# 158 Padel, Baird Street, Manchester

## Manchester City Council

## Drainage Strategy Technical Report

**Client: Padel 16**

**Our Ref: P26195-DGC-Z1-GF-REP-C-0001-P04**

**Date: 23/07/2026**

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## 1. Introduction

This Drainage Strategy Technical Report has been prepared by DGC Consulting Engineers on behalf of Padel 16 in support of a planning application for the redevelopment of an existing brownfield site at Baird Street, Manchester.

The proposed development comprises the construction of five covered padel courts, two uncovered padel courts and associated recreational facilities, together with the necessary drainage infrastructure required to safely manage surface water and foul water arising from the development.

The purpose of this report is to demonstrate that an appropriate drainage strategy can be delivered in accordance with the principles of sustainable drainage, whilst providing a practical solution appropriate to the constraints associated with the redevelopment of an existing urban site. The proposed strategy seeks to provide a significant betterment over the existing drainage arrangement by reducing peak surface water discharge rates, incorporating on site attenuation storage and providing water quality treatment prior to discharge.

The drainage proposals have been developed having regard to the following guidance and design standards:

- National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG)
- Non Statutory Technical Standards for Sustainable Drainage Systems
- CIRIA C753 SuDS Manual
- Building Regulations Approved Document H
- Manchester City Council planning and drainage requirements
- United Utilities requirements for new sewer connections

The report demonstrates the proposed approach to both surface water and foul water drainage, including the application of the drainage hierarchy, hydraulic performance of the proposed drainage network, SuDS integration, maintenance requirements and the proposed points of connection to the existing public sewer network.

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## 2. Existing Site and Runoff

### 2.1 Existing Site

The application site comprises an existing hard surfaced brownfield car park located on Baird Street, Manchester. The proposed redevelopment utilises the existing developed footprint to provide a new recreational facility comprising covered and uncovered padel courts together with associated external areas.

Based on the existing site arrangement and available United Utilities asset information, surface water runoff from the site is understood to discharge to the adjacent public combined water sewer network without any on-site attenuation or flow control. Consequently, the redevelopment presents an opportunity to provide a significant betterment over the existing drainage regime through the introduction of sustainable drainage measures and controlled discharge.

The proposed impermeable area associated with the completed development is approximately 0.35 ha, with runoff collected via a private gravity drainage network before being conveyed to the proposed attenuation system.

### 2.2 Existing Runoff and Discharge Rate

Existing peak runoff rates have been calculated using the Modified Rational Method to establish the current brownfield discharge characteristics of the site. The calculated peak runoff rates are summarised in Table 2.1.

| **Return Period** | **Existing Brownfield Peak Runoff** |
|---|---|
| 1 in 1 year | 18.9 l/s |
| 1 in 10 year | 29.4 l/s |
| 1 in 30 year | 36.3 l/s |
| 1 in 100 year | 45.8 l/s |

The equivalent greenfield runoff rate for the site has been calculated as 2.25 l/s. Whilst this represents the preferred discharge rate within the drainage hierarchy, achieving this

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level of restriction for a constrained urban brownfield redevelopment would require a disproportionate increase in attenuation storage with limited additional environmental benefit.

In applying the drainage hierarchy, a practical discharge rate of 5.0 l/s has therefore been adopted. This represents a significant reduction in peak discharge when compared with the existing unrestricted brownfield runoff whilst remaining proportionate to the scale and nature of the proposed development. The proposed restriction therefore delivers a substantial betterment over the existing situation and accords with the principles of sustainable drainage.

## 3. Drainage Hierarchy & SuDS Assessment

### 3.1 Drainage Hierarchy

In accordance with the National Planning Policy Framework (NPPF) and the Non Statutory Technical Standards for Sustainable Drainage Systems, the proposed drainage strategy has been developed following the recognised drainage hierarchy, seeking to discharge surface water by the most sustainable means reasonably practicable.

The drainage hierarchy has been assessed as follows (see below and overleaf):

| Drainage Hierarchy | Assessment |
|---|---|
| **Infiltration** | Infiltration has not been proposed due to the constrained nature of the existing urban brownfield site and, with the proposals being part of a temporary planning application. No infiltration testing has been undertaken at this stage, and the proposed attenuation system has been designed as a lined storage feature to provide a robust and maintainable drainage solution suitable for the proposed development. |
| **Discharge to a Watercourse** | There are no reasonably practicable watercourses available within the immediate vicinity of the site capable of receiving surface water runoff from the proposed development. |

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| Drainage Hierarchy | Assessment |
|---|---|
| **Discharge to a Surface Water Sewer** | No public surface water sewer has been identified within close proximity of the site. Discharge to a surface water sewer has therefore not been considered a reasonably practicable outfall for the proposed development. |
| **Discharge to a Combined Sewer** | A 450mm diameter public combined sewer is located to the north of the site in Chapeltown Street, in close proximity to the development. Following assessment, discharge to the combined sewer has been identified as the preferred drainage solution. Foul and surface water will be combined on site and discharged at a restricted rate of 5.0 l/s via a single new connection at manhole reference SD9902. |

The proposed drainage strategy therefore accords with the drainage hierarchy by directing attenuated surface water runoff to the available public combined water sewer whilst providing a significant betterment over the existing unrestricted brownfield drainage regime.

3.2 Sustainable Drainage Assessment

The proposed drainage strategy has been developed to maximise the use of Sustainable Drainage Systems (SuDS) appropriate to the scale and constraints of the development. Whilst opportunities for traditional above ground SuDS features such as swales, detention basins and rain gardens are limited by the constrained nature of the site and the operational requirements of the proposed sports facility, SuDS principles have been incorporated throughout the drainage design.

The primary attenuation feature comprises a permeable external court construction incorporating a deep, lined granular sub base beneath the two uncovered padel courts. This provides online attenuation storage whilst also delivering source control and water quality treatment through filtration within the permeable pavement construction prior to discharge.

The drainage proposals have been developed to deliver the following SuDS benefits (see overleaf):

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| SuDS Principle | Proposed Measure |
|---|---|
| **Source Control** | Surface water runoff collected close to source and conveyed directly into the permeable court construction. |
| **Water Quantity** | Online attenuation provided within the permeable sub base, restricting discharge to 5.0 l/s and providing significant betterment over existing brownfield runoff rates. |
| **Water Quality** | Filtration through the permeable pavement construction provides treatment of surface water runoff prior to discharge to the public sewer network. |
| **Amenity** | Integration of the attenuation system beneath the external courts maximises the available recreational space whilst avoiding the need for separate above ground storage features. |
| **Biodiversity** | Although opportunities for ecological enhancement are limited due to the urban brownfield nature of the site, the proposed drainage strategy provides an overall improvement over the existing hard surfaced car park by incorporating sustainable drainage principles into the redevelopment. |

The proposed drainage strategy therefore represents a practical and sustainable solution that reflects the constraints of the site whilst delivering improvements in runoff management, water quality and long-term maintenance when compared with the existing drainage arrangement.

## 4. Proposed Surface Water Drainage Strategy

### 4.1 Surface Water Drainage Strategy

Surface water runoff generated by the proposed development will be collected via a private gravity surface water drainage network before being conveyed to an online attenuation system located beneath the two uncovered permeable padel courts. The drainage network has been designed to collect runoff from the proposed buildings and

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external hardstanding before discharging to the attenuation storage via proprietary diffuser units integrated within the permeable pavement construction.

Following attenuation, runoff will discharge via a Hydro-Brake flow control chamber restricting flows to a maximum discharge rate of 5.0 l/s. The restricted discharge will combine with the foul drainage on site before discharging via a single new gravity connection to the public combined water sewer at manhole reference SD9902 in Chapeltown Street, as referenced in Section 3.1. The proposed drainage layout is shown on Drawing P26195-DGC-Z1-GF-DR-C-0001-P03, included in Appendix A.

### 4.2 Surface Water Discharge

A restricted discharge rate of 5.0 l/s has been adopted for the proposed development. Whilst the calculated greenfield runoff rate for the site is 2.25 l/s, achieving this level of restriction would require a disproportionate increase in attenuation storage for a constrained urban brownfield redevelopment.

The proposed discharge rate therefore represents a practical engineering solution that balances the objectives of the drainage hierarchy with the physical constraints associated with the redevelopment of the existing urban brownfield site as part of a temporary planning application. The proposed discharge provides a significant betterment over the existing unrestricted brownfield runoff regime whilst remaining proportionate to the scale and nature of the proposed development.

The proposed discharge rate will be subject to agreement through the planning process with Manchester City Council, acting as Lead Local Flood Authority, and through the detailed design stage with United Utilities as part of the Section 106 sewer connection approval process.

A Pre-Development Enquiry (PDE) was submitted to United Utilities to identify a suitable outfall for surface water generated on site. In their response (UU Reference: 09638440, dated 06 July 2026), United Utilities confirmed that they would consider a connection to the public combined sewer within Chapeltown Street, located to the north of the site, at a pass forward flow not exceeding 20 l/s at manhole reference SD9902 (Grid Reference 384957, 397958). A copy of this correspondence is included in Appendix B.

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## 4.3 Surface Water Attenuation

In lieu of a conventional attenuation tank, on site attenuation is provided within a deepened, impermeably lined granular sub-base located beneath the two uncovered permeable padel courts. This approach enables the attenuation system to be integrated directly within the proposed development whilst maximising the available recreational space and avoiding the need for separate below ground storage structures.

The attenuation system has been hydraulically modelled using Site3D and has been sized to accommodate all rainfall events up to and including the 1 in 100 year return period, incorporating the latest Environment Agency peak rainfall climate change allowances applicable to the Irwell Management Catchment.

The proposed attenuation system comprises:

| **Item** | **Value** |
|---|---|
| Storage Volume | 157.75 $m^3$ |
| Storage Footprint | 606.24 $m^2$ |
| Granular Sub-base Depth | 650 mm |
| Liner Type | Impermeable Geomembrane |
| Design Standard | 1 in 30 year +40% Climate Change<br>1 in 100 year +45% Climate Change |

Hydraulic modelling demonstrates that the proposed storage volume provides sufficient attenuation whilst maintaining the required freeboard within the drainage system and restricting discharge to the approved design flow rate. The full hydraulic modelling results are included in Appendix C.

