically impermeable. The Mercia Mudstone is a mudstone weathering to a red brown clay which is also practically impermeable. Given the geology of the site, soakaways are not feasible for this development.
- 5.6 There are no watercourses or ditches within the vicinity of the site for our site to discharge into.
- 5.7 As soakaways and connections into the watercourse are not feasible, a direct connection into the combined Severn Trent Water sewer to the south of the site is the proposed discharge location. This can be achieved utilising a gravity connection.

- 5.8 The proposed site has an area of 2087.6 m² with 941.02 m² of impermeable area and 283.5 m² type c permeable contributing to the surface water drainage system, and 827.6 m² of soft landscaping.
- 5.9 Type C permeable systems is being used at the parking bays to provide treatment to the surface water runoff.
- 5.10 Raised storm planters to be used to provide treatment and storage to part of the roof runoff. Water butts will be provided to the rear gardens for added source and catchment control. Filter strips are also proposed to the rear gardens of plots 4, 5, 6 and 7 to collect and treat surface water runoff.
- 5.11 Flows leaving the site will be restricted using a Hydrobrake chamber to 12.0/s during a 1 in 100 year storm event plus 40% for climate change. This represents a 50.7% betterment on the existing brownfield runoff.
- 5.12 The proposed development will discharge via a gravity system that has been designed to accommodate all rainfall events up to and including a 1 in 100 year storm plus 40% within 1050mm diameter pipes.
- 5.13 It is proposed that the surface water drainage system from this site to connect into a combined demarcation manhole at the southern border of the site. This will then discharge into the combined Severn Trent Water sewer (0401:9401) within Main Street. Any connection to the public sewer will be subject to a formal S106 agreement.
- 5.14 It is recognised that consideration should be given to the exceedance of the surface water drainage system to account for:
- An exceptional rainfall event (ie in excess of a 1 in 100 year event plus 40% for climate change)
 - A failure of one or more parts of the drainage system
- 5.15 The flood exceedance would generally flow from southeast to the northwest direction entering a large expanse of green space, flooding here will not have detrimental effect on the neighbouring properties. The finished floor levels for the properties within development have been set to ensure flood waters pass them by and do not

enter. It also worth noting that the permeable paving structures have not been taken into account when calculating storage volumes. These will offer additional storage in the event on an exceptional rainfall event or system failure.

- 5.16 PRP previously submitted a developer enquiry to Severn Trent Water regarding a different development at this location. They responded initially stating they had capacity for the foul and surface water drainage within the combined sewer situated to the south of the proposed development, under Main Street. However, they required evidence showing the ground conditions were not suitable for soakaways, that there were no nearby watercourses to discharge into and the existing site connected into this combined sewer. The required information was provided and subsequently Severn Trent Water accepted the proposal to connect the foul and surface water from the future development into their combined sewer. This application has already expired and a new application will be made. Severn Trent Water have been recontacted, once a response has been received it will be appended to this report.

6. ASSESSMENT OF PRESENT AND FUTURE FOUL WATER FLOWS

- 6.1 Presently the site is comprised of a public house with car parking and a verged area to the rear.
- 6.2 The site is presently developed in the form of a disused public house accompanying car park. The existing public house will be partially demolished and converted into a semidetached house and the car park will be removed for the construction of 6 houses.
- 6.3 The foul flow from these properties will drain by gravity towards the combined demarcation chamber.
- 6.4 PRP have previously sent a developer enquiry to Severn Trent Water regarding the foul water flows for a different development. They initially stated they had capacity within the combined sewer situated to the south of the proposed development. However, they required information proving connectivity from the existing site into their sewer. This was provided and subsequently they accepted the proposal to connect the foul drainage into the combined sewer under Main Street, this application has already expired and a new application will be made as the site has been reconfigured. Severn Trent Water have been recontacted, once a response has been received it will be appended to this report.

7. MAINTENANCE OF THE SURFACE WATER DRAINAGE SYSTEM

- 7.1 It is recognised that the surface water drainage system has to be designed with its future maintenance being considered. In this context, there will be a management structure in place to cover various aspects of the development which will include the drainage requirements as set out herein.
- 7.2 In principle, by good design, it is intended to reduce the risk of the system becoming broken or otherwise failing to operate properly as the most effective way of reducing the need for active maintenance.
- 7.3 A maintenance and action schedule specific to the site is included in appendix VI. This will be included in the O & M manuals and the health and safety file for the development.
- 7.4 The type c permeable paving and the raised storm planters system will be maintained by a management company.

