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ENVIRONMENT

Dukesmead Industries Limited
Lincolnshire Gateway Drive Thru
Spalding
Sustainable Drainage Statement

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Lincolnshire Gateway Drive Thru
Spalding
Sustainable Drainage Statement

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1. INTRODUCTION

1.1 A Sustainable Drainage Statement (SDS) sets out the principles of drainage design for a development and summarises the reasoning behind the chosen design. This includes consideration of national and local guidance, justification of specific flow rates, volumes of attenuated storage, as well as the appropriate level of treatment to be provided to surface water runoff.

1.2 This SDS has been produced by BWB Consulting on behalf of Dukesmead Industries Limited in respect of a site located at the existing Lincolnshire Gateway Business Park, Spalding. This SDS is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

1.3 The location of the site is illustrated within **Figure 1.1**, with contextual information provided within **Table 1.1**. A proposed site layout plan is included as **Appendix 1**.

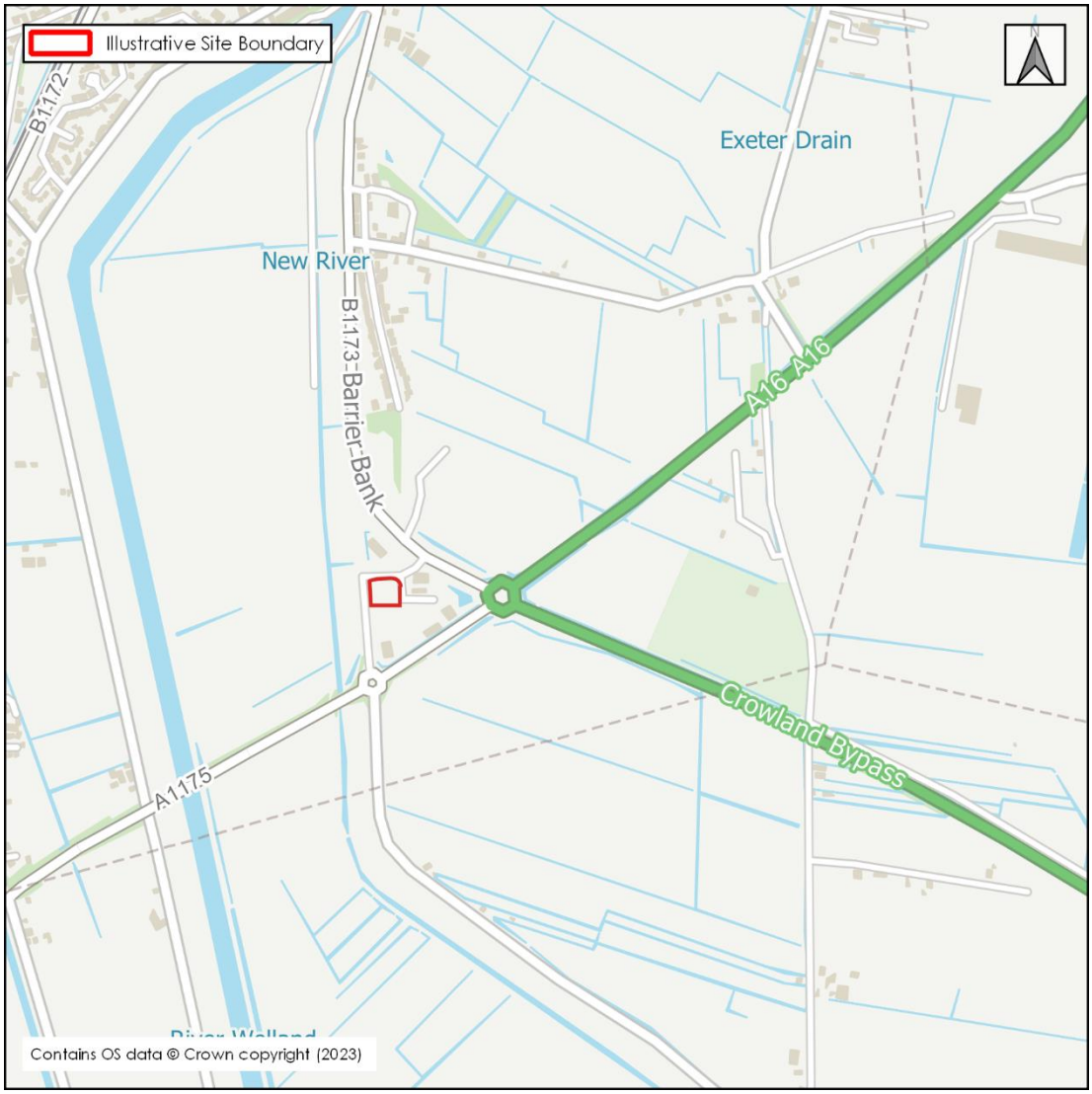


Figure 1.1: Site Location

Table 1.1: Site Details

Site Name	Lincolnshire Gateway Drive Thru
Location	Spalding
NGR (approx.)	TF242197
Application Site Area (ha)	043ha (approx.)
Development Type	Drive Thru Restaurants
Lead Local Flood Authority	Lincolnshire County Council
Local Planning Authority	South Holland District Council