## 4.4 Climate Change

Hydraulic modelling has been undertaken using the latest Environment Agency peak rainfall climate change allowances applicable to the Irwell Management Catchment. In accordance with the current guidance, the drainage network has been assessed for the 1 in 30 year rainfall event including a 40% Upper End climate change allowance and the 1 in 100 year rainfall event including a 45% Upper End climate change allowance. (See figure 1 overleaf)

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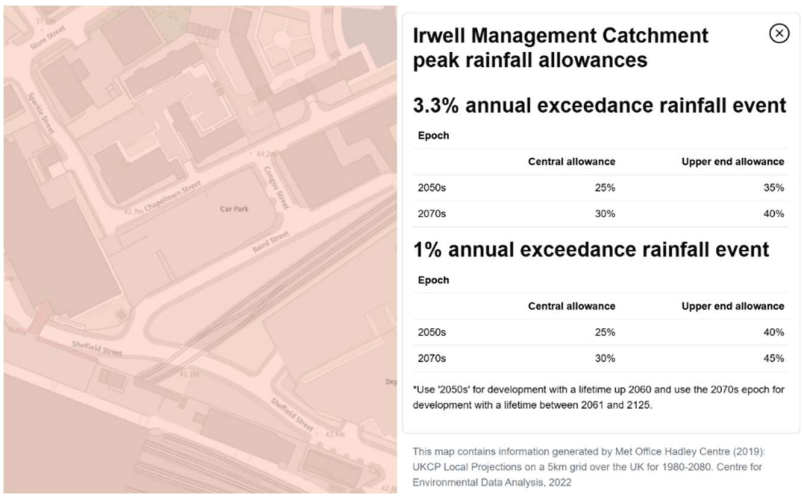



*Figure 1: Peak Rainfall Climate Change Allowances*

The proposed attenuation system has been demonstrated to accommodate these design events whilst maintaining the approved discharge rate of 5.0 l/s and ensuring that no flooding occurs within the drainage system. The proposed strategy therefore provides an appropriate level of resilience to the anticipated impacts of future climate change throughout the design life of the development.

### 4.5 Exceedance Flows

The drainage network has been designed to accommodate all rainfall events up to and including the 1 in 100 year return period with the appropriate climate change allowance. In the unlikely event that rainfall exceeds the design standard, exceedance flows will remain above ground and follow the proposed site topography towards external hardstanding areas before ultimately entering the combined water drainage system.

## 5. SuDS Integration and Betterment

The proposed drainage strategy has been developed in accordance with the principles of Sustainable Drainage Systems (SuDS), seeking to maximise source control and deliver improvements in runoff quantity, water quality and long-term sustainability whilst recognising the operational requirements and constraints associated with the redevelopment of an existing urban brownfield site.

Rather than relying on conventional underground attenuation infrastructure, the primary storage feature has been integrated directly within the permeable construction of the two

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uncovered padel courts, providing a multifunctional drainage solution without compromising the operational requirements of the development.

The permeable court construction comprises a specialist permeable playing surface, permeable asphalt base and an open graded granular sub-base, all contained within an impermeable geomembrane liner. Surface water runoff from the wider development is conveyed into the granular storage layer via proprietary diffuser units, allowing runoff to be distributed evenly throughout the attenuation system before discharging at a controlled rate through the downstream Hydro-Brake flow control.

The proposed drainage strategy has been developed to provide the following sustainable drainage benefits (see below):

| **SuDS Principle** | **Proposed Benefit** |
|---|---|
| **Water Quantity** | Provision of 157.75 $m^3$ of online attenuation storage beneath the permeable courts, restricting discharge to 5.0 l/s and providing a significant betterment over the existing brownfield runoff regime. |
| **Water Quality** | Filtration through the permeable pavement construction provides treatment of runoff prior to discharge, reducing sediment and associated pollutants entering the receiving surface water sewer. |
| **Amenity** | Integration of the attenuation system beneath the external courts maximises the available recreational space whilst avoiding the need for separate above ground attenuation features. |
| **Biodiversity** | Whilst opportunities for ecological enhancement are limited due to the constrained urban brownfield nature of the site, the drainage strategy provides an overall environmental improvement through the incorporation of sustainable drainage principles and controlled runoff management. |

## 5.1 Water Quality

Surface water runoff passing through the permeable pavement construction receives treatment through filtration and settlement within the open graded granular sub-base prior to discharge. This process assists in the removal of sediments and associated pollutants generated by the development, providing an improvement in runoff quality before entering the public combined water sewer network.

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A water quality assessment has been undertaken in accordance with the CIRIA SuDS Manual (C753) using the Simple Index Approach. The assessment compares the pollution hazard associated with the proposed land use against the pollution mitigation provided by the proposed SuDS treatment train to confirm that an appropriate level of treatment is achieved.

For the proposed development, the runoff area has been classified as non-residential parking with infrequent vehicle movements, resulting in a Low Pollution Hazard Index. The proposed permeable pavement treatment train provides Pollution Mitigation Indices which exceed the required Pollution Hazard Indices for all pollutant categories, as summarised below.

| **Pollutant** | **Pollution Hazard Index** | **Pollution Mitigation Index** | **Compliance** |
|---|---|---|---|
| Total Suspended Solids | 0.5 | 0.7 | Sufficient |
| Metals | 0.4 | 0.6 | Sufficient |
| Hydrocarbons | 0.4 | 0.7 | Sufficient |

The assessment confirms that the proposed permeable pavement treatment train provides sufficient treatment for all anticipated pollutants associated with the proposed development prior to discharge to the receiving combined water sewer. The completed CIRIA C753 Simple Index Assessment is included within Appendix D.

Given the nature of the proposed development as a recreational sports facility with a relatively low pollution potential, the proposed level of treatment is considered appropriate and proportionate to the anticipated runoff characteristics.

## 5.2 Long Term Betterment

The redevelopment of the existing hard surfaced brownfield site provides a significant improvement over the existing drainage regime through the introduction of controlled discharge, on-site attenuation and sustainable drainage principles.

Key benefits of the proposed strategy include:

- Reduction in peak surface water discharge from the existing unrestricted brownfield runoff to a maximum of 5.0 l/s.

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- Provision of 157.75 $m^3$ of online attenuation storage designed for the 1 in 30 year rainfall event including a 40% climate change allowance and the 1 in 100 year rainfall event including a 45% climate change allowance.
- Integration of attenuation storage within the permeable court construction, eliminating the need for separate attenuation structures.
- Improved surface water quality through filtration within the permeable court construction, supported by a CIRIA C753 Simple Index Assessment confirming sufficient pollutant mitigation.
- A robust and easily maintainable drainage solution requiring straightforward long-term inspection and maintenance.

The proposed drainage strategy therefore delivers a practical, sustainable and resilient drainage solution which provides a significant betterment over the existing site whilst remaining appropriate for the operational requirements and spatial constraints of the proposed development.

## 6. Foul Drainage

Foul water generated by the proposed development will comprise domestic wastewater associated with the welfare facilities serving the padel courts. Given the nature of the development, foul flows are anticipated to be relatively modest and no trade effluent or process water will be generated.

A Pre-Development Enquiry (PDE) was submitted to United Utilities in advance of the proposed development. In their response, United Utilities confirmed their preference for a connection to the combined sewer system at an unrestricted rate at manhole reference SD9902.

In response to this, the proposed drainage strategy combines foul and surface water drainage on site, discharging via a single new gravity connection to the public combined water sewer at manhole reference SD9902, as referenced in Section 3.1. The combined discharge will be restricted to 5.0 l/s via a Hydro-Brake flow control device.

Approval of the proposed sewer connection will be obtained from United Utilities through the Section 106 application process prior to commencement of the works, with the detailed design and construction undertaken in accordance with the sewerage undertaker's requirements.

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The proposed foul drainage strategy is considered appropriate for the scale and nature of the development and provides a simple, robust and maintainable solution for the lifetime of the scheme.

## 7. Drainage Maintenance

The proposed drainage system has been designed to provide a robust, efficient and maintainable solution throughout the operational life of the development. In accordance with the principles set out within the CIRIA SuDS Manual (C753), all drainage components have been selected to facilitate straightforward inspection, routine maintenance and long-term operation, thereby ensuring the continued hydraulic performance of the drainage network.

A proportionate maintenance regime has been developed for the principal drainage assets associated with the scheme, including the permeable court construction, proprietary diffuser units, surface water pipework, inspection chambers, Hydro-Brake flow control chamber, sub-base attenuation storage and the final outfall connection.

Routine inspections will ensure that the accumulation of silt, debris and vegetation is identified and removed before the performance of the drainage system is adversely affected. Regular maintenance of the Hydro-Brake flow control chamber and associated inspection chambers will ensure the approved discharge rate is maintained, whilst inspection and maintenance of the permeable court construction will preserve both its hydraulic performance and water quality treatment function.

The proposed maintenance activities are considered proportionate to the scale and nature of the development and will ensure that the drainage system continues to operate in accordance with the approved design throughout its operational life. The recommended inspection and maintenance regime is summarised in Table 7.1 below (see below and overleaf).

Table 7.1 – Proposed Drainage Maintenance Schedule

| Asset | Inspection | Maintenance Action | Frequency |
|---|---|---|---|
| **Permeable outdoor court surface** | Check for ponding, debris, sediment | Sweep to remove silt and debris, remove vegetation where necessary and | Quarterly and following |

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| Asset | Inspection | Maintenance Action | Frequency |
|---|---|---|---|
| | accumulation and surface damage. | repair any localised defects to maintain permeability. | significant rainfall events. |
| **Diffuser units** | Inspect for blockage or evidence of restricted flow. | Flush through the downstream inspection chamber and remove any accumulated debris where necessary. | Six monthly. |
| **Surface water pipework** | Inspect for blockage, surcharge or signs of structural damage. | Jet clean pipework and undertake repairs where required. | Annually or as required. |
| **Catchpits and inspection chambers** | Inspect silt levels, benching and general structural condition. | Remove accumulated silt and debris and repair defects where necessary. | Six monthly. |
| **Hydro-Brake flow control chamber** | Inspect for debris accumulation and confirm correct operation of the flow control device. | Clean the Hydro-Brake, remove any obstructions and ensure the design discharge rate is maintained. | Six monthly and following significant storm events. |
| **Permeable sub-base attenuation system** | Inspect inlets, outlets and upstream sediment control measures for evidence of blockage or reduced performance. | Maintain upstream silt control measures and flush the system where required to preserve storage capacity and hydraulic performance. | Annually. |
| **Outfall connection** | Inspect for blockage, erosion or damage at the point of discharge. | Remove debris and undertake repairs where necessary to maintain unrestricted discharge. | Six monthly. |

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Responsibility for the ongoing inspection and maintenance of the private drainage infrastructure will rest with the site owner or appointed management company, ensuring the drainage system continues to operate in accordance with the approved design throughout its operational life.