8. CONCLUSIONS AND RECOMMENDATIONS

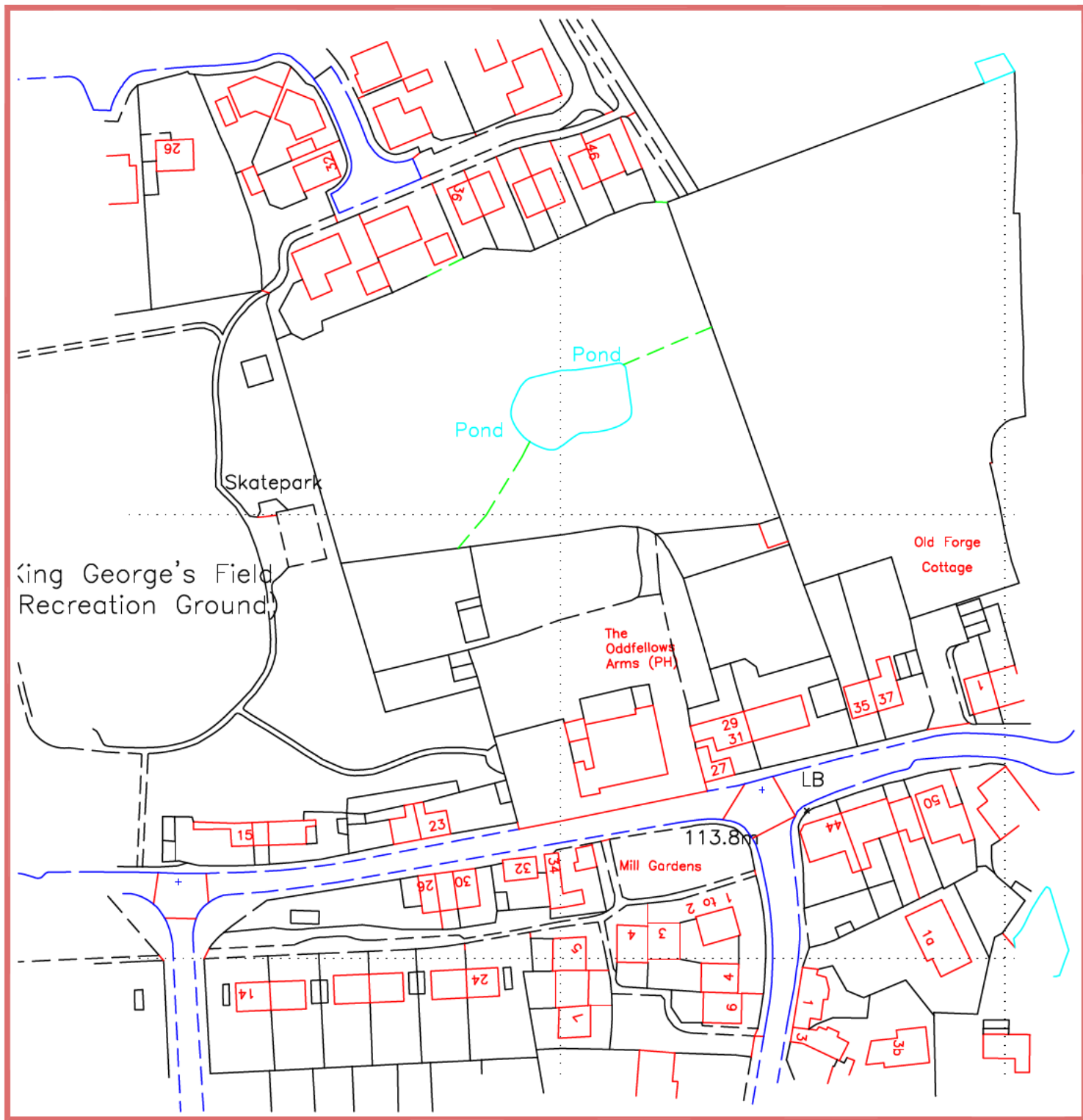
- 8.1 The site is presently developed in the form of a disused public house accompanying car park. The existing public house will be partially demolished and converted into a semi detached house and the car park will be removed for the construction of 6 houses.
- 8.2 A preliminary drainage schematic shows how the drainage is to be achieved.
- 8.3 A topographical survey was performed on the existing site which showed a combined system connecting in the combined sewer to the south of the property. Whilst the existing connection cannot be reused due to clashes with the proposed layout, the proposed development will connect into the same combined Severn Trent Water sewer.
- 8.4 The development should be allowed to proceed because:
- The foul drainage and surface water drainage can be connected by gravity into an existing Severn Trent Water sewer at the outfall
 - The issue of water quality and quantity is addressed through the use of permeable paving, upsized pipes, and a flow control chamber housing a Hydrobrake
 - The surface water discharge rate from site will be 12.0l/s for a 1 in 100 year storm (plus 40% for climate change) which represents a 50.7% betterment on the brownfield runoff rate. The system is designed to cause no above ground flooding for a 1 in 100 year event plus 40% and exceedance flows have been shown to have no impact on the proposed development and neighbouring properties.
 - A sustainable drainage operation and maintenance plan specific to the site has been developed and is appended to this report.



Dan Edwards
Meng CEng MICE
Director

APPENDIX I

SITE LOCATION PLAN



Location Plan

Scale 1:1250

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Landmark Ref. LIG0816

DGADL Job Ref: 19.3763



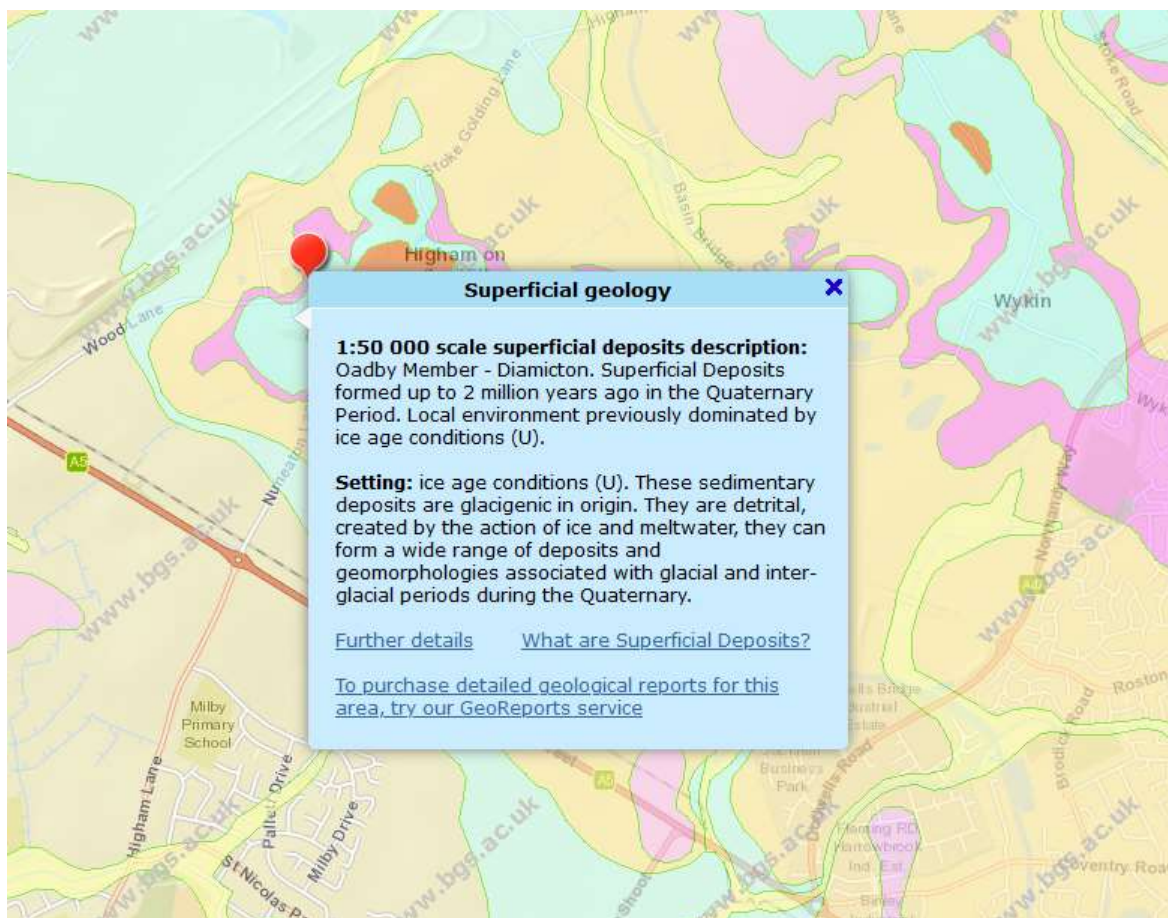
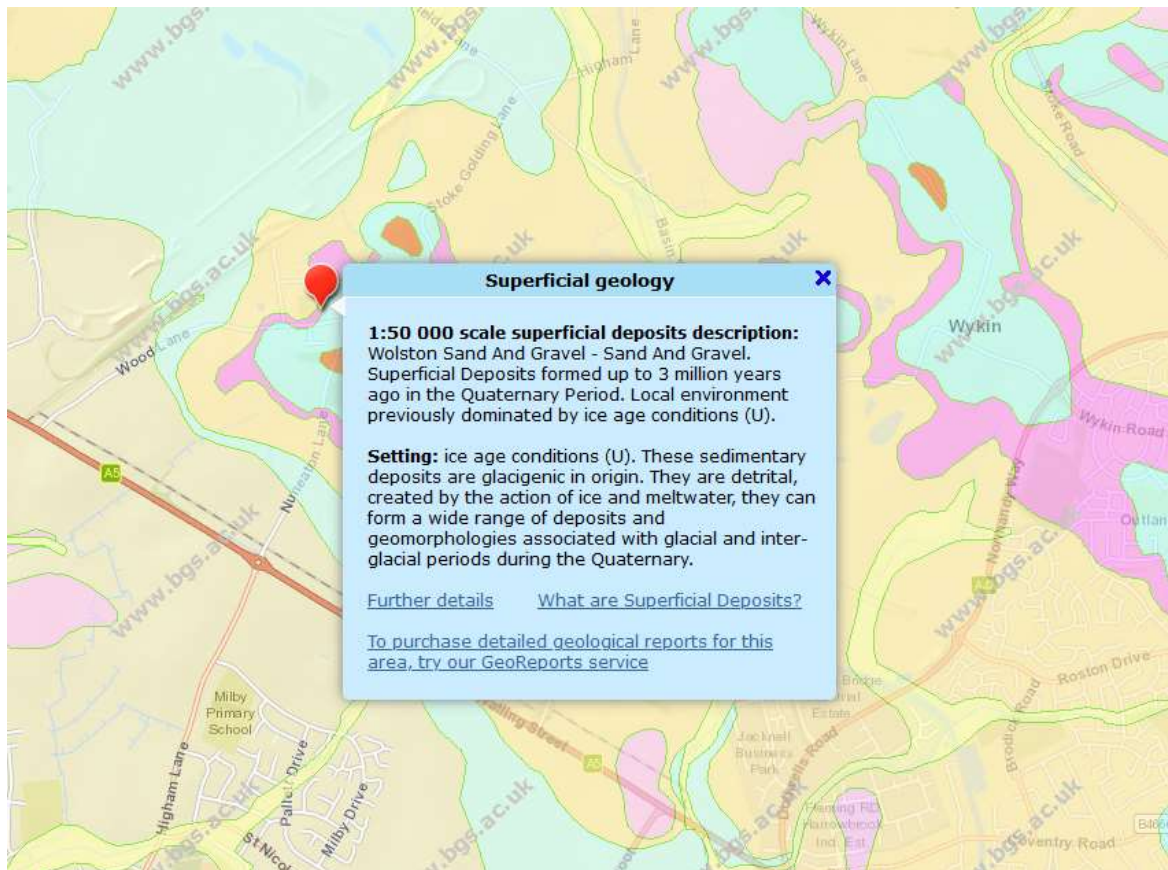
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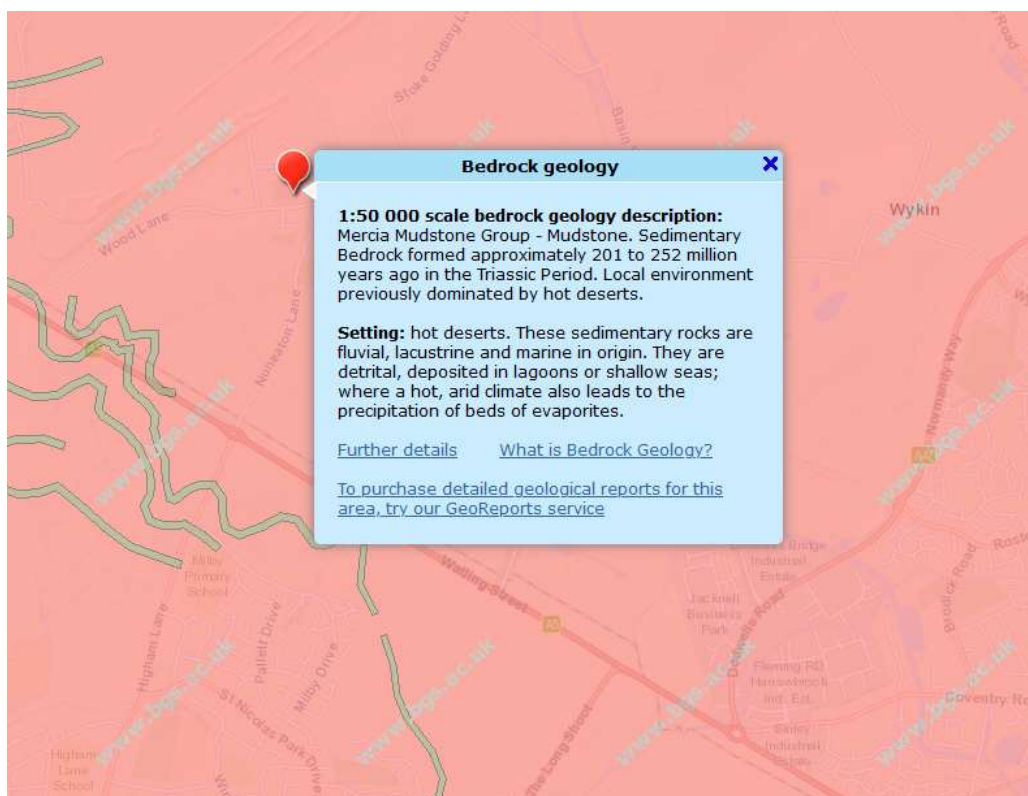
APPENDIX II