Environment Agency Area	Lincolnshire and Northamptonshire
Sewerage Undertaker	Anglian Water
Internal Drainage Board	South Holland Internal Drainage Board

2. EXISTING CONDITIONS AND WIDER SITE CONTEXT

2.1 The site is located off Barrier Bank Road within the existing Lincolnshire Gateway Business Park, approximately 1.5km south of Spalding. The site is bound by existing office and commercial development to the north and east. An area of grassland bounds the site to the south with Barrier Bank Road bordering the western boundary. The existing site is currently entirely greenfield in nature.

2.2 A topographical survey for the site was undertaken by Anglia Land Surveys Ltd in January 2013 and is included as **Appendix 1**. The survey shows the site to be generally flat with a slight fall from east to west, with levels ranging from 3.57m Above Ordnance Datum (AOD) to 2.90m AOD. Within the very north of the site levels rise sharply to meet Barrier Bank Road which is raised above the north of the site.

2.3 The Lincolnshire Gateway Business Park (LGBP)currently consists of a petrol station, an office building, a hotel, and a mix of restaurants, including their associated access and parking. The site received outline planning permission in October 2014 (Planning Reference H16-0009-14).

2.4 LGBP refers to an area of approximately 24.7ha split by the B1173 into two parcels **Figure 2.1**. The application site is for one of the development parcels within the southern parcel of LGBP **Figure 2.1**. Reference to LGBP hereafter refers to the southern parcel.

