PRP environmental

PRP Northampton
Catherine House Harborough Road
Brixworth Northampton NN6 9BX

Telephone: 01604 889870

northampton@prp.uk.com
www.prp.uk.com

Foul and Storm Water Drainage Strategy

for

Land off 127 Ruscote Avenue , Banbury, OX16 2NL

for:

Paloma I Propco Ltd
3rd Floor, Liberation House
Castle Street
St Helier
Jersey
JE1 1BL

Date	Issued	Revision
12 November 2021	For Planning	

Reference: 63364

Prepared by: [redacted]
Myles Sturgess - Civil Engineer

Approved by: [redacted]
Barry Smith
B.Eng. C.Eng. M.I.Struct.E. FGS
Director

EXECUTIVE SUMMARY

This drainage strategy has been developed for Jacobs Douwe Egberts (JDE) in support of their planning application for the proposed Starbucks café drive through development at land off 127 Ruscote Avenue, Banbury, OX16 2NL.

The report provides a description of the best means of providing surface water drainage to the development using the hierarchy of SuDS alternatives.

A SuDS scheme is proposed incorporating type C permeable paving, catchpits, and flow control device to restrict the discharge rate. The type C permeable paving will provide sufficient storage for all storms up to and including a 1 in 100 year plus 40% for climate change. Flows will be restricted by means of a flow control device to an existing surface water ditch north-east of the site. The discharge rate will be restricted to 25.3l/s which provides 40% betterment to the existing brownfield rate. The existing ditch is located to the north-east of the proposed Starbucks café development, adjacent to Ruscote Avenue (A422). Permission will be required on third party land in these areas in order to form the surface water drainage run to the outfall connection into the existing ditch via a new headwall. The type C permeable paving constructed below all of the parking bays will provide treatment to the surface water runoff. Initial flood exceedance can be contained within the site with further flooding shown to not impact upon neighbouring properties.

In order to ensure the surface water drainage scheme remains effective, a maintenance plan is proposed. The key here is to prevent silt and the like entering the proposed drainage system which will be achieved with catchpits situated upstream of the orifice plate.

A Unilog retaining wall system has been proposed along the proposed parking bays and the proposed drive through road in the north-west side of Starbucks. This will protect the site against overland flows from the adjacent plot of land, preventing flows from entering the site. Proposed road gullies, yard gullies and drainage channels located at the proposed levels low points will pick up any additional flows and prevent runoff from escaping.

In light of all of the above, it can be seen that SuDS principles have been fully taken into account for the proposed surface water drainage system.

Foul drainage from the proposed Starbucks development will discharge into the Thames Water public foul sewer via a junction connection. The proposed foul junction connection is located to the north-east of the proposed development, close to the existing surface water ditch described above.

CONTENTS **Page**

APPENDICES

1. INTRODUCTION

1.1 This drainage strategy has been prepared on the instruction of Jacobs Douwe Egberts (JDE) in support of the planning application for the proposed drive through Starbucks café development and accompanying amenities on the land off 127 Ruscote Avenue, Banbury.

1.2 At the time of writing this report the site was currently occupied by a car park taking up the southern and central portions of the site, with an exit onto Ruscote Avenue along the north-west boundary.

1.3 The purpose of the report is to establish the best means of providing surface and foul water drainage to the new development taking into account statutory requirements.

1.4 References to the left and right are taken as viewing the site from the front. The front is taken to be the elevation facing the existing central car parking area where the proposed Starbucks café drive through will be located.

1.5 The appendices to this report are:

Appendix I	Architectural Layout
Appendix II	Proposed Preliminary Surface and Foul Drainage Layout
Appendix III	MicroDrainage Calculations – Proposed Development
Appendix IV	Drainage Maintenance Schedule
Appendix V	Thames Water Asset Plan
Appendix VI	General Conditions

2. THE SCOPE OF THE ASSESSMENT

2.1 The purpose of this strategy is to investigate and make recommendation as to the best way to deal with the discharge of foul and surface water drainage from the proposed Starbucks café drive through development and associated car parking spaces and landscaped areas on site, located adjacent to Ruscote Avenue.

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

- Investigations into existing drainage systems to the site
- Assessment of future and present surface water flows
- Assessment of future foul water flows
- Assessment of the permeability of underlying geology

2.3 The following specific additional considerations will be applied to the surface water drainage design:

- SuDS principles are to be adopted generally
- Allowances for climate change are to be incorporated into the scheme
- A surface water drainage layout and calculations are to be provided
- A maintenance plan

The purpose of the above is to contain as far as is reasonably practical surface water drainage within the site and to not have an adverse effect on neighbouring properties during exceptional rainfall events.

2.4 A foul water drainage layout will be produced showing how the foul drainage will be discharged.

3. EXISTING CONDITIONS AND THE LOCAL ENVIRONMENT

3.1 The site is relatively rectangular in shape. The site has an area of approximately 0.35 hectares.

3.2 The existing land use around the site includes existing parking spaces, residential houses, factories and commercial stores. The site is located at grid reference of 444908, 241491.

3.3 The site is currently a combination of an undeveloped piece of land as well as an existing car parking area with an existing access to Ruscote Avenue.

3.4 The existing site topography shows that the existing levels adjacent and around the site boundary vary from highest point of 103.930 m AOD at south-west direction, to the lowest point of the site at 99.670 m AOD located in the north-east corner of the existing access.

3.5 To the north-east of the site there is a large surface water ditch running from west to east. This ditch is approximately 2.5m deep with the top of the ditch between 97.9 – 96.9m AOD and the bottom between 95.3 – 94.8m AOD. A short section of the ditch has been culverted to facilitate access to the extended northern portion of the site.

3.6 The immediate surrounding land uses are:

Direction	Description
North	Ruscote Avenue road, ALDI, McDonalds
South	Nursery Drive road, Residential houses, Cemetery
East	Factories & commercial stores including Kenco coffee company, Jacobs Douwe Egberts coffee company, Waitrose, B&Q and Homebase
West	Ruscote Avenue, Residential houses, Primary school

4. THE DEVELOPMENT PROPOSALS

4.1 It is proposed to construct a new drive through Starbucks Café along with amenities such as an access roadway, staff and visitor car parking spaces including disabled parking bays, pedestrian access, HGV access for deliveries on site and soft landscaping.

4.2 The architectural layout is shown in appendix I.

5. SITE INVESTIGATIONS

5.1 Geological sources from the site investigation report (Hydrock, July 2016) which was highlighted in T.R. Collier & Associates Limited - Flood Risk Assessment report, indicated that as a result of the site's historic development, the depth of made ground/topsoil varies between 0.3-0.9m. The superficial deposit that was found on this site was Alluvium, which was encountered across the northern portion of the site at depths between 0.3-2.8m below ground level. Bedrock-wise, the remainder of the site is underlain by River Terrace formation, to a depth between 0.3-8.0m below ground level. The entire site is underlain by the Charmouth Mudstone Formation. The borehole logs indicated a layer of stiff grey clay transitioning to a weak laminated grey mudstone from a depth of 0.55m below ground level to a depth of at least 20m below ground level.

5.2 Groundwater was mostly encountered at the transition from the superficial deposits to the Charmouth Mudstone formation, with water depths in groundwater monitoring pipes varying between 0.36m – 5.00m below ground level.

5.3 Given the likely make up of superficial deposits and the likely presence of ground water at shallow depth it is unlikely that soakaways will be suitable for this development.

5.4 The above predictions will be confirmed by the site specific ground investigation which will be conducted before the final design is completed. If these site investigations reveal that soakaways are a viable option, this strategy will be amended accordingly.

6. ASSESSMENT OF PRESENT AND FUTURE SURFACE WATER FLOWS

6.1 The area where the new Starbucks building and amenities are to be constructed is part of an undeveloped field and part of existing car parking bays.

6.2 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

6.3 Due to the makeup of the superficial deposits and the presence of ground water at shallow depths, soakaways are considered unsuitable for this development.

6.4 An existing ditch is available to the north-east of the development and would be utilised as the proposed surface water outfall, however this would require laying drainage within third party land. As this draining route is across third party land, permission to use this route will be required.

6.5 Thames Water sewer records plans show that there are some existing surface water sewers available to the north-east of the site, close to the existing ditch along Ruscote Avenue, including a rising main running nearby the existing access of the site in the road and a gravity drain running further east in the road, further away from the site. However, this will not be utilised as the proposed surface water network from the site will discharge into the existing ditch instead.