SEVERN TRENT DEVELOPER ENQUIRY RESPONSE - PENDING

APPENDIX III

BRITISH GEOLOGICAL SURVEY MAPS





APPENDIX IV

HAND CALCULATIONS - BROWNFIELDS RUNOFF CALCULATIONS

 PRP: consulting civil & structural engineers Leicester 0116 275 1710 Northampton 01604 889870 Bythorn 01832 710959		Project:	Sheet No. 1
		The Oddfellows	Project 81712
			Date Feb 2024
		Section:	Designed MFS
		Brownfield Run off Rate Calculation	Checked MAS
Reference	Calculation		
	The Oddfellows total site area is 2087.6m². The public house and car park have a combined area of 1812m² impermeable area and 275.6m² of the total site area is soft landscaping. Considering that a partial surface water runoff rate will travel toward the soft landscaping. Equation for Brownfield Runoff $Q1 = 2.78 \times C \times I \times A$ Q1 = flow rate in l/s C = 1 I = is rainfall intensity I = 50mm/hr A = area in hectares. A = 0.181 $Q1 = 2.78 \times 1 \times 50 \times A$ Q1 = 25.16 l/s Runoff rate of greenfield runoff Q1 = flow rate in l/s C = 0.22 *Runoff coefficient for lawns with slope between 2-10% I = is rainfall intensity I = 50mm/hr A = area in hectares. A = 0.028 $Q2 = 2.78 \times 1 \times 50 \times A$ Q2 = 0.84 l/s Brownfield Runoff Rate Q = Q1 - Q2 Q = 24.32 l/s		

APPENDIX V

MICRODRAINAGE CALCULATIONS

PRP				Page 1	
Catherine House Old Harborough Road Brixworth NN6 9BX		81712 - Pipe Storage All storms up to and including 1 in 100 years + 40%			
Date 01/03/2024 File 81712 - 1 IN 100 YEAR S...		Designed by MFS Checked by MAS			
Micro Drainage		Source Control 2020.1.3			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	112.108	0.738	12.0	20.2	O K
30 min Summer	112.167	0.797	12.0	22.1	O K
60 min Summer	112.139	0.769	12.0	21.2	O K
120 min Summer	111.989	0.619	12.0	16.3	O K
180 min Summer	111.838	0.468	12.0	11.2	O K
240 min Summer	111.714	0.344	12.0	7.2	O K
360 min Summer	111.559	0.189	11.7	2.8	O K
480 min Summer	111.500	0.130	10.5	1.4	O K
600 min Summer	111.478	0.108	9.0	1.0	O K
720 min Summer	111.464	0.094	7.8	0.8	O K
960 min Summer	111.446	0.076	6.2	0.5	O K
1440 min Summer	111.427	0.057	4.5	0.3	O K
2160 min Summer	111.412	0.042	3.2	0.1	O K
2880 min Summer	111.404	0.034	2.6	0.1	O K
4320 min Summer	111.393	0.023	1.9	0.0	O K
5760 min Summer	111.387	0.017	1.5	0.0	O K
7200 min Summer	111.383	0.013	1.2	0.0	O K
8640 min Summer	111.380	0.010	1.1	0.0	O K
10080 min Summer	111.377	0.007	1.0	0.0	O K
15 min Winter	112.216	0.846	12.0	23.5	O K
30 min Winter	112.301	0.931	12.0	25.8	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	138.153	0.0	29.6	16	
30 min Summer	90.705	0.0	38.8	25	
60 min Summer	56.713	0.0	48.5	42	
120 min Summer	34.246	0.0	58.5	76	
180 min Summer	25.149	0.0	64.5	106	
240 min Summer	20.078	0.0	68.7	136	
360 min Summer	14.585	0.0	74.8	190	
480 min Summer	11.622	0.0	79.5	246	
600 min Summer	9.738	0.0	83.3	306	
720 min Summer	8.424	0.0	86.4	366	
960 min Summer	6.697	0.0	91.6	488	
1440 min Summer	4.839	0.0	99.3	728	
2160 min Summer	3.490	0.0	107.4	1100	
2880 min Summer	2.766	0.0	113.5	1452	
4320 min Summer	1.989	0.0	122.5	2160	
5760 min Summer	1.573	0.0	129.1	2880	
7200 min Summer	1.311	0.0	134.4	3576	
8640 min Summer	1.129	0.0	138.9	4400	
10080 min Summer	0.994	0.0	142.7	5104	
15 min Winter	138.153	0.0	33.1	16	
30 min Winter	90.705	0.0	43.4	27	
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PRP					Page 2
Catherine House Old Harborough Road Brixworth NN6 9BX		81712 - Pipe Storage All storms up to and including 1 in 100 years + 40%			
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Micro Drainage		Source Control 2020.1.3			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	112.239	0.869	12.0	24.2	O K
120 min Winter	111.989	0.619	12.0	16.3	O K
180 min Winter	111.756	0.386	12.0	8.5	O K
240 min Winter	111.592	0.222	11.9	3.6	O K
360 min Winter	111.488	0.118	9.7	1.2	O K
480 min Winter	111.464	0.094	7.8	0.8	O K
600 min Winter	111.450	0.080	6.5	0.6	O K
720 min Winter	111.440	0.070	5.7	0.4	O K
960 min Winter	111.427	0.057	4.5	0.3	O K
1440 min Winter	111.413	0.043	3.3	0.1	O K
2160 min Winter	111.401	0.031	2.4	0.1	O K
2880 min Winter	111.394	0.024	1.9	0.0	O K
4320 min Winter	111.385	0.015	1.3	0.0	O K
5760 min Winter	111.380	0.010	1.1	0.0	O K
7200 min Winter	111.376	0.006	0.9	0.0	O K
8640 min Winter	111.375	0.005	0.9	0.0	O K
10080 min Winter	111.372	0.002	0.7	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	56.713	0.0	54.3	46	
120 min Winter	34.246	0.0	65.7	82	
180 min Winter	25.149	0.0	72.3	110	
240 min Winter	20.078	0.0	76.9	136	
360 min Winter	14.585	0.0	83.8	186	
480 min Winter	11.622	0.0	89.0	244	
600 min Winter	9.738	0.0	93.3	306	
720 min Winter	8.424	0.0	96.8	368	
960 min Winter	6.697	0.0	102.6	490	
1440 min Winter	4.839	0.0	111.2	720	
2160 min Winter	3.490	0.0	120.3	1076	
2880 min Winter	2.766	0.0	127.1	1468	
4320 min Winter	1.989	0.0	137.2	2148	
5760 min Winter	1.573	0.0	144.4	2800	
7200 min Winter	1.311	0.0	150.5	3600	
8640 min Winter	1.129	0.0	154.9	4288	
10080 min Winter	0.994	0.0	159.8	5016	
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PRP		Page 3																																	
Catherine House Old Harborough Road Brixworth NN6 9BX	81712 - Pipe Storage All storms up to and including 1 in 100 years + 40%																																		
Date 01/03/2024	Designed by MFS																																		
File 81712 - 1 IN 100 YEAR S...	Checked by MAS																																		
Micro Drainage		Source Control 2020.1.3																																	
<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>0.750</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>0.840</td> </tr> <tr> <td>M5-60 (mm)</td> <td>20.000</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.400</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+40</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.114 <table> <tr> <th colspan="2">Time (mins)</th> <th>Area</th> </tr> <tr> <th>From:</th> <th>To:</th> <th>(ha)</th> </tr> <tr> <td>0</td> <td>4</td> <td>0.114</td> </tr> </table>			Rainfall Model	FSR	Winter Storms	Yes	Return Period (years)	100	Cv (Summer)	0.750	Region	England and Wales	Cv (Winter)	0.840	M5-60 (mm)	20.000	Shortest Storm (mins)	15	Ratio R	0.400	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+40	Time (mins)		Area	From:	To:	(ha)	0	4	0.114
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PRP		Page 4
Catherine House Old Harborough Road Brixworth NN6 9BX	81712 - Pipe Storage All storms up to and including 1 in 100 years + 40%	
Date 01/03/2024 File 81712 - 1 IN 100 YEAR S...	Designed by MFS Checked by MAS	
Micro Drainage Source Control 2020.1.3		

Model Details

Storage is Online Cover Level (m) 113.250

Pipe Structure

Diameter (m) 1.050 Length (m) 31.500
Slope (1:X) 500.000 Invert Level (m) 111.370

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0158-1200-1050-1200
Design Head (m)	1.050
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	158
Invert Level (m)	111.340
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.050	12.0
Flush-Flo™	0.322	12.0
Kick-Flo®	0.714	10.0
Mean Flow over Head Range	-	10.3

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)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.7	1.200	12.8	3.000	19.8	7.000	29.7
0.200	11.6	1.400	13.7	3.500	21.3	7.500	30.7
0.300	12.0	1.600	14.6	4.000	22.7	8.000	31.7
0.400	11.9	1.800	15.5	4.500	24.0	8.500	32.6
0.500	11.7	2.000	16.3	5.000	25.2	9.000	33.5
0.600	11.2	2.200	17.0	5.500	26.4	9.500	34.4
0.800	10.6	2.400	17.8	6.000	27.6		
1.000	11.7	2.600	18.4	6.500	28.6		

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APPENDIX VI

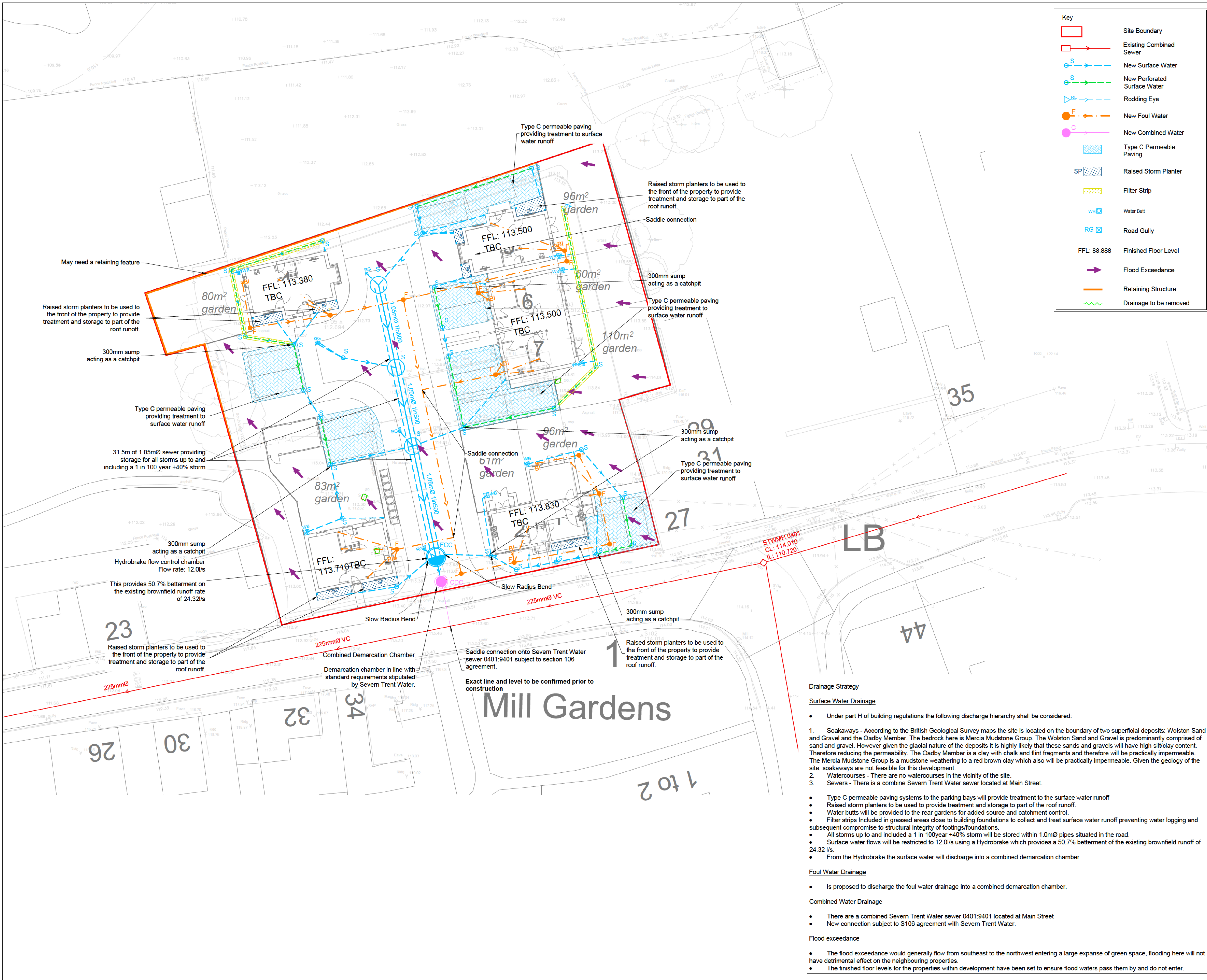
MAINTENANCE AND ACTION SCHEDULE FOR SURFACE WATER DRAINAGE

Maintenance Schedule - All maintenance to be carried out in accordance with CIRIA 753

SuDS Feature	Maintenance Schedule	Required Action	Typical Frequency
Flow Control Chamber	Monitoring	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months
	Occasional maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Six monthly
		Remove sediment build-up from pre-treatment structures	Six monthly
Manhole & Rodding Eye	Monitoring	Lift pumping station cover and inspect to determine condition of chamber and pump. Remove debris	Monthly during first half year of operation, then every six months
	Routine maintenance	Inspect manholes and remove any silt or debris from base and ensure that they are clean.	Six monthly
		Jet pipework to remove debris/silt from rodding eye	As required
Raised Storm Planter	Monitoring	Inspect and document presence of wildlife	Annually or as required
		Inspect/check all inlets, outlets and overflows to ensure that they are in good condition and operating as designed.	Monthly
		Repair/rehabilitate inlets, outlets, overflows and vents.	As required
	Occasional maintenance	Remove nuisance and invasive vegetation	Annually or as required
		Re-mulch and re-seed to repair erosion	Six monthly
		Scarify and spike topsoil to prevent compaction and improve infiltration	As required
	Regular maintenance	Check for poor vegetation growth, prune and trim dying shrubs	Six monthly
		Remove litter debris from catchment surface	Monthly
		Mulching	Monthly
Permeable Paving	Monitoring	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then six monthly or after heavy rainfall
		Monitor inspection chambers	Annually
		Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Remedial action	Inspect for evidence of poor operation and/ or weed growth - if required, take remedial action	Three monthly, 48 hours after large storms in first six months
		Initial inspection	Monthly for three months after installation
		Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
	Occasional maintenance	Remedial works to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users and replace lost jointing material.	As required
		Remediate and landscaping which through vegetation maintenance or soil slip has raised to within 50mm of the level of the paving	As required
		Stabilise and mow contributing adjacent areas	As required
Gully	Routine maintenance	Removal of weed or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required - once per year on less frequently used pavements
		Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturers recommendations - pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect most sediment
Filter Strip	Regular Maintenance	Inspect manholes, gullies and inlet kerbs. Remove any silt or debris from base and ensure that they are clean.	Six monthly
		Jet pipework to remove debris/silt	As required
		Remove litter (including leaf litter) and debris from filter drain/strip surface, access chambers and pre-treatment devices	Monthly (or as required)
	Occasional Maintenance	Inspect filter drain/strip surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
		Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
Water Butt	Regular maintenance	Remove or control roots where they are encroaching the sides of the filter drain/strip, using recommended methods	As required
		At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Occasional Maintenance	Inspection of tank, inlet pipe, pipes filters etc for sediment build-up	Annually (and following poor performance)
	Remedial action	Cleaning of tank, inlet, withdrawal devices and roof drain filters for silt and other debris	Annually (and following poor performance)
		Cleaning and /or replacement of filters	Three monthly (as required)
Soft Landscaping	Regular maintenance	Repair of overflow erosion damage or damage to tank	As required
		Pump repair	As required
	Regular inspections	Replace any plants, to maintain planting density	As required
		Remove litter and surface debris and weeds	Quarterly
		Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly

APPENDIX VII

DRAINAGE STRATEGY LAYOUT



SAFETY, HEALTH & ENVIRONMENTAL HAZARD INFORMATION BOX.

The hazards noted below are in addition to the normal hazards and risks faced by a competent contractor when dealing with the types of works detailed on this drawing.

CONSTRUCTION RISKS:

- Deep trenches
- Striking unforeseen services
- Leptospirosis

DEMOLITION RISKS:

- Leptospirosis

Notes:

1. DO NOT SCALE FROM THIS DRAWING.
2. All dimensions are in millimetres Unless Noted Otherwise (u.n.o.)
3. Drawing is to be read in conjunction with all relevant architect's drawings. Any inconsistencies should be reported to PRP immediately.
4. All levels and dimensions are to be checked on site before any work commences.
5. The Health and Safety at Work act is to be complied with at all times. Attention is drawn to the wearing of hard hats, reflectorised clothing, and the use of any other required safety equipment.