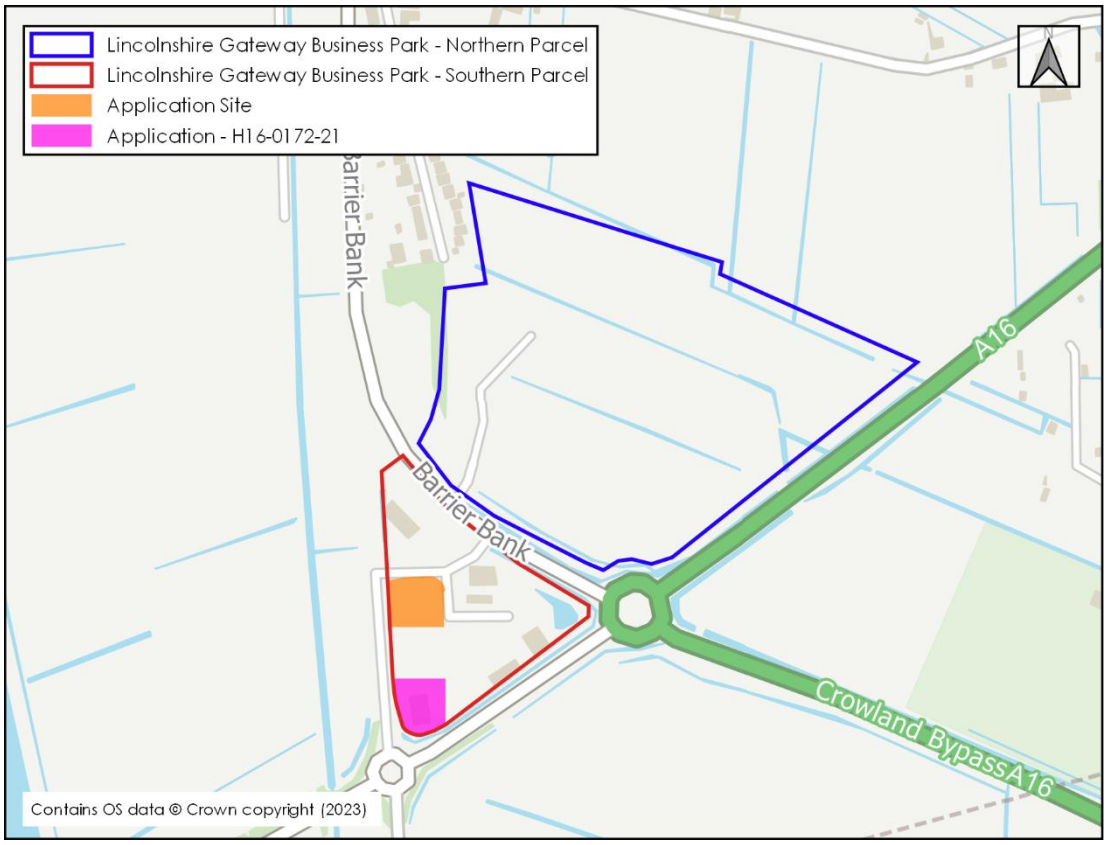


Figure 2.1: Lincolnshire Gateway Business Park Breakdown

2.5 A Flood Risk Assessment (FRA) by ARP Associates, reference 800/235r4, was submitted alongside the application. The report has been reviewed and a summary of the implications on the current site are outlined below:

- The application site is located within Flood Zone 1. LGBP is shown to be within Flood Zones 2 and 3, albeit benefitting from defences. Model results provided by the EA shows the LGBP to be located outside of the extents which are confined to the flood storage area west of Barrier Bank.
- There is a small area of low (1 in 1000-year) surface water risk in the west of the application site at the low point in the topography.
- The application site is at a low risk of flooding from groundwater, canal, reservoir sources.
- Finished floor levels of buildings should be raised above existing ground levels by 600mm, where possible.

2.6 Latest available flood risk data has been reviewed for the application site and it is considered that the principals outlined in the LGBP FRA remain valid.

2.7 An indicative drainage strategy for the LGBP was produced by ARP in support of the outline application, reference 800/235/05-01. The strategy shows that attenuated storage is provided for surface water runoff for the 1 in 100-year +30% climate change storm in the form of oversized pipes, underground tanks, and balancing ponds.

2.8 The discharge for the surface water from LGBP is shown to be the watercourse in the north of LGBP. The connection could not be achieved by gravity and required a package pump station. Surface water runoff is shown to be stored within a detention basin in the east of LGBP.

2.9 The LGBP drainage strategy shows a series of surface water and foul water stubs as provisions for future development, including within the current site.

2.10 A full planning application (Planning Reference H16-0172-21) for a parcel of land in the south of LGBP (**Figure 2.1**) received planning permission in July 2021. The future development stubs are recorded as being 375mm laid at a gradient of 1 in 317 giving a theoretical capacity of over 110l/s. The pipes are shown to upsize to 675mm between the site and the pond.

2.11 The foul water from this site connects to existing 150mm foul water sewer stubs provided by LGBP which ultimately discharges foul water into the public foul sewer within Fen End Lane via a pumped connection.

Existing Runoff Rates

2.12 An assessment of the existing surface water runoff rates from LGBP was undertaken as part of the outline planning application. The existing QBAR runoff rate was calculated as 6.4l/s.

2.13 Application H16-0172-21 within LGBP is reported as discharging into the enabling infrastructure for future development provided by LGBP at an unrestricted rate via the existing stubs supplied for future development.

Existing Runoff Volume

2.14 An assessment of the existing surface water runoff rates from the area proposed for development (0.43ha approx.) has been made for a 1 in 100-year, 6 hour storm.

2.15 As the existing site is permeable, the runoff volume has been calculated using the Source Control module within Micro Drainage to be **44m³**, results are included within **Appendix 2**.

3. SURFACE WATER DRAINAGE STRATEGY

3.1 The proposals include for three drive thru restaurants included associated access, parking and landscaping. The site has a developable area of approximately 0.43ha and an impermeable area of approximately 0.33ha calculated from the proposed site layout plan (**Appendix 1**).

Drainage Hierarchy

3.2 The Planning Policy Guidance[1] and the SuDS Manual[2] identify that surface water runoff from a development should be disposed of as high up the following hierarchy as reasonably practicable:

i. into the ground (infiltration);
ii. to a surface water body;
iii. to a surface water sewer, highway drain, or another drainage system;
iv. to a combined sewer.

3.3 The aim of this is approach is to manage surface water runoff close to where it falls and mimic natural drainage as closely as possible.

Infiltration

3.4 Previous works as part of the LGBP outline application have demonstrated infiltration techniques to not be viable at the site.

Surface Water Body

3.5 An Unnamed Ordinary Watercourse (UOW) is present in the north of LGBP which is where the existing outfall for the existing development is located. It is therefore proposed to connect to the existing surface water stubs provided from the LGBP to ultimately discharge into the UOW. Details on the levels and length of these stubs is unknown, at this time a cover level has been derived from the topographical survey with an invert level calculated assuming 1.2m of cover from the soffit of the manhole.

Peak Flow Control

3.6 To comply with the Non-Statutory Technical Standards for Sustainable Drainage Systems S2-S3[3], runoff from greenfield developments should not exceed the equivalent greenfield rates for the 1 and 100-year return period events.

3.7 For previously developed sites, the proposed runoff rate must be "as close as reasonably practicable" to the greenfield runoff rates but should never exceed the rate of discharge prior to redevelopment for that event.

[1] Planning Practice Guidance. http://planningguidance.planningportal.gov.uk/.
[2] The SuDS Manual (C753). CIRIA 2015.
[3] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems

3.8 As the application sites sits within LGBP surface water runoff will ultimately be restricted to the equivalent greenfield QBAR rate of 6.4l/s up to the 1 in 100-year plus climate change event for LGBP.

Runoff Volume Control

3.9 The Non-Statutory Technical Standards for Sustainable Drainage Systems S4-S6[4] states that where reasonably practical the runoff volume from a development for the 1 in 100-year 6 hour rainfall event should not exceed the runoff volume prior to development or redevelopment. Additionally, if practicable on previously developed sites, the runoff volume should not exceed the equivalent greenfield runoff volume. Where it is not reasonably practicable to constrain the volume of runoff from a development at or below the existing volume, then the runoff must be discharged in a manner that does not adversely affect flood risk, i.e.:

i. The additional runoff volume resulting from the development (the 'long term storage volume') should be discharged separately from the site at a rate of 2l/s/ha or less. Or,

ii. All the runoff volume from the development should be discharged at a rate equivalent to the mean annual flow rate (QBAR) rate under greenfield conditions or less. Or,

iii. All the runoff volume from the development should be discharged at a rate of 2l/s/ha or less.

3.10 An estimate of the post-development runoff volume from the 1 in 100-year 6 hour storm can be derived from the peak rainfall depth and the proposed impermeable area of the parcel (peak rainfall depth (m/hr) x Impermeable Area (m^2)). The existing and post-development runoff volumes are compared within **Table 3.1**.

Table 3.1: Runoff Volume Comparison

Existing Volume (m^3)	Proposed Volume (m^3)	Difference (m^3)
44	289	245

3.11 The 1 in 100-year 6 hour storm runoff volume from the site has been shown to increase as a result of the proposed development. However, as part of LGBP drainage regime the runoff volume from the development will be discharged at a rate equivalent to the mean annual flow rate (QBAR) rate under greenfield conditions, the volume control criteria will be met.

Long Term Storage

3.12 The runoff from the development as part of LGBP will discharge at a rate equivalent to the mean annual flow rate (QBAR) rate under greenfield conditions or less. Therefore, provision for long term storage is not required.

[4] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems

Sustainable Drainage Systems

3.13 As part of LGBP drainage strategy the surface water runoff from the current site will be attenuated within a single detention basin to the east before discharging to the UOW in the north at the restricted greenfield runoff rate for LGBP.

3.14 It is envisaged that the drainage principals of the Application H16-0172-21 can be retained for the current site. As such further SuDS opportunities that could be explore at the site include:

i. Permeable paving in parking areas, to collect flows whilst providing attenuation at source and providing benefits to water quality.

ii. Rain gardens in proposed landscaped area to drain hardstanding and providing at source attenuation, water quality and amenity benefits.

3.15 An indicative surface and foul water layout for the development is shown on BWB Dwg No. LGDT-BWB-ZZ-XX-DR-CD-0001_Indicative Drainage Strategy which is included as **Appendix 3**.