## Conclusion

The proposed drainage strategy has been developed in accordance with current national guidance and industry best practice. A summary of compliance is provided in Table 8.1 (see below and overleaf).

Table 8.1 – Drainage Strategy Compliance Summary

| Requirement | Compliance |
|---|---|
| **Drainage Hierarchy** | **Compliant** – The drainage strategy has been developed in accordance with the drainage hierarchy. Following assessment of alternative disposal methods, discharge to the public combined sewer has been identified as the most sustainable reasonably practicable solution, with a combined foul and surface water connection proposed at manhole reference SD9902 in Chapeltown Street. This strategy is also well suited to the site considering the nature of the temporary planning application it's associated to. |
| **Sustainable Drainage Systems (SuDS)** | **Compliant** – The strategy incorporates permeable surfacing, online attenuation, source control, water quality treatment and controlled discharge in accordance with SuDS principles. |
| **Surface Water Betterment** | **Compliant** – Peak surface water discharge has been reduced from the existing unrestricted brownfield runoff to a controlled discharge rate of 5.0 l/s, providing a significant betterment over the existing site. |
| **Climate Change Resilience** | **Compliant** – Hydraulic modelling has been undertaken using the latest Environment Agency Upper End climate change allowances of +40% for the 1 in 30 year event and +45% for the 1 in 100 year event, demonstrating appropriate resilience throughout the design life of the development. |

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| Requirement | Compliance |
|---|---|
| **Surface Water Attenuation** | **Compliant** – A total of 157.75 $m^3$ of online attenuation storage is provided beneath the permeable court construction to manage runoff up to the 1 in 100 year plus climate change event. |
| **Water Quality** | **Compliant** – A CIRIA C753 Simple Index Assessment confirms that the proposed permeable pavement treatment train provides sufficient mitigation for total suspended solids, metals and hydrocarbons prior to discharge. |
| **Foul Drainage** | **Compliant** – Foul and surface water drainage are combined on site and discharged via a single new gravity connection to the existing public combined sewer at manhole reference SD9902, via a Section 106 sewer connection application. |
| **Long Term Maintenance** | **Compliant** – A proportionate inspection and maintenance schedule has been prepared in accordance with the principles of the CIRIA SuDS Manual (C753) to ensure the long-term performance of the drainage system. |
| **National Guidance** | **Compliant** – The drainage strategy has been prepared in accordance with the National Planning Policy Framework (NPPF), Non-Statutory Technical Standards for Sustainable Drainage Systems, CIRIA C753 SuDS Manual and Building Regulations Approved Document H. |

Accordingly, the proposed drainage strategy is considered to provide a practical, sustainable and deliverable drainage solution which is suitable in support of the associated planning application.

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## Appendix A

**P26195-DGC-Z1-GF-DR-C-0001-P03 – Drainage Strategy**

PROPOSED COMBINED WATER EFFLUENT TO DISCHARGE TO EXISTING COMBINED WATER SEWER AT A RATE OF 5.0 l/s VIA ONE NEW GRAVITY CONNECTION TO EXISTING UNITED UTILITIES (UU) MANHOLE. CONNECTION TO BE AGREED WITH UU VIA S106 APPLICATION.

CW MH 9902
CL: 42.30
IL: 36.35

SURFACE WATER FLOW TO BE RESTRICTED VIA A HYDRO-BRAKE FLOW CONTROL DEVICE TO A RATE OF 5.0 l/s, DESIGNED TO OFFER A SIGNIFICANT BETTERMENT TO THE BROWNFIELD RUN OFF RATE FOR THE SITE (18.9 l/s FOR 1 in 1yr 5min EVENT). THE GREENFIELD RUNOFF RATE FOR THE SITE: (1ha = 6.42l/s) ∴ (0.35ha = 2.25l/s).

PROPOSED PERMEABLE ASPHALT SUB BASE STORAGE:

DESIGN BASED ON DEVELOPABLE AREA OF 0.3435 ha (REFER TO PROPOSED CATCHMENT PLAN).

| | |
|---|---|
| BASE LEVEL: | 41.95m AOD |
| SURFACE LEVEL: | 42.90m AOD (MIN) |
| TOP WATER LEVEL: | 42.60m AOD |
| FREEBOARD DEPTH: | 0.300m |

WATER VOLUME 157.75m³ TO ACCOMMODATE STORAGE FOR ALL STORM EVENTS UP TO AND INCLUDING A 1 IN 100 YEAR RETURN PERIOD WITH 45% CLIMATE CHANGE.

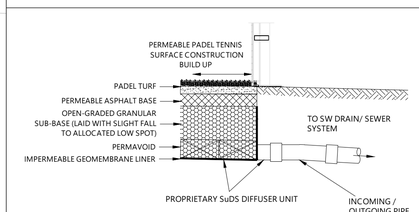
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CW MH 0901
CL: TBC
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SPARKLE ST
COMET ST
CHAPELTOWN ST
CONGUL ST
BAIRD ST

PROPOSED SW IMPERMEABLE AREA PLAN
SCALE: 1:500




TYPICAL SPORTS PITCH PERMEABLE CONSTRUCTION OUTFALL DETAIL
SCALE: 1:20

KEY:

- PROPOSED COMBINED WATER LATERAL WITH BACKDROP
- PROPOSED PRIVATE SURFACE WATER DRAIN WITH 300Ø PPIC, UNLESS OTHERWISE NOTED
- PROPOSED PRIVATE FOUL WATER DRAIN WITH 450Ø PPIC, UNLESS OTHERWISE NOTED
- PROPOSED PRIVATE COMBINED WATER DRAIN WITH 450Ø PPIC, UNLESS OTHERWISE NOTED
- PROPOSED PRIVATE SW HYDRO-BRAKE CONTROL CHAMBER
- PERMEABLE ASPHALT WITH DEEP LINED GRAVEL SUB-BASE STORAGE BENEATH SPECIALIST TENNIS TURF SURFACE WITH OUTFALL UNIT
- PROPOSED PRIVATE ACO (OR SIMILAR) CHANNEL DRAIN
- EXISTING PUBLIC SURFACE WATER SEWER
- EXISTING PUBLIC COMBINED WATER SEWER

NOTES

1.0 GENERAL

1.1 DRAWING ISSUED FOR DRAINAGE STRATEGY ONLY; NOT FOR CONSTRUCTION.

1.2 READ IN CONJUNCTION WITH ALL OTHER CONSULTANT DRAWINGS.

1.3 LEVELS, ILS AND GRADIENTS SHOWN ARE INDICATIVE; TO BE CONFIRMED ON SITE AT DETAILED DESIGN.

1.4 EXISTING SERVICES AND CONSTRAINTS TO BE CONFIRMED BEFORE SETTING OUT.

2.0 SURFACE WATER DRAINAGE

2.1 SURFACE WATER DISCHARGE RESTRICTED TO 5.0 l/s TO THE EXISTING COMBINED WATER SEWER TO THE NORTH OF THE SITE.

2.2 SUB-BASE STORAGE SIZED FOR 3,435 m² IMPERMEABLE AREA, DESIGNED TO THE 1 IN 100 YEAR +45% CLIMATE CHANGE EVENT.

2.3 SUB-BASE SIZE AND LOCATION SHOWN ARE INDICATIVE; STORAGE VOLUME TO BE MAINTAINED AT DETAILED DESIGN.

2.4 COVER LEVELS AND LOW-POINT PICK-UP LOCATIONS TO BE CONFIRMED ONCE FULL TOPOGRAPHICAL SURVEY IS AVAILABLE.

2.5 EXCEEDANCE FLOWS TO BE DIRECTED AWAY FROM BUILDINGS AND SENSITIVE AREAS.

3.0 FOUL DRAINAGE

3.1 FOUL DISCHARGE PROPOSED TO THE COMBINED WATER SEWER TO THE NORTH OF THE SITE.

3.3 AN ASSUMED FREE DISCHARGE RATE HAS BEEN ADOPTED FOR STRATEGY.

4.0 DESIGN & CONSTRUCTION

4.1 ALL DRAINAGE TO COMPLY WITH NPPF AND BUILDING REGULATIONS STANDARDS.

4.2 SAFE ACCESS FOR INSPECTION AND MAINTENANCE TO BE PROVIDED TO ALL CHAMBERS & FLOW CONTROL.

4.3 FINAL DESIGN SUBJECT TO DETAILED SURVEY, UTILITY CHECKS, AND GEOTECHNICAL REVIEW.

4.4 CONTRACTOR TO MAINTAIN TEMPORARY DRAINAGE AND POLLUTION CONTROLS DURING CONSTRUCTION WORKS.

| REV: | AMENDMENTS: | DRN: | CHK: | DATE: |
|---|---|---|---|---|
| P03 | Minor drawing amendments | BW | GP | 13.07.26 |
| P02 | Updated SW discharge Outfall Location | GP | EC | 10.07.26 |
| P01 | First Issue | BW | GP | 24.06.26 |

PROJECT:
158 Padel
Baird Street
Manchester

DRAWING TITLE:
Drainage Strategy

CLIENT:
Padel 16

DRAWING NUMBER:
P26195-DGC-Z1-GF-DR-C-0001

| REVISION: | SHEET SIZE: | SCALE: |
|---|---|---|
| P03 | A1 | 1:200 |
| DRAWN BY: | CHECKED BY: | DATE: |
| BW | GP | 24.06.2026 |

STATUS:
PRELIMINARY

DGC CONSULTING ENGINEERS
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Printed:14.07.2026 File Location: C:\Users\Ben Wheeler\OneDrive - DGC Consulting Engineers\DGC - Documents\Projects\2026\26195 - 158 Padel, Baird St, Manchester\Engineer\Civil\CAD\DWGs\26195-DGC-Z1-GF-DR-C-0001-P03 - Drainage Strategy.dwg

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## Appendix B

## United Utilities Pre-Development Enquiry Response

# WASTEWATER PRE-DEVELOPMENT ENQUIRY

United Utilities Grasmere House, 2nd Floor
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

06.07.26

Dear Ben**,**

Pre-Development Enquiry for Baird Street, Manchester M1 2WQ. UU Reference Number: **09638440**

We have assessed your application based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your strategy will need review by other authorities as part of the planning process. We advise conducting necessary site investigations to confirm viability of your proposals.