Drainage:

1. The position, line, level and diameter of all existing drainage apparatus should be confirmed on site prior to the commencement of the works. Any discrepancies should be reported to PRP immediately.
2. The connection of foul and surface water drainage to the existing public sewer system shall be subject to the approval of the water authority
3. For positions of all rainwater pipes & foul outlets refer to Architect's drawings.
4. Drainage designed in accordance with the Sewerage Sector Guidance, Design and Construction Guidance ("the Code") Approved Version 2.0, 10 March 2020.
5. All joints between precast manhole components shall have a minimum uncompressed thickness of 10mm of proprietary bitumen or resin mastic sealant.
6. Chambers & manholes with outgoing pipes of **greater than Ø600mm** shall be fitted with removable stainless steel (grade 316) safety chains or polypropylene rope.
7. Storm & foul branch connections are to be laid at gradients of between 1:10 & 1:80
8. All in-situ concrete shall be minimum grade GEN3.
9. Precast concrete cover & reducing slabs to be heavy duty reinforced concrete to BS 5911.
10. Manhole covers & frames shall be manufactured in cast iron or ductile iron & shall comply with requirements of BS EN 124 & shall be kite marked or equivalent.
11. All completed work shall be suitably protected from damage by construction work. Damaged drainage will not be accepted. It is recommended that no heavy loading or underground work is permitted above or near unprotected drainage, and that dumpers, trucks, fork lifts or other heavy vehicles are not driven along or near pipe runs.
12. Inspection chambers and flow control units are to be installed strictly in accordance with manufacturer guidance and instructions

P5	05/03/2024	Site layout updated and drainage updated to suit.	MFS/MAS
P4	03/02/2022	Discharge rate reduced to provide 30% of brownfield runoff	AGS/ DE
P3	19/01/2022	Site layout changed	AGS/ DE
P2	03/11/2020	Foul pump rate reduced to 1l/s	AGS/ DE
P1	15/10/2020	First Issue	AGS/ DE
Rev	Date	Description	By / Chk

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engineering excellence | creating advantage

Client:
A.R. Cartwright Ltd

Architect:
David Granger

Project:
Land at Oddfellows Arms
Higham on the Hill
Leicestershire

Title:
Drainage Strategy

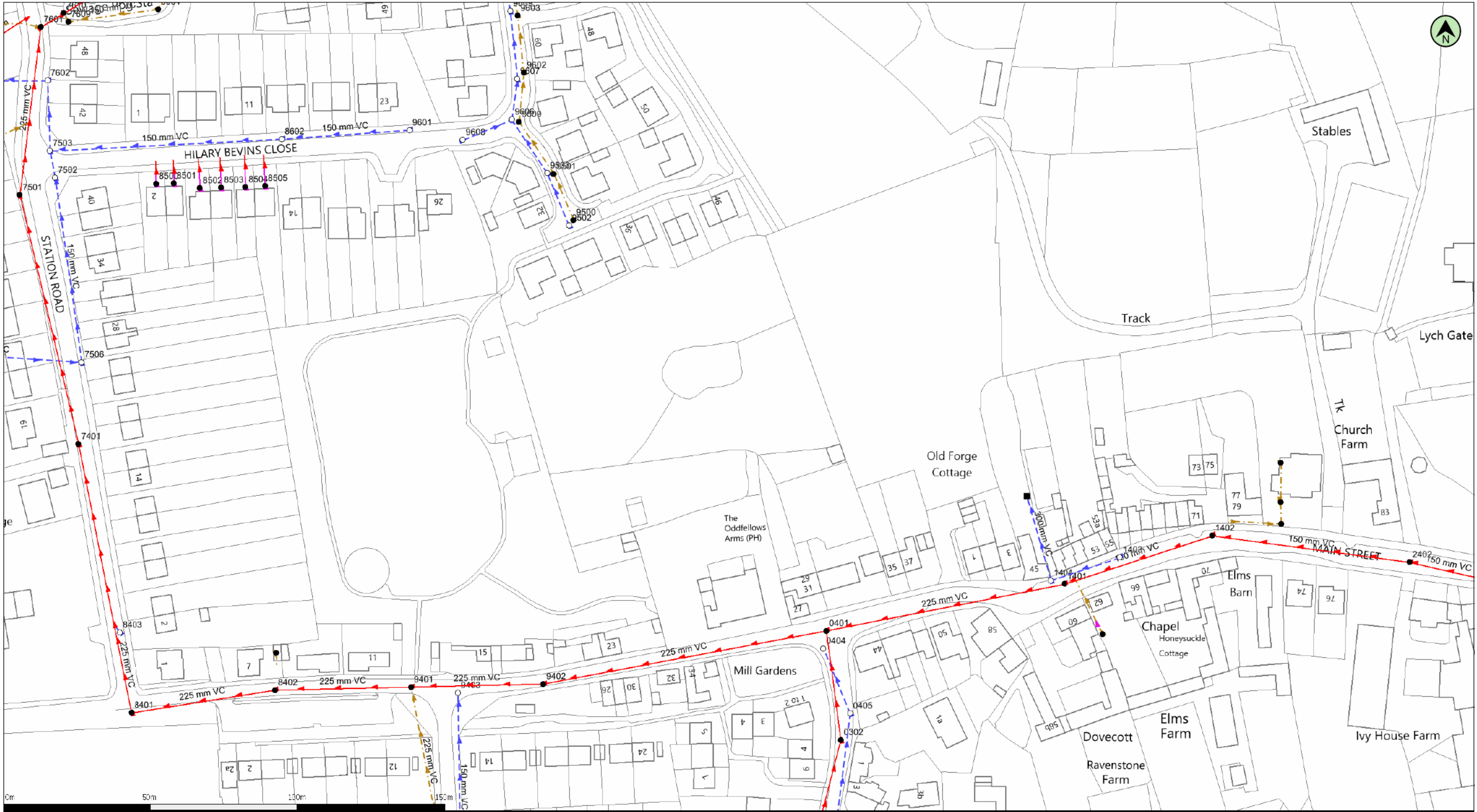
Status:
PRELIMINARY

Engineer:	AGS	Date:	October 2020
Drawn:	AGS	Scales @ A1:	1:200
Checked:	DE		
Project No:	81712	Drg No:	101
		Rev:	P5