6.6 Type C permeable paving has a sufficient storage volume to accommodate all storms up to and including a 1 in 100 year storm plus 40% for climate change. The permeable paving will provide attenuation capacity at a depth of 0.450m in the event of an exceptional storm. No above ground flooding will occur for a flood event of this magnitude.

6.7 Flows will be restricted by means of a flow control device to an existing surface water ditch north-east of the site. The discharge rate will be restricted to 25.3l/s which provides 40% betterment to the existing brownfield rate. This discharge rate calculation of the existing (Brownfield) runoff compared to the new development runoff is demonstrated in Appendix III as part of the drainage calculations.

6.8 Type C permeable paving will be provided within all of the car parking bays and a part of the proposed road. These systems will provide treatment to the surface water runoff reducing the presence of hydrocarbons, heavy metals and other pollutants.

6.9 The outline drainage design is included in appendix II. This is supported by the MicroDrainage calculations demonstrating the feasibility of the system (appendix III). A Thames Water sewer records plan is provided in appendix V which shows the location of the ditch into which the surface water will discharge.

6.10 Although no above ground flooding occurs for a 1 in 100 year storm event plus 40% for climate change, exceedance flows for exceptional rainfall events were considered. As a result of this we comment as follows:

- The type C permeable paving will provide storage for all storms up to and including 1 in 100 year storm plus 40% for climate change. In the event of exceedance of the surface water drainage system occurring during an exceptional rainfall event, the water would pond back into the permeable paving and the spare capacity within the attenuation. Should the permeable paving sub-base become completely saturated, water would pond above ground within the proposed road area and will be picked up by the road gullies and drainage channels specified at the low points.

- In the exceedance event or in the event of a drainage blockage occurring at the flow control device the water will back up into the provided sewers, channel drainage and the porous paved storage.

- The car parking areas and access roadway will be bounded by kerb upstands, including 300mm upstands where trief kerbs will be used for the HGV delivery vehicles, which will be able to contain a large degree of above ground water preventing any initial flooding from leaving the site.

- Should this above ground storage be breached, overland flows will travel in a north easterly direction and will discharge into the carriageway of Ruscote Avenue. This road is bound by kerbs containing overland flows and thus the development will have no adverse effect on neighbouring properties.

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 Before entry into the flow control chamber via an orifice and eventually outfall into the existing ditch, the drainage runs will be drained via catchpits with 300mm sumps. In this way, all silt will be prevented from entering the orifice plate thus ensuring that it is kept clear of silt and other debris.

7.4 Inspection access points will be provided which can be accessed and maintained.

7.5 A drainage maintenance schedule is included in appendix IV.

7.6 All the above will be developed by PRP and included in the O & M manuals and the health and safety file for the development.

8. FOUL WATER DRAINAGE

8.1 Foul drainage from the proposed Starbucks development will discharge via a junction connection on the Thames Water foul sewer located to the east of the proposed site, close by to the existing surface water ditch, and just before Ruscote Avenue, as indicated in the Thames Water sewer records plan provided in appendix V.

8.2 The existing foul sewer will need to be surveyed for depth and accurate position of the foul outfall to be confirmed.

8.3 The proposed drainage layout is shown in appendix II. The SVP positions are assumed at this stage but can be confirmed as part of the detailed design.

9. CONCLUSIONS AND RECOMMENDATIONS

9.1 It is intended to construct a new drive through Starbucks cafe with accompanying amenities.

9.2 The development should be allowed to proceed because:

- The surface water runoff from the proposed development can be treated and subsequently discharged via a permeable paving system into an existing surface water ditch by means of a flow control device.

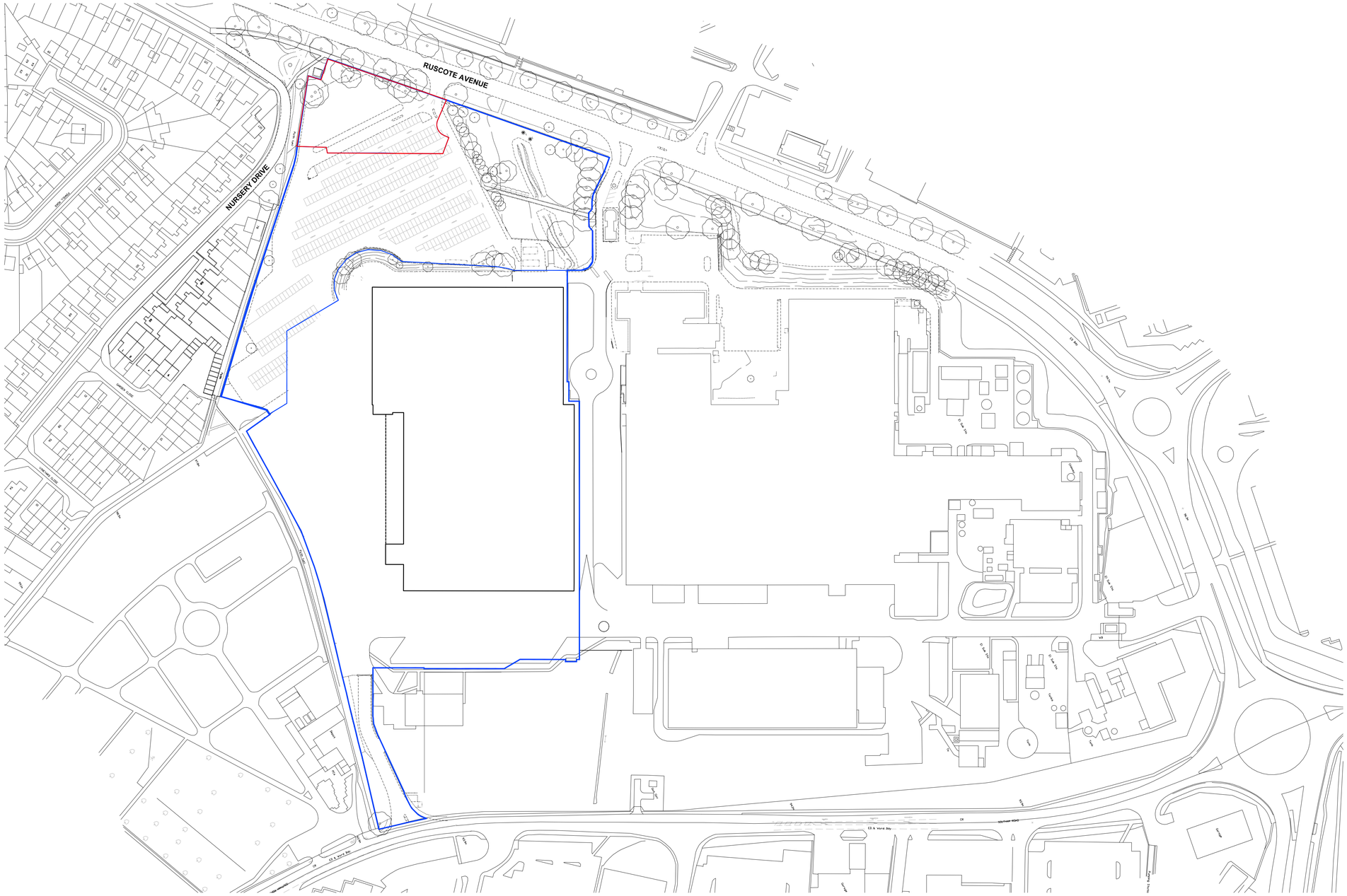
- The foul water flows from the proposed development can be discharged into an existing Thames Water sewer via an existing junction connection.

- The initial flood exceedance from exceptional rainfall events will be contained within the type C permeable paving structures with further flood exceedance being contained within the kerb bound car parking areas and access roadway. Should this be breached further flood exceedance has been shown to have no adverse effect on neighbouring properties.

- A maintenance plan including prevention measures has been outlined for the development and will be finalised as part of the detailed design thus ensuring the longevity of the surface water drainage scheme.

APPENDIX I

ARCHITECTURAL LAYOUT



General Notes

Drawings, specifications and schedules are to be read in conjunction with the following where applicable; Employer's Requirements documents, Agreements to Lease, Structural Engineer's drawings and specifications, Civil Engineer's drawings and specifications, Survey Drawings, Party Wall/ Boundary Awards. Other specialist design consultant's requirements as appointed by the Main Contractor. Other specialist design sub-contractor's requirements as appointed by the Main Contractor.

Notes

KEY:

Site Boundary

Areas under applicant's ownership

0 12.5m 25m 37.5m 50m 62.5m 75m 87.5m 100m 112.5m 125m

SCALE IN MM

REV	NOTES	DATE	BY	AUTH
PL1	Issued for Planning	14.07.21	SL	GW

DARLING ASSOCIATES
ARCHITECTS

1 Greencoat Row
London SW1P 1PQ
UK

mail@darlingassociates.net
www.darlingassociates.net
+44 20 7630 0500

DRAWING STATUS
Planning

TITLE
Existing Site Location Plan

PROJECT
Ruscote Avenue, Banbury - Site 3

SCALE AT A1:	SCALE AT A3:
1:1250	1:2500

JOB NO.	DRAWING	REV
16061	(01)-S3-S-000	PL1

G:\Project Data\16061 Ruscote Avenue Banbury\DATA\TitleSheets\Phase 3 Planning\16061-(01)-S3-S-000_PL.dwg

G:\Project Data\16061 Ruscote Avenue Banbury\DATA\TitleSheets\Phase 3 Planning\16061-(01)-S3-S-001_PL.dwg

General Notes

Notes

Overall Site Area 0.85 Acres

KEY:

Site Boundary

0 2500 5000 7500 10000 12500 15000 17500 20000 22500 25000

SCALE IN MM

REV	NOTES	DATE	BY	AUTH
PL2	Issued for Planning	27.07.21	SL	GW
PL1	Issued for Planning	14.07.21	SL	GW

DARLING ASSOCIATES
ARCHITECTS

1 Greencoat Row
London SW1P 1PQ
UK

mail@darlingassociates.net
www.darlingassociates.net
+44 20 7630 0500

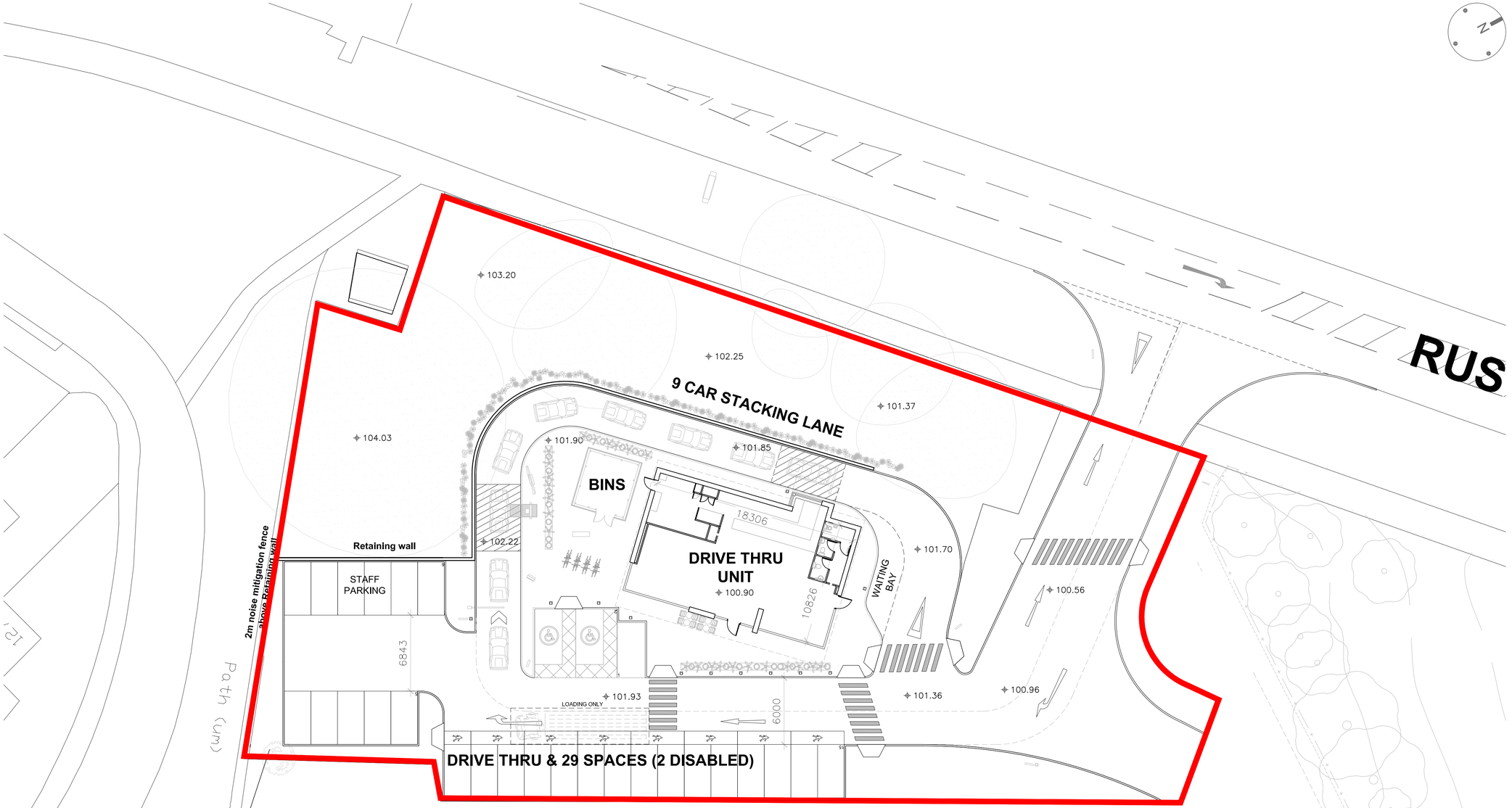
DRAWING STATUS
Planning

TITLE
Existing Block Plan of Site

PROJECT
Ruscote Avenue, Banbury - Site 3

SCALE AT A1:	SCALE AT A3:
1:250	1:500

JOB NO.	DRAWING	REV
16061	(01)-S3-S-001	PL2



General Notes

Drawings, specifications and schedules are to be read in conjunction with the following where applicable; Employer's Requirements documents, Agreements to Lease, Structural Engineer's drawings and specifications, Civil Engineer's drawings and specifications, Survey Drawings, Party Wall/ Boundary Awards, Other specialist design consultant's requirements as appointed by the Main Contractor. Other specialist design sub-contractor's requirements as appointed by the Main Contractor.

Key Plan

Notes

0 2000 4000 6000 8000 10000 12000 14000 16000 18000 20000

SCALE BAR IN mm

REV	NOTES	DATE	BY	AUTH
PL5	Issued for Planning	11.11.21	SL	GW
PL4	Issued for Planning	03.11.21	SL	GW
PL3	Issued for Planning	11.08.21	SL	GW
PL2	Issued for Planning	27.07.21	SL	GW
PL1	Issued for Planning	14.07.21	SL	GW

DARLING ASSOCIATES ARCHITECTS

1 Greencoat Row
London SW1P 1DH
UK

mail@darlingassociates.net
www.darlingassociates.net
+44 20 7630 0500

DRAWING STATUS
Planning

TITLE
Proposed Site Plan

PROJECT
Ruscote Avenue, Banbury - Phase 3

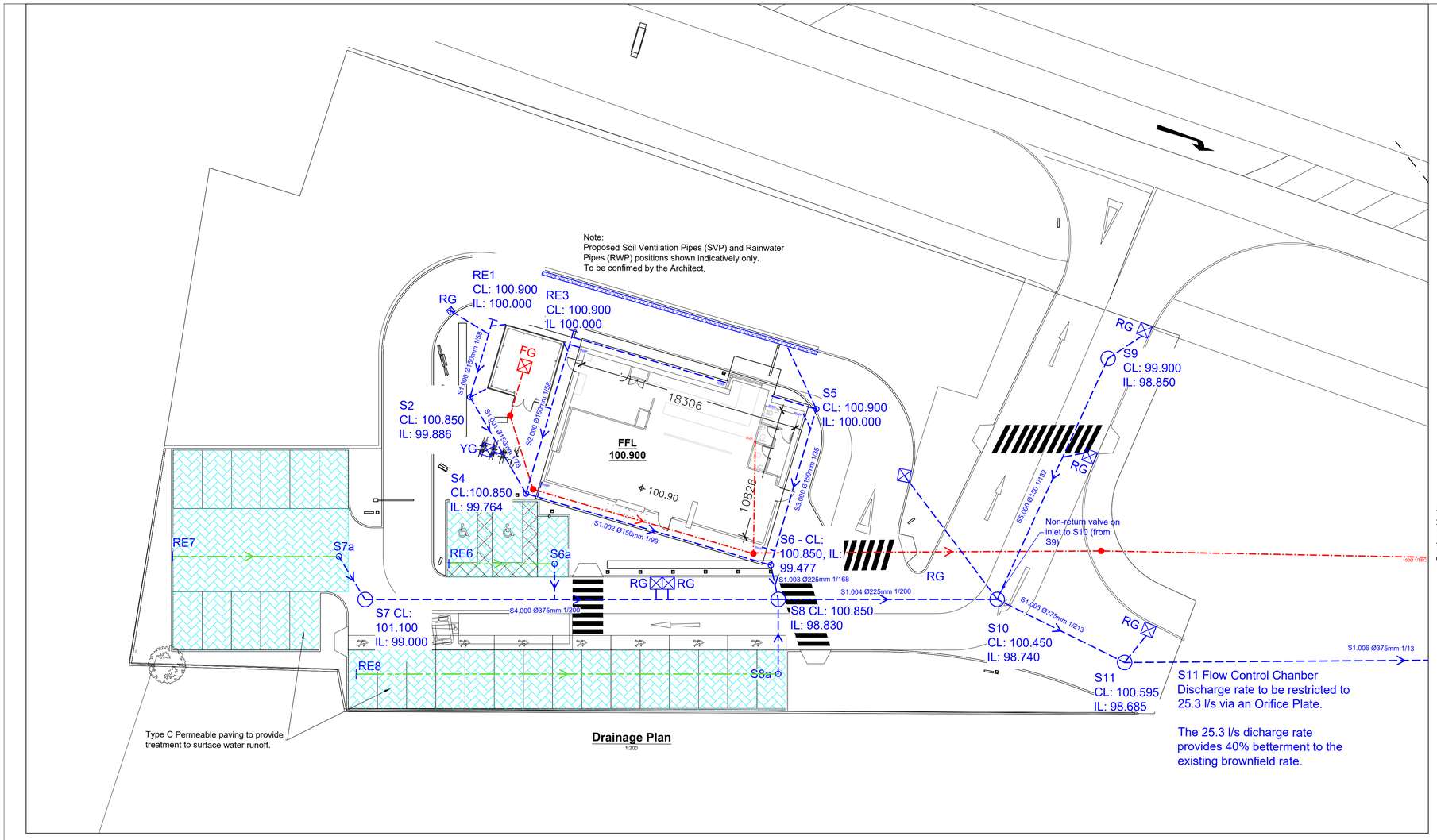
SCALE AT A1: 1:200
SCALE AT A3: N.T.S.

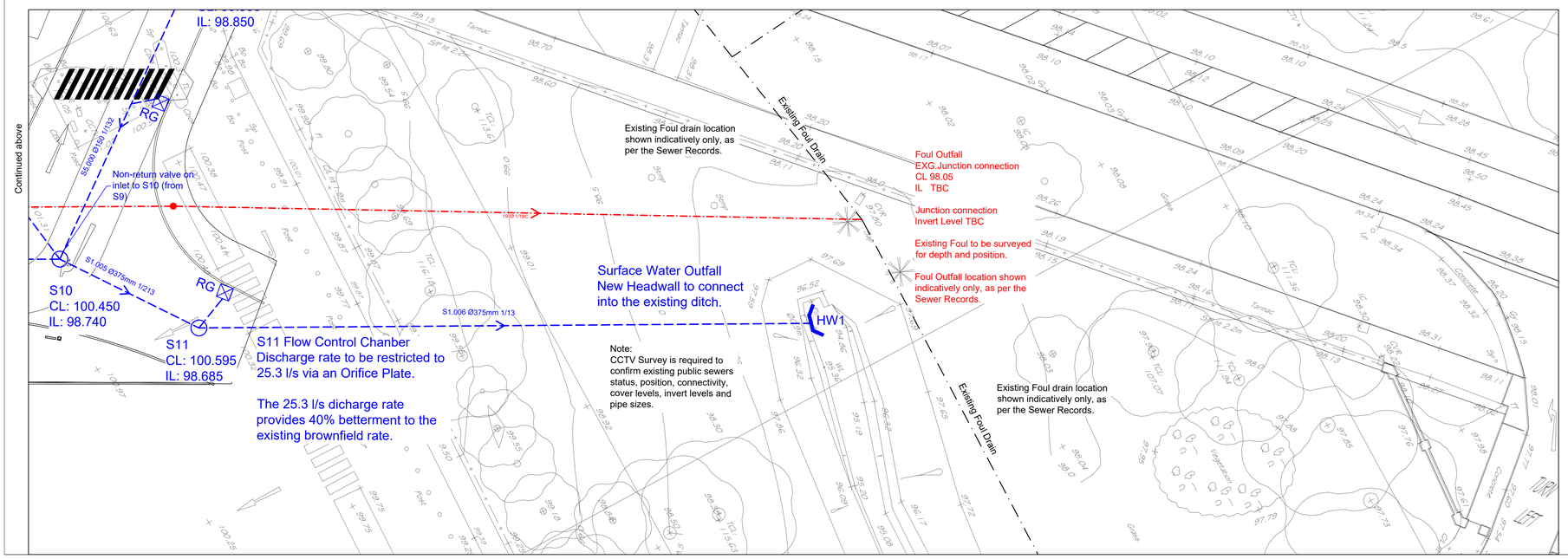
JOB NO. 16061
DRAWING (03)-S3-S-002
REV PL5

G:\Project Data\16061 Ruscote Avenue Banbury\DATA\TitleSheets\Phase 3 Planning\16061-(03)-S3-S-002_PL.dwg

APPENDIX II

PROPOSED PRELIMINARY SURFACE AND FOUL DRAINAGE LAYOUT





Drainage Legend:

- Existing Surface Water
- Existing Foul
- New Surface Water
- New Foul
- Rodding Eye
- Road Gully
- Yard Gully
- Foul Gully
- ACO / Channel Drain
- 150Ø Perforated Pipe
- Type C Permeable Paving

Continued below

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:

DEMOLITION RISKS:

MAINTENANCE / CLEANING RISKS:

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. For more information see PRP drawings:
   63364 - 100series - Drainage and External Works
   63364- 200series - Foundations
   63364 - 300series - Superstructure
6. The Health and Safety at Work act is to be complied with at all times. Attention is drawn to the wearing of hard hats, safety boots, reflective 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. Storm & foul branch connections are to be laid at gradients of between 1:10 & 1:80
7. All in-situ concrete shall be minimum grade GEN3.
8. Precast concrete cover & reducing slabs to be heavy duty reinforced concrete to BS 5911.
9. 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.
10. Where there is no intermediate manhole between the start of a surface water pipe run and the soakaway the gradient of the run shall be not less than 1 : 60.
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, soakaways and flow control units are to be installed strictly in accordance with manufacturer guidance and instructions

Rev	Date	Description	By / Chk
P3	12/11/2021	Site layout updated, pipe sizes and gradients shown, cover and invert levels shown	ST / HP
P2	04/10/2021	Gully positions updated accordingly to suit as per the revised External Levels.	SK / HP
P1	13/08/2021	Issued for comments	SK / HP

PRP
consulting engineers & surveyors

Catherine House
Old Harborough Road
Brixworth, NN6 9BX

Telephone: 01604 889 870
northampton@prp.uk.com
www.prp.uk.com

Leicester
Northampton
London

engineering excellence | creating advantage

Client: Paloma I Propco Ltd

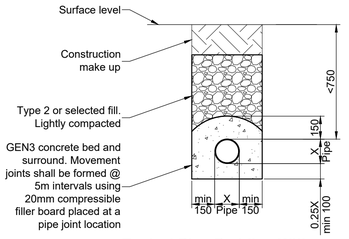
Architect: Darling Associates

Project: Ruscote Avenue, Banbury

Title: Drainage Layout

Status: **PRELIMINARY**

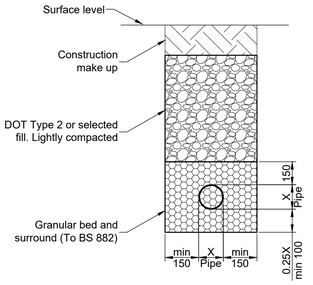
Engineer:	SK	Date:	Aug 2021
Drawn:	JD	Scales @ A1:	1:200
Checked:	HP		
Project No:	63364	Drg No: 101	Rev: P3



Typical Pipe Bedding With Concrete Bed and Surround

1:20

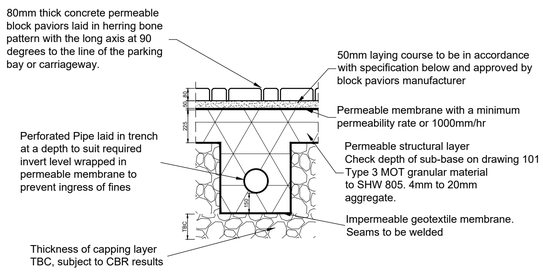
GEN3 concrete bed and surround to be used under paved areas where the depth between the finished construction level and the Barrel of the drain is less than 750mm.



