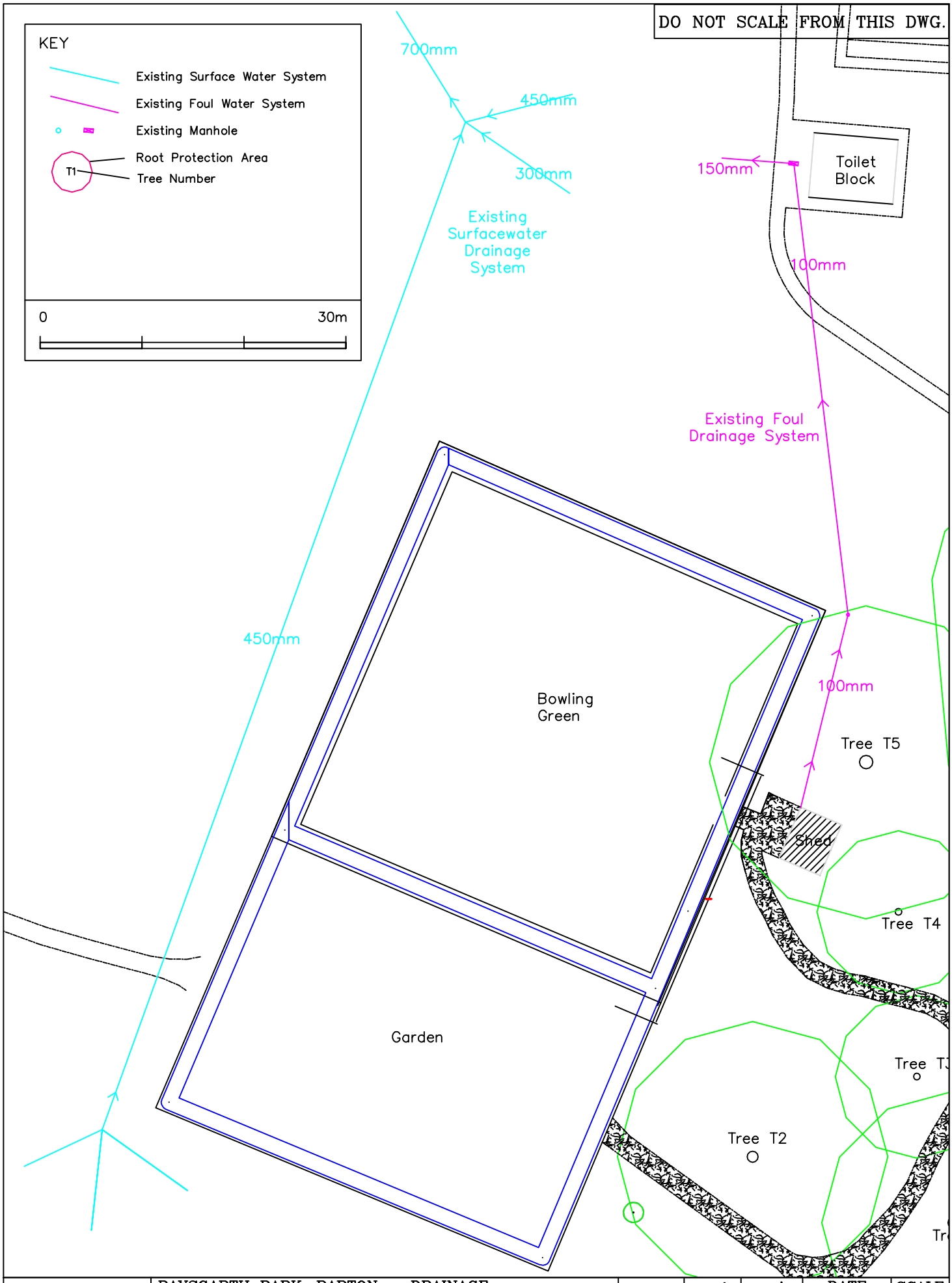