Network Model

3.16 Based upon the above a Micro Drainage simulation for the site surface water spine has been undertaken. Results for the critical storms are included within **Appendix 5**. The network has been designed with a 111l/s restriction to demonstrate the theoretical capacity of the existing 375mm stub as outlined by the FRA for the Application H16-0172-21.

3.17 Due to a critical storm duration of 15 minutes, the FSR rainfall method has been used in place of FEH as it is considered to more appropriate methodology for this network. The LGBP drainage has been modelled using a 30% allowance for climate change on the 100-year storm. The current site has been modelled with a 40% allowance for climate change based upon the Environment Agency (EA) Peak Rainfall Allowances[5].

3.18 The results demonstrate that drainage has been designed such that there is nominal flooding of 17.7m^3 in the 1 in 100-year +40% climate change storm. Any flooding within the 1 in 100-year +40% climate change event will be retained within low lying parking areas aware from built development until volume becomes available within the downstream network. This is an indicative network, further pipes and manholes that have not been represented will be added at detailed design that will address the flooding demonstrated in the climate change event.

3.19 The main site infrastructure has been designed such that any flooding is directed away from the development plots and main access and egress routes on the site.

[5] Environment Agency, Flood risk assessments: climate change allowances: Environment Agency, Flood risk assessments: climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances. Last Accessed March, 2023.

3.20 It is anticipated that the volume of flooding will be reduced through the implementation of rain gardens and permeable paving which have not been accounted for within the network.

Residual Risk and Designing for Exceedance

3.21 The main site infrastructure has been designed such that any flooding is directed away from the development plots and main access and egress routes on the site and retained within low lying parking areas aware from built development until volume becomes available within the downstream network.

3.22 Indicative flood routing is highlighted within the Indicative Drainage Strategy (**Appendix 4**).

4. MAINTENANCE

4.1 In line with the principals of Application H16-0172-21 and the LGBP it is anticipated that the responsibility for the ongoing inspection and maintenance of the drainage systems will lie with the site owner. It is envisaged that the Operation and Maintenance manual will be developed at the detailed design stage, but some examples are included below.

i. All drainage features should be in open areas which are readily accessible.

ii. Gullies should be inspected and de-silted at least once a year, where necessary.

iii. Pipes, and manholes should be inspected and de-silted at least once a year, where necessary.

iv. If permeable paving is incorporated within the layout, it should be swept a minimum of every 6 months to maintain flow capacity of the joints between blocks.

5. FOUL WATER DRAINAGE

5.1 In line with the principals of Application H16-0172-21 is proposed to discharge foul water from the development via the existing 150mm foul water stubs provided as part of LGBP drainage regime.

5.2 It has been assumed that the foul water infrastructure has been constructed to accommodate foul flows from the current application site.

5.3 The foul flows from LGBP ultimately discharges to a public foul sewer within Fen End Lane via a foul water rising main.

6. SUMMARY

6.1 This statement and supporting appendices demonstrate that the drainage design for the development will comply with the relevant local and national standards, specifically the hierarchy of discharge, runoff rate and volume criterion.

6.2 This SDS is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

6.3 The site is shown to sit within the LGBP. The LGBP drainage strategy is shown to provide both surface water and foul water stubs for future development to connect into.

6.4 As part of the drainage regime for the current site it is proposed to discharge surface water runoff into the 375mm stub at an unrestricted rate. The surface water runoff ultimately discharges into an UOW in the north of the LGBP at a restricted greenfield runoff rate of 6.4l/s.

6.5 The LGBP is shown to provide attenuated storage to accommodate the 1 in 100-year +30% climate change storm.

6.6 A MicroDrainage network model has been simulated using a 111l/s restriction to demonstrate the theoretical capacity of the existing 375mm stub. In the critical storm durations there is shown to be nominal flooding of 17.7m^3 in the 1 in 100-year +40% climate change storm. Any flooding within the 1 in 100-year +40% climate change event will be retained within low lying parking areas away from built development until volume becomes available within the downstream network.

6.7 It is anticipated that the volume of flooding will be reduced through the implementation of rain gardens and permeable paving which have not been accounted for within the network.