## Modelled Flood Risk

Please see the image on **page 3** for details

I can confirm that we do not have modelled flood risk within the vicinity of the proposed development.

Please note that our modelling data is indicative, and only representative of the 1:100year storm event.

Please see **comment 2** of the attached guidance sheet

## Asset Protection

1. We have reviewed our records and can confirm that there does not appear to be any charted public sewers located within the boundary of the proposed development.

Please see **comment 3** of the attached guidance sheet and **Working Near Our Pipelines Guidance document**

## Foul Water

Foul flow from this site will be allowed to drain into the public combined sewer system.

Our preferred point of discharge would be to the North of your proposed development at an unrestricted rate.

**Manhole reference** SD 9902, **Grid reference** 384957, 397958

Please see the images on **page 3** for clarification

# WASTEWATER PRE-DEVELOPMENT ENQUIRY

## Surface Water

Follow the National Planning Policy Guidance drainage hierarchy and Provide evidence for discounting higher options before considering public sewer discharge. Consult the Lead Local Flood Authority regarding surface water concerns.

Please see comment **4** within the guidance sheet

## Infiltration

Please see comment **4** within the guidance sheet

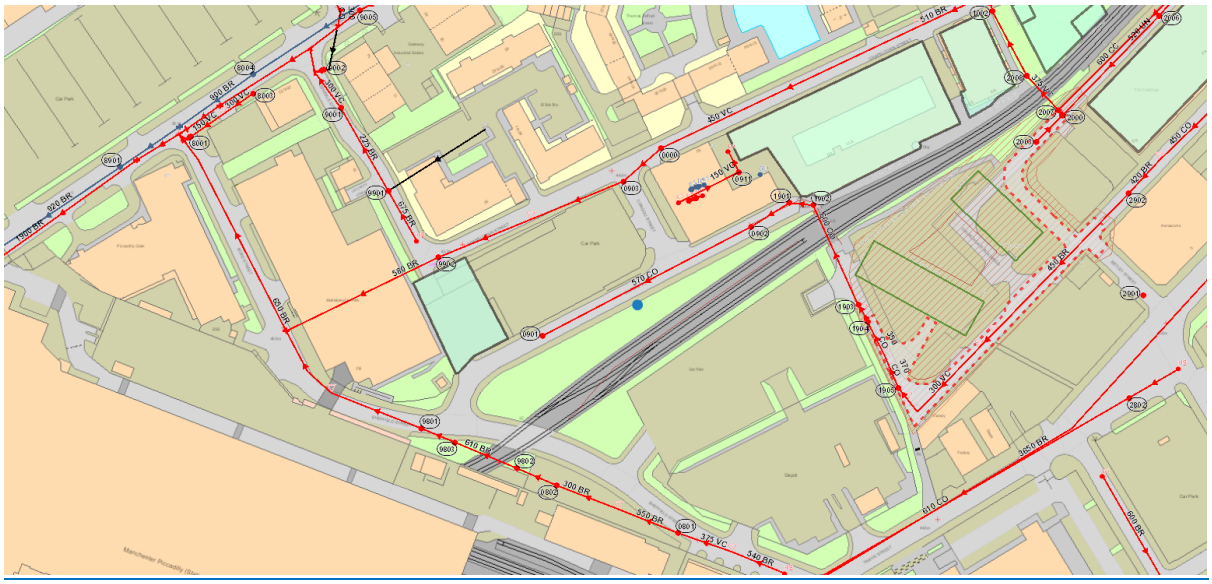
## Public Sewer

United Utilities will consider a connection to the mm diameter public combined sewer within Chapeltown Street located North of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities requests that any agreed rate does not exceed 20 l/s.

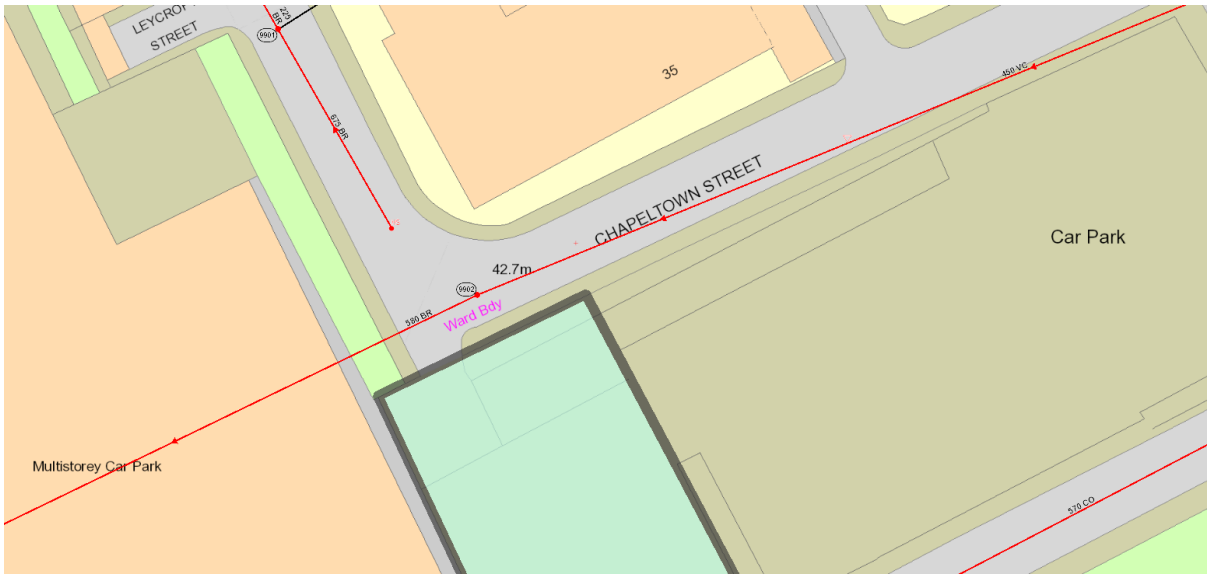
**Manhole reference** SD9902, **Grid reference** 384957, 397958

Please see images on **page 3** for clarification

## Site Images



# WASTEWATER PRE-DEVELOPMENT ENQUIRY



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## Appendix C

## Site3D Hydraulic Modelling Results

# Network Details

## Manhole Schedule

| Manhole | Catchment Area (ha) | Size (mm) | Type | CL (m) | IL (m) | Depth To Soffit (m) | Easting (m) | Northing (m) |
|---|---|---|---|---|---|---|---|---|
| PS8 | 0.050 | 300 | Type E | 44.300 | 43.550 | 0.600 | 373858.683 | 401512.534 |
| PS7 | 0.051 | 300 | Type E | 44.300 | 43.550 | 0.600 | 373863.891 | 401546.575 |
| PS6 | 0.000 | 450 | Type E | 44.300 | 43.418 | 0.732 | 373863.891 | 401533.416 |
| PS5 | 0.000 | 600 | Type E | 44.300 | 43.266 | 0.809 | 373858.813 | 401533.448 |
| PS14 | 0.045 | 600 | Unknown | 44.300 | 42.050 | 2.025 | 373803.348 | 401533.466 |
| PS13 | 0.051 | 600 | Type E | 42.900 | 42.143 | 0.532 | 373801.509 | 401511.972 |
| PS9 | 0.050 | 600 | Type E | 44.300 | 43.250 | 0.900 | 373801.011 | 401546.230 |
| PS12 | 0.000 | 900 | Type E | 42.900 | 41.960 | 0.640 | 373801.369 | 401533.491 |
| PS3 | 0.000 | 450 | Type E | 42.900 | 41.950 | 0.650 | 373783.131 | 401534.432 |
| PS2 | 0.095 | 900 | Type E | 42.900 | 41.438 | 1.162 | 373783.171 | 401536.741 |
| PS1 | 0.000 | 1500 | Type E | 42.900 | 41.400 | 1.350 | 373783.216 | 401541.646 |
| S4 | 0.000 | 1200 | Type B | 42.300 | 40.531 | 1.619 | 373782.034 | 401565.668 |
| S3 | 0.000 | 1200 | Unknown | 41.700 | 35.199 | 6.351 | 373781.772 | 401610.311 |
| S2 | 0.000 | 1200 | Type B | 38.000 | 34.902 | 2.948 | 373776.738 | 401654.509 |
| S1 | 0.000 | 1200 | Type A | 37.760 | 32.630 | 4.980 | 373756.310 | 401660.687 |

## Pipe Schedule

| Pipe Number | US Manhole | US IL (m) | DS Manhole | DS IL (m) | Shape | Dimension (mm) | Length (m) | Gradient (1:x) | Roughness (mm) | US Depth To Soffit (m) | DS Depth To Soffit (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.000 | PS8 | 43.550 | PS5 | 43.341 | Circ | 150 | 20.914 | 100 | 0.600 | 0.600 | 0.809 |
| 2.000 | PS7 | 43.550 | PS6 | 43.418 | Circ | 150 | 13.159 | 100 | 0.600 | 0.600 | 0.732 |
| 2.001 | PS6 | 43.418 | PS5 | 43.341 | Circ | 150 | 5.079 | 66 | 0.600 | 0.732 | 0.809 |
| 1.001 | PS5 | 43.266 | PS14 | 42.896 | Circ | 225 | 55.465 | 150 | 0.600 | 0.809 | 1.179 |
| 1.002 | PS14 | 42.050 | PS12 | 42.035 | Circ | 225 | 1.979 | 132 | 0.600 | 2.025 | 0.640 |
| 3.000 | PS13 | 42.143 | PS12 | 42.035 | Circ | 225 | 21.519 | 199 | 0.600 | 0.532 | 0.640 |
| 4.000 | PS9 | 43.250 | PS12 | 42.110 | Circ | 150 | 12.744 | 11 | 0.600 | 0.900 | 0.640 |
| 1.003 | PS12 | 41.960 | PS3 | 41.950 | Circ | 300 | 18.262 | 1826 | 0.600 | 0.640 | 0.650 |
| 1.004 | PS3 | 41.950 | PS2 | 41.438 | Circ | 300 | 2.310 | 5 | 0.600 | 0.650 | 1.162 |
| 1.005 | PS2 | 41.438 | PS1 | 41.400 | Circ | 300 | 4.905 | 128 | 0.600 | 1.162 | 1.200 |
| 1.006 | PS1 | 41.400 | S4 | 40.531 | Circ | 150 | 24.051 | 28 | 0.600 | 1.350 | 1.619 |
| 1.007 | S4 | 40.531 | S3 | 35.199 | Circ | 150 | 44.644 | 8 | 0.600 | 1.619 | 6.351 |
| 1.008 | S3 | 35.199 | S2 | 34.902 | Circ | 150 | 44.484 | 150 | 0.600 | 6.351 | 2.948 |
| 1.009 | S2 | 34.902 | S1 | 32.630 | Circ | 150 | 21.342 | 9 | 0.600 | 2.948 | 4.980 |

# Outfall Details

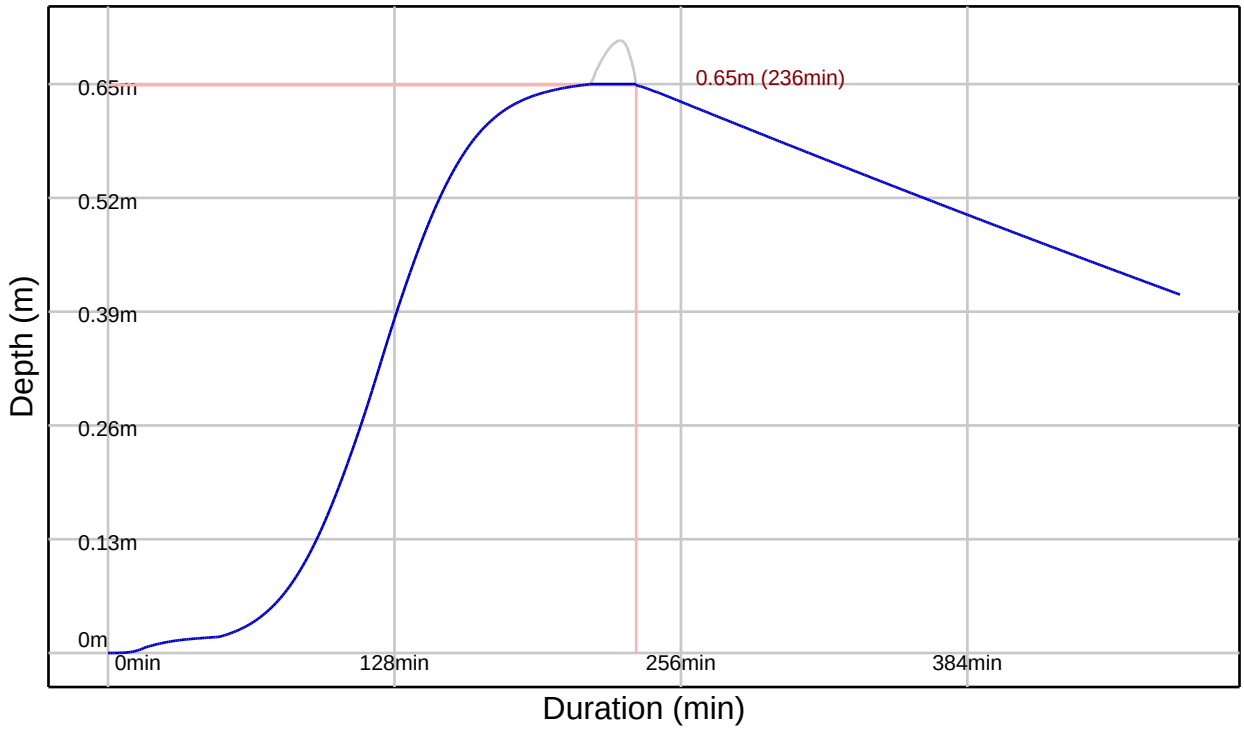
## Outfall Manhole S1 : Free Discharge

# Flow Control Details

## Tank Structure at Manhole PS3

| Tank Invert (m) | Tank Height (m) | Porosity Ratio (%) | Area (m2) | Effective Area (m2) Area x Porosity Ratio | Max Storage (m3) Effective Area x Height | Infil Base (m/hr) | Infil Side (m/hr) | Safety Factor |
|---|---|---|---|---|---|---|---|---|
| 41.950 | 0.650 | 40.00 | 606.240 | 242.496 | 157.622 | 0.00000000 | 0.00000000 | 2.00 |

## Permeable Sub Base at PS3 (100Yr+45% 240Min Winter)

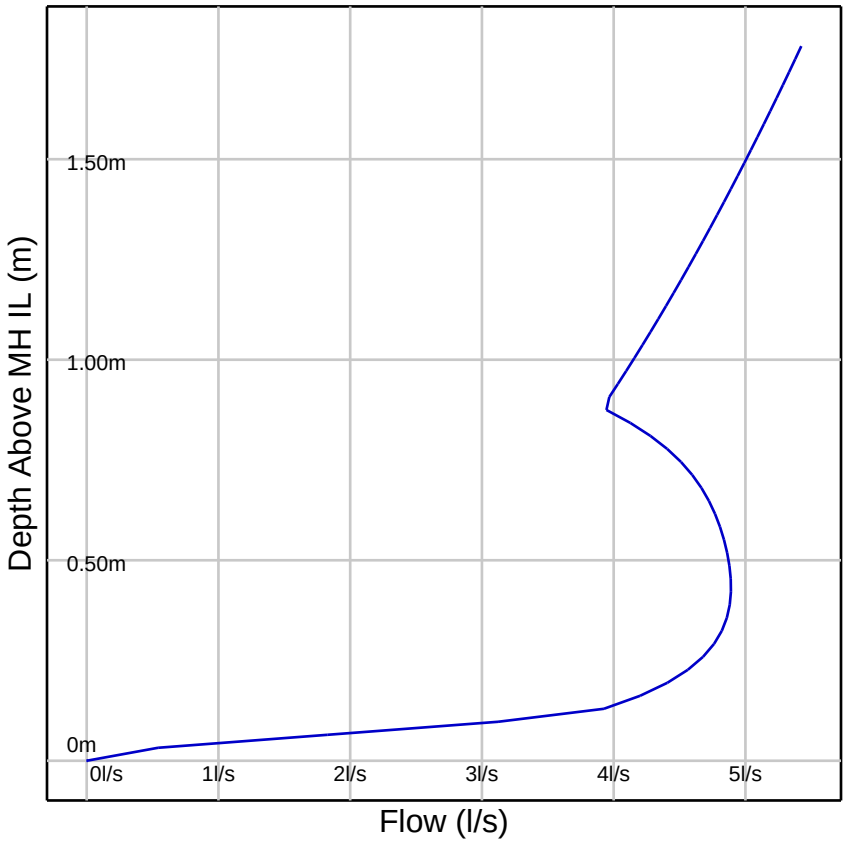



## Controls within Manhole PS1

### Hydro-Brake® Optimum Control

| Model Ref | Design Depth (m) | Design Flow (l/s) | Invert Offset (m) | FF Head (m) | FF Flow (l/s) | KF Head (m) | KF Flow (l/s) |
|---|---|---|---|---|---|---|---|
| SHE-0098-5000-1500-5000 | 1.500 | 5.000 | 0.000 | 0.432 | 4.890 | 0.879 | 3.910 |

## Hydro-Brake® Optimum Control from PS1 to S4



## Simulation Settings

FSR: M5-60=18.00, R=0.36, Locale=England and Wales

Summer (Cv: 0.75), Winter (Cv: 0.84)

Global Time of Entry: 5.0 mins

Durations (mins): 15, 30, 60, 120, 240, 360, 480, 960, 1440

Return Periods (yrs) + Climate Change: (1, +0%), (2, +0%), (10, +0%), (30, +0%), (100, +45%)

Manhole Flood Risk Freeboard: 0.300m

# Simulated Rainfall Events

| Storm | Average Intensity (mm/hr) | Runoff Continuity % | Flow Continuity % | Storm | Average Intensity (mm/hr) | Runoff Continuity % | Flow Continuity % |
|---|---|---|---|---|---|---|---|
| 1Yr 15Min Winter | 31.890 | 0.00 | 0.00 | 10Yr 240Min Winter | 8.078 | 0.00 | 0.00 |
| 1Yr 15Min Summer | 31.890 | 0.00 | 0.00 | 10Yr 360Min Summer | 5.998 | 0.00 | 0.00 |
| 1Yr 30Min Winter | 20.563 | 0.00 | 0.55 | 10Yr 360Min Winter | 5.998 | 0.00 | 0.00 |
| 1Yr 30Min Summer | 20.563 | 0.00 | 0.00 | 10Yr 480Min Summer | 4.854 | 0.00 | 0.00 |
| 1Yr 60Min Winter | 12.828 | 0.00 | 0.46 | 10Yr 480Min Winter | 4.854 | 0.00 | 0.00 |
| 1Yr 60Min Summer | 12.828 | 0.00 | 0.00 | 10Yr 960Min Summer | 2.907 | 0.00 | 0.00 |
| 1Yr 120Min Winter | 7.878 | 0.00 | 0.00 | 10Yr 960Min Winter | 2.907 | 0.00 | 0.00 |
| 1Yr 120Min Summer | 7.878 | 0.00 | 0.00 | 10Yr 1440Min Summer | 2.151 | 0.00 | 0.00 |
| 1Yr 240Min Winter | 4.824 | 0.00 | 0.00 | 10Yr 1440Min Winter | 2.151 | 0.00 | 0.00 |
| 1Yr 240Min Summer | 4.824 | 0.00 | 0.00 | 30Yr 15Min Summer | 65.624 | 0.00 | 0.68 |
| 1Yr 360Min Winter | 3.628 | 0.00 | 0.00 | 30Yr 15Min Winter | 65.624 | 0.00 | 0.57 |
| 1Yr 360Min Summer | 3.628 | 0.00 | 0.00 | 30Yr 30Min Summer | 43.507 | 0.00 | 0.47 |
| 1Yr 480Min Winter | 2.960 | 0.00 | 0.00 | 30Yr 30Min Winter | 43.507 | 0.00 | 0.47 |
| 1Yr 480Min Summer | 2.960 | 0.00 | 0.00 | 30Yr 60Min Summer | 27.653 | 0.00 | 0.41 |
| 1Yr 960Min Summer | 1.812 | 0.00 | 0.00 | 30Yr 60Min Winter | 27.653 | 0.00 | 0.41 |
| 1Yr 960Min Winter | 1.812 | 0.00 | 0.00 | 30Yr 120Min Summer | 17.088 | 0.00 | 0.26 |
| 1Yr 1440Min Winter | 1.360 | 0.00 | 0.00 | 30Yr 120Min Winter | 17.088 | 0.00 | 0.27 |
| 1Yr 1440Min Summer | 1.360 | 0.00 | 0.00 | 30Yr 240Min Summer | 10.331 | 0.00 | 0.00 |
| 2Yr 15Min Winter | 36.942 | 0.00 | 0.69 | 30Yr 240Min Winter | 10.331 | 0.00 | 0.00 |
| 2Yr 15Min Summer | 36.942 | 0.00 | 0.00 | 30Yr 360Min Summer | 7.624 | 0.00 | 0.00 |
| 2Yr 30Min Summer | 23.956 | 0.00 | 0.56 | 30Yr 360Min Winter | 7.624 | 0.00 | 0.00 |
| 2Yr 30Min Winter | 23.956 | 0.00 | 0.54 | 30Yr 480Min Summer | 6.146 | 0.00 | 0.00 |
| 2Yr 60Min Summer | 15.001 | 0.00 | 0.45 | 30Yr 480Min Winter | 6.146 | 0.00 | 0.00 |
| 2Yr 60Min Winter | 15.001 | 0.00 | 0.44 | 30Yr 960Min Summer | 3.643 | 0.00 | 0.00 |
| 2Yr 120Min Summer | 9.225 | 0.00 | 0.00 | 30Yr 960Min Winter | 3.643 | 0.00 | 0.00 |
| 2Yr 120Min Winter | 9.225 | 0.00 | 0.00 | 30Yr 1440Min Summer | 2.677 | 0.00 | 0.00 |
| 2Yr 240Min Summer | 5.634 | 0.00 | 0.00 | 30Yr 1440Min Winter | 2.677 | 0.00 | 0.00 |
| 2Yr 240Min Winter | 5.634 | 0.00 | 0.00 | 100Yr+45% 15Min Summer | 122.849 | 0.00 | 0.73 |
| 2Yr 360Min Winter | 4.221 | 0.00 | 0.00 | 100Yr+45% 15Min Winter | 122.849 | 0.00 | 0.77 |
| 2Yr 360Min Summer | 4.221 | 0.00 | 0.00 | 100Yr+45% 30Min Summer | 82.249 | 0.00 | 0.72 |
| 2Yr 480Min Summer | 3.435 | 0.00 | 0.00 | 100Yr+45% 30Min Winter | 82.249 | 0.00 | 0.81 |
| 2Yr 480Min Winter | 3.435 | 0.00 | 0.00 | 100Yr+45% 60Min Summer | 52.627 | 0.00 | 0.84 |
| 2Yr 960Min Summer | 2.089 | 0.00 | 0.00 | 100Yr+45% 60Min Winter | 52.627 | 0.00 | 0.99 |
| 2Yr 960Min Winter | 2.089 | 0.00 | 0.00 | 100Yr+45% 120Min Summer | 32.592 | 0.00 | 0.69 |
| 2Yr 1440Min Summer | 1.561 | 0.00 | 0.00 | 100Yr+45% 120Min Winter | 32.592 | 0.00 | 0.86 |
| 2Yr 1440Min Winter | 1.561 | 0.00 | 0.00 | 100Yr+45% 240Min Summer | 19.616 | 0.00 | 0.30 |
| 10Yr 15Min Summer | 51.979 | 0.00 | 0.70 | 100Yr+45% 240Min Winter | 19.616 | 0.00 | 0.65 |
| 10Yr 15Min Winter | 51.979 | 0.00 | 0.69 | 100Yr+45% 360Min Summer | 14.378 | 0.00 | 0.13 |
| 10Yr 30Min Winter | 34.153 | 0.00 | 0.52 | 100Yr+45% 360Min Winter | 14.378 | 0.00 | 0.18 |
| 10Yr 30Min Summer | 34.153 | 0.00 | 0.51 | 100Yr+45% 480Min Summer | 11.541 | 0.00 | 0.00 |
| 10Yr 60Min Summer | 21.577 | 0.00 | 0.41 | 100Yr+45% 480Min Winter | 11.541 | 0.00 | 0.09 |
| 10Yr 60Min Winter | 21.577 | 0.00 | 0.42 | 100Yr+45% 960Min Summer | 6.764 | 0.00 | 0.00 |
| 10Yr 120Min Winter | 13.307 | 0.00 | 0.26 | 100Yr+45% 960Min Winter | 6.764 | 0.00 | 0.00 |
| 10Yr 120Min Summer | 13.307 | 0.00 | 0.23 | 100Yr+45% 1440Min Winter | 4.934 | 0.00 | 0.00 |
| 10Yr 240Min Summer | 8.078 | 0.00 | 0.00 | 100Yr+45% 1440Min Summer | 4.934 | 0.00 | 0.00 |

# Simulation Results

Return Period (yrs) + Climate Change (%):

1yr+0%

## Manholes

| Manhole | Critical Storm | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Flood (m3) | Status |
|---|---|---|---|---|---|---|---|
| PS8 | 15 min Winter | 8 | 43.617 | 0.067 | 7.359 | | OK |
| PS7 | 15 min Winter | 8 | 43.620 | 0.070 | 7.549 | | OK |
| PS6 | 15 min Winter | 8 | 43.481 | 0.062 | 7.500 | | OK |
| PS5 | 15 min Winter | 9 | 43.356 | 0.090 | 14.255 | | OK |
| PS14 | 15 min Winter | 7 | 42.363 | 0.313 | 17.478 | | Surcharged |
| PS13 | 15 min Winter | 7 | 42.356 | 0.212 | 7.101 | | OK |
| PS9 | 15 min Winter | 8 | 43.287 | 0.037 | 7.430 | | OK |
| PS12 | 15 min Winter | 7 | 42.358 | 0.398 | 30.158 | | Surcharged |
| PS3 | 60 min Winter | 50 | 42.040 | 0.090 | 3.643 | | OK |
| PS2 | 60 min Winter | 64 | 42.064 | 0.626 | 15.792 | | Surcharged |
| PS1 | 60 min Winter | 64 | 42.084 | 0.684 | 9.614 | | Surcharged |
| S4 | 480 min Winter | 234 | 40.559 | 0.028 | 4.889 | | OK |
| S3 | 480 min Winter | 235 | 35.264 | 0.065 | 4.889 | | OK |
| S2 | 480 min Winter | 235 | 34.931 | 0.029 | 4.889 | | OK |
| S1 | 480 min Winter | 235 | 32.659 | 0.029 | 4.889 | | Outfall |

## Conduits

| Pipe No. | Critical Storm | Peak (mins) | US Manhole | DS Manhole | Flow Depth (m) | Max Velocity (m/s) | Max Flow (l/s) | Flow / Capacity | Status |
|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 15 min Winter | 8 | PS8 | PS5 | 0.067 | 0.954 | 7.233 | 0.408 | OK |
| 2.000 | 15 min Winter | 8 | PS7 | PS6 | 0.066 | 1.005 | 7.500 | 0.423 | OK |
| 2.001 | 15 min Winter | 8 | PS6 | PS5 | 0.060 | 1.124 | 7.434 | 0.339 | OK |
| 1.001 | 15 min Winter | 9 | PS5 | PS14 | 0.090 | 0.975 | 14.460 | 0.342 | OK |
| 1.002 | 15 min Summer | 9 | PS14 | PS12 | 0.225 | 1.118 | 21.629 | 0.479 | OK |
| 3.000 | 15 min Winter | 8 | PS13 | PS12 | 0.219 | 0.535 | 11.446 | 0.312 | OK |
| 4.000 | 15 min Winter | 8 | PS9 | PS12 | 0.094 | 2.021 | 7.409 | 0.138 | OK |
| 1.003 | 15 min Winter | 8 | PS12 | PS3 | 0.160 | 1.659 | 50.980 | 2.017 | OK |
| 1.004 | 60 min Winter | 62 | PS3 | PS2 | 0.195 | 0.533 | 24.634 | 0.047 | OK |
| 1.005 | 60 min Winter | 76 | PS2 | PS1 | 0.300 | 0.473 | 26.794 | 0.273 | Surcharged |
| 1.006 | 360 min Winter | 285 | PS1 | S4 | 0.038 | 1.389 | 4.890 | 0.144 | OK |
| 1.007 | 480 min Winter | 235 | S4 | S3 | 0.047 | 1.042 | 4.890 | 0.079 | OK |
| 1.008 | 480 min Winter | 235 | S3 | S2 | 0.047 | 1.028 | 4.889 | 0.339 | OK |
| 1.009 | 480 min Winter | 235 | S2 | S1 | 0.029 | 2.038 | 4.889 | 0.084 | OK |

Return Period (yrs) + Climate Change (%):

2yr+0%

## Manholes

| Manhole | Critical Storm | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Flood (m3) | Status |
|---|---|---|---|---|---|---|---|
| PS8 | 15 min Winter | 8 | 43.624 | 0.074 | 8.529 | | OK |
| PS7 | 15 min Winter | 8 | 43.626 | 0.076 | 8.750 | | OK |
| PS6 | 15 min Winter | 8 | 43.486 | 0.068 | 8.692 | | OK |
| PS5 | 15 min Winter | 9 | 43.364 | 0.098 | 16.506 | | OK |
| PS14 | 15 min Winter | 7 | 42.377 | 0.327 | 20.379 | | Surcharged |
| PS13 | 15 min Winter | 7 | 42.397 | 0.254 | 8.227 | | Surcharged |
| PS9 | 15 min Winter | 8 | 43.290 | 0.040 | 8.612 | | OK |
| PS12 | 15 min Winter | 7 | 42.370 | 0.410 | 39.341 | | Surcharged |
| PS3 | 60 min Winter | 53 | 42.062 | 0.112 | 3.466 | | OK |
| PS2 | 60 min Winter | 69 | 42.080 | 0.641 | 6.297 | | Surcharged |
| PS1 | 60 min Winter | 69 | 42.100 | 0.700 | 4.614 | | Surcharged |
| S4 | 960 min Summer | 540 | 40.559 | 0.028 | 4.890 | | OK |
| S3 | 960 min Summer | 540 | 35.264 | 0.065 | 4.890 | | OK |
| S2 | 960 min Summer | 485 | 34.931 | 0.029 | 4.889 | | OK |
| S1 | 960 min Summer | 485 | 32.659 | 0.029 | 4.889 | | Outfall |

## Conduits

| Pipe No. | Critical Storm | Peak (mins) | US Manhole | DS Manhole | Flow Depth (m) | Max Velocity (m/s) | Max Flow (l/s) | Flow / Capacity | Status |
|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 15 min Winter | 8 | PS8 | PS5 | 0.073 | 0.990 | 8.385 | 0.473 | OK |
| 2.000 | 15 min Winter | 8 | PS7 | PS6 | 0.072 | 1.041 | 8.692 | 0.490 | OK |
| 2.001 | 15 min Winter | 8 | PS6 | PS5 | 0.065 | 1.166 | 8.618 | 0.392 | OK |
| 1.001 | 15 min Winter | 9 | PS5 | PS14 | 0.098 | 1.014 | 16.778 | 0.397 | OK |
| 1.002 | 15 min Summer | 8 | PS14 | PS12 | 0.225 | 1.152 | 25.081 | 0.556 | OK |
| 3.000 | 15 min Winter | 8 | PS13 | PS12 | 0.225 | 0.527 | 14.236 | 0.388 | OK |
| 4.000 | 15 min Winter | 8 | PS9 | PS12 | 0.095 | 2.108 | 8.587 | 0.160 | OK |
| 1.003 | 15 min Winter | 8 | PS12 | PS3 | 0.163 | 1.680 | 57.496 | 2.274 | OK |
| 1.004 | 60 min Winter | 97 | PS3 | PS2 | 0.206 | 0.713 | 32.548 | 0.062 | OK |
| 1.005 | 30 min Winter | 56 | PS2 | PS1 | 0.300 | 0.538 | 28.944 | 0.295 | Surcharged |
| 1.006 | 480 min Winter | 214 | PS1 | S4 | 0.038 | 1.389 | 4.890 | 0.144 | OK |
| 1.007 | 960 min Summer | 540 | S4 | S3 | 0.047 | 1.042 | 4.890 | 0.079 | OK |
| 1.008 | 960 min Summer | 540 | S3 | S2 | 0.047 | 1.028 | 4.889 | 0.339 | OK |
| 1.009 | 960 min Summer | 485 | S2 | S1 | 0.029 | 2.038 | 4.889 | 0.084 | OK |

Return Period (yrs) + Climate Change (%):

10yr+0%

## Manholes

| Manhole | Critical Storm | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Flood (m3) | Status |
|---|---|---|---|---|---|---|---|
| PS8 | 15 min Winter | 8 | 43.641 | 0.091 | 12.000 | | OK |
| PS7 | 15 min Winter | 8 | 43.644 | 0.094 | 12.311 | | OK |
| PS6 | 15 min Winter | 8 | 43.502 | 0.083 | 12.234 | | OK |
| PS5 | 15 min Winter | 9 | 43.386 | 0.120 | 23.213 | | OK |
| PS14 | 15 min Winter | 6 | 42.446 | 0.396 | 22.342 | | Surcharged |
| PS13 | 15 min Winter | 6 | 42.449 | 0.306 | 9.623 | | Surcharged |
| PS9 | 15 min Winter | 8 | 43.298 | 0.048 | 12.117 | | OK |
| PS12 | 15 min Winter | 6 | 42.438 | 0.478 | 37.734 | | Surcharged |
| PS3 | 120 min Winter | 101 | 42.140 | 0.190 | 3.338 | | OK |
| PS2 | 120 min Winter | 101 | 42.140 | 0.702 | 4.616 | | Surcharged |
| PS1 | 120 min Winter | 101 | 42.140 | 0.740 | 4.617 | | Surcharged |
| S4 | 960 min Winter | 447 | 40.559 | 0.028 | 4.890 | | OK |
| S3 | 960 min Winter | 448 | 35.264 | 0.065 | 4.889 | | OK |
| S2 | 960 min Winter | 449 | 34.931 | 0.029 | 4.889 | | OK |
| S1 | 960 min Winter | 449 | 32.659 | 0.029 | 4.889 | | Outfall |

## Conduits

| Pipe No. | Critical Storm | Peak (mins) | US Manhole | DS Manhole | Flow Depth (m) | Max Velocity (m/s) | Max Flow (l/s) | Flow / Capacity | Status |
|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 15 min Winter | 8 | PS8 | PS5 | 0.090 | 1.072 | 11.804 | 0.666 | OK |
| 2.000 | 15 min Winter | 8 | PS7 | PS6 | 0.089 | 1.125 | 12.234 | 0.690 | OK |
| 2.001 | 15 min Winter | 8 | PS6 | PS5 | 0.080 | 1.266 | 12.135 | 0.553 | OK |
| 1.001 | 15 min Winter | 9 | PS5 | PS14 | 0.119 | 1.106 | 23.687 | 0.560 | OK |
| 1.002 | 15 min Winter | 8 | PS14 | PS12 | 0.225 | 1.199 | 35.094 | 0.778 | OK |
| 3.000 | 15 min Winter | 8 | PS13 | PS12 | 0.225 | 0.547 | 16.278 | 0.444 | OK |
| 4.000 | 15 min Summer | 8 | PS9 | PS12 | 0.098 | 2.013 | 11.609 | 0.217 | OK |
| 1.003 | 120 min Winter | 100 | PS12 | PS3 | 0.186 | 1.008 | 18.806 | 0.744 | OK |
| 1.004 | 120 min Winter | 218 | PS3 | PS2 | 0.245 | 0.662 | 30.866 | 0.059 | OK |
| 1.005 | 120 min Summer | 176 | PS2 | PS1 | 0.300 | 0.496 | 27.556 | 0.281 | Surcharged |
| 1.006 | 960 min Winter | 447 | PS1 | S4 | 0.038 | 1.389 | 4.890 | 0.144 | OK |
| 1.007 | 960 min Winter | 448 | S4 | S3 | 0.047 | 1.042 | 4.890 | 0.079 | OK |
| 1.008 | 960 min Winter | 449 | S3 | S2 | 0.047 | 1.028 | 4.889 | 0.339 | OK |
| 1.009 | 960 min Winter | 449 | S2 | S1 | 0.029 | 2.038 | 4.889 | 0.084 | OK |

Return Period (yrs) + Climate Change (%):

30yr+0%

## Manholes

| Manhole | Critical Storm | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Flood (m3) | Status |
|---|---|---|---|---|---|---|---|
| PS8 | 15 min Winter | 8 | 43.658 | 0.108 | 15.148 | | OK |
| PS7 | 15 min Winter | 8 | 43.661 | 0.111 | 15.540 | | OK |
| PS6 | 15 min Winter | 8 | 43.516 | 0.097 | 15.436 | | OK |
| PS5 | 15 min Winter | 9 | 43.406 | 0.140 | 29.319 | | OK |
| PS14 | 15 min Winter | 6 | 42.485 | 0.435 | 28.521 | | Surcharged |
| PS13 | 15 min Winter | 6 | 42.484 | 0.341 | 12.161 | | Surcharged |
| PS9 | 15 min Winter | 8 | 43.304 | 0.054 | 15.295 | | OK |
| PS12 | 15 min Winter | 6 | 42.472 | 0.512 | 54.562 | | Surcharged |
| PS3 | 120 min Winter | 113 | 42.220 | 0.270 | 3.140 | | OK |
| PS2 | 120 min Winter | 113 | 42.220 | 0.781 | 4.382 | | Surcharged |
| PS1 | 120 min Winter | 112 | 42.220 | 0.820 | 4.384 | | Surcharged |
| S4 | 1440 min Winter | 699 | 40.559 | 0.028 | 4.890 | | OK |
| S3 | 1440 min Winter | 700 | 35.264 | 0.065 | 4.889 | | OK |
| S2 | 1440 min Winter | 700 | 34.931 | 0.029 | 4.889 | | OK |
| S1 | 1440 min Winter | 700 | 32.659 | 0.029 | 4.889 | | Outfall |

## Conduits

| Pipe No. | Critical Storm | Peak (mins) | US Manhole | DS Manhole | Flow Depth (m) | Max Velocity (m/s) | Max Flow (l/s) | Flow / Capacity | Status |
|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 15 min Winter | 8 | PS8 | PS5 | 0.106 | 1.122 | 14.896 | 0.840 | OK |
| 2.000 | 15 min Winter | 8 | PS7 | PS6 | 0.104 | 1.178 | 15.436 | 0.871 | OK |
| 2.001 | 15 min Winter | 8 | PS6 | PS5 | 0.093 | 1.332 | 15.315 | 0.697 | OK |
| 1.001 | 15 min Winter | 9 | PS5 | PS14 | 0.139 | 1.165 | 29.932 | 0.708 | OK |
| 1.002 | 15 min Winter | 9 | PS14 | PS12 | 0.225 | 1.205 | 43.396 | 0.961 | OK |
| 3.000 | 15 min Winter | 8 | PS13 | PS12 | 0.225 | 0.583 | 17.925 | 0.489 | OK |
| 4.000 | 15 min Winter | 8 | PS9 | PS12 | 0.102 | 1.632 | 15.262 | 0.285 | OK |
| 1.003 | 120 min Winter | 112 | PS12 | PS3 | 0.265 | 1.016 | 24.206 | 0.957 | OK |
| 1.004 | 120 min Winter | 113 | PS3 | PS2 | 0.285 | 0.303 | 5.750 | 0.011 | OK |
| 1.005 | 240 min Winter | 389 | PS2 | PS1 | 0.300 | 0.386 | 26.489 | 0.270 | Surcharged |
| 1.006 | 1440 min Winter | 698 | PS1 | S4 | 0.038 | 1.389 | 4.890 | 0.144 | OK |
| 1.007 | 1440 min Winter | 700 | S4 | S3 | 0.047 | 1.042 | 4.890 | 0.079 | OK |
| 1.008 | 1440 min Winter | 700 | S3 | S2 | 0.047 | 1.028 | 4.889 | 0.339 | OK |
| 1.009 | 1440 min Winter | 700 | S2 | S1 | 0.029 | 2.038 | 4.889 | 0.084 | OK |

Return Period (yrs) + Climate Change (%):

100yr+45%

## Manholes

| Manhole | Critical Storm | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Flood (m3) | Status |
|---|---|---|---|---|---|---|---|
| PS8 | 15 min Winter | 9 | 44.020 | 0.470 | 26.649 | | Flood Risk |
| PS7 | 15 min Winter | 9 | 44.004 | 0.454 | 27.338 | | Flood Risk |
| PS6 | 15 min Winter | 10 | 43.688 | 0.270 | 24.641 | | Surcharged |
| PS5 | 15 min Winter | 10 | 43.570 | 0.304 | 49.311 | | Surcharged |
| PS14 | 240 min Winter | 230 | 42.653 | 0.603 | 1.880 | | Surcharged |
| PS13 | 240 min Winter | 230 | 42.650 | 0.507 | 0.616 | | Flood Risk |
| PS9 | 15 min Winter | 8 | 43.329 | 0.079 | 28.636 | | OK |
| PS12 | 240 min Winter | 229 | 42.650 | 0.690 | 4.652 | | Flood Risk |
| PS3 | 240 min Winter | 228 | 42.650 | 0.700 | 3.007 | | Surcharged |
| PS2 | 240 min Winter | 229 | 42.650 | 1.212 | 4.503 | | Flood Risk |
| PS1 | 240 min Winter | 228 | 42.650 | 1.250 | 4.499 | | Flood Risk |
| S4 | 960 min Winter | 308 | 40.559 | 0.028 | 4.890 | | OK |
| S3 | 1440 min Winter | 512 | 35.264 | 0.065 | 4.889 | | OK |
| S2 | 1440 min Winter | 512 | 34.931 | 0.029 | 4.889 | | OK |
| S1 | 1440 min Winter | 512 | 32.659 | 0.029 | 4.889 | | Outfall |

## Conduits

| Pipe No. | Critical Storm | Peak (mins) | US Manhole | DS Manhole | Flow Depth (m) | Max Velocity (m/s) | Max Flow (l/s) | Flow / Capacity | Status |
|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 15 min Winter | 9 | PS8 | PS5 | 0.150 | 1.490 | 26.339 | 1.486 | Surcharged |
| 2.000 | 15 min Winter | 8 | PS7 | PS6 | 0.150 | 1.543 | 27.276 | 1.538 | Surcharged |
| 2.001 | 15 min Winter | 9 | PS6 | PS5 | 0.150 | 1.491 | 26.340 | 1.199 | Surcharged |
| 1.001 | 15 min Winter | 10 | PS5 | PS14 | 0.205 | 1.297 | 49.285 | 1.165 | OK |
| 1.002 | 15 min Winter | 9 | PS14 | PS12 | 0.225 | 1.823 | 72.472 | 1.606 | OK |
| 3.000 | 15 min Winter | 8 | PS13 | PS12 | 0.225 | 0.722 | 28.715 | 0.783 | OK |
| 4.000 | 15 min Winter | 8 | PS9 | PS12 | 0.115 | 1.972 | 28.553 | 0.533 | OK |
| 1.003 | 30 min Summer | 20 | PS12 | PS3 | 0.300 | 1.869 | 113.759 | 4.500 | Surcharged |
| 1.004 | 960 min Winter | 1246 | PS3 | PS2 | 0.300 | 0.739 | 34.963 | 0.066 | Surcharged |
| 1.005 | 1440 min Winter | 1494 | PS2 | PS1 | 0.300 | 0.395 | 27.895 | 0.284 | Surcharged |
| 1.006 | 1440 min Winter | 510 | PS1 | S4 | 0.038 | 1.389 | 4.890 | 0.144 | OK |
| 1.007 | 1440 min Winter | 511 | S4 | S3 | 0.047 | 1.043 | 4.889 | 0.079 | OK |
| 1.008 | 1440 min Winter | 512 | S3 | S2 | 0.047 | 1.028 | 4.889 | 0.339 | OK |
| 1.009 | 1440 min Winter | 512 | S2 | S1 | 0.029 | 2.038 | 4.889 | 0.084 | OK |

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## Appendix D

## Water Quality Assessment (CIRIA C753 Simple Index Assessment)

# Water Quality Design for SuDS - Simple Index Approach - SuDS Manual 2015 - CIRIA C753

**Project:** 185 Padel - Baird St
**Section:**

**Project No:** 26195
**Date:** 26/06/2026
**Sheet No:** 1 **of** 1

**Produced by:** BW **Checked by: GP**

**Key:**

- **DROP DOWN LIST**
- **USER ENTRY**
- **AUTOMATICALLY CALCULATED**

**PLEASE NOTE!**
**This tool must be read in conjunction with Chapter 4 and Chapter 26 of the SuDS Manual as other key criteria, parameters and design conditions apply.**

## STEP 1: Determine the Pollution Hazard Index for the runoff area discharging to the proposed SuDS scheme

- If the land use varies across the 'runoff area', either:
  - use the land use type with the highest Pollution Hazard Index
  - apply the approach for each of the land use types to determine whether the proposed SuDS design is sufficient for all. If it is not, consider collecting more hazardous runoff separately and providing additional treatment.
- If the generic land use types suggested are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in the row below the drop down lists.

| | Runoff Area Land Use Description | Pollution Hazard Indices: Level | Total Suspended Solids | Metals | Hydrocarbons |
|---|---|---|---|---|---|
| Select land use type from the drop down list (or 'Other' if none applicable): | Non-residential parking with infrequent change (e.g. schools, offices, < 300 traffic movements a day) | Low | 0.5 | 0.4 | 0.4 |
| User Defined Indicies | | | | | |
| **Landuse Pollution Hazard Index** | | **Low** | **0.5** | **0.4** | **0.4** |

## STEP 2A: Determine the Pollution Mitigation Index for the proposed SuDS components

- This step requires the user to select the proposed SuDS components that will be used to treat runoff - before it is discharged to a receiving surface waterbody or downstream infiltration component
- If the runoff is discharged directly to an infiltration component, without upstream treatment, select 'None' for each of the 3 SuDS components and move to Step 2B
- This step should be applied to evaluate the water quality protection provided by proposed SuDS components for discharges to receiving surface waters or downstream infiltration components. This will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design.

| | SuDS Component Description | Pollution Mitigation Indices: Total Suspended Solids | Metals | Hydrocarbons |
|---|---|---|---|---|
| Select SuDS Component 1 (i.e. the u/s component) | Pervious pavement (where the pavement is not designed as an infiltration component) | 0.7 | 0.6 | 0.7 |
| Select SuDS Component 2 | None | | | |
| Select SuDS Component 3 | None | | | |
| If the proposed SuDS components are bespoke/proprietary select 'Proprietary treatment system' or 'User defined indices' and enter component descriptions and agreed user defined indices in these rows: | | | | |
| **Aggregated Surface Water Pollution Mitigation Index** | | **0.7** | **0.6** | **0.7** |

## STEP 2B: Determine the Pollution Mitigation Index for the proposed Groundwater Protection

- This step requires the user to select the type of groundwater protection that is either part of the SuDS component or that lies between the component and the groundwater
- This step should be applied where a SuDS component is allows any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design.
- Where the discharge is to surface waters and risks to groundwater need not be considered, select 'None'

| | SuDS Component Description | Pollution Mitigation Indices: Total Suspended Solids | Metals | Hydrocarbons |
|---|---|---|---|---|
| Select type of groundwater protection from the drop down list: | None | | | |
| If the proposed groundwater protection is bespoke/proprietary select 'Proprietary product' or 'User defined indices' and enter a description of the protection and agreed user defined indices in this row: | | | | |
| **Groundwater Protection Pollution Mitigation Index** | | **0** | **0** | **0** |

## STEP 2C: Determine the Combined Pollution Mitigation Indices for the Runoff Area

- This is an automatic step which combines the proposed SuDS Pollution Mitigation Indices with any Groundwater Protection Pollution Mitigation Indices

| | *Combined Pollution Mitigation Indices*: Total Suspended Solids | Metals | Hydrocarbons |
|---|---|---|---|
| **Combined Pollution Mitigation Indices for the Runoff Area** | **0.7** | **0.6** | **0.7** |

## STEP 2D: Determine Sufficiency of Pollution Mitigation Indices for Selected SuDS Components

- This is an automatic step which compares the Combined Pollution Mitigation Indices with the Land Use Hazard Indices, to determine whether the proposed components are sufficient to manage each pollutant category type
- When the combined mitigation index exceeds the land use pollution hazard index, then the proposed components are considered sufficient in providing pollution risk mitigation.
- In England and Wales, where the discharge is to protected surface waters or groundwater, an additional treatment component (ie over and above that required for standard discharges), or other equivalent protection, is required that provides environmental protection in the event of an unexpected pollution event or poor system performance. Protected surface waters are those designated for drinking water abstraction. In England and Wales, protected groundwater resources are defined as Source Protection Zone 1.

| *Sufficiency of Pollution Mitigation Indices*: Total Suspended Solids | Metals | Hydrocarbons |
|---|---|---|
| **Sufficient** | **Sufficient** | **Sufficient** |