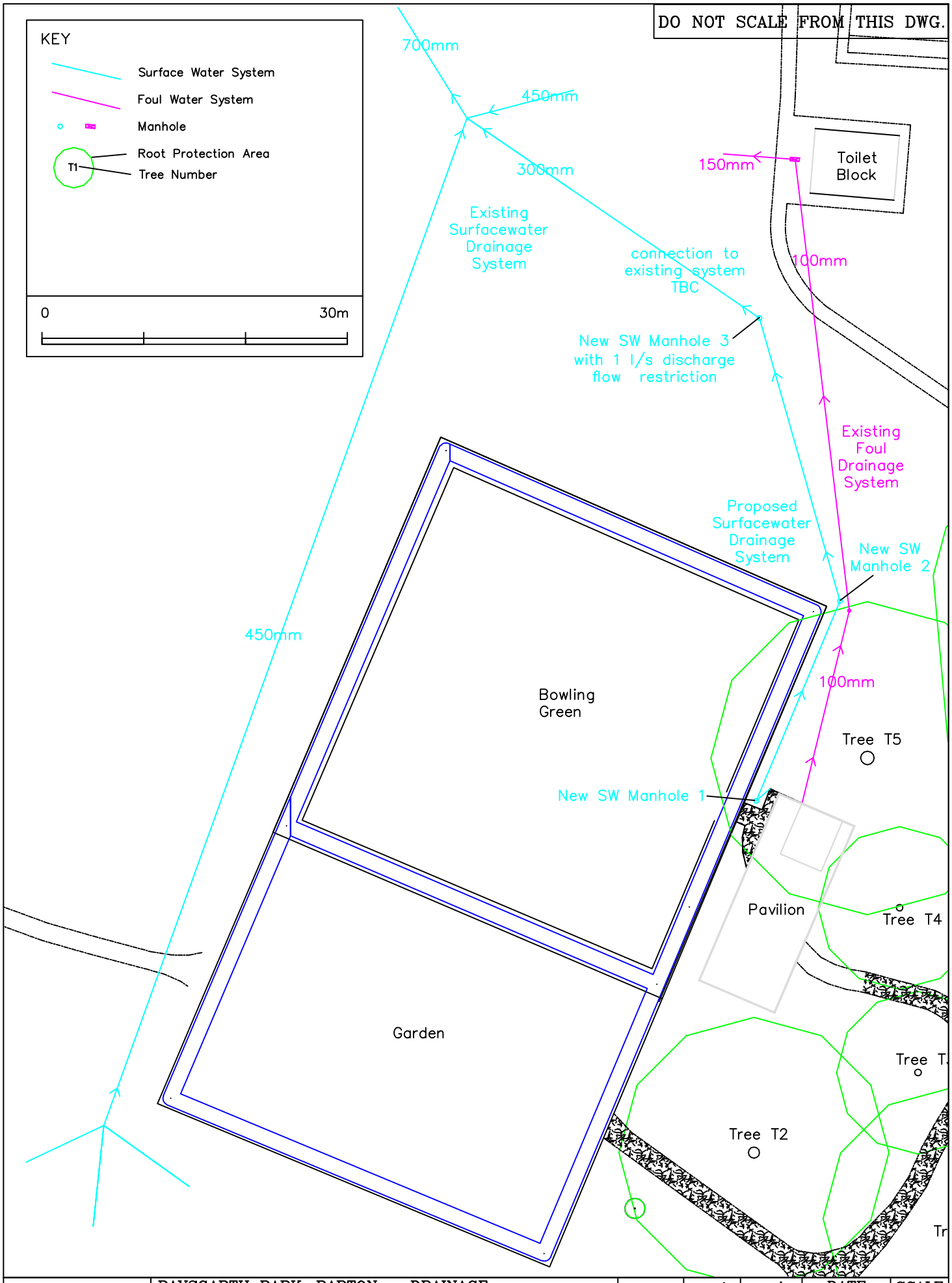


	BAYSGARTH PARK, BARTON – DRAINAGE	DRAWN	CHK'D	APP'D	DATE	SCALE
	TITLE – EXISTING DRAINAGE LAYOUT PLAN	RFB	WA	RFB	30-01-29	NTS
		DWG No.	3992-D-01			



	BAYSGARTH PARK, BARTON – DRAINAGE					
	TITLE – PROPOSED DRAINAGE LAYOUT PLAN	DRAWN	CHK'D	APP'D	DATE	SCALE
		RFB	WA	RFB	30-01-29	NTS
		DWG No.			3992-D-02	

H4 Assessment Criteria to Consider Building Over

Assessment questions for applying the criteria set out in Part H4 of the Building Regulations (2010)	Response (If YES to any of the below, please contact Yorkshire Water)
Is the proposed building footprint within 3 metres of a public sewer that is greater than 225mm in diameter and/or greater than 3m in depth?	NO (If YES, see Note 1 below).
Is the proposed building footprint over a public sewer access point (a manhole, inspection chamber, gully or rodding point)?	NO (If YES, see Note 2 below).
Does the proposed building footprint span over more than 10 metres of a public sewer or lateral drain?	NO (If YES, see Note 3 below).
Will the proposed building foundations put additional load on a public sewer or lateral drain?	NO (If YES, see Note 4 below).
Are piling works proposed near a public sewer or lateral drain?	NO (if YES, see Note 5 below).
Are you proposing, or do you need, to alter the existing shared drainage system?	NO (if YES, see Note 6 below).

1. If 'YES', the applicant can either revise the proposed building footprint or request a formal public sewer diversion agreement from Yorkshire Water. If the applicant is considering a diversion, they should contact us to discuss their proposal.
2. If 'YES', the applicant can either revise the proposed building footprint so that any access points are outside of it, or request a minor alteration agreement with Yorkshire Water to remove/relocate the access point(s). If the applicant is considering a minor alteration, they should contact us to discuss their proposal.
3. If 'YES', the applicant can either reduce the proposed building footprint so that it spans no more than 10m of the public sewer or lateral drain, or request to divert the sewer system around the proposed works. If the applicant is considering an alteration/diversion, they should contact us to discuss their proposal.
4. If 'YES', the applicant must make sure that the proposed building foundations will not overload the public sewer. The foundations should be laid below the public sewer or, if this isn't possible, designed so that there is no additional load that could damage the pipe(s).
5. If 'YES', we will need to see the details to understand if there will be any potential damage to the public sewer. The applicant should contact us to discuss their proposal if this is the case.
6. If 'YES', our permission is needed before any alterations to a shared system can go ahead. This could be because of a new connection, to relocate an existing access point, to divert the pipes

Introduction

These notes are to be read in conjunction with the associated calculations and drawings, regarding the recreational development at Baysgarth Park Community Pavilion, Barton-upon-Humber. The development consists of a new pavilion. Both foul drainage and surface water drainage require design. The proposed foul system uses existing pipework and manholes draining to an existing foul system. The proposed surface water system uses new pipework and manholes draining to an existing surface water system. Rainwater harvesting may be employed at the Pavilion. The impermeable area has been calculated and provides the run-off details for a 1%+CC rainfall event. SI units are used.

Existing Drainage

There is no existing on-site surface water drainage. An existing surface water drainage system, ~60m west, drains northerly, and consists of a 450mmØ pipe running freely.

The existing foul drainage arrangements consists of a 100mmØ pipe running to a manhole to the north of the site.

There are problems associated with the existing drainage. The foul drainage manhole had excessive soil present (and broken non-standard lid), and another manhole near the toilet block was flooded. An area around the existing toilet block was also flooded.

All drainage systems were culverted, and where seen were generally operational and in good condition. Prior to works it is recommended that the existing surface water and foul drainage systems are cleaned (jetted out) and confirm operational (CCTV survey or drain dye test). The proposed foul system will require confirmation from the sewerage undertaker that the existing system can accept the additional flows (three toilets and three wash basins).

Proposed Drainage

The proposed surface water drainage solution comprises of new pipework with new manholes, connecting to the existing surface water system, with discharge rate limited by a flow restriction at New Manhole 3. The existing system will accept the additional flows. Pipework is laid to the correct fall for its size so that they are self-cleansing, as is the flow restriction. The system is designed to be self-cleansing, and has siltation traps in each manhole and will require annual maintenance.

The proposed foul drainage solution comprises of using the existing pipework and manholes, which connecting to the existing foul water system near the existing toilet block. The existing system will require confirmation to accept the additional flows. Pipework is laid to the correct fall for its size so that they are self-cleansing. The system is designed to be self-cleansing, and has siltation traps in each manhole and will require annual maintenance.

Notes

An allowance for the increased impermeable area has been made in the calculations and design. An allowance for urban creep has been included.

No part of the existing or proposed drainage arrangement is located within 9m of any IDB or EA infrastructure or watercourse.

