

**Residential Development
School Road
Hurst
Berkshire**

Drainage Strategy Report

Rev	Date	Purpose/Status	Document Ref.	QA
A	12.07.2025	For approval	First issue	RAC/STC
B	08.04.2026	For approval	Second issue	RAC/STC
C	14.04.2026	For approval	Third issue	RAC/STC
D	30.04.2026	For approval	Fourth issue	RAC/STC
E	30.04.2026	For approval	Fifth issue	RAC/STC

Disclaimer

This report is for the use of the Client only and is not for the use of any other parties without the express permission of the Client. All calculations and related quantified assumptions are indicative for planning purposes only and are based solely on the available design proposals and must be reassessed during detailed design with the appropriate compliance methodology.

Table of Contents

Executive Summary	4
1.0 Flooding.....	5
1.1 Pluvial and Fluvial Flooding.....	5
2.0 Existing Drainage.....	6
3.0 Proposed Drainage Strategy.....	7
3.1 Surface Water Drainage.....	9
3.2 Foul Water Drainage.....	10
4.0 Attenuation.....	11
5.0 Sustainable Urban Drainage Systems (SUDS)	11
5.1 Infiltration Devices.....	12
5.2 Brown/Green Roofs	13
5.3 Rainwater Harvesting.....	14
5.4 Porous Paving	15
5.5 Below Ground Attenuation.....	16
5.6 Wetlands.....	17
5.7 Swales	17
5.8 Ponds/Rain gardens	17
6.0 Proposed SUDS solution.....	18
7.0 Management and Maintenance of SUDS	18
8.0 Contamination mitigation.....	19

Executive Summary

RCD Consultants Ltd has been appointed to design the surface water and foul water drainage aspects of the proposed development at School Road, Hurst, Berkshire.

The site is an undeveloped plot of land with an approximate area of 1.16Ha. To the north is Hurst Road, to the east there is the primary school and residential curtilage, to the south there is Orchard Road and to the west there is residential curtilage.

The report outlines the strategy for the surface water and foul water drainage for the proposed development with reference to the NPPF (National Planning Policy Framework), Ciria 753 (The SUDS Manual) and the Wokingham SUDS strategy 2017.

The proposed development includes the construction of seventeen houses and six apartments with a total roof area of 1,720m² (including 10% urban creep), an impermeable access road with an area of 600m² and permeable paved drives and access road with a total area of 1,570m². A porous paved carpark with an area of 430m² is to be provided for school dropping off as well as general public use.

The Flood Warning Information Services website confirms that the site is in flood zone 1 and that there is low risk of surface water flooding in the rear garden of the apartment block where levels will remain as existing.

The British Geological Society website indicates that the site is underlain superficial deposits of the Kempton Park Gravel Member over bedrock of the Lambeth group (Clay, silt, sand) to the north and London Clay to the south. Soakage testing was completed in July 2025 with infiltration values in each test location ranging between 1.8x10⁻⁶m/s to 5.9x10⁻⁶m/s.

There are public foul sewers in Church Road. There are no public surface water sewers.

Roof drainage discharges to the porous paved drives and the impermeable access road discharges to soakaways.

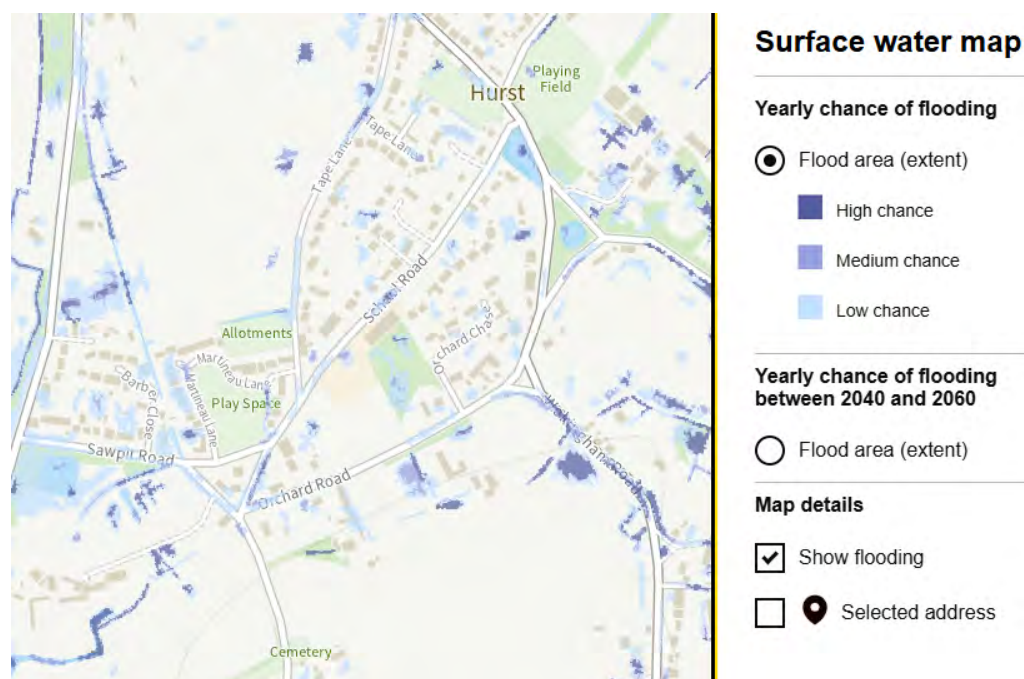
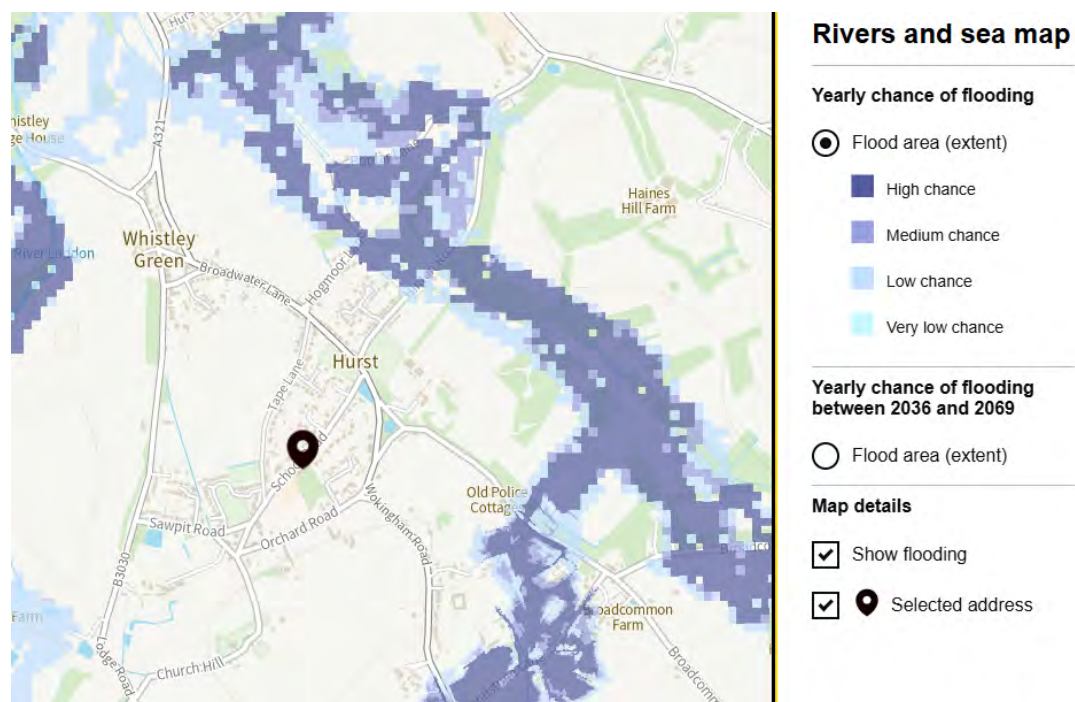
To accord with the Environment Agency climate change allowances 40% has been added to the 1 in 100 year storm event and 35% has been added to the 1 in 30 year storm event.

To accord with LLFA drainage requirements a flood exceedance plan is provided showing the route flood water will take in the unlikely event of SUDS failure.

1.0 Flooding

1.1 Pluvial and Fluvial Flooding

The Flood Warning Information Services website confirms that the site is in flood zone 1 and that there is low risk of surface water flooding in the rear garden of the apartment block where levels will remain as existing.



2.0 Existing Drainage

The site is an undeveloped plot of land with an approximate area of 1.16Ha. To the north is Hurst Road, to the east there is the primary school and residential curtilage, to the south there is Orchard Road and to the west there is residential curtilage.

A copy of the topographical survey is shown in Appendix A.

The British Geological Society website indicates that the site is underlain superficial deposits of the Kempton Park Gravel Member over bedrock of the Lambeth group (Clay, silt, sand) to the north and London Clay to the south.

Soakage testing was completed in July 2025 with infiltration values in each test location ranging between $1.8 \times 10^{-6} \text{m/s}$ to $5.9 \times 10^{-6} \text{m/s}$.

A copy of the soakage testing results is shown in Appendix A.

There are public foul sewers in Church Road. There are no public surface water sewers.

A copy of the sewer records is shown in Appendix A.

The nearest watercourse is the River Loddon approximately 1.0Km north of the development.

HR Wallingford Greenfield surface water calculations are shown in Appendix B.

3.0 Proposed Drainage Strategy

The proposed development includes the construction of seventeen houses and six apartments with a total roof area of 1,720m² (including 10% urban creep), an impermeable access road with an area of 530m² and permeable paved drives and access road with a total area of 1,570m². A porous paved carpark with an area of 600m² is to be provided for school dropping off as well as general public use.

Surface drainage discharges to the porous paved drives and the impermeable access road discharges to a shallow cellular storage tank soakaway.

The Drainage Layout is shown in Appendix C.

Groundwater observations across the site indicate levels typically between approximately 2.0m and 3.6m below ground level, based on the majority of infiltration testing and trial pit records undertaken during a notably wet period. Localised shallow standing water was recorded in isolated locations following prolonged rainfall events and is considered to represent perched or transient conditions rather than the prevailing groundwater table.

The drainage design has been developed using representative groundwater levels and conservative infiltration parameters. All proposed SUDS components have been checked against the highest recorded groundwater levels across the site and maintain a minimum 1.0m unsaturated zone in accordance with BRE 365. This separation is achieved across the site and ensures that attenuation storage is not compromised by groundwater ingress.

To provide a robust design the worst-case infiltration rate of 1.8×10^{-6} m/s (0.065m/hr) has been adopted within the hydraulic calculations, across all SUDS components, and based on BRE 365 testing and reflects a representative value within the tested range. The design incorporates appropriate conservatism through climate change allowances and storage provision. The system retains sufficient capacity to manage runoff without impacting dwellings or critical infrastructure.

Based upon the 1 in 100 year calculations during the 6 hour storm event it can be seen that all SUDS features have plentiful capacity, at worst the 450mm thick porous paving fills up to a depth of 264mm and the 750mm deep cellular storage tank reaches a depth of 347mm.

The drainage design retains sufficient storage and conveyance capacity to operate effectively should infiltration performance be lower than anticipated.

The proposed attenuation and infiltration features are located above the identified groundwater level, maintaining a minimum 1.0m unsaturated zone. On this basis, attenuation storage volumes are not compromised by groundwater ingress and will remain fully effective during all design storm events.

3.1 Surface Water Drainage

In accordance with Ciria 753, SUDS Manual, flooding is permitted above ground during the 1 in 100 year storm event + climate change allowance but all flood water is to be contained within the site boundaries. No flooding is permitted during the 1 in 30 year storm event.

Post-development surface water calculations are shown in Appendix D and are to be read in conjunction with the drainage layouts in Appendix C.

The calculations confirm that no flooding occurs during the worst-case 1 in 100 year storm event with a 40% climate change allowance.

The half drain time during the 1 in 10 year storm event is less than 24 hours.

3.1.2 Surface water flows and volumes

Pre-development and post-development surface water discharges via infiltration so the flows and volumes have not been summarized as we are not increasing the volume of rainfall landing on the site.

3.1.4 Standards

The performance of the surface water drainage system will be designed to BS EN 752 Parts 3 and 4, and the most current issue of Part H of the Building Regulations.

The materials specification for the scheme will be in accordance with the Highways Agency Specification for Highway Works. For the purposes of the indicative design, the following material types have been assumed:

- Drainage pipes up to 300mm diameter – Vitrified clayware, plastic pipes will be permitted subject to ground conditions.
- Manholes and chambers - Precast concrete with concrete surround or PPIC
- Chamber covers – Class D400 infill type in hard paved areas.
- Pipe bedding - Imported granular material.
- Pipe Trench backfill - Selected as dug or imported material.
- Manholes should be located at every change of alignment or gradient; at the head of all sewers; at every junction of a public sewer.

The drainage shall be designed utilizing the following criteria:

- Minimum flow velocity 1.0m/s for self-cleansing
- Standard pipe roughness “Ks” of 0.6.

3.2 Foul Water Drainage

3.2.1 Proposed Infrastructure

Foul drainage from the buildings will be collected via pipes and will be discharged to the public foul sewer in Church Road.

Average Water flows will be 1.06l/s in accordance with sewers for adoption.

3.2.2 Standards

The performance of the foul drainage system has been designed to BS EN 752 Parts 3 and 4, and the most current issue of Part H of the Building Regulations. The main criteria used are as follows.

- Drainage pipes up to 100mm diameter – Vitrified clayware, plastic pipes will be permitted subject to ground conditions.
- Manholes and chambers - Precast concrete with concrete surround or PPIC
- Chamber covers – Class D400 infill type in higher quality paved areas.
- Class D400 standard type in all other road / parking areas
- Class C250 standard type in all footpath areas
- Pipe bedding - Imported granular
- Pipe Trench backfill - Selected as dug or imported material
- Manholes should be located at every change of alignment or gradient; at the head of all sewers; at every junction of a public sewer

The drainage shall be designed utilizing the following criteria:

- Minimum flow velocity 0.75m/s for self-cleansing
- Standard pipe roughness “Ks” of 1.5.

4.0 Attenuation

It is proposed that Sustainable Urban Drainage Systems (SUDS) will be the primary consideration for surface water management. There are several different methods that may be used to provide sufficient attenuation of the surface water described in Section 5 below.

Attenuation should be positioned as close to the outfall as possible and would control the surface water discharge from the site. Implementation of one or all of the SUDS methods outlined in Section 5 of this report is highly recommended to reduce the requirement for below ground storage.

The proposed drainage design includes surface water from the roof discharging to the porous paved drives where water will be attenuated in the stone voids. The impermeable road will discharge to a suitably sized shallow geocellular soakaway. The surface water calculations confirm that no flooding occurs during the worst-case storm event with a 40% climate change allowance.

5.0 Sustainable Urban Drainage Systems (SUDS)

The objective of SUDS is to minimise the impacts of the development on the quantity and quality of site runoff and maximise amenity and biodiversity opportunities. Surface water SUDS will be designed and installed in accordance with NPPF and associated technical guidance March 2012 and associated CIRIA documents.

The mix of SUDS to be used is determined by the conditions on site, in this case a development with areas of external space which can be utilised for SUDS. The methodology of surface water control is to slow the entry of the surface water into the system by using flow control devices, in this instance infiltration will limit the flow of water into the ground and the voids within the stone layer will provide attenuation as the soakaway.

5.1 Infiltration Devices

Infiltration devices drain water directly into the ground. Infiltration trenches and soakaways are more practicable for urban sites with limited space available. Infiltration devices can be integrated into and form part of the landscaped areas.

Infiltration trenches are completely below ground, and water should not occur on the surface.

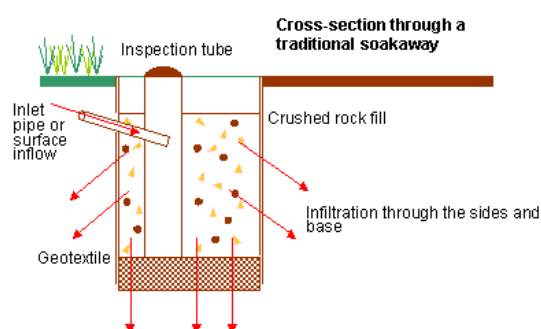


Figure 1 – Typical cross section through infiltration trench

Advantages – Reduces the volume of runoff, effective at pollutant removal, contributes to ground water recharge, simple and cost effective.

Disadvantages – Potentially high failure rates, comprehensive ground investigations required, offset from foundations (min. 5m away), risk of ground water pollution, reduced performance during prolonged wet periods.

Suitable for use – **Yes**, a shallow geocellular soakaway is proposed for the impermeable section of the access road.

5.2 Brown/Green Roofs

Green roofs comprise a multi-layered system that covers the roof of a building or podium structure with vegetation cover/landscaping over a drainage layer. They are designed to intercept and retain precipitation, increasing the time of concentration and reducing the volume of runoff and attenuation peak flows. Green roofs can be anything from a thin growing layer of sedums and mosses to plants, shrubs and large trees.

These roofs vary in specification and can be designed to attract bird and invertebrate species. Referring to CIRIA document C644, green and brown roofs also participate in attenuating rainwater. This would reduce the requirement for below ground storage attenuation on the site.

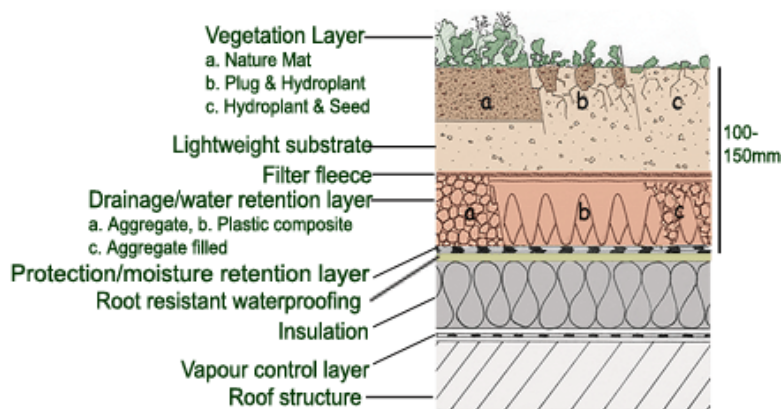


Figure 2 – Typical section through green roof build up

Advantages – Mimic greenfield state of building footprint, good removal of pollutants, ecological and amenity benefits, improve air quality, insulates building.

Disadvantages – Costs, increased structural loading, roof height, design, maintenance and exposure may preclude use.

Suitable for use – **No**, the roofs will be pitched and unable to provide support for green roofs.

5.3 Rainwater Harvesting

These tanks act as mini-storage chambers for surface water, reducing the extent of underground storage required. They provide a source of water for plant irrigation, washing machines and for flushing toilets.

Harvested rainwater is stored below ground and pumped to provide a substitute for potable mains water reducing both the site discharge and water consumption.



Figure 4 – Rainwater Harvesting

Advantages – Provided source control of storm water runoff, reduces demand on mains water.

Disadvantages – Costs, Risk to public health, use dependant on demand requirements and seasonal rainfall characteristics, maintenance of pumps & control systems.

Suitable for use – **Yes**, rainwater butts are proposed for each house. The low demand for each dwelling and the low average rainfall for the area makes installation of rainwater harvesting tanks unviable.

5.4 Porous Paving

Porous pavement is an alternative to conventional paving in which water permeates through the paved structure rather than draining off it. The surface water will be held in a reservoir structure (high void content sub-base) under the pavement for subsequent delayed discharge or infiltration into the sub-strata below.

The porous paving can be materials such as gravel, grasscrete, porous (no fines) concrete, concrete blocks or porous asphalt. Pollutant removal rates have been shown to be high, as the majority of the removal occurs as a result of the filtration of the water through the aggregate sub-base.

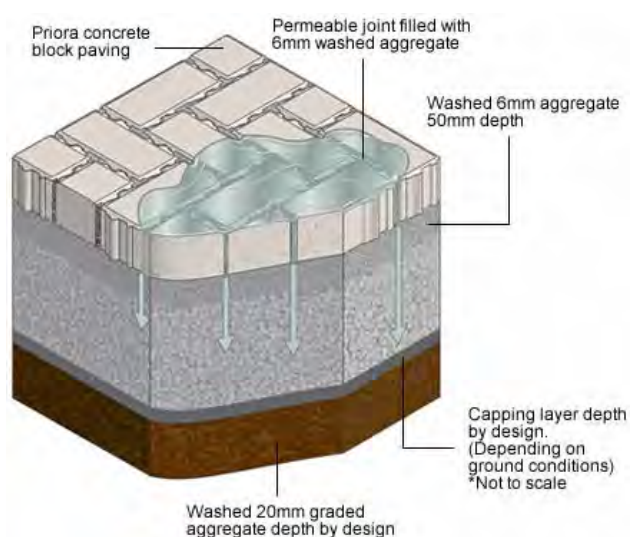


Figure 3 – Typical section through porous paving

Advantages – Effective in removing pollutants, lined systems can be used to avoid infiltration, reduces volume and rate of surface water runoff, suitable for high density developments. Mimics existing Greenfield conditions by filtering into the surrounding soft landscaped areas.

Disadvantages – Costs, used for low traffic volumes, low axle loads and speeds, risk of long-term clogging due to poor maintenance.

Suitable for use – **Yes**, permeable paving is proposed for the drives and southern half of the access road to mimic existing greenfield conditions.

5.5 Below Ground Attenuation

Attenuation involves the storing of surface water within pipework or underground tanks prior to controlled discharge into the public system. Attenuation tanks can also provide offline storage.

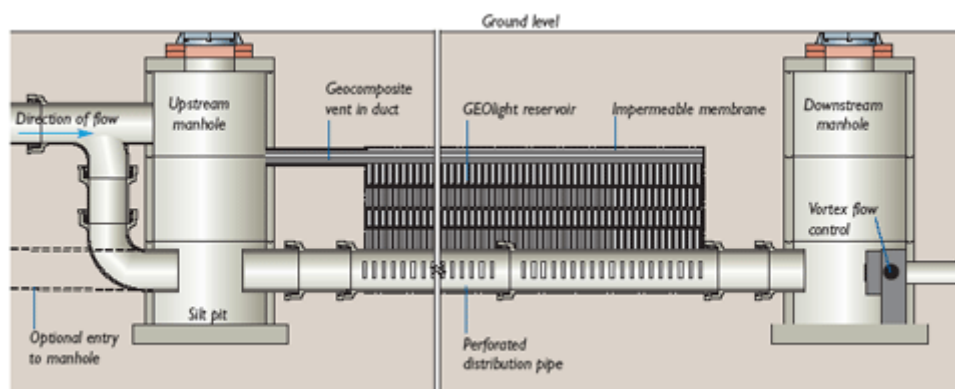


Figure 5 – Typical section through below ground attenuation chamber (cellular storage)

Advantages – Effective storage of surface water, can be used below trafficked areas, can be used below public open areas, minimum maintenance.

Disadvantages – No water quality treatment.

Suitable for use – **Yes**, the current design shows pre-cast concrete soakaways that could be change to cellular storage tanks.

5.6 Wetlands

Wetlands provide both stormwater attenuation and treatment. They comprise shallow ponds and marshy areas, covered in aquatic vegetation. Wetlands provide settlement of sediment and remove contaminants.

Advantages – Effective storage of surface water, good pollutant removal, ecological and amenity benefits.

Disadvantages – Requires large surface area. Health & Safety issues associated with large bodies of water.

Suitable for use – **No**, there is no space available.

5.7 Swales

Swales are vegetated drainage structures up to 500mm deep and used to provide flow control through attenuation. They can be used for infiltration, where possible.

Advantages – Can be incorporated into landscaping, good removal of contaminants, reduces discharge rates. Low costs.

Disadvantages – Requires large surface area. Limits the extent of trees used in landscaping. Health & Safety issues are associated with large bodies of water following heavy rainfall.

Suitable for use – **No**, there is no space available.

5.8 Ponds/Rain gardens

Ponds or rain gardens are irregular shaped vegetated drainage structures used to provide flow control through attenuation. They can be used for infiltration, where possible.

Advantages – Can be incorporated into landscaping, good removal of contaminants, reduces discharge rates. Low costs.

Disadvantages – Requires large surface area. Limits the extent of trees used in landscaping. Health & Safety issues are associated with large bodies of water following heavy rainfall.

Suitable for use – **No**, there is no space available.

6.0 Proposed SUDS solution

It is advised that a combination of Sustainable Drainage Systems (SUDS) is used to increase the time of concentration of the water before it from the development.

In this instance we are using the permeable paved drives to discharge all roof drainage to. The impermeable access road will discharge to a shallow geocellular soakaway.

In the unlikely event of flood exceedance (i.e. rainfall exceeding the 1 in 100 year + climate change or poor SUDS maintenance), surface water will flow overland along the site access road and hardstanding areas, following the site topography. Flow routes direct water away from proposed dwellings and towards School Road, ensuring no flooding of residential properties. Finished floor levels are set above surrounding ground levels, with level differences defined by site topography and the drainage/exceedance design. This ensures that no internal flooding occurs during the 1 in 100 year + climate change event. Refer to Flood Exceedance Plan (Drawing 1111-2530-CIV-FEP) for routing details.

The design ensures that exceedance routing remains effective even under high groundwater conditions.

7.0 Management and Maintenance of SUDS

The owners will be responsible for maintenance of their individual permeable paved drives and rainwater butts.

The developer will be responsible for all SUDs components outside private ownership, i.e. porous paved access road and geocellular tank soakaway.

The school or Local Authority will be responsible for maintenance of the porous paved offsite carpark.

All SUDs components, porous paving, catchpits and geocellular storage tank soakaway are shown on the drainage layouts in Appendix C.

Refer to The SUDS operation and maintenance schedule in Appendix F.

8.0 Contamination mitigation

The British Geological Society website indicates that the site is underlain superficial deposits of the Kempton Park Gravel Member over bedrock of the Lambeth group (Clay, silt, sand) to the north and London Clay to the south.

The site lies above a principal bedrock aquifer and the Groundwater vulnerability is high.

Ciria 753 Chapter 26 Mitigation indices:

Pre-development pollution indices:

Greenfield use is not identified in Table 26.2 however this report classes it with very low pollution hazard level due to fertilisers being used and associated farm vehicles;

Roofs: Total Solids = 0.2, Metals = 0.2 and Hydrocarbons = 0.05

The mitigation index is therefore $MI = 0.2 + 0.5 \times 0.2 + 0.5 \times 0.05 = 0.325$

Post-development

Residential use is identified in Table 26.2 as very low pollution hazard level;

Roofs: Total Solids = 0.2, Metals = 0.2 and Hydrocarbons = 0.05

The mitigation index is therefore $MI = 0.2 + 0.5 \times 0.2 + 0.5 \times 0.05 = 0.325$

The post-development mitigation indices are the same as pre-development.

The proposed development will enhance this mitigation indices by using porous paving extensively where particles will be filtered and hydrocarbons will be biologically removed within the stone layers.

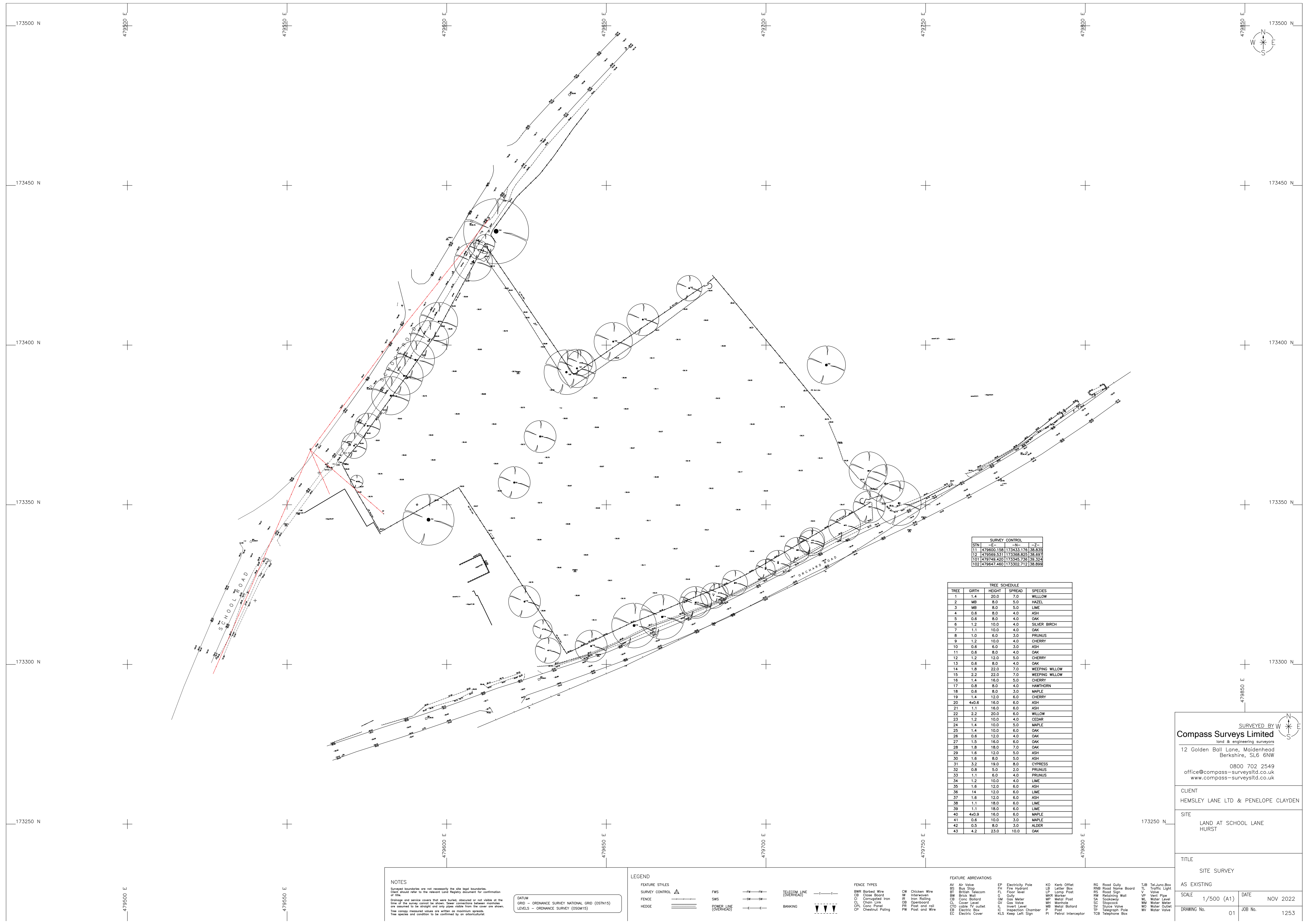
Table 26.5 Risk matrix

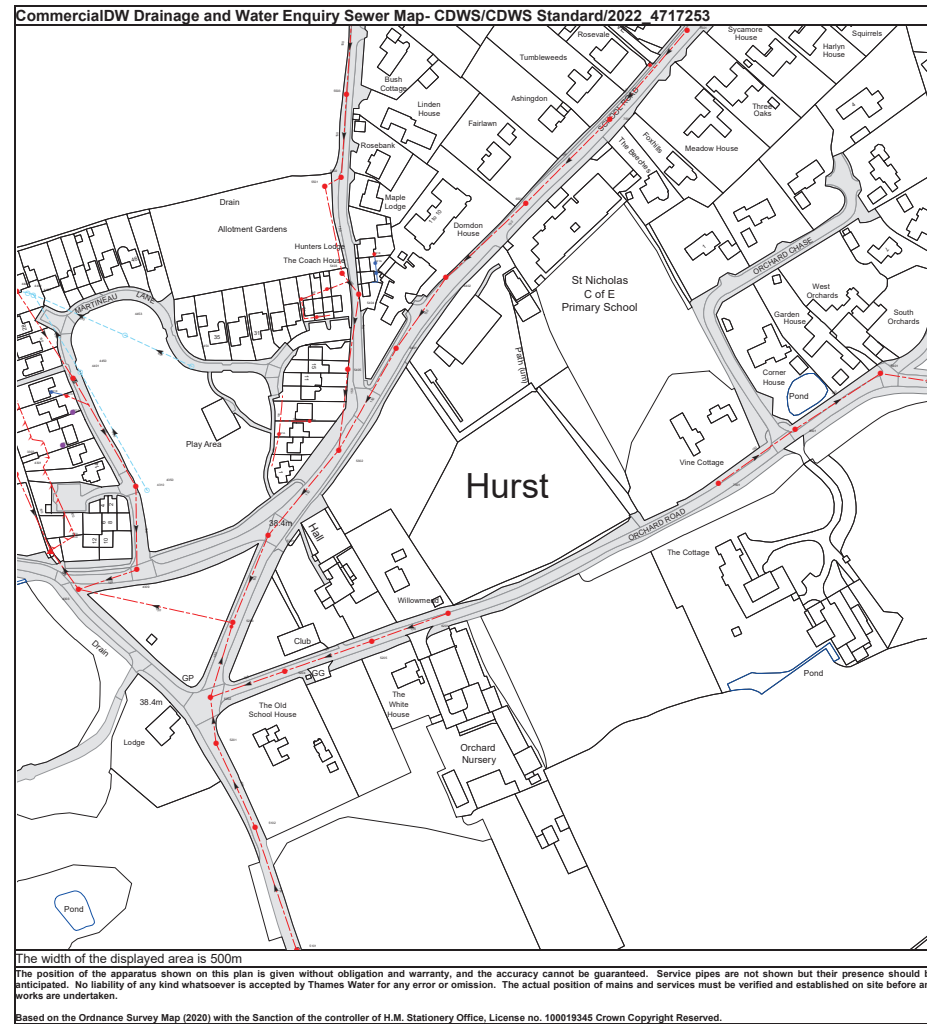
Element Number	Description	Risk Score	Weighting Factor	Score
1	Pollution Hazard Traffic Density	1	15	15
2	Average annual rainfall	1	15	30
3	Type of SUDS	2	15	30
4	Unsaturated zone depth	1	20	20
5	Flow through sub-soils	2	20	40
6	Unsaturated zone material	2	10	20
7	Soil organic matter	1	5	5
8	Unsaturated zone ph	1	5	5
Total				165

Based upon the above table the risk to groundwater is low as the total value is less than 180.

Appendix A

Topographical Survey
Sewer Records
Soakage testing results





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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
5404	38.5	36.02
541F	n/a	n/a
6402	38.62	36.18
541A	n/a	n/a
5403	38.7	36.08
541G	n/a	n/a
531A	n/a	n/a
541E	n/a	n/a
541C	n/a	n/a
541D	n/a	n/a
5302	38.53	35.54
5405	38.59	35.71
6401	38.74	36.1
5301	38.44	35.24
5204	38.42	36.71
5205	38.56	37.04
6201	38.8	37.28

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



Con29DW Commercial Drainage and Water Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

	Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
	Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
	Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
	Storm Sewer
	Sludge Sewer
	Foul Trunk Sewer
	Surface Trunk Sewer
	Combined Trunk Sewer
	Foul Rising Main
	Surface Water Rising Main
	Combined Rising Main
	Vacuum
	Thames Water Proposed
	Vent Pipe
	Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

	Sewer
	Culverted Watercourse
	Proposed
	Decommissioned Sewer
	Content of this drainage network is currently unknown
	Ownership of this drainage network is currently unknown

Sewer Fittings

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

	Air Valve
	Meter
	Dam Chase
	Vent
	Fitting

Operational Controls

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

	Ancillary
	Drop Pipe
	Control Valve
	Weir

End Items

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

	Inlet
	Outfall
	Undefined End

Other Symbols

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

	Change of Characteristic Indicator
	Public / Private Pumping Station
	Invert Level
	Summit

Areas

Lines denoting areas of underground surveys, etc.

	Agreement
	Chamber
	Operational Site

Ducts or Crossings

Ducts may contain high voltage cables. Please check with Thames Water.

	Casement
	Conduit Bridge
	Subway
	Tunnel

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plan are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

- 5) 'na' or '0' on a manhole indicates that data is unavailable.
- 6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.



Con29DW Commercial Drainage and Water Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

- Distribution Main:** The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.
- Trunk Main:** A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.
- Supply Main:** A supply main indicates that the water main is used as a supply for a single property or group of properties.
- Fire Main:** Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.
- Metered Pipe:** A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.
- Transmission Tunnel:** A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.
- Proposed Main:** A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm – 600mm (12" – 24")	1100mm (3' 6")
600mm and bigger (24" plus)	1200mm (4')

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger
- Casement:** Ducts may contain high voltage cables. Please check with Thames Water.

Other Water Pipes (Not Operated or Maintained by Thames Water)

- Other Water Company Main:** Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.
- Private Main:** Indicates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

KP HOLDING GROUP LTD

LAND SOUTH OF SCHOOL ROAD, HURST, BERKSHIRE RG10 0DB

**INFILTRATION TEST REPORT REV_2
STATUS FINAL**

Reference: 1753/IR_2

4th July 2025

**CLIENT: KP Holding Group Ltd
3 Lloyd Road, Broadstairs,
Kent, United Kingdom,
CT10 1HY**

**SITE: Land South of School Road,
Hurst, RG10 0DB**

INFILTRATION TEST REPORT Rev2

Reference: 1753/IR2_

4th July 2025

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Contents

FOREWORD

1.0	SUMMARY TEXT	1
1.1	Summary and Infiltration Tests Results.....	1
1.2	Site Location, Description, and Geology	1
1.3	Tests Dates, Locations and Methodology	2
1.4	Results and Comparison with Reference Values	2
2.0	REFERENCES	3

TABLES

Table 1	Infiltration test summary.....	1
---------	--------------------------------	---

FIGURES

Figure 1	Test Location Plan	ii
----------	--------------------------	----

APPENDICES**Appendix A DESK STUDY DATA**

Appendix A 1	Geological Maps.....	v
--------------	----------------------	---

Appendix B FIELD DATA

Appendix B 1	Trial Pits Logs.....	vii
Appendix B 2	Infiltration Test Reports.....	viii

APPENDIX C 1	Photographs	ix
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FOREWORD

1. This document has been prepared by Peter Baxter Associates Ltd with all reasonable skill, care, and diligence within the terms of the contract with the Client and within the limitations of the resources devoted to it by agreement with the client.
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1.0 SUMMARY TEXT

1.1 Summary and Infiltration Test Results

1.1.1 Peter Baxter Associates (PBA) were commissioned by the Client: KP Holding Group Ltd, to carry out infiltration tests, denoted INFL1A to INFL4A, at their proposed development site at School Road, Hurst, near Reading, to the procedure detailed in BRE365 (1). INFL01A was excavated to 2.0m, and INFL 2A to 4A were excavated to 0.6 to 0.7m. The locations were specified by the Client's advisers. The subsoils were a clayey sand and a gravely sand, which was consistent with geological maps of the Site. The test locations are shown in Figure 1, and the pits logs are presented in Appendix B1.

1.1.2 The infiltration tests are denoted on the table below:

Reference	Test depth (m)	Infiltration rates		
		Cycle 1	Cycle 2	Cycle 3
INFL01A	2	1.8×10^{-6}	2.4×10^{-6}	-
INFL02A	0.7	2.4×10^{-6}	-	-
INFL03A	0.5	1.2×10^{-5}	5.9×10^{-6}	9.9×10^{-6}
INFL04A	0.75	2.1×10^{-6}	2.1×10^{-6}	-

Table 1 Infiltration test summary

The test reports are presented in Appendix B 2.

1.2 Site Location, Description, and Geology

1.2.1 The Site is a 1.2 ha plot of land situated at Hurst, School Road, in Reading. The postcode of the Site is RG10 0DB, and the National Grid coordinates of the centroid of the Site are 479650, 173370.

1.2.2 The Site is a green field that appeared to have been used as a pasture. The area was flat, grassed, with occasional mature trees. It is surrounded to the three sides by houses, and to the east by a primary school.

The site is illustrated in photos in APPENDIX C 1 *Photographs*. It is proposed to develop the Site for housing with 23 units.

1.2.3 Geological maps obtained from Reference (2) indicated that the Site geology in the areas of the infiltration tests was Kempton Park Gravel Member over Lambeth Group in

the north of the site and London Clay to the south. Geological maps are included in Appendix A1.

1.3 Test Dates, Locations and Methodology

- 1.3.1 The tests were started on 21st May 2025 and completed on 22nd May 2025.
- 1.3.2 The test's locations and depth were specified with the Client's engineer and are shown in Figure 1. The locations were set out with a GPS using a mobile phone app from a sketch provided by the client.
- 1.3.3 Each location pit was excavated to specified depth with a minidigger and flooded with mains water. The water level was recorded with time at each pit. The pits were fenced with safety fencing and backfilled on completion of the tests. Due to the low permeability, less than three cycles of flooding was carried out at some of the pits. The infiltration rates were calculated as defined in BRE365 (1).

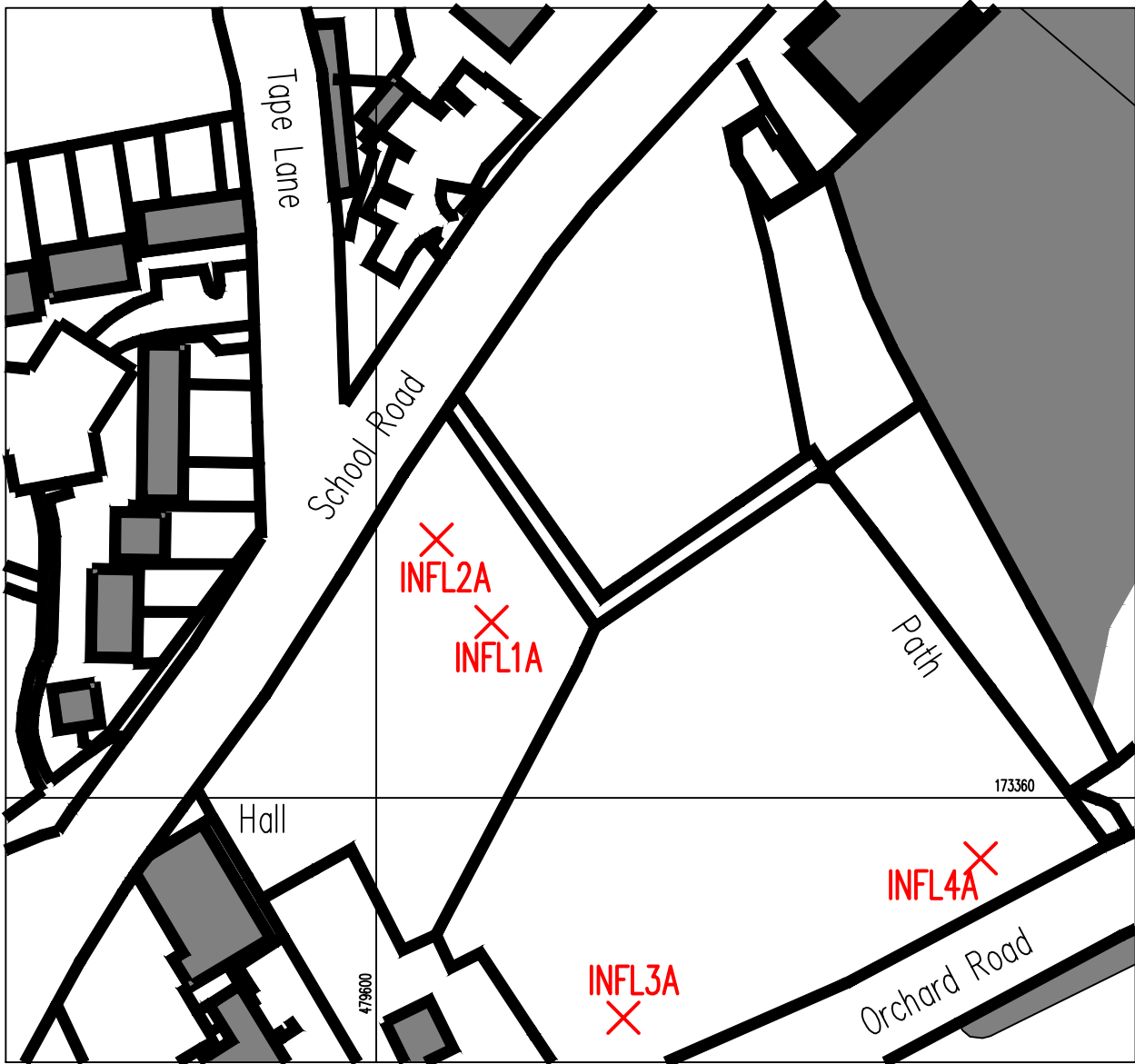
1.4 Results and Comparison with Reference Values

- 1.4.1 The infiltration tests, denoted INFL01A, INFL03A, INFL04A, INFL05A and INFL06A, gave lowest infiltration rates of 1.8×10^{-6} m/s, 2.4×10^{-6} m/s, 1.2×10^{-5} m/s, and 2.1×10^{-6} m/s, respectively. The test reports are presented in Appendix B 2.
- 1.4.2 These infiltrations were within the range of 1×10^{-5} m/s to 1×10^{-7} quoted in literature for fine sands and coarse silts and are therefore considered representative of the geology tested.

Peter Baxter MSc BEng CEng MICE (Director)

For and on behalf of Peter Baxter Associates Ltd

Figure 1 Test Locations



Ordnance Survey, (c) Crown Copyright 2025. All rights reserved. Licence number 100022432

Location	Easting	Northing
INFL1A	479621	173392
INFL2A	479611	173407
INFL3A	479645	173320
INFL4A	479710	173349



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Tel: 01634 717974

Client
KP Holding Group Ltd

Project
Test Location Plan

Title
TRIAL PIT LOCATION PLAN

A	20.06.25	CD	PB	
Rev.	Date	Drn.	App.	Revision
Drawn				Checked
CH				PB
Size	CD	Scale	1:1250	Status
				Information
Drawing No.				Rev.
1753/Fig 1				B

Appendix B 1 Trial Pit Logs



Trial Pit Log

Project Name: Hurst School Road		Client: KP Holding Group Ltd		Date: 21/05/2025	
Location: Land South of School Road, Hurst, Berkshire RG10 0DB		Contractor: CK Drilling		Co-ords: E479621.00 N173392.00	
Project No. : 1753		Crew Name:		Equipment: Minidigger	
Location Number INFL1A	Location Type TP	Level 38.50m AoD	Logged By PB	Scale 1:10	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	38.20		Topsoil	
								Firm orange brown mottled grey very sandy CLAY	
					1.40	37.10		Orange brown slightly gravelly medium SAND. Gravel includes black rounded pebbles	
					2.00	36.50		End of Borehole at 2.000m	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.30	0.30	Stable	None				

Remarks	
No groundwater. Ground level interpolated from client's PDF survey	

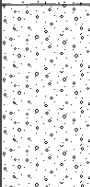






Trial Pit Log

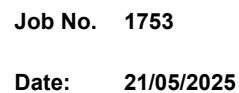
Project Name: Hurst School Road		Client: KP Holding Group Ltd		Date: 21/05/2025	
Location: Land South of School Road, Hurst, Berkshire RG10 0DB		Contractor: CK Drilling		Co-ords: E479710.00 N173349.00	
Project No. : 1753		Crew Name:		Equipment: Minidigger	
Location Number INFL4A	Location Type TP	Level 39.50m AoD	Logged By PB	Scale 1:10	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	39.20		Topsoil	1
								Orange brown clayey SAND	
					0.50	39.00		Orange brown sandy GRAVEL	
					0.75	38.75		End of Borehole at 0.750m	
									2

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.20	0.30	Stable	None				

Remarks	
No groundwater. Ground level interpolated from client's PDF survey	

Appendix B 2 Infiltration Test Reports



Location: INFL1A

Time (mins)	Dip mBGL
0	1.50
20	1.52
40	1.55
60	1.58
80	1.60
100	1.62
120	1.64
140	1.66
160	1.68
180	1.70
200	1.72
220	1.74
240	1.76
260	1.78
280	1.80
300	1.82
320	1.84
340	1.86
360	1.88
380	1.90
400	1.92
420	1.94
440	1.96
460	1.98
480	2.00
500	2.02
520	2.04
540	2.06
560	2.08
580	2.10
600	2.12
620	2.14
640	2.16
660	2.18
680	2.20
700	2.22
720	2.24
740	2.26
760	2.28
780	2.30
800	2.32
820	2.34
840	2.36
860	2.38
880	2.40
900	2.42
920	2.44
940	2.46
960	2.48
980	2.50
1000	2.52
1020	2.54
1040	2.56
1060	2.58
1080	2.60
1100	2.62
1120	2.64
1140	2.66
1160	2.68
1180	2.70
1200	2.72
1220	2.74
1240	2.76
1260	2.78
1280	2.80
1300	2.82

1.8E-06

Remarks:



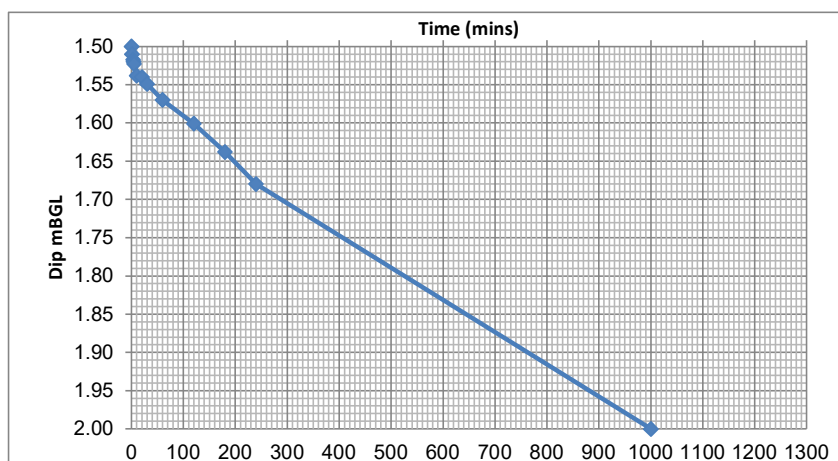
Project: Hurst School Road
Client: KP Holding Group Ltd

Job No. 1753
Date: 22/05/2025

Soakaway Test Cycle 2

Location: INFL1A

<u>Trial Pit Details</u>	Depth (m)	Length (m)	Width (m)	Effective Storage Volume 2.416167		
Dimensions	2.00	1.30	0.30	0.20		
Minimum dip to water (mbgl)	Volume (m3)			Depth (m)		
1.5						
75% Full	0.14625			1.63		
25% Full	0.04875			1.88		
Volume Outflowing	0.0975					
	Area (m2)			Time (24hr)	Elapsed Time (mins)	Dip to water (mbGL)
Mean surface Area	1.19			0 1.50		
Time (mins) 75% full	180			1 1.51		
				3 1.52		
Time (mins) 25% full	740			4 1.52		
				5 1.52		
				10 1.54		
				20 1.54		
				30 1.55		
				60 1.57		
				120 1.60		
				180 1.64		
				240 1.68		
				extrapolated 1000 2.00		



Soil Infiltration Rate F (m/s)

2.4E-06

Remarks:



Project: Hurst School Road

Job No. 1753

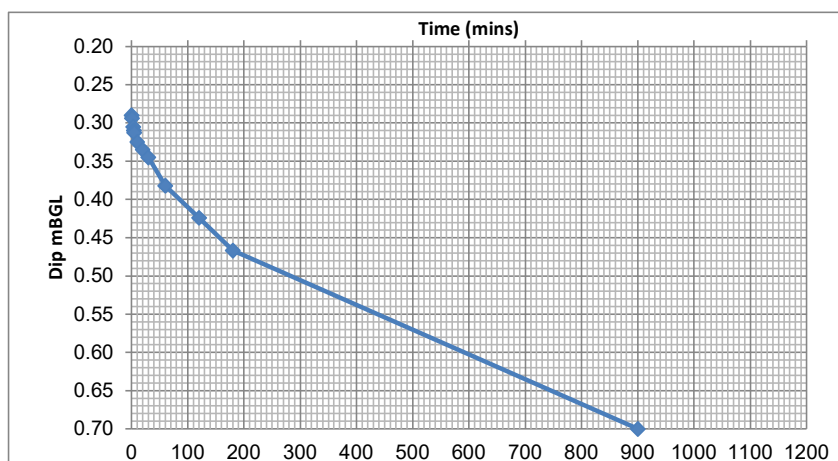
Client: KP Holdings Ltd

Date: 22/05/2025

Soakaway Test Cycle 1

Location: INFL2A

<u>Trial Pit Details</u>	Depth (m)	Length (m)	Width (m)	Effective Storage Volume 2.416167		
Dimensions	0.70	1.30	0.30	0.16		
Minimum dip to water (mbgl)	Volume			Depth		
0.29	(m3)			(m)		
75% Full	0.119925			0.39		
25% Full	0.039975			0.60		
Volume Outflowing	0.07995					
	Area			Time (24hr)	Elapsed Time	Dip to water
	(m2)				(mins)	(mbGL)
Mean surface Area	1.046			0 0.29		
				1 0.29		
				3 0.31		
				4 0.31		
Time (mins) 75% full	60			5 0.31		
				10 0.33		
Time (mins) 25% full	600			20 0.34		
				30 0.35		
				60 0.38		
				120 0.42		
				180 0.47		
				extrapolated	900	0.70



Soil Infiltration Rate F (m/s)

2.4E-06

Remarks:

Remarks:

Remarks:

Remarks:



Project: Hurst School Road

Job No. 1753

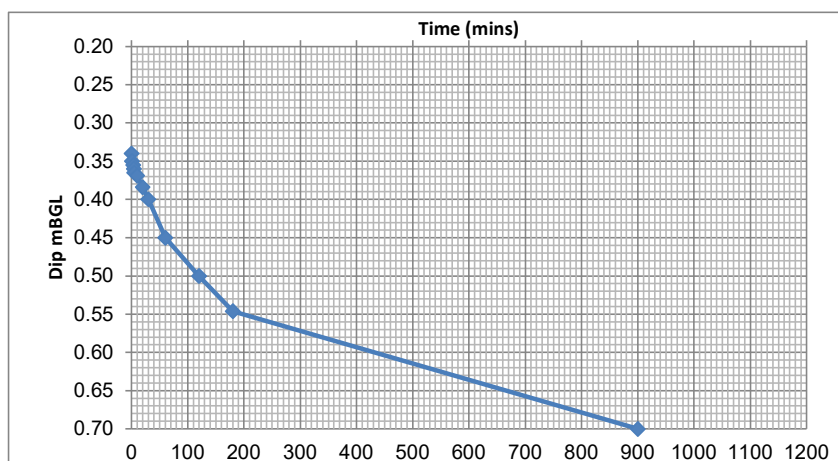
Client: KP Holdings Ltd

Date: 22/05/2025

Soakaway Test Cycle 1

Location: INFL4A

<u>Trial Pit Details</u>	Depth (m)	Length (m)	Width (m)	Effective Storage Volume 2.416167		
Dimensions	0.75	1.20	0.30	0.15		
Minimum dip to water (mbgl)	Volume (m3)			Depth (m)		
0.34						
75% Full	0.1107			0.44		
25% Full	0.0369			0.65		
Volume Outflowing	0.0738					
	Area (m2)			Time (24hr)	Elapsed Time (mins)	Dip to water (mbGL)
Mean surface Area	0.975			0 0.34		
Time (mins) 75% full	50			1 0.35		
				3 0.36		
Time (mins) 25% full	650			4 0.36		
				5 0.37		
				10 0.37		
				20 0.38		
				30 0.40		
				60 0.45		
				120 0.50		
				180 0.55		
			extrapolated	900	0.70	



Soil Infiltration Rate F (m/s)

2.1E-06

Remarks:



Project: Hurst School Road

Job No. 1753

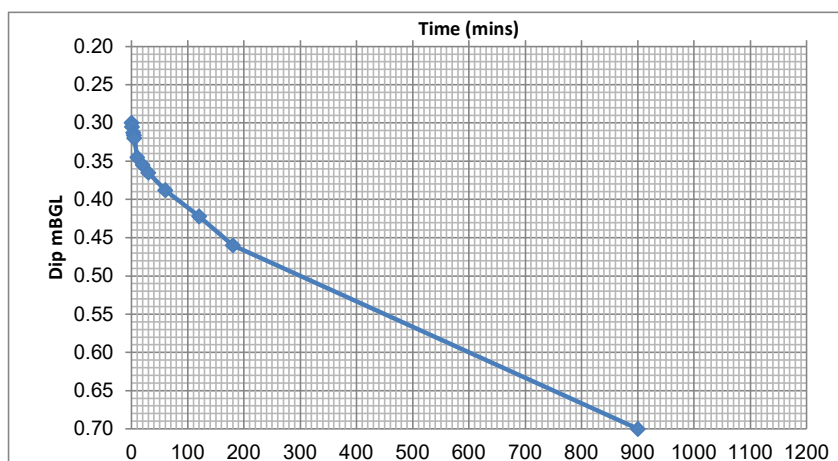
Client: KP Holdings Ltd

Date: 22/05/2025

Soakaway Test Cycle 2

Location: INFL4A

<u>Trial Pit Details</u>	Depth (m)	Length (m)	Width (m)	Effective Storage Volume 2.416167		
Dimensions	0.75	1.20	0.30	0.16		
Minimum dip to water (mbgl)	Volume (m3)			Depth (m)		
0.3						
75% Full	0.1215			0.41		
25% Full	0.0405			0.64		
Volume Outflowing	0.081					
	Area (m2)			Time (24hr)	Elapsed Time (mