TECHNICAL NOTE

Job Name: Ladds Garden Centre

Job No: 332699148

Note No: 332699148/TN01

Date: December 2025

Prepared By: J Blaikie

Subject: **Response to Wokingham Borough Council LLFA Drainage Comments (App No: 25257)**

We have received the Wokingham Borough Council (WBC) consultation response, dated 16th October 2025, in relation to the Planning Application at Ladds Garden Village Bath Road Hare Hatch Wokingham RG10 9SB, application number 252257[1]. This Technical Note provides responses to the comments which are set out below (WBC comments in ***italics***), which we hope will further clarify the proposed arrangements and allow WBC to remove their holding objection to the application.

1 Infiltration / ground investigation (GI)

> ***"FRA discounts soakaways on desk study (clay over chalk) but has no site GI. A programme of trial pits, percolation tests and groundwater monitoring must be submitted prior to detailed design: deep/bore soakaways may be possible but must be proven. Condition this."***

1.1.1 Soakaways were discounted in the FRA due to the published ground conditions (clay over chalk) and the lack of available ground investigation data; as such, an inherently precautionary 'worst case' approach has been taken, and it is considered reasonable on the basis that the approach can be reviewed at detailed stage with this requirement for intrusive investigations stipulated through a planning condition at detailed design stage.

1.1.2 However, it should be noted that, in the Preliminary Risk Assessment and Site Investigation report (24-304.01 v2, dated: September 2025), nine window sample (WS) boreholes were carried out across the site. The closest to the existing drainage pond was WS3 which showed no chalk present and clay down to a depth of 4m, indicating neither standard soakaway nor a deep bore solution would be feasible in this location.

1.1.3 Of the remaining 8 WS boreholes only WS1, WS2, WS4, and WS5 show the presence of chalk at depths of 2.5m, 2.2m, 2.7m, and 3.3m respectively. None of these WS boreholes are in a location suitable for the outfall of the surface water drainage system due to on site level constraints and the proposed site layout. Additionally, due to the depth of chalk, any deep bore soakaways in these areas would likely need to be placed a further 1m below the top of the chalk, posing health and safety concerns for deep excavations and construction. Furthermore, the site is in the Environment Agency's Source Protection Zone (SPZ) 3 (total catchment) which can provide further complications when attempting to infiltrate via deep bore soakaways.

1.1.4 Therefore, it is considered reasonable to discount soakaways for discharge of the surface water and the alternative method of discharging to the existing ditch, identified in the submitted drainage strategy, is deemed acceptable in this instance.

[1] https://planning.wokingham.gov.uk/FastWebPL/detail.asp?AltRef=252257&ApplicationNumber=252257&AddressPrefix=&Postcode=&KeywordSearch=&Submit=Search

2 Attenuation basin freeboard / surcharged outfall risk

"Basin freeboard is 273 mm for the 1% +40% CC case (FRA states requirement of 300 mm unless agreed). Under a surcharged ditch scenario, the pond freeboard reduces to 136 mm. This is below WBC standard and increases risk to exceedance; provide mitigation (raise basin invert, increase storage, or provide engineered spillway and safe exceedance routing)."

2.1.1 Following receipt of WBC comments, further discussion was undertaken with the Applicant on the balance between the pond size and open space provision. It was decided to reduce the plan area of the pond by providing a tank upstream underneath the proposed road to the south of the Site, and deepening the porous paving underneath the road in the north east area of the Site, as shown on the updated surface water drainage strategy drawing (no. 330910067) in **Appendix A**.

2.1.2 Following these updates, basin freeboard is 215mm for the 1 in 100 Annual Exceedance Probability (AEP) +40% allowance for climate change event and reduces to 81mm under a surcharged ditch scenario – see **Appendix B** for InfoDrainage results.

2.1.3 To provide mitigation in accordance with WBC comments, it is proposed that a 220mm bund is placed around the pond perimeter, ensuring 300mm freeboard for the 1 in 100 AEP +40% CC surcharged ditch scenario. It is proposed that an engineered spillway is also incorporated into this bund, to provide safe exceedance routing, to be conditioned for detailed design.

3 Downstream capacity / culvert check and discharge rate

"The receiving ditch culverts ~100m downstream. The FRA's InfoDrainage surcharged scenario is a good start, but the applicant must provide downstream hydraulic check (culvert capacity, backwater sensitivity, and confirm that high ditch levels will not cause flow reversal/flooding on site or to third parties. Provide modelling results. The FRA applies the national relaxation up to brownfield cap (~7.1 L/s). Provide the calculation steps, sensitivity checks, and justification that the relaxation is the minimum necessary."

3.1.1 The existing brownfield runoff rates based on the existing impermeable area were calculated using the Modified Rational Method equation (see **Appendix C**). The proposed discharge rate provides over 50% betterment for all events up to the 1 in 100 AEP + 40% allowance for climate change rainfall event – see **Table 3-1**.

Table 3-1 Existing Runoff Rates and Betterment Provided by the Proposed Rate

Return Period	Brownfield Runoff Rate l/s	Betterment
1 in 1 year	12.5	43%
1 in 2 year	17.2	58%
1 in 30 year	37.8	81%
1 in 100 year	47.1	85%

3.1.2 During the modelled design event in which the ditch is surcharged, results show no flooding on site or to third parties and the proposed discharge rate of 7.1l/s is achieved. Given this is a significant betterment (greater than 85%) compared to the existing runoff, it is concluded that the proposed development will result in less flow entering the ditch, reducing any flood risk related to the existing culvert that is located approximately 100m downstream.

Proposed Runoff Calculations

3.1.3 Existing greenfield runoff based on the proposed impermeable area (0.519ha) was calculated using the FEH method, giving 1.5l/s (see **Appendix C**). Given the volume of long-term storage required to achieve this discharge and the spatial constraints on site, this is not a viable solution.