Surface water attenuation is achieved by storing water in pipework and manholes and with a restricted flow before entering into the exiting system.

Due to the presence of tree roots, all excavations are to be carried out under the supervision of the arboriculturist. Tree root barriers may need to be installed.

The BRE Digest 365 has been included for completeness, so that the final drainage scheme can be compared to the BRE requirements.

An allowance for the increased rainfall arising from climate changes has been included as a 40% increase.

The anticipated maximum additional flow from the flow restriction is expected to be no greater than 1l/s, which will easily be accommodated with the existing drainage arrangements. The flow calculated from the green field run-off rate 1.4 l/s/ha, is 1.09 l/s (0.5%+CC).

It is assumed that the existing and proposed systems are cleansed and are in good working order.

All pipework to be laid to minimum fall for the pipe size. Where pipework passes through tree root zones suitable tree root protection and air digging is required (consult with arboriculturist on specific requirements).

These notes, calculations and drawings are for surface water and foul water pavilion disposal only.

Where foul drainage pipes cross surface water pipes a minimum of 150mm clearance is required with suitable pipe fill material in the gap.

These notes are to be read in conjunction with Drawings 3992-D-01 & 3992-D-02, and with associated calculation sheets.

Richard Bate BSc 30th January 2025

Pavilion Development - Baysgarth Park, Barton-upon-Humber **3992**
1 No. Pavilion Development

Impermeable Area Calculations

Existing Shed (5.4m x 4.36m)	**24**	**m2**
Existing Paths & Tarmac	**51**	**m2**
New Pavilion (20m x 8.12m)	**162**	**m2**
Additional impermeable area	**87**	**m2**
TOTAL BUILDING AREA	**162**	**m2**

Existing access & tarmac areas are assumed adequately drained

Paths	**10**	**m2**
TOTAL IMP. YARD AREA	**10**	**m2**

New grass areas are assumed 100% permeable

All other paths and areas are assumed 100% permeable

Total Impermeable area	**172**	**m2**
Urban Creep 10%	17	m2
Calculated Impermeable area	**190**	**m2**

Drain Run Details

3992

	Length (m)	Invert Level	Pipe size	Fall	Min Fall	Ground Level	Pipe cover		
SOLID PIPEWORK									
Average Ground Level at Pavilion		***18.700 mAODN***							
New Pavilion FF Level		***18.800 mAODN***							
				0.005	**0.005**				
NMH1 (Pavilion)	**1.6**	**18.150 mAODN**	**150 mm**			18.7	0.40 m		Pavilion
NMH2 (Hedge Corner)	**21.3**		**150 mm**	**0.012**	**0.005**				
NMH2 (Hedge Corner)		**17.900 mAODN**				18.4	0.35 m		near hedge corner
NMH3 (Park)	**28.9**		**150 mm**	**0.036**	**0.005**				
NMH3 (Park)		**16.850 mAODN**				17.3	0.30 m		*has flow restriction*
								0.55 m	*Average MH depth - north*
MH (Existing Park)	**34.8**		**300 mm**	**0.018**	**0.005**				
MH (Existing Park)		**16.220 mAODN**				17.3	0.93 m		

pipe size 150mm minimum fall 1:200
Pipework and manholes near trees require air-digging out to protect roots - check with arboriculturist
Pipework to heavy traffic areas & additional loads require re-inforcement & additional details
Shallow Pipework may freeze
Overflow to existing system during exceedance events
Annual inspection and maintenance required

CALCULATIONS RELATING TO SOAKAWAY DESIGN

Pavilion Development - Baysgarth Park, Barton-upon-Humber **3992**

1 No. Pavilion Development

Building

190m2 impermeable area

BRE Soakaway Design Digest 365

$$I - O = S$$

where:
I = Inflow
O = Outflow
S = Required Storage

Inflow to the Soakaway

$$I = A \times R$$

where:
A = Impermeable Area Draining to Soakaway
R = Rainfall (10%)

Outflow from the Soakaway

$$O = a_{s50} \times f \times D$$

where:
a_{s50} = Internal surface area (50%) - no base
f = Soil infiltration rate
D = Storm duration

Calculated Design Rainfall

Z1(5) = 0.42

M5-60 = 20mm

M5-D =	8.4	mm
M10-D =	10.2	mm
M5-15 =	12.8	mm
M5-30 =	16.2	mm
M10-15 =	15.9	mm
M10-30 =	20.1	mm

Soil Infiltration Rate

$f = V_{p75-25} / [a_{p50} \times t_{p75-25}]$

where:

V_{p75-35} = Effective volume	0.0135
a_{p50} = Internal surface area (50%) - including base	0.27
t_{p75-35} = Time to drain effective volume	9220
f =	**0.00E+00**

Soakaway Design Details

$V = w \times l \times d$

where:

V = Soakaway volume

w= width

l = length

d = depth (effective)

Equation of Volume

Impermeable surface area (including 10% urban creep) **190** m^2

$I - O = S$

1 No. Residential Building, Shed & Access

where:

I = Inflow		**3.81**	m^3
O = Outflow (1)	$a_{s50} \times f \times D$	a_{s50} =	0 m^2
O(1) =			0.000 m^3
S = Required Storage		**3.81**	m^3
Additional required		3.81	m^3

Storage Required

1% SUDS **3 m3**

Drainage storage system

Pipework & Manholes	**2.00**	**m3**	
Discharge at 1 l/s	0.92	l/s	at 1% rainfall event
Storm duration	60	minutes	
Total Discharge	3312	l	
Total Discharge	**3.312**	**m3**	60 minute storm

Total Effective storage & Discharge	**5.31**	**m3**
S = Required Storage (365)	3.81	m3
Excess	1.50	m3
Total Storage (uk SUDS)	3.00	m3
Excess	2.31	m3

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	0.26	0.26
1 in 1 year (l/s):	0.22	0.22
1 in 30 years (l/s):	0.63	0.63
1 in 100 year (l/s):	0.92	0.92
1 in 200 years (l/s):	1.09	1.09

Pavilion Development - Baysgarth Park, Barton-upon-Humber
1 No. Pavilion Development

Surface Water Drainage Outline Design (1)

Drainage Pipework to New Pavilion

Existing Drainage
450mm Pipe along far side of bowling green and garden
This system works well and had a good clean flow
Existing 300mm connection available (route estimated)
Flooded manhole and area near toilet block
There is no surface water drainage near the site
pipe size 150mm minimum fall 1:200

Proposed Arrangements
Impermeble Area **172 m2**
Drains to existing system (north) with hydrobrake

Drain run north side

connecting Rainwater pipes (100mmØ)	1.0	m	(storage volume not included in calculations)
Solid Pipe (150mmØ)	50	m	
Fall over 50m length 1:200	*0.251*	*m*	
Pipe diameter	150	mm	
Pipe Volume (solid)	**0.89**	**m3**	plus additional connecting rainwater pipes

Manholes (2)

450mmØ plastic manhole		
Effective depth	1.00	m
Chamber ring volume	0.16	m^3
Total Manhole Storage Volume (x2)	**0.32**	**m3**

Manholes (1)

600mmØ plastic manhole		
Effective depth	1.40	m
Chamber ring volume	0.40	m^3
Total Manhole Storage Volume (x1)	**0.79**	**m3**

Total Storage (North) 2.00 m3

Note: Large manhole fitted with flow restriction 1 l/s

Pavilion Development - Baysgarth Park, Barton-upon-Humber **3992**
1 No. Pavilion Development

Foul Water Drainage Outline Design

Existing Arrangements

100mm Pipe from kitchen sink in existing timber shed
This system had excessive soil present which would impede flow
The existing toilet blcok has operational public sewer available
Use 1:80 for 110mm foul pipework (flow >1l/s)

Proposed Arrangements
3 No. WCs & 4 No. Wash basins (say 1 6-bed dwelling equivalent)
Drains to existing system (north)
Maximum flow 1.2 l/s
Using DEFRA guidance and calculator for 1 dwelling average daily discharge is 1.2m3/day.
average flow at discharge **0.012 l/s** **1.05 m3/day**

Typical ground level (existing shed)	18.70	mAODN	(estimate‡)
Typical floor level (existing shed)	18.80	mAODN	(estimate‡)

Assumed Ground Level	18.7	mAODN	(estimate‡)
Assumed Water Level (flooded area)	17.0	mAODN	(estimate‡)
Assumed Water Level (culvert)	16.0	mAODN	(estimate‡)