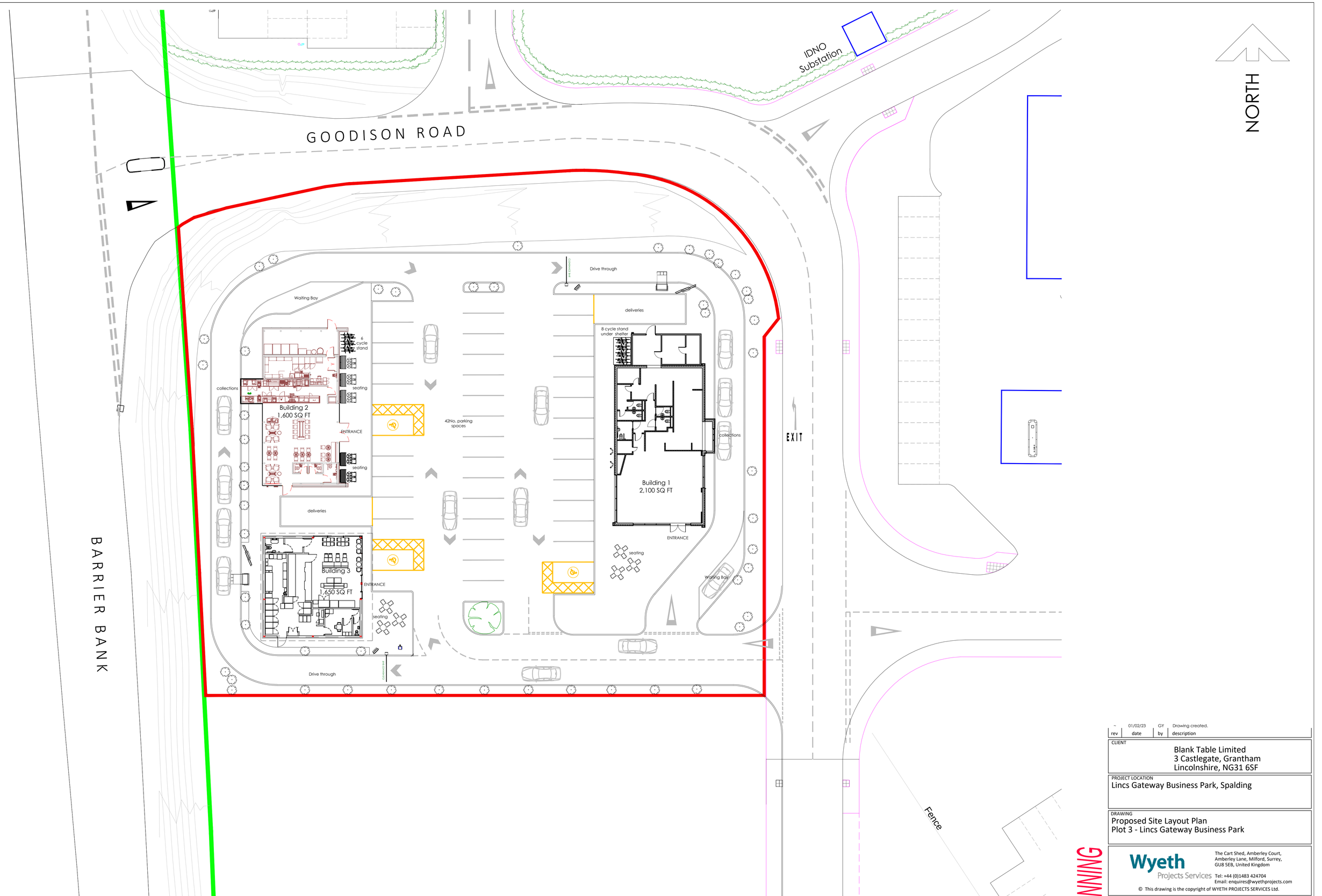
6.8 In line with the principals of Application H16-0172-21 and LGBP it is anticipated that the responsibility for the ongoing inspection and maintenance of the drainage systems will lie with the site owner.

6.9 In line with the principals of Application H16-0172-21 it is proposed to discharge foul water from the development via the existing 150mm foul water stubs provided as part of LGBP drainage regime.

6.10 It is envisaged that the final drainage strategy will be determined during the detailed design stage, as the development layout is finalised.

APPENDICES

Appendix 1: Proposed Site Layout Plan



Proposed Site Layout Plan
Scale 1:200

Scale Bar 1:200 (Metres)
0 1 2 3 4 5 10 15 20 25 30

PLANNING

rev	date	by	description
~	01/02/23	GY	Drawing created.

CLIENT
Blank Table Limited
3 Castlegate, Grantham
Lincolnshire, NG31 6SF

PROJECT LOCATION
Lincs Gateway Business Park, Spalding

DRAWING
Proposed Site Layout Plan
Plot 3 - Lincs Gateway Business Park

Wyeth Projects Services
The Cart Shed, Amberley Court,
Amberley Lane, Milford, Surrey,
GU8 5EB, United Kingdom
Tel: +44 (0)1483 424704
Email: enquires@wyethprojects.com
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Date:	Drawn By:	A1 original plot size
February 2023	GY	
Scale: 1:200	Dwg No: WPS-WEN-003-P-03	Rev: ~

Appendix 2: Greenfield Runoff Volume

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.000
Ratio R	0.400
Areal Reduction Factor	1.00
Area (ha)	0.335
SAAR (mm)	563
CWI	78.860
Urban	0.000
SPR	30.000

Results

Percentage Runoff (%)	22.10
Greenfield Runoff Volume (m^3)	44.282

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Appendix 3: Indicative Drainage Strategy

LINEAR DRAIN AT LOW POINT OF CAR PARK.

PROPOSED PERMEABLE PAVING TO PROVIDE FURTHER SURFACE WATER STORAGE AND TO PROVIDE BENEFITS TO WATER QUALITY.

PROPOSED FILTER DRAIN FED BY SURFACE WATER RUNOFF.

PROPOSED FOUL WATER CONNECTION TO EXISTING 150mm SURFACE WATER STUB AS PART OF LINCOLNSHIRE GATEWAY BUSINESS PARK DRAINAGE STRATEGY.

LINCOLNSHIRE GATEWAY BUSINESS PARK ULTIMATELY DISCHARGES PUBLIC FOUL WATER SEWER IN FEN END LANE TO THE NORTH.

PROPOSED RAIN GARDENS TO PROVIDE FURTHER SURFACE WATER STORAGE AND TO PROVIDE BENEFITS TO WATER QUALITY, BIODIVERSITY AND AMENITY.

PROPOSED FILTER DRAIN FED BY SURFACE WATER RUNOFF.

PROPOSED SURFACE WATER CONNECTION TO EXISTING 375mm SURFACE WATER STUB AS PART OF LINCOLNSHIRE GATEWAY BUSINESS PARK DRAINAGE STRATEGY.

CONNECTION PROPOSED AT UNRESTRICTED RATE IN LINE WITH THE PRINCIPALS IN PLANNING APPLICATION H16-0172-21.

LINCOLNSHIRE GATEWAY BUSINESS PARK ULTIMATELY DISCHARGES SURFACE WATER TO UNNAMED ORDINARY WATERCOURSE TO THE NORTH OF THE CURRENT SITE AT A GREENFIELD RUNOFF RATE OF 6.4l/s.

S1 CL 4.250m IL 3.125m
S1A
S1B
S2 CL 4.250m IL 2.766m
S3 CL 4.250m IL 3.200m
S4 CL 4.250m IL 2.547m
S5 CL 4.250m IL 2.263m
S6 CL 4.250m IL 3.078m

FFL 4.525
Building 1 2,100 SQ FT
Building 2 1,600 SQ FT
Building 3 650 SQ FT

4.25
4.375
4.025
4.038

Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. Existing site levels have been taken from Anglia Land Surveys topographical survey drawing ref ALS5957-500-02 dated January 2013.
6. Proposed development plan underlay taken from Wyeth Project Services drawing reference WPS-WEN-003-P-03.
7. Existing stubs to be retained subject to a survey of condition prior to works and remedial work carried out if necessary.
8. Levels of existing surface water stub have been assumed based upon a cover level taken from topographical survey and an invert assuming a 1.2m cover to the soffit level.
9. The exact position and level of existing drainage is to be confirmed on site. Any discrepancies are to be reported to the engineer prior to the commencement of works.
10. Surface water network has been designed with a restriction of 111l/s based upon the theoretical capacity of the existing stub connection.
11. Network shows nominal flooding in the 1 in 100-year +40 critical storm. Any flooding within this event will be directed away from built development and retained in low lying areas until capacity is available within the downstream network.

Legend

- Indicative Site Boundary
- Rain Garden/ Bioretention Area
- Filter Drain
- Permeable Paving
- Proposed Surface Water Sewer
- Proposed Surface Water Manhole
- Exceedance Routing
- Proposed Foul Water Sewer
- Proposed Foul Water Manhole
- Gully
- Linear Drain

Rev	Date	Details of issue / revision	Drw	Rev
P02	23.03.23	Preliminary Issue	CC	CD
P01	17.03.23	Preliminary Issue	CC	CD

Issues & Revisions

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DUKESMEAD INDUSTRIES LIMITED

Project Title
LINCOLNSHIRE GATEWAY DRIVE THRU

Drawing Title
INDICATIVE DRAINAGE STRATEGY

Drawn:	C. Crowe	Reviewed:	C. Dodd	
BWB Ref:	232317	Date:	17.03.23	Scale@A1: 1:200

Drawing Status
PRELIMINARY

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LGDT-BWB-ZZ-XX-DR-CD-0001	S2	P02

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Appendix 4: MicroDrainage Network Model

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.400	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

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.003	Outfall	3.810	2.235	2.235	1200	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	1	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)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Storm

Orifice Manhole: 4, DS/PN: 1.003, Volume (m³): 4.6

Diameter (m) 0.197 Discharge Coefficient 0.600 Invert Level (m) 2.263

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	1	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)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	1	+0%	30/15 Summer	100/15 Summer			3.227
2.000	2	15 Winter	1	+0%	30/15 Summer	100/15 Summer			3.295
1.001	2	15 Winter	1	+0%	30/15 Summer				2.885
1.002	3	15 Winter	1	+0%	30/15 Summer				2.830
3.000	5	15 Winter	1	+0%	30/15 Summer	100/15 Winter			3.121
1.003	4	15 Winter	1	+0%	1/15 Summer				2.794

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.123	0.000	0.41			18.3	OK	5
2.000	2	-0.055	0.000	0.70			12.9	OK	6
1.001	2	-0.181	0.000	0.33			32.6	OK	
1.002	3	-0.017	0.000	0.35			33.1	OK	
3.000	5	-0.107	0.000	0.18			5.8	OK	1
1.003	4	0.156	0.000	0.48			37.5	SURCHARGED	

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	1	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)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	30	+0%	30/15 Summer	100/15 Summer			3.732
2.000	2	15 Winter	30	+0%	30/15 Summer	100/15 Summer			3.985
1.001	2	15 Winter	30	+0%	30/15 Summer				3.571
1.002	3	15 Winter	30	+0%	30/15 Summer				3.499
3.000	5	15 Winter	30	+0%	30/15 Summer	100/15 Winter			3.457
1.003	4	15 Winter	30	+0%	1/15 Summer				3.401

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.382	0.000	0.81			35.8	SURCHARGED	5
2.000	2	0.635	0.000	1.19			21.9	FLOOD RISK	6
1.001	2	0.505	0.000	0.57			56.6	SURCHARGED	
1.002	3	0.652	0.000	0.68			63.7	SURCHARGED	
3.000	5	0.229	0.000	0.40			12.7	SURCHARGED	1
1.003	4	0.763	0.000	0.94			73.2	SURCHARGED	

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	1	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)	19.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	100	+40%	30/15 Summer	100/15 Summer			4.258
2.000	2	15 Winter	100	+40%	30/15 Summer	100/15 Summer			4.259
1.001	2	15 Winter	100	+40%	30/15 Summer				4.134
1.002	3	15 Winter	100	+40%	30/15 Summer				4.070
3.000	5	15 Winter	100	+40%	30/15 Summer	100/15 Winter			4.168
1.003	4	15 Winter	100	+40%	1/15 Summer				3.931

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.908	8.054	1.17			51.5	FLOOD	5
2.000	2	0.909	9.407	1.86			34.2	FLOOD	6
1.001	2	1.068	0.000	0.75			75.0	FLOOD RISK	
1.002	3	1.223	0.000	0.86			80.7	FLOOD RISK	
3.000	5	0.940	0.198	0.69			21.9	FLOOD	1
1.003	4	1.293	0.000	1.20			93.6	SURCHARGED	

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