3.1.4 As this is a brownfield site, in line with national guidance the maximum allowable discharge is 7.5l/s. Following sensitivity testing, the minimum necessary runoff rate is 7.1l/s.

3.1.5 Sensitivity testing was conducted for the 1 in 100 AEP +40% allowance for climate change event with a surcharged outfall, as this is considered the worst-case scenario. Results show a 7.1l/s outfall restriction results in no flooding on site, and 81mm of freeboard in the pond, which as discussed in **Section 2** can be increased to the required 300mm using a 220mm bund.

3.1.6 Running the same scenario with a 6.1l/s restricted outfall results in only 3mm of freeboard in the pond. It is not deemed viable to completely fill the pond in this event, thus sensitivity testing shows 7.1/s to be the suitable solution. The sensitivity testing results are included in **Appendix B**.

4 Exceedance routing, access & safety

"Show clear exceedance routes on a plan (overland flow arrows, safe refuge/building levels). Confirm access route resilience (A4 adjacent is high RoFSW; secondary access to Scarletts Lane must remain passable)."

4.1.1 The updated surface water drainage strategy drawing – included in **Appendix A** – now shows clear exceedance routes. Flow is routed away from buildings which, as confirmed in **Section 6.4** of the FRA, have a minimum Finished Floor Level (FFL) of 55.0m AOD. This is based on a conservative estimate based on the topographic site survey and the 1 in 1000 (0.1%) AEP event ('Low' risk scenario) from the EA Risk of Flooding from Surface Water (RoFSW) mapping, which indicates a flood level range of 54.3-54.7m AOD. Thus, the FFL satisfies the requirement to be set 300mm above the design flood level.

4.1.2 The EA RoFSW mapping confirms that the secondary access to Scarletts Lane is in Flood Zone 1 and at 'Low' risk of surface water flooding. EA depth mapping indicates the small area of 'Low' flood risk has a modelled depth of less than 0.2m for the 'Low' risk scenario, thus is considered shallow ponding which would not impede safe acces or egress.

4.1.3 The exceedance route arrows on the updated surface water drainage strategy (drawing no. 330910067/001 in **Appendix A**) show any overland flow from the site would not flow towards the secondary access to Scarletts Lane.

5 Pollution control, maintenance and adoption

"Provide SuDS treatment train details (permeable sub-base design, forebays, detention basin inlet protection) and adoption."

5.1.1 Permeable pavement sub-bases have been designed with aggregate material with a porosity of 30%.

5.1.2 The attenuation basin would have appropriate protection measures on inlets and outlets and are likely to incorporate forebays. Further details can be conditioned to be confirmed as part of detailed design.

Adoption

5.1.3 The ongoing management and maintenance of the proposed surface water management systems will likely be expected to fall under the responsibility of the relevant site management company.

5.1.4 It is recommended to condition the production of a management and maintenance plan, confirming the final strategy and responsibilities at the end of the detailed design phase once details of the proposed drainage system have been finalised.

6 Conclusion

6.1.1 The proposed strategy assumes zero infiltration as a conservative approach. This can be reassessed at detailed design stage following infiltration testing and secured by a planning condition.

6.1.2 A 300mm freeboard within the attenuation basin is achieved for all modelled events (80mm in the basin and a 220mm bund above basin cover level). An engineered spillway is proposed to provide safe exceedance routing, to be conditioned for detailed design.

6.1.3 Sensitivity testing shows the relaxation of the greenfield discharge rate to 7.1l/s is the minimum necessary. Exceedance routes show any overland flow is routed away from buildings which are set 300mm above the estimated 1 in 1000 (0.1%) AEP surface water event flood level. Exceedance flows are routed away from the secondary access to Scarletts Lane, which is at 'Low' risk of surface water flooding, and located in Flood Zone 1.

6.1.4 We hope the above addresses your comments. If you would like to discuss further, please get in touch.

DOCUMENT ISSUE RECORD

Technical Note No	Rev	Date	Prepared	Reviewed (Discipline Lead)	Approved (Project Director)
332611948/TN01	-	18/12/2025	JB	EE	RF