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APPENDIX VIII

SEWER RECORDS



(c) Crown copyright and database rights 2019 Ordnance Survey 100031673 Date: 06/12/19 Scale: 1:1250 Map Centre: 438015,295512 Data updated: 31/07/19 Our Ref: 357663 - 1 Wastewater Plan A3

Do not scale off this Map. This plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of SEVERN TRENT WATER assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems. On 1 October 2011 most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were connected to a public sewer as at 1 July 2011, Transferred to the ownership of Severn Trent Water and became public sewers and public lateral drains. A further transfer takes place on 1 October 2012. Private pumping stations, which form part of these sewers or lateral drains, will transfer to ownership of Severn Trent Water on or before 1 October 2016. Severn Trent Water does not assess complete records of these assets. These assets may not be displayed on the map. Reproduction by permission of Ordnance Survey on behalf of HMSO. © Crown Copyright and database right 2004. All rights reserved. Ordnance Survey licence number: 100031673. Document users other than SEVERN TRENT WATER business users are advised that this document is provided for reference purpose only and is subject to copyright, therefore, no further copies should be made from it.

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

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E6992



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

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

0800 783 4444 (24 hours)

- a) These general conditions and precautions apply to the public sewerage, water distribution and cables in ducts including (but not limited to) sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991(a legal agreement between a developer and STW, where a developer agrees to build sewers to an agreed standard, which STW will then adopt); mains installed in accordance with an agreement for the self-construction of water mains entered into with STW and the assets described at condition b) of these general conditions and precautions. Such apparatus is referred to as “STW Apparatus” in these general conditions and precautions.
- b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.
- c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private drains, private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.
- d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.
- e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations).
- f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

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

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.
2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to STW Apparatus. You or your contractor must ensure the safety of STW Apparatus and will be responsible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts).
3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated.
4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented.
5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.
6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.
7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW Apparatus.
8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW Apparatus for smaller sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus.
9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected.
10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you.
11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable. Minor reduction in existing levels may result in conflict with STW Apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works.
12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.
13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,

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

TREE PLANTING RESTRICTIONS

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

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

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

17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May 2014

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

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

8602	S	102.9899	102.15	0.8399
9403	S	110.37	0	0
9502	S	105.944	104.404	1.54000000000001
9503	S	105.052	103.527	1.52500000000001
9601	S	103.8399	102.66	1.1799
9606	S	104.344	102.41	1.934
9607	S	104.277	102.355	1.922
9608	S	104.046	102.505	1.54100000000001
9609	S	103.689	102.171	1.51799999999999

APPENDIX IX

SUDS APPRAISAL

SuDS Appraisal for The Oddfellows – 81712

SuDS Feature	Included	Justification
Soakaway	X	Not included. According to the British Geological Survey maps the site is located on the boundary of two superficial deposits: Wolston Sand and Gravel and the Oadby Member. The bedrock here is Mercia Mudstone Group. The Wolston Sand and Gravel is predominantly comprised of sand and gravel. However given the glacial nature of the deposits it is highly likely that these sands and gravels will have high silt/clay content. Therefore, reducing the permeability. The Oadby Member is a clay with chalk and flint fragments and therefore will be practically impermeable. The Mercia Mudstone Group is a mudstone weathering to a red brown clay which also will be practically impermeable. Given the geology of the site, soakaways are not feasible for this development.
Pipe Storage	✓	Included as attenuation measure.
Attenuation Pond	X	Not included. There is not enough space within the site boundary for an attenuation pond.
Reed Bed	X	Not included.
Flow Control Chamber	✓	Included to restrict flows going into the tributary to the north of the site at 12.0l/s providing 50.7% betterment on the existing brownfield runoff rate of 24.32l/s.
Permeable Paving	✓	Included within parking bays to provide treatment and storage for surface water runoff. Aids in the degradation of contaminants found in runoff
Permeable Tarmac	X	Not included.
Green Roof	X	Not included as deemed unfeasible due to pitch roof system
Raised Storm Planter	✓	Included to promote amenity, biodiversity, treatment and source control of surface water runoff.
Filter Strip	✓	Included in grassed areas close to building foundations to collect and treat surface water runoff preventing water logging and subsequent compromise to structural integrity of footings/foundations.
Water Butt	✓	Included for added catchment and source control. Promoting the preservation of the natural water resource through harvesting and reuse

APPENDIX X**GENERAL CONDITIONS**

1. This report has been prepared and written specifically for the Client named in the introduction and is exclusively for his/her/their benefit. No reliance may be placed in the contents of this report by any third party except with the express agreement of the original Client and the written agreement of PRP. Such written agreement may require the payment of an additional fee.
2. The Recommendations section of this report only provides an overview of the guidance and should not be specifically relied upon in their own right but should be considered in relation to the whole report and the development described in this report.
3. This report has been prepared and written in the context of the proposals for the development of the site as stated by the Client and will not be valid in a differing context. Furthermore, new information, improved practices, or legislation may necessitate alterations to the report in whole or in part after its submission. Therefore, with any change in circumstances or after the expiry of one year from the date of this report, it should be referred to us for re-assessment.
4. Any assessments made in this report are based on the ground conditions and as revealed by the test pits and boreholes undertaken by others and where appropriate other relevant data which may have been obtained for the site. The sources of such information are detailed in this report and while PRP use only such sources as are believed to be reliable, PRP will not be liable for the authenticity or reliability of information obtained from others.
5. Where data has been provided or is made available to PRP and this has been used in the report, it has been assumed that the information is correct. No responsibility can be accepted by PRP for inaccuracies within the data supplied.
6. The copyright in this report and other related plans and documents prepared by PRP is owned by them and no such report, plan or document may be reproduced, published or adapted without their written consent. Complete copies of the report may however be made and distributed by the Client as an expedient in dealing with matters related to its commission.
7. This report has been prepared solely for the client's purposes in obtaining planning permission related to the proposed development indicated in the report.