Typical Pipe Bedding With Granular Bed and Surround

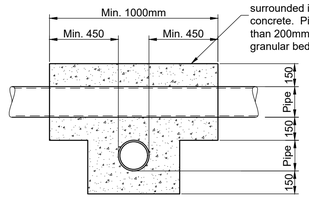
1:20

Granular bed and surround to be used where concrete bed and surround are not required.



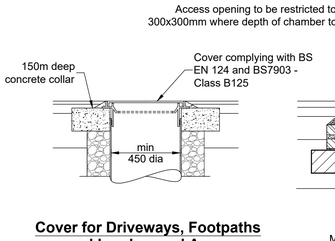
Typical Porous Pipe in Permeable Block Paved Areas Providing Attenuation

1:20



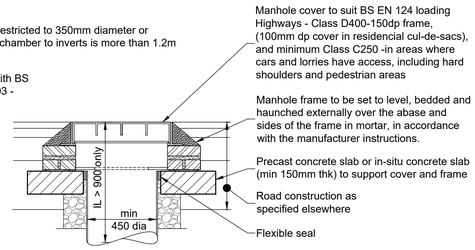
Typical Pipe Crossing Detail

1:20

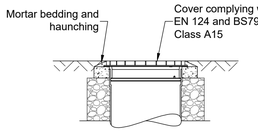


Cover for Driveways, Footpaths and Landscaped Areas

1:20



Min 900mm IL, for shallower chambers use Type 3 (precast concrete rings) or Type 4 (brick manhole)

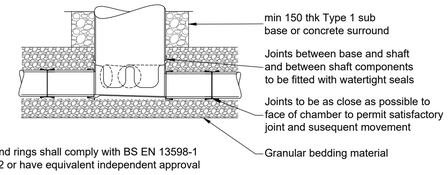


Cover for Domestic Gardens

1:20

Cover for Roads and Carparks

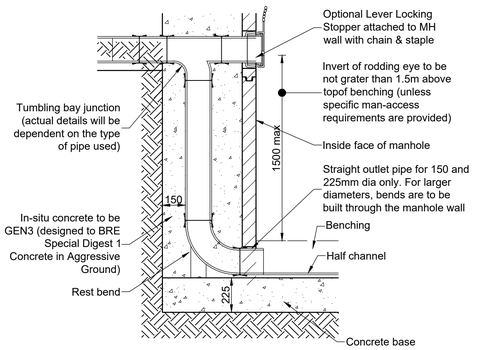
1:20



Plastic chambers and rings shall comply with BS EN 13598-1 and BS EN 13598-2 or have equivalent independent approval

Polypropylene Inspection Chamber (PPIC) Detail

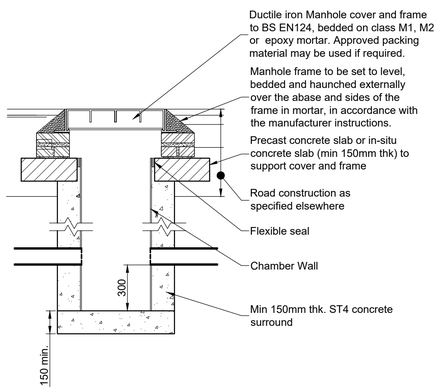
1:20



Note: steeper gradients are preferred to the use of backdrops.
Type of backdrop (vertical or 45deg ramped) to be used to be agreed with Undertaker.

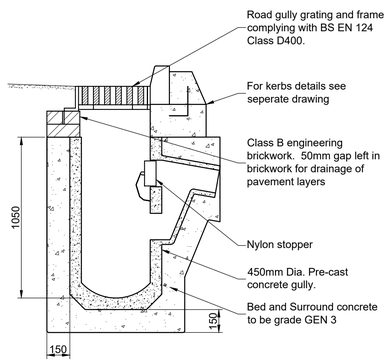
Typical Vertical Backdrop Detail

1:20



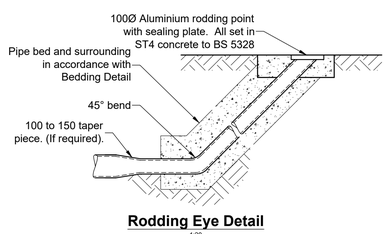
Typical Catchpit Detail

1:20



Typical Concrete Gully Detail

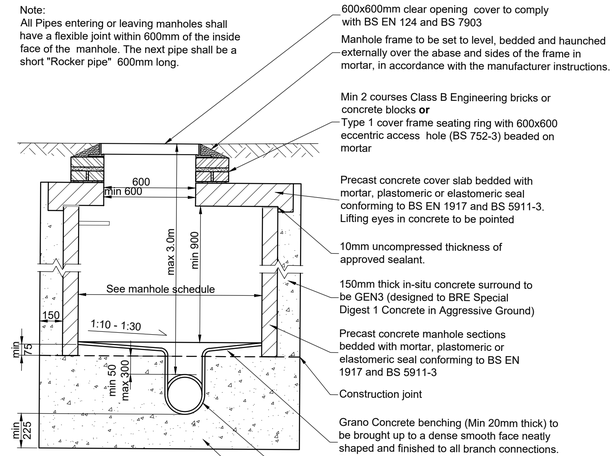
1:20



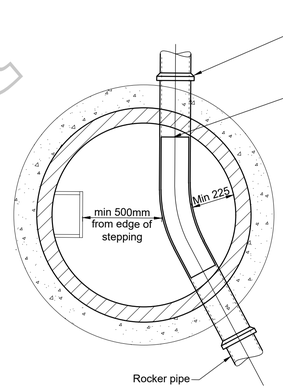
Rodding Eye Detail

1:20

Note:
All Pipes entering or leaving manholes shall have a flexible joint within 600mm of the inside face of the manhole. The next pipe shall be a short "Rocker pipe" 600mm long.



Typical Manhole Detail

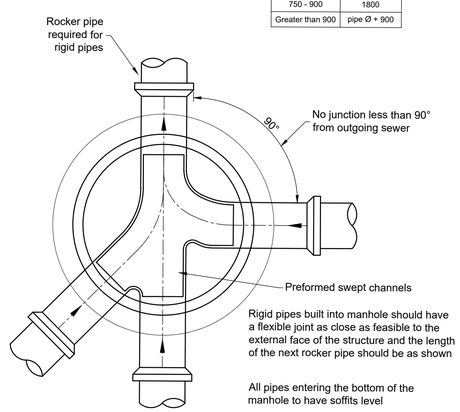


Rocker Pipes

Sewer Diameter [mm]	Effective Length [mm]
150 to 600	600
over 600 to 750	1000
over 750	1250

Min Manhole Diameters

Largest Pipe Ø in manhole [mm]	Internal Ø of manhole [mm]
Less than 375	1200
375 - 450	1350
500 - 700	1500
750 - 900	1800
Greater than 900	pipe Ø + 900



Arrangement of Pipe Junctions Within Manholes

1:20

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:

DEMOLITION RISKS:

MAINTENANCE / CLEANING RISKS:

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. For more information see PRP drawings:
   63364 - 100series - Drainage and External Works
   63364- 200series - Foundations
   63364 - 300series - Superstructure
6. The Health and Safety at Work act is to be complied with at all times. Attention is drawn to the wearing of hard hats, safety boots, reflective 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. Rising mains shall be black MDPE SDR11 as WI 4-32-03 & joints & fittings to be in accordance with WI 4-32-04. Other approved pipe materials to be in accordance with their relevant BS.
11. 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.
12. Where there is no intermediate manhole between the start of a surface water pipe run and the soakaway the gradient of the run shall be not less than 1 : 60.
13. 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.
14. Inspection chambers, soakaways and flow control units are to be installed strictly in accordance with manufacturer guidance and instructions