FM 1 Details (existing)
Plastic Ring with concrete lid

Cover Level	18.46	mAODN	(estimate‡)
Diameter Ø	300	mm	
Depth	930	mm	
Invert	17.53	mAODN	(estimate‡)

FM 2 Details (existing)
Brick 600mmx450mm with steel lid

Cover Level	17.37	mAODN	(estimate‡)
Size 600x450 Area =	0.27	m2	
Depth	650	mm	
Invert	16.72	mAODN	(estimate‡)

CHECK EXISTING FALL

Drain Run Details (check)

	Length (m)	Invert Level	Pipe size	Fall	Min Fall	Pipe cover	
Existing Building FFL		**18.80 mAODN**					
Internal Foul System (low point)		**18.80 mAODN**					
FM1	**19.45**	**17.53 mAODN**	**110 mm**	**0.065**	**0.016**	0.82 m	Adequte fall
FM2	**44.57**	**16.72 mAODN**	**110 mm**	**0.018**	**0.010**	0.54 m	Adequte fall

EXISTING FALL OK
Drain runs needs jetting out - soil present in FM1

Use 1:80 for 110mm foul pipework (flow >1l/s)

NOTES:
* TREE ROOT BARRIERS AS REQUIRED (WITHIN TREE ROOT ZONES)
TO BE READ WITH DRAWINGS 3992-D-01 & 3992-D-02
MINIMUM COVER OVER PIPEWORK 300mm
PROTECTION / RE-INFORCING TO PIPEWORK OVER TRAFFIC AREAS AS REQUIRED
NO SURFACE WATER TO BE CONNECTED TO FOUL DRAINAGE SYSTEM
A SOIL VENT PIPE (SVP) IS REQUIRED
ANY CHANGES TO THIS DESIGN MUST BE COMMUNICATED TO A&F CONSULTING ENGINEERS LLP
TO BE CONSTRUCTED AS PER WITH BUILDING REGULATIONS 2023
REGULAR MAINTENANCE OF SYSTEM REQUIRED

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Richard Bate
Site name:	Baysgarth Park
Site location:	Barton

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

Site Details

Latitude:	53.67923° N
Longitude:	0.43841° W
Reference:	2299041781
Date:	Jan 31 2025 17:05

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.1

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	3	3
HOST class:	N/A	N/A
SPR/SPRHOST:	0.37	0.37

Hydrological characteristics

	Default	Edited
SAAR (mm):	638	638
Hydrological region:	5	5
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	2.45	2.45
Growth curve factor 100 years:	3.56	3.56
Growth curve factor 200 years:	4.21	4.21

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

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

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):	0.26	0.26
1 in 1 year (l/s):	0.22	0.22
1 in 30 years (l/s):	0.63	0.63
1 in 100 year (l/s):	0.92	0.92
1 in 200 years (l/s):	1.09	1.09

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Richard Bate
Site name:	Baysgarth Park
Site location:	Barton

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	53.67922° N
Longitude:	0.43841° W
Reference:	2182242355
Date:	Jan 31 2025 17:35

Site characteristics

Total site area (ha):	0.019
Significant public open space (ha):	0
Area positively drained (ha):	0.019
Impermeable area (ha):	0.019
Percentage of drained area that is impermeable (%):	100
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	100
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.02
Net impermable area for storage volume design (ha):	0.02
Pervious area contribution to runoff (%):	50

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	3	3
SPR:	0.37	0.37

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	63
Rainfall 100 yrs 12 hrs:	--	96.25
FEH / FSR conversion factor:	1.25	1.25
SAAR (mm):	638	638
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydological region:	5	5
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 10 year:	1.65	1.65
Growth curve factor 30 year:	2.45	2.45

Design criteria

Climate change allowance factor:	1.4		Growth curve factor 100 years:	3.56	3.56
Urban creep allowance factor:	1.1		Q_{BAR} for total site area (l/s):	0.05	0.05
Volume control approach	Use long term storage		Q_{BAR} for net site area (l/s):	0.05	0.05
Interception rainfall depth (mm):	5				
Minimum flow rate (l/s):	2				

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	2	2
1 in 30 years (l/s):	2	2
1 in 100 year (l/s):	2	2

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m^3):	3	3
Long term storage 1/100 years (m^3):	0	0
Total storage 1/100 years (m^3):	3	3