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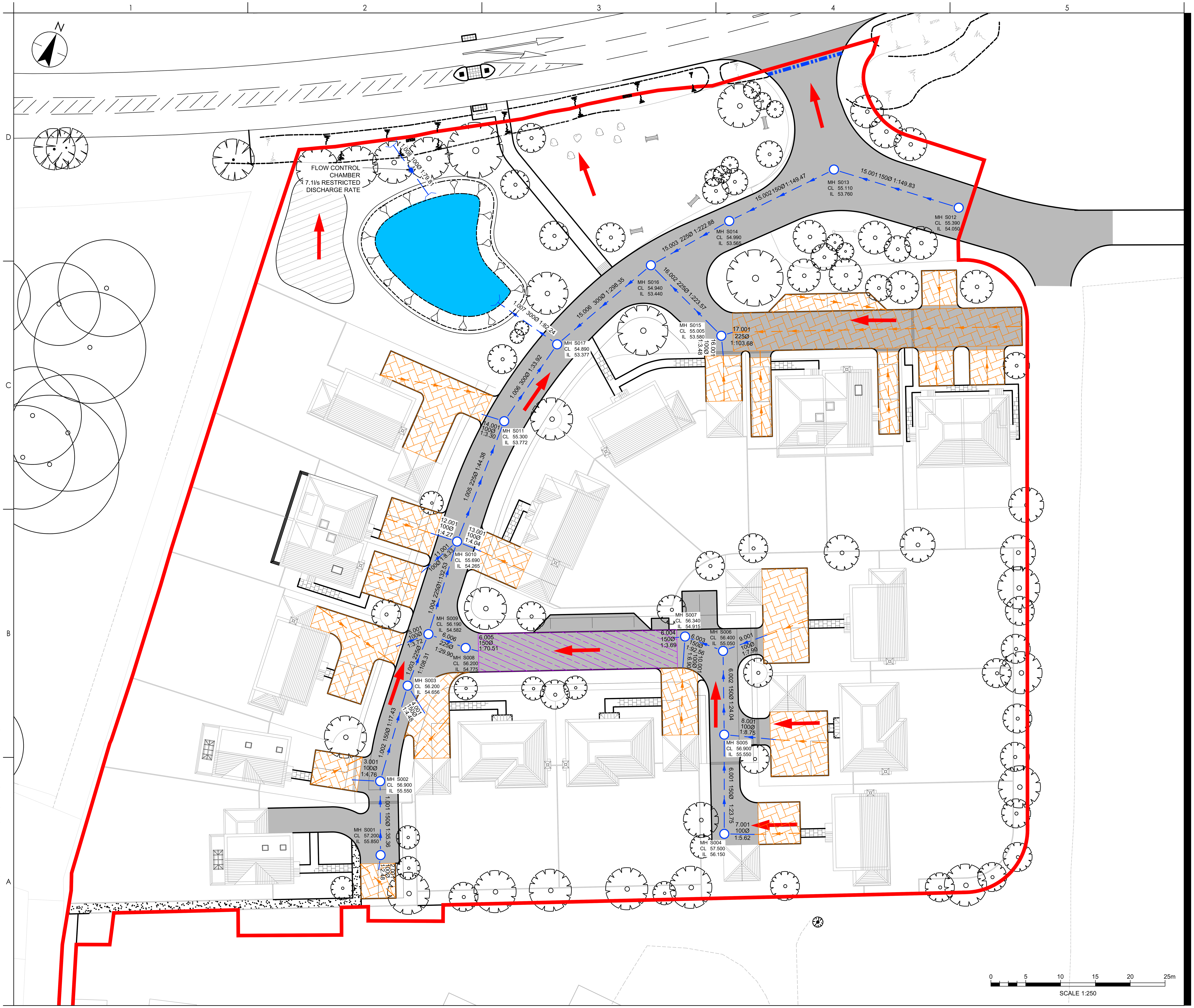
Appendix A – Proposed Surface Water Drainage Strategy



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Notes

UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake their own investigation where the presence of any existing sewers, services, plant or apparatus may affect their operations.

NOTES:

1. MASTERPLAN BASED ON DRAWING: LADDS GARDEN CENTRE - SITE LAYOUT00525
2. LEVELS AND DITCH INFORMATION TAKEN FROM TOPOGRAPHICAL SURVEY DRAWING HARE2401 Rev.A BY CHILTERN SURVEYS LTD. 20.04.2024
3. SUITABLE DIGGING METHODS TO BE USED WHERE PIPES PASS THROUGH ROOT PROTECTION AREAS

KEY:

- SITE BOUNDARY
- SURFACE WATER MANHOLE (MH / CL / IL)
- SURFACE WATER PIPE
- PROPOSED PERMEABLE PAVEMENT
- PROPOSED SURFACE WATER STORAGE TANK
- EXCEEDANCE FLOW PATH
- INDICATIVE CHANNEL DRAIN

		By	Appd	YYYY.MM.DD
P04	Updated Site Layout	SR	EE	2026.01.28
P03	SITE LAYOUT UPDATED AND EXCEEDANCE ROUTE ADDED	VT	EE	2025.12.16
P02	SITE LAYOUT UPDATED	VT	EE	2025.07.23
P01	FIRST ISSUE	VT	EE	2025.07.03

Issued/Revision

Dwn.	Dsgn.	Chkd.	YYYY.MM.DD
VT	JB	EE	2026.01.27

Issue Status

S3 - FOR REVIEW AND COMMENT

This document is suitable only for the purpose noted above.
Use of this document for any other purpose is not permitted.

Client/Project Logo

Client/Project
WESTBOURNE HOMES

LADDS GARDEN CENTRE

Title
PROPOSED DRAINAGE LAYOUT

Project No. 330910067

A1 Scale 1:250

Revision P04

Drawing No. 330910067/001

Appendix B – InfoDrainage Results

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		

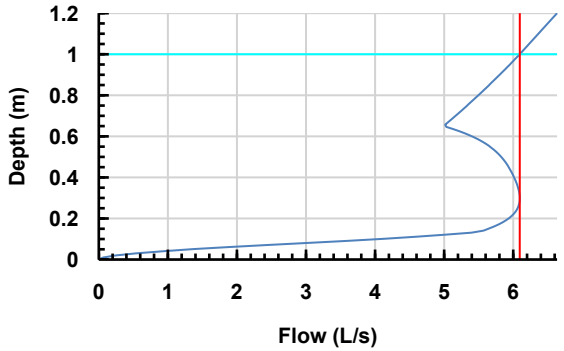
Pond

Type : Pond

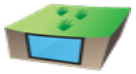
Outlets

Outlet

Outgoing Connection	1.008
Outlet Type	Hydro-Brake®
Invert Level (m)	53.100
Design Depth (m)	1.000
Design Flow (L/s)	6.1
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☑
Unit Reference	SHE-0116-6100-1000-6100



Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



Tank

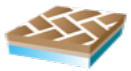
Type : Tank

Outlets

Outlet

Outgoing Connection	6.005
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P3

Type : Porous Paving

Under Drain

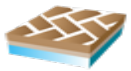
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	2.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P4

Type : Porous Paving

Under Drain

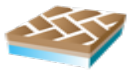
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	3.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P5

Type : Porous Paving

Under Drain

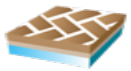
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	5.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P6

Type : Porous Paving

Under Drain

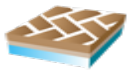
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	11.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P7

Type : Porous Paving

Under Drain

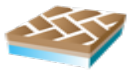
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	12.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P8

Type : Porous Paving

Under Drain

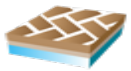
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	14.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P12

Type : Porous Paving

Under Drain

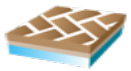
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	7.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P13

Type : Porous Paving

Under Drain

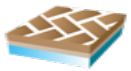
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	13.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P14

Type : Porous Paving

Under Drain

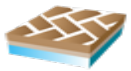
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	16.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P15

Type : Porous Paving

Under Drain

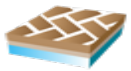
Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	No Delay (1)
Outlet Type	Orifice
Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	54.600

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P16

Type : Porous Paving

Under Drain

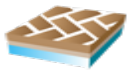
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	No Delay (2)
Outlet Type	Orifice
Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	54.680

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P17

Type : Porous Paving

Under Drain

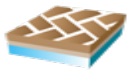
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	No Delay (5)
Outlet Type	Orifice
Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	54.780

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P18

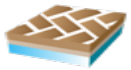
Type : Porous Paving

Outlets

Outlet

Outgoing Connection	No Delay (3)
Outlet Type	Orifice

Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	54.700



P11

Type : Porous Paving

Under Drain

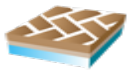
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	10.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P9

Type : Porous Paving

Under Drain

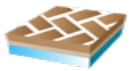
Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	4.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P10

Type : Porous Paving

Under Drain

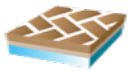
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	9.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P19

Type : Porous Paving

Under Drain

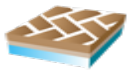
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	8.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P20

Type : Porous Paving

Under Drain

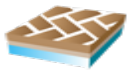
Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	No Delay
Outlet Type	Orifice
Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	54.600

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		



P1

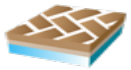
Type : Porous Paving

Outlets

Outlet

Outgoing Connection	No Delay (4)
Outlet Type	Orifice

Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	54.600



P2

Type : Porous Paving

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	225
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	17.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Inflows Summary Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area (1)	FEH: 100 years: +40 %: 15 mins: Summer	0.03	25.6	11.111
Catchment Area (3)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	6.1	2.636
Catchment Area (5)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	12.1	5.251
Catchment Area (6)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	8.5	3.699
Catchment Area (7)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	10.4	4.515
Catchment Area (8)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	11.6	5.038
Catchment Area (9)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	9.1	3.942
Catchment Area (11)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	1.5	0.670
Catchment Area (12)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	6.0	2.600
Catchment Area (15)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	4.9	2.126
Catchment Area (18)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	4.8	2.069
Catchment Area (19)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	4.9	2.135
Catchment Area (20)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	7.5	3.263
Catchment Area (21)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	5.5	2.402
Catchment Area (22)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	10.1	4.380
Catchment Area (23)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	9.9	4.299
Catchment Area (24)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	10.3	4.488

Catchment Area (25)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	10.1	4.398
Catchment Area (26)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	7.1	3.074
Catchment Area (27)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	7.7	3.326
Catchment Area (28)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	12.9	5.602
Catchment Area (30)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	9.7	4.185
Catchment Area (31)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	8.5	3.675
Catchment Area (32)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	8.6	3.732
Catchment Area (33)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	6.8	2.954
Catchment Area (34)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	12.0	5.182
Catchment Area (35)	FEH: 100 years: +40 %: 15 mins: Summer	0.02	16.9	7.322
Catchment Area (14)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	3.4	1.498
Catchment Area (38)	FEH: 100 years: +40 %: 15 mins: Summer	0.02	20.1	8.713
Catchment Area (39)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	1.8	0.766
Catchment Area (40)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	10.3	4.476
Catchment Area (41)	FEH: 100 years: +40 %: 15 mins: Summer	0.02	23.0	9.985
Catchment Area (42)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	1.8	0.763
Catchment Area (43)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.7	1.156
Catchment Area	FEH: 100 years: +40 %: 15 mins: Summer	0.01	6.3	2.753
Catchment Area (44)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	3.3	1.444
Catchment Area (2)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.3	1.018
Catchment Area (45)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	9.7	4.203

Catchment Area (47)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.6	1.120
Catchment Area (48)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.6	1.147
Catchment Area (49)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	6.8	2.966
Catchment Area (50)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	11.4	4.945
Catchment Area (51)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	11.4	4.942
Catchment Area (52)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	8.8	3.834
Catchment Area (55)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	11.6	5.044
Catchment Area (56)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.6	1.129
Catchment Area (57)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	10.7	4.635
Catchment Area (58)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	9.9	4.290
Catchment Area (59)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	7.9	3.450
Catchment Area (60)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	3.2	1.402
Catchment Area (61)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	4.1	1.780
Catchment Area (64)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	3.4	1.486
Catchment Area (66)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	3.5	1.528
Catchment Area (68)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	3.5	1.516
Catchment Area (4)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	4.2	1.834
Catchment Area (69)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	7.5	3.266
Catchment Area (70)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.6	1.129
Catchment Area (71)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.6	1.135
Catchment Area (72)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.6	1.132

Catchment Area (73)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	7.2	3.119
Catchment Area (74)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	7.9	3.423
Catchment Area (10)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	1.3	0.546
Catchment Area (13)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	5.3	2.318
Catchment Area (17)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.0	0.856
Catchment Area (29)	FEH: 100 years: +40 %: 15 mins: Summer	0.02	13.8	5.971

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Summary Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Pond	FEH: 100 years: +40 %: 600 mins: Winter	54.557	54.557	1.457	1.457	29.2	346.468	0.000	0.000	6.1	352.836	491	-35.193
P3	FEH: 100 years: +40 %: 15 mins: Summer	56.744	56.715	0.043	0.015	2.3	0.209	0.000	0.000	1.9	1.323	2	90.622
P4	FEH: 100 years: +40 %: 15 mins: Summer	56.595	56.444	0.194	0.044	13.0	1.153	0.000	0.000	11.4	5.546	2	62.145
P5	FEH: 100 years: +40 %: 15 mins: Summer	55.967	55.724	0.276	0.034	20.6	4.435	0.000	0.000	8.5	8.147	14	43.919
P6	FEH: 100 years: +40 %: 30 mins: Summer	55.372	55.235	0.181	0.045	9.6	1.515	0.000	0.000	8.8	8.262	3	62.744
P7	FEH: 100 years: +40 %: 15 mins: Summer	55.335	55.227	0.144	0.037	12.9	1.244	0.000	0.000	9.0	5.440	2	70.084
P8	FEH: 100 years: +40 %: 15 mins: Summer	55.089	54.834	0.287	0.034	22.5	5.048	0.000	0.000	8.8	8.699	15	42.275
P12	FEH: 100 years: +40 %: 15 mins: Summer	57.187	57.042	0.186	0.042	14.6	1.333	0.000	0.000	9.4	6.228	2	62.407
P13	FEH: 100 years: +40 %: 30 mins: Summer	55.453	55.230	0.262	0.040	12.0	1.858	0.000	0.000	10.8	10.328	3	50.246
P14	FEH: 100 years: +40 %: 120 mins: Winter	54.744	54.743	0.243	0.243	5.5	2.367	0.000	0.000	5.5	16.201	5	19.995
P15	FEH: 100 years: +40 %: 15 mins: Summer	54.880	54.876	0.279	0.276	12.0	2.921	0.000	0.000	4.9	4.466	16	32.794
P16	FEH: 100 years: +40 %: 15 mins: Summer	54.988	54.972	0.308	0.292	10.7	2.195	0.000	0.000	5.1	4.286	11	7.111
P17	FEH: 100 years: +40 %: 15 mins: Summer	55.072	55.058	0.292	0.278	10.3	2.097	0.000	0.000	4.9	4.117	11	11.771
P18	FEH: 100 years: +40 %: 60 mins: Summer	54.869	54.764	0.168	0.064	1.5	0.843	0.000	0.000	0.8	1.680	17	61.638
P11	FEH: 100 years: +40 %: 15 mins: Summer	56.112	55.879	0.278	0.046	20.2	2.831	0.000	0.000	10.3	8.508	6	40.681
P9	FEH: 100 years: +40 %: 15 mins: Summer	55.871	55.745	0.169	0.045	20.9	1.689	0.000	0.000	17.6	8.852	1	63.960

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Summary Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		

Status
Flood Risk
OK
OK
OK
OK
OK
OK
OK
OK
OK
OK
OK
OK
OK
OK
OK

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Summary Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		

P10	FEH: 100 years: +40 %: 15 mins: Summer	56.128	55.952	0.227	0.052	24.9	4.966	0.000	0.000	11.7	9.824	11	53.611
P19	FEH: 100 years: +40 %: 15 mins: Summer	56.651	56.461	0.250	0.061	21.7	3.276	0.000	0.000	13.9	9.069	5	48.376
P20	FEH: 100 years: +40 %: 15 mins: Summer	54.885	54.881	0.284	0.281	12.0	2.859	0.000	0.000	4.9	4.501	16	31.600
P1	FEH: 100 years: +40 %: 120 mins: Summer	54.768	54.741	0.167	0.141	0.7	0.986	0.000	0.000	0.4	1.242	28	48.897
P2	FEH: 100 years: +40 %: 120 mins: Winter	54.755	54.753	0.625	0.803	22.5	47.772	0.000	0.000	4.5	40.986	441	17.692
Tank	FEH: 100 years: +40 %: 240 mins: Winter	55.088	55.088	0.688	0.688	22.5	103.230	0.000	0.000	2.6	60.493	347	14.587

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Summary Storm Phase: Perm pav stone & cellular mix - surcharged outfall sensitivity outfall	100 Barbirolli Square Manchester M2 3AB		

OK
OK
OK
OK
OK
OK

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		

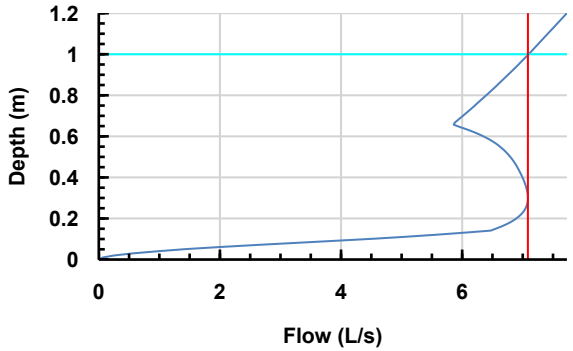
Pond

Type : Pond

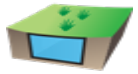
Outlets

Outlet

Outgoing Connection	1.008
Outlet Type	Hydro-Brake®
Invert Level (m)	53.100
Design Depth (m)	1.000
Design Flow (L/s)	7.1
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☑
Unit Reference	SHE-0124-7100-1000-7100



Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



Tank

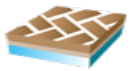
Type : Tank

Outlets

Outlet

Outgoing Connection	6.005
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P3

Type : Porous Paving

Under Drain

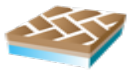
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	2.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P4

Type : Porous Paving

Under Drain

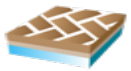
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	3.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P5

Type : Porous Paving

Under Drain

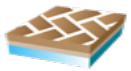
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	5.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P6

Type : Porous Paving

Under Drain

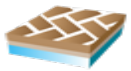
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	11.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P7

Type : Porous Paving

Under Drain

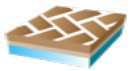
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	12.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P8

Type : Porous Paving

Under Drain

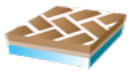
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	14.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P12

Type : Porous Paving

Under Drain

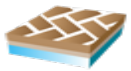
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	7.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P13

Type : Porous Paving

Under Drain

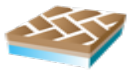
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	13.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P14

Type : Porous Paving

Under Drain

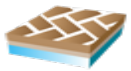
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	16.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P15

Type : Porous Paving

Under Drain

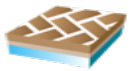
Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	No Delay (1)
Outlet Type	Orifice
Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	54.600

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P16

Type : Porous Paving

Under Drain

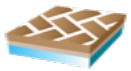
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	No Delay (2)
Outlet Type	Orifice
Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	54.680

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P17

Type : Porous Paving

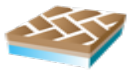
Under Drain

Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	No Delay (5)
Outlet Type	Orifice
Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	54.780



P18

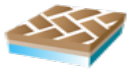
Type : Porous Paving

Outlets

Outlet

Outgoing Connection	No Delay (3)
Outlet Type	Orifice

Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	54.700



P11

Type : Porous Paving

Under Drain

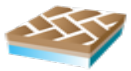
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	10.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P9

Type : Porous Paving

Under Drain

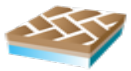
Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	4.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P10

Type : Porous Paving

Under Drain

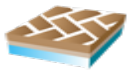
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	9.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P19

Type : Porous Paving

Under Drain

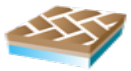
Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	8.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P20

Type : Porous Paving

Under Drain

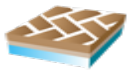
Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	No Delay
Outlet Type	Orifice
Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	54.600

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		



P1

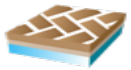
Type : Porous Paving

Outlets

Outlet

Outgoing Connection	No Delay (4)
Outlet Type	Orifice

Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	54.600



P2

Type : Porous Paving

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	225
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	17.001
Outlet Type	Free Discharge

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Outfall Details Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		

Outfalls

Outfall	Outfall Type	Gated	Fixed Surcharged Level (m)	Level Curve
S018	Fixed Surcharged Level	☐	53.500	
FEH : 100 years: +40 %: 15 mins: Summer			53.500	
FEH : 100 years: +40 %: 15 mins: Winter			53.500	
FEH : 100 years: +40 %: 30 mins: Summer			53.500	
FEH : 100 years: +40 %: 30 mins: Winter			53.500	
FEH : 100 years: +40 %: 60 mins: Summer			53.500	
FEH : 100 years: +40 %: 60 mins: Winter			53.500	
FEH : 100 years: +40 %: 120 mins: Summer			53.500	
FEH : 100 years: +40 %: 120 mins: Winter			53.500	
FEH : 100 years: +40 %: 180 mins: Summer			53.500	
FEH : 100 years: +40 %: 180 mins: Winter			53.500	
FEH : 100 years: +40 %: 240 mins: Summer			53.500	
FEH : 100 years: +40 %: 240 mins: Winter			53.500	
FEH : 100 years: +40 %: 360 mins: Summer			53.500	
FEH : 100 years: +40 %: 360 mins: Winter			53.500	
FEH : 100 years: +40 %: 480 mins: Summer			53.500	
FEH : 100 years: +40 %: 480 mins: Winter			53.500	
FEH : 100 years: +40 %: 600 mins: Summer			53.500	
FEH : 100 years: +40 %: 600 mins: Winter			53.500	
FEH : 100 years: +40 %: 720 mins: Summer			53.500	
FEH : 100 years: +40 %: 720 mins: Winter			53.500	
FEH : 100 years: +40 %: 960 mins: Summer			53.500	
FEH : 100 years: +40 %: 960 mins: Winter			53.500	
FEH : 100 years: +40 %: 1440 mins: Summer			53.500	
FEH : 100 years: +40 %: 1440 mins: Winter			53.500	
FEH : 100 years: +40 %: 2160 mins: Summer			53.500	
FEH : 100 years: +40 %: 2160 mins: Winter			53.500	
FEH : 100 years: +40 %: 2880 mins: Summer			53.500	
FEH : 100 years: +40 %: 2880 mins: Winter			53.500	
FEH : 100 years: +40 %: 4320 mins: Summer			53.500	
FEH : 100 years: +40 %: 4320 mins: Winter			53.500	
FEH : 100 years: +40 %: 5760 mins: Summer			53.500	
FEH : 100 years: +40 %: 5760 mins: Winter			53.500	

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Outfall Details Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		

FEH : 100 years: +40 %: 7200 mins: Summer			53.500	
FEH : 100 years: +40 %: 7200 mins: Winter			53.500	
FEH : 100 years: +40 %: 8640 mins: Summer			53.500	
FEH : 100 years: +40 %: 8640 mins: Winter			53.500	
FEH : 100 years: +40 %: 10080 mins: Summer			53.500	
FEH : 100 years: +40 %: 10080 mins: Winter			53.500	

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Inflows Summary Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area (1)	FEH: 100 years: +40 %: 15 mins: Summer	0.03	25.6	11.111
Catchment Area (3)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	6.1	2.636
Catchment Area (5)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	12.1	5.251
Catchment Area (6)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	8.5	3.699
Catchment Area (7)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	10.4	4.515
Catchment Area (8)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	11.6	5.038
Catchment Area (9)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	9.1	3.942
Catchment Area (11)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	1.5	0.670
Catchment Area (12)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	6.0	2.600
Catchment Area (15)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	4.9	2.126
Catchment Area (18)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	4.8	2.069
Catchment Area (19)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	4.9	2.135
Catchment Area (20)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	7.5	3.263
Catchment Area (21)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	5.5	2.402
Catchment Area (22)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	10.1	4.380
Catchment Area (23)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	9.9	4.299
Catchment Area (24)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	10.3	4.488

Catchment Area (25)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	10.1	4.398
Catchment Area (26)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	7.1	3.074
Catchment Area (27)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	7.7	3.327
Catchment Area (28)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	12.9	5.602
Catchment Area (30)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	9.7	4.185
Catchment Area (31)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	8.5	3.675
Catchment Area (32)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	8.6	3.732
Catchment Area (33)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	6.8	2.954
Catchment Area (34)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	12.0	5.182
Catchment Area (35)	FEH: 100 years: +40 %: 15 mins: Summer	0.02	16.9	7.323
Catchment Area (14)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	3.4	1.498
Catchment Area (38)	FEH: 100 years: +40 %: 15 mins: Summer	0.02	20.1	8.713
Catchment Area (39)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	1.8	0.766
Catchment Area (40)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	10.3	4.476
Catchment Area (41)	FEH: 100 years: +40 %: 15 mins: Summer	0.02	23.0	9.986
Catchment Area (42)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	1.8	0.763
Catchment Area (43)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.7	1.156
Catchment Area	FEH: 100 years: +40 %: 15 mins: Summer	0.01	6.3	2.753
Catchment Area (44)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	3.3	1.444
Catchment Area (2)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.3	1.018
Catchment Area (45)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	9.7	4.203

Catchment Area (47)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.6	1.120
Catchment Area (48)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.6	1.147
Catchment Area (49)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	6.8	2.966
Catchment Area (50)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	11.4	4.945
Catchment Area (51)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	11.4	4.942
Catchment Area (52)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	8.8	3.834
Catchment Area (55)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	11.6	5.044
Catchment Area (56)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.6	1.129
Catchment Area (57)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	10.7	4.635
Catchment Area (58)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	9.9	4.290
Catchment Area (59)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	7.9	3.450
Catchment Area (60)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	3.2	1.402
Catchment Area (61)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	4.1	1.780
Catchment Area (64)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	3.4	1.486
Catchment Area (66)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	3.5	1.528
Catchment Area (68)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	3.5	1.516
Catchment Area (4)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	4.2	1.834
Catchment Area (69)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	7.5	3.266
Catchment Area (70)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.6	1.129
Catchment Area (71)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.6	1.135
Catchment Area (72)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.6	1.132

Catchment Area (73)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	7.2	3.119
Catchment Area (74)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	7.9	3.423
Catchment Area (10)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	1.3	0.546
Catchment Area (13)	FEH: 100 years: +40 %: 15 mins: Summer	0.01	5.3	2.318
Catchment Area (17)	FEH: 100 years: +40 %: 15 mins: Summer	0.00	2.0	0.856
Catchment Area (29)	FEH: 100 years: +40 %: 15 mins: Summer	0.02	13.8	5.971

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Summary Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Pond	FEH: 100 years: +40 %: 480 mins: Winter	54.519	54.519	1.419	1.419	34.3	332.324	0.000	0.000	7.1	317.078	403	-29.674
P3	FEH: 100 years: +40 %: 15 mins: Summer	56.744	56.715	0.043	0.015	2.3	0.209	0.000	0.000	1.9	1.323	2	90.621
P4	FEH: 100 years: +40 %: 15 mins: Summer	56.595	56.444	0.194	0.044	13.0	1.153	0.000	0.000	11.4	5.546	2	62.145
P5	FEH: 100 years: +40 %: 15 mins: Summer	55.967	55.724	0.276	0.034	20.6	4.435	0.000	0.000	8.5	8.147	14	43.918
P6	FEH: 100 years: +40 %: 30 mins: Summer	55.372	55.235	0.181	0.045	9.6	1.515	0.000	0.000	8.8	8.262	3	62.744
P7	FEH: 100 years: +40 %: 15 mins: Summer	55.335	55.227	0.144	0.037	12.9	1.244	0.000	0.000	9.0	5.440	2	70.084
P8	FEH: 100 years: +40 %: 15 mins: Summer	55.089	54.834	0.287	0.034	22.5	5.049	0.000	0.000	8.8	8.700	15	42.268
P12	FEH: 100 years: +40 %: 15 mins: Summer	57.187	57.042	0.186	0.042	14.6	1.333	0.000	0.000	9.4	6.228	2	62.407
P13	FEH: 100 years: +40 %: 30 mins: Summer	55.453	55.230	0.262	0.040	12.0	1.858	0.000	0.000	10.8	10.328	3	50.246
P14	FEH: 100 years: +40 %: 120 mins: Winter	54.744	54.743	0.243	0.243	5.5	2.368	0.000	0.000	5.5	16.201	5	19.965
P15	FEH: 100 years: +40 %: 15 mins: Summer	54.880	54.876	0.279	0.276	12.0	2.921	0.000	0.000	4.9	4.466	16	32.792
P16	FEH: 100 years: +40 %: 15 mins: Summer	54.989	54.973	0.308	0.293	10.7	2.197	0.000	0.000	5.1	4.287	11	7.052
P17	FEH: 100 years: +40 %: 15 mins: Summer	55.072	55.058	0.292	0.278	10.3	2.097	0.000	0.000	4.9	4.117	11	11.768
P18	FEH: 100 years: +40 %: 60 mins: Summer	54.869	54.764	0.168	0.064	1.5	0.843	0.000	0.000	0.8	1.680	17	61.639
P11	FEH: 100 years: +40 %: 15 mins: Summer	56.113	55.879	0.279	0.046	20.2	2.833	0.000	0.000	10.3	8.510	6	40.631
P9	FEH: 100 years: +40 %: 15 mins: Summer	55.871	55.745	0.169	0.045	20.9	1.689	0.000	0.000	17.6	8.852	1	63.960

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Summary Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		

Status
Flood Risk
OK
OK
OK
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OK

P10	FEH: 100 years: +40 %: 15 mins: Summer	56.128	55.952	0.227	0.052	24.9	4.966	0.000	0.000	11.7	9.824	11	53.610
P19	FEH: 100 years: +40 %: 15 mins: Summer	56.651	56.461	0.250	0.061	21.7	3.276	0.000	0.000	13.9	9.069	5	48.373
P20	FEH: 100 years: +40 %: 15 mins: Summer	54.885	54.881	0.284	0.281	12.0	2.859	0.000	0.000	4.9	4.501	16	31.598
P1	FEH: 100 years: +40 %: 120 mins: Winter	54.768	54.742	0.167	0.142	0.5	0.986	0.000	0.000	0.3	1.247	28	48.899
P2	FEH: 100 years: +40 %: 120 mins: Winter	54.755	54.753	0.625	0.803	22.5	47.776	0.000	0.000	4.5	41.762	434	17.684
Tank	FEH: 100 years: +40 %: 240 mins: Winter	55.089	55.089	0.689	0.689	22.5	103.290	0.000	0.000	2.6	60.044	348	14.537

Project:	Date:		
Ladds Garden Centre	13/06/2025		
	Designed by:	Checked by:	Approved By:
	JB		
Report Details:	Stantec UK Ltd: :		
Type: Stormwater Controls Summary Storm Phase: Perm pav stone & cellular mix - surcharged outfall	100 Barbirolli Square Manchester M2 3AB		

OK
OK
OK
OK
OK
OK

Appendix C – Runoff Rate Calculations

FEH Greenfield Runoff

Using the 2008 Statistical Method QMED Equation

Project Title	Ladds Garden Centre
Project No	332611948

Methodology as set out in SuDS Manual 24.3.2 — SUDS Manual Chapter 24

1 Retrieve FEH Catchment Information

Define BFIHOST definition source		FEH		*see note 1*
Catchment Descriptors	**BFIHOST**	0.502		
	SAAR	659.0		*see note 1*
	FARL	1.0		*see note 2*

2 Derive QBAR (mean annual flood)

Define area	**Site Area**	0.5	ha	
	Applied Area	50.0	ha	*see note 3*
FEH Index Flood (SuDS Manual Equation 24.2)	**QMED (Q_2)**	1.3	l/s	*see note 4*
Calculate QBAR by dividing QMED by 2yr growth factor	**QBAR**	1.5	l/s	*see note 5*

3 Select appropriate growth factors

FSR Hydrological Region		6
100yr Growth Curve Factor	**GQ_{100}**	3.19
30yr Growth Curve Factor	**GQ_{30}**	2.40
10yr Growth Curve Factor	**GQ_{10}**	1.62
2yr Growth Curve Factor	**GQ_2**	0.88
1yr Growth Curve Factor	**GQ_1**	0.85

(refer to FSR Hydrological Region tab)

Figure 24.1 Hydrological areas

4 Derive Flood Frequency

Greenfield Runoff per 1ha

100yr Peak Runoff Rate	**Q_{100}**	4.8	l/s	**Q_{100}**	9.0	l/s/ha
30yr Peak Runoff Rate	**Q_{30}**	3.6	l/s	**Q_{30}**	6.7	l/s/ha
10yr Growth Curve Rate	**Q_{10}**	2.4	l/s	**Q_{10}**	4.5	l/s/ha
QBAR Peak Runoff Rate	**QBAR**	1.5	l/s	**Q_{BAR}**	2.8	l/s/ha
2yr Peak Runoff Rate	**Q_2**	1.3	l/s	**Q_2**	2.5	l/s/ha
1yr Peak Runoff Rate	**Q_1**	1.3	l/s	**Q_1**	2.4	l/s/ha

DOCUMENT ISSUE RECORD

Rev	Comments	Prepared	Date	Checked	Date
A	Original calculation	JB	02/07/2025	EE	02/07/2025

Brownfield Runoff Rates
Modified Rational Method

Project Title	Ladds Garden Centre
Project No	332611948

Existing Site Condition

Rainfall Model		FEH	
Storm Duration		360.00	mins
Global Time of Entry		5.00	mins
Volumetric Runoff Coefficient	Cv	0.85	
Routing Coefficient	Cr	1.30	
Contributing Area	A	1.31	ha

	Average Rainfall Intensity, i (mm/hr)	Runoff Rate , Q (l/s)	
1 in 1 Year	3.1	12.5	FEH22
1 in 2 Year	4.28	17.2	FEH22
1 in 30 Year	9.4	37.8	FEH22
1 in 100 Year	11.71	47.1	FEH22

Based on the Modified Rational Method as described in CIRIA C753 - The SuDS Manual 2015

EQ. 24.5 Modified rational method equation to determine peak flow rates

$$Q = 2.78\,C\,i\,A$$

where:

- Q = design event peak rate of runoff (l/s)
- C = non-dimensional runoff coefficient which is dependent on the catchment characteristics

$$C = C_V\,C_R$$

where C_v = volumetric runoff coefficient

C_R = dimensionless routing coefficient

- i = rainfall intensity for the design return period (in mm/hr) and for a duration equal to the "time of concentration" of the network
- A = total catchment area being drained (ha)

Note: 2.78 is a conversion factor to address the rainfall unit being in mm/hr.

DOCUMENT ISSUE RECORD

Rev	Comments	Prepared	Date	Checked	Date
-	Original calculation	JB	02/07/2025	EE	02/07/2025