Rev	Date	Description	By / Chk
P1	13/08/2021	Issued for comments	JD / HP

PRP
consulting engineers & surveyors

Catherine House
Old Harborough Road
Brixworth, NN6 9BX

Telephone: 01604 889 870
northampton@prp.uk.com
www.prp.uk.com

Leicester
Northampton
London

engineering excellence] creating advantage

Client:
Paloma I Propco Ltd

Architect:
Darling Associates

Project:
Ruscote Avenue,
Banbury

Title:
Drainage Construction Details

Status:
PRELIMINARY

Engineer:	SK	Date:	Aug 2021
Drawn:	JD	Scales @ A1:	1:20
Checked:	HP		
Project No:	63364	Drg No: 102	Rev: P1

APPENDIX III

MICRODRAINAGE CALCULATIONS

Catherine House
Old Harborough Road
Brixworth NN6 9BX

Date 12/11/2021 10:48 | Designed by Scott
File 63364 - SW Network Rev ... | Checked by
Micro Drainage | Network 2020.1

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	6.647	0.114	58.3	0.006	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	9.173	0.122	75.2	0.015	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	13.937	0.240	58.1	0.015	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	20.951	0.212	98.8	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit	
S3.000	14.073	0.402	35.0	0.020	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.003	2.890	0.017	170.0	0.003	0.00	0.0	0.600	o	225	Pipe/Conduit	
S4.000	33.956	0.679	50.0	0.045	5.00	0.0	0.600	o	375	Pipe/Conduit	
S1.004	17.998	0.090	200.0	0.034	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.005	11.690	0.039	299.7	0.028	0.00	0.0	0.600	o	375	Pipe/Conduit	
S5.000	21.331	0.162	132.0	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit	
S5.001	3.715	0.028	132.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.006	46.023	3.540	13.0	0.029	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.08	100.000	0.006	0.0	0.0	0.0	1.32	23.3	0.8
S1.001	50.00	5.22	99.886	0.021	0.0	0.0	0.0	1.16	20.5	2.8
S2.000	50.00	5.18	100.000	0.015	0.0	0.0	0.0	1.32	23.4	2.0
S1.002	50.00	5.56	99.764	0.046	0.0	0.0	0.0	1.01	17.9	6.2
S3.000	50.00	5.14	100.000	0.020	0.0	0.0	0.0	1.71	30.2	2.7
S1.003	50.00	5.61	99.477	0.069	0.0	0.0	0.0	1.00	39.8	9.3
S4.000	50.00	5.22	99.000	0.045	0.0	0.0	0.0	2.57	283.6	6.1
S1.004	50.00	5.84	98.830	0.148	0.0	0.0	0.0	1.28	141.1	20.0
S1.005	50.00	6.03	98.740	0.176	0.0	0.0	0.0	1.04	115.0	23.8
S5.000	50.00	5.41	98.850	0.018	0.0	0.0	0.0	0.87	15.4	2.4
S5.001	50.00	5.48	98.688	0.018	0.0	0.0	0.0	0.87	15.4	2.4
S1.006	50.00	6.18	98.685	0.223	0.0	0.0	0.0	5.05	557.6	30.2

Catherine House
Old Harborough Road
Brixworth NN6 9BX

Date 12/11/2021 10:48 | Designed by Scott
File 63364 - SW Network Rev ... | Checked by
Micro Drainage | Network 2020.1

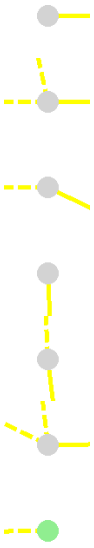
Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	100.900	0.900	Open Manhole	1200	S1.000	100.000	150				
S2	100.850	0.964	Open Manhole	1200	S1.001	99.886	150	S1.000	99.886	150	
S3	100.900	0.900	Open Manhole	1200	S2.000	100.000	150				
S3	100.850	1.090	Open Manhole	1200	S1.002	99.764	150	S1.001	99.764	150	
								S2.000	99.760	150	
S5	100.900	0.900	Open Manhole	1200	S3.000	100.000	150				
S4	100.850	1.373	Open Manhole	1200	S1.003	99.477	225	S1.002	99.552	150	
								S3.000	99.598	150	46
S7	101.100	2.100	Open Manhole	1350	S4.000	99.000	375				
S5	100.850	2.529	Open Manhole	1350	S1.004	98.830	375	S1.003	99.460	225	480
								S4.000	98.321	375	
S6	100.450	1.710	Open Manhole	1350	S1.005	98.740	375	S1.004	98.740	375	
S10	99.900	1.050	Open Manhole	1200	S5.000	98.850	150				
S11	100.248	1.560	Open Manhole	1200	S5.001	98.688	150	S5.000	98.688	150	
S7	100.595	1.935	Open Manhole	1350	S1.006	98.685	375	S1.005	98.701	375	16
								S5.001	98.660	150	
S	97.500	2.355	Open Manhole	0		OUTFALL		S1.006	95.145	375	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	-7.183	2.277	-7.183	2.277	Required	
S2	-9.026	-4.110	-9.026	-4.110	Required	
S3	-0.541	1.363	-0.541	1.363	Required	
S3	-4.397	-12.029	-4.397	-12.029	Required	
S5	19.626	-4.314	19.626	-4.314	Required	
S4	15.732	-17.838	15.732	-17.838	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S7	-17.600	-20.785	-17.600	-20.785	Required	
S5	16.356	-20.659	16.356	-20.659	Required	
S6	34.354	-20.593	34.354	-20.593	Required	
S10	43.404	-0.742	43.404	-0.742	Required	
S11	44.416	-22.048	44.416	-22.048	Required	
S7	44.851	-25.737	44.851	-25.737	Required	
S	90.871	-25.231			No Entry	



Catherine House
Old Harborough Road
Brixworth NN6 9BX

Date 12/11/2021 10:48 | Designed by Scott
File 63364 - SW Network Rev ... | Checked by
Micro Drainage | Network 2020.1

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	150	S1	100.900	100.000	0.750	Open Manhole	1200
S1.001	o	150	S2	100.850	99.886	0.814	Open Manhole	1200
S2.000	o	150	S3	100.900	100.000	0.750	Open Manhole	1200
S1.002	o	150	S3	100.850	99.764	0.936	Open Manhole	1200
S3.000	o	150	S5	100.900	100.000	0.750	Open Manhole	1200
S1.003	o	225	S4	100.850	99.477	1.148	Open Manhole	1200
S4.000	o	375	S7	101.100	99.000	1.725	Open Manhole	1350
S1.004	o	375	S5	100.850	98.830	1.645	Open Manhole	1350
S1.005	o	375	S6	100.450	98.740	1.335	Open Manhole	1350
S5.000	o	150	S10	99.900	98.850	0.900	Open Manhole	1200
S5.001	o	150	S11	100.248	98.688	1.410	Open Manhole	1200
S1.006	o	375	S7	100.595	98.685	1.535	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	6.647	58.3	S2	100.850	99.886	0.814	Open Manhole	1200
S1.001	9.173	75.2	S3	100.850	99.764	0.936	Open Manhole	1200
S2.000	13.937	58.1	S3	100.850	99.760	0.940	Open Manhole	1200
S1.002	20.951	98.8	S4	100.850	99.552	1.148	Open Manhole	1200
S3.000	14.073	35.0	S4	100.850	99.598	1.102	Open Manhole	1200
S1.003	2.890	170.0	S5	100.850	99.460	1.165	Open Manhole	1350
S4.000	33.956	50.0	S5	100.850	98.321	2.154	Open Manhole	1350
S1.004	17.998	200.0	S6	100.450	98.740	1.335	Open Manhole	1350
S1.005	11.690	299.7	S7	100.595	98.701	1.519	Open Manhole	1350
S5.000	21.331	132.0	S11	100.248	98.688	1.410	Open Manhole	1200
S5.001	3.715	132.0	S7	100.595	98.660	1.785	Open Manhole	1350
S1.006	46.023	13.0	S	97.500	95.145	1.980	Open Manhole	0

Catherine House
Old Harborough Road
Brixworth NN6 9BX

Date 12/11/2021 10:48 | Designed by Scott
File 63364 - SW Network Rev ... | Checked by
Micro Drainage | Network 2020.1

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.006	0.006	0.006
1.001	-	-	100	0.015	0.015	0.015
2.000	-	-	100	0.015	0.015	0.015
1.002	-	-	100	0.010	0.010	0.010
3.000	-	-	100	0.020	0.020	0.020
1.003	-	-	100	0.003	0.003	0.003
4.000	-	-	100	0.045	0.045	0.045
1.004	-	-	100	0.034	0.034	0.034
1.005	-	-	100	0.028	0.028	0.028
5.000	-	-	100	0.018	0.018	0.018
5.001	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.029	0.029	0.029
				Total	Total	Total
				0.223	0.223	0.223

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)
S1.006	S	97.500	95.145	0.000	0	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	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Storm Duration (mins)	30
Ratio R	0.409		

Online Controls for Storm

Non Return Valve Manhole: S11, DS/PN: S5.001, Volume (m³): 2.1

Orifice Manhole: S7, DS/PN: S1.006, Volume (m³): 3.9

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 98.685

Storage Structures for Storm

Porous Car Park Manhole: S7, DS/PN: S4.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	19.0
Membrane Percolation (mm/hr)	1000	Length (m)	16.0
Max Percolation (l/s)	84.4	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	100.060	Membrane Depth (mm)	0

Porous Car Park Manhole: S5, DS/PN: S1.004

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	36.0
Max Percolation (l/s)	48.0	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	100.060	Membrane Depth (mm)	0

Manhole Headloss for Storm

PN	US/MH Name	US/MH Headloss
S1.000	S1	0.500
S1.001	S2	0.500
S2.000	S3	0.500
S1.002	S3	0.500
S3.000	S5	0.500
S1.003	S4	0.500
S4.000	S7	0.500
S1.004	S5	0.500
S1.005	S6	0.500
S5.000	S10	0.500
S5.001	S11	0.500
S1.006	S7	0.500

Catherine House
Old Harborough Road
Brixworth NN6 9BX

Date 12/11/2021 10:48 | Designed by Scott
File 63364 - SW Network Rev ... | Checked by
Micro Drainage | Network 2020.1

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.408
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.700	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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	1	+0%	100/15 Summer			
S1.001	S2	15 Winter	1	+0%	30/15 Winter			
S2.000	S3	15 Winter	1	+0%	100/15 Summer			
S1.002	S3	15 Winter	1	+0%	30/15 Winter			
S3.000	S5	15 Winter	1	+0%	100/15 Summer			
S1.003	S4	15 Winter	1	+0%	30/15 Summer			
S4.000	S7	15 Winter	1	+0%	30/15 Summer			
S1.004	S5	30 Winter	1	+0%	30/15 Summer			
S1.005	S6	30 Winter	1	+0%	30/15 Summer	100/60 Summer		
S5.000	S10	30 Winter	1	+0%	30/15 Summer	100/15 Summer		
S5.001	S11	30 Winter	1	+0%	1/15 Summer			
S1.006	S7	30 Winter	1	+0%	30/15 Summer	100/120 Summer		

Catherine House
Old Harborough Road
Brixworth NN6 9BX

Date 12/11/2021 10:48 | Designed by Scott
File 63364 - SW Network Rev ... | Checked by
Micro Drainage | Network 2020.1

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	100.020	-0.130	0.000	0.04			0.8	OK
S1.001	S2	99.924	-0.112	0.000	0.14			2.6	OK
S2.000	S3	100.031	-0.119	0.000	0.10			2.1	OK
S1.002	S3	99.825	-0.089	0.000	0.35			5.8	OK
S3.000	S5	100.032	-0.118	0.000	0.10			2.7	OK
S1.003	S4	99.566	-0.136	0.000	0.33			8.9	OK
S4.000	S7	99.039	-0.336	0.000	0.02		4	5.6	OK
S1.004	S5	99.002	-0.203	0.000	0.12			13.5	OK
S1.005	S6	98.998	-0.117	0.000	0.12			10.1	OK
S5.000	S10	98.995	-0.005	0.000	0.13			1.9	OK
S5.001	S11	98.991	0.153	0.000	0.13			1.4	SURCHARGED
S1.006	S7	98.994	-0.066	0.000	0.02			10.6	OK

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	
S2.000	S3	
S1.002	S3	
S3.000	S5	
S1.003	S4	
S4.000	S7	
S1.004	S5	
S1.005	S6	5
S5.000	S10	11
S5.001	S11	
S1.006	S7	2

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	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.408
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.700	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.
S1.000	S1	30 Winter	30	+0%	100/15 Summer			
S1.001	S2	30 Winter	30	+0%	30/15 Winter			
S2.000	S3	30 Winter	30	+0%	100/15 Summer			
S1.002	S3	30 Winter	30	+0%	30/15 Winter			
S3.000	S5	30 Winter	30	+0%	100/15 Summer			
S1.003	S4	30 Winter	30	+0%	30/15 Summer			
S4.000	S7	30 Winter	30	+0%	30/15 Summer			
S1.004	S5	30 Winter	30	+0%	30/15 Summer			
S1.005	S6	30 Winter	30	+0%	30/15 Summer	100/60 Summer		
S5.000	S10	60 Winter	30	+0%	30/15 Summer	100/15 Summer		
S5.001	S11	60 Winter	30	+0%	1/15 Summer			
S1.006	S7	30 Winter	30	+0%	30/15 Summer	100/120 Summer		

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	100.109	-0.041	0.000	0.08			1.6	OK

Catherine House
Old Harborough Road
Brixworth NN6 9BX

Date 12/11/2021 10:48 | Designed by Scott
File 63364 - SW Network Rev ... | Checked by
Micro Drainage | Network 2020.1

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.001	S2	100.107	0.071	0.000	0.31			5.6	SURCHARGED
S2.000	S3	100.107	-0.043	0.000	0.18			3.9	OK
S1.002	S3	100.098	0.184	0.000	0.72			12.1	SURCHARGED
S3.000	S5	100.081	-0.069	0.000	0.19			5.3	OK
S1.003	S4	100.067	0.365	0.000	0.65			17.5	SURCHARGED
S4.000	S7	100.066	0.691	0.000	0.04		10	9.3	SURCHARGED
S1.004	S5	100.062	0.857	0.000	0.18		25	20.8	SURCHARGED
S1.005	S6	100.059	0.944	0.000	0.25			22.1	SURCHARGED
S5.000	S10	99.894	0.894	0.000	0.14			2.1	FLOOD RISK
S5.001	S11	99.890	1.051	0.000	0.30			3.2	SURCHARGED
S1.006	S7	100.052	0.992	0.000	0.05			23.9	SURCHARGED

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	
S2.000	S3	
S1.002	S3	
S3.000	S5	
S1.003	S4	
S4.000	S7	
S1.004	S5	
S1.005	S6	5
S5.000	S10	11
S5.001	S11	
S1.006	S7	2

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	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.408
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.700	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.
S1.000	S1	15 Winter	100	+40%	100/15 Summer			
S1.001	S2	15 Winter	100	+40%	30/15 Winter			
S2.000	S3	15 Winter	100	+40%	100/15 Summer			
S1.002	S3	15 Winter	100	+40%	30/15 Winter			
S3.000	S5	30 Winter	100	+40%	100/15 Summer			
S1.003	S4	30 Winter	100	+40%	30/15 Summer			
S4.000	S7	60 Winter	100	+40%	30/15 Summer			
S1.004	S5	30 Winter	100	+40%	30/15 Summer			
S1.005	S6	120 Summer	100	+40%	30/15 Summer	100/60 Summer		
S5.000	S10	30 Winter	100	+40%	30/15 Summer	100/15 Summer		
S5.001	S11	180 Winter	100	+40%	1/15 Summer			
S1.006	S7	120 Winter	100	+40%	30/15 Summer	100/120 Summer		

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	100.465	0.315	0.000	0.14			2.7	SURCHARGED

Catherine House
Old Harborough Road
Brixworth NN6 9BX

Date 12/11/2021 10:48 | Designed by Scott
File 63364 - SW Network Rev ... | Checked by
Micro Drainage | Network 2020.1

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.001	S2	100.459	0.423	0.000	0.53			9.7	SURCHARGED
S2.000	S3	100.459	0.309	0.000	0.32			6.8	SURCHARGED
S1.002	S3	100.434	0.520	0.000	1.04			17.4	SURCHARGED
S3.000	S5	100.254	0.104	0.000	0.31			8.7	SURCHARGED
S1.003	S4	100.241	0.539	0.000	0.93			25.3	SURCHARGED
S4.000	S7	100.229	0.854	0.000	0.06		24	15.9	SURCHARGED
S1.004	S5	100.233	1.028	0.000	0.27		21	31.3	SURCHARGED
S1.005	S6	100.451	1.336	2.448	0.35			31.0	FLOOD
S5.000	S10	99.903	0.903	3.127	0.91			13.3	FLOOD
S5.001	S11	99.995	1.156	0.000	0.80			8.7	FLOOD RISK
S1.006	S7	100.596	1.536	1.713	0.05			24.3	FLOOD

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	
S2.000	S3	
S1.002	S3	
S3.000	S5	
S1.003	S4	
S4.000	S7	
S1.004	S5	
S1.005	S6	5
S5.000	S10	11
S5.001	S11	
S1.006	S7	2

PRP:
consulting civil & structural engineers

Leicester 0116 275 1710
Northampton 01604 889870
Bythorn 01832 710959

Project:	Sheet No. 0 0 0 1
Starbucks, Ruscote Avenue, Banbury	Project 63364
	Date Aug 2021
Section:	Designed MAS
Brownfield Runoff Rate	Checked

Reference	Calculation

Equation for Brownfield Runoff

Q=2.78 x C x I x A

Q = flow rate in l/s
C = 1
I = is rainfall intensity – 50mm/hr
A = area in hectares. A = 0.303

Q=2.78x1x50x0.303 = 42.11 l/s

Equation of New Development

Reduce Total of Brownfield Runoff Rate by 40% (as per Oxfordshire Flood Toolkit - LOCAL-STANDARDS-AND-GUIDANCE-FOR-SURFACE-WATER-DRAINAGE-ON-MAJOR-DEVELOPMENT-IN-OXFORDSHIRE.pdf)

40% of 42.11 = 16.84

42.11 - 16.84 = 25.27 ≈ 25.3l/s

APPENDIX IV

DRAINAGE MAINTENANCE SCHEDULE

MAINTENANCE AND ACTION SCHEDULE
FOR
SURFACE WATER DRAINAGE

Project No:	**63364**	Prepared by:	PRP Catherine House Old Harborough Road Brixworth Northampton NN6 9BX
For:	Trinity Property Consultants		
Date:	August 2021		

1. Catchpits, manholes and inspection chambers should be regularly inspected and debris/silt removed, if this is not removed then it is likely to become hard packed requiring considerable effort to remove it. Replacement of the cellular storage units will be necessary if the system becomes blocked with silt. Effective monitoring will give information on changes in infiltration and provide a warning of potential failure in the long term.

2. The following are guidelines for when inspections and treatment should be carried out based on typical commercial units with average usage. The rate of silt and debris accumulation should be monitored and the frequency of inspection may need to be adjusted based on this.

    2.1. Monthly:

    - Lift hydrobrake manhole cover and inspect to make sure that the outfall and inlet are clear. (Monthly during Autumn and Winter.)
    - Inspect silt traps and note rate of sediment accumulation (Monthly during first year, then annually.)

    2.2. Annually:

    - Inspect all gutters and gullies for sediment and debris and remove as necessary to prevent it from entering into the attenuation tank.
    - Any roots that have entered the system should be removed.
    - Inspect manholes and silt traps and remove any silt or debris from base and ensure that they are clean.
    - Inspect filter drains including inlet and outlet pipework for blockages.
    - Check attenuation tanks to ensure emptying is occurring.
    - Remove and clean silt traps and clean out catchpits to ensure they operate correctly.

    2.3. As required:

    - Clean perforated pipework of blockages (usually annually or bi-annually).

APPENDIX V

THAMES WATER SEWER RECORDS PLAN

CommercialDW Drainage and Water Enquiry Sewer Map- CDWS/CDWS Standard/2017_3586211

The width of the displayed area is 500m

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no survey information is available.

Manhole Reference	Manhole Cover Level	Manhole Invert Level
9451	103.66	102.03
9401	104.23	102.4
8451	103.67	101.14
2501	96.93	91.58
1501	96.79	92.39
9554	100.44	95.39
9503	100.35	95.54
8551	100.66	95.46
9551	99.82	95.42
0501	97.04	93.23
8504	100.41	95.74
9502	98.53	94.97
8502	101.31	95.74
9504	99.79	95.19
9501	97.89	95.44
8503	100.62	95.92
9553	98.11	96.55
9651	98.39	96.51
0602	99.03	97.18
0652	99.04	97.49
0651	100.65	98.86
0601	100.78	98.61
2401	95.85	90.83
8354	106.56	105.52
8352	n/a	n/a
8353	111.01	110.12
831A	n/a	n/a
8258	107.98	103.7
8356	105.68	103.89
8260	n/a	n/a
8351	105.72	104.74
9254	106.66	103.73
931D	n/a	n/a
9206	106.68	104.06
9253	106.58	104.97
921B	n/a	n/a
921A	n/a	n/a
931C	n/a	n/a
931B	n/a	n/a
921C	n/a	n/a
931A	n/a	n/a
9452	103.14	102.4
9402	103.01	101.58
9453	102.78	101
9301	102.36	101.08
9403	102.51	101.7
9302	102.08	100.7
9307	102.57	101.75
9353	102.09	100.3
9404	102.51	101.97
9203	102.5	101.64
9306	101.91	101.11
9351	102.25	100.64
9303	101.94	100.17
9202	102.72	101.38
9304	101.52	100.71
9309	101.41	100.76
9305	101.56	100.86
9352	101.82	99.8
9308	101.42	100.41
9310	n/a	n/a
9204	101.69	99.89
9252	101.72	99.53
9311	n/a	n/a
9251	101.43	99.19
9205	101.46	99.43
9312	n/a	n/a
9313	n/a	n/a
8253	109.15	107.57
8201	108.59	105.16
821B	n/a	n/a
921E	n/a	n/a
9201	102.71	102.18
921D	n/a	n/a
821A	n/a	n/a
8202	109.21	103.39
8252	106.34	104.8
8259	108.25	103.66
0252	98.37	97.5
0202	98.31	97.2
1352	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
1301	96.68	94.87
1302	95.52	93.66
1351	95.55	94.31
2351	94.48	93.56
2301	94.23	93.08
2302	93.93	92.5
2352	94.45	91.1
2303	94.07	90.7
3301	94.47	90.56
3353	94.17	92.71
3351	95.15	91.77
3302	95.03	90.43
3253	n/a	n/a
3251	93.89	90.1
3352	93.99	93.16
3201	93.41	91.14
3202	93.27	91.15
0251	101.17	99.62
0354	99.09	98.61
0201	101.09	98.74
0297	n/a	n/a
0356	99.17	98.49
0353	99.12	97.97
0301	99.31	97.85
0352	99.21	97.71
0296	n/a	n/a
0351	98.93	97.29
0203	98.53	97.17
0294	n/a	n/a
0295	n/a	n/a
0358	n/a	n/a
0355	97.77	96.75
0303	97.58	96.18
0302	97.77	96.53
0304	97.52	96.01
0357	97.5	96.27
0305	97.51	95.85

Sewer Key - Commercial Drainage and Water Enquiry

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flowpassing downstream.

Control Valve

Drop Pipe

Ancillary

Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

Outfall

Undefined End

Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plans are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole level indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Searches on 0118 925 1504.

APPENDIX VI

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. 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 alteration 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.

3. Factual reports received from third parties are included or summarised in this report. They have been used in best faith and in the context of the site and the proposals. We cannot be held responsible for any shortcomings in these third party reports in any way whatsoever.

4. There may also be special conditions appertaining to the site which were not revealed by the investigation and which will not, therefore, have been taken into account in this report. Any assessments may be subject to amendment in the light of additional information becoming available.

5. Whilst an opinion may be expressed or implied in this report on possible configurations or on the possible presence of features based either visual, verbal or published evidence, this is for guidance only and no liability can be accepted for the accuracy of such opinions.

6. Comments on groundwater conditions will have been based on observations made only at the time of any investigation or published data unless otherwise stated. It should be noted, however, that groundwater levels vary due to seasonal and other effects.

7. This report is not a site categorisation, and hazards could occur which have not been detected.

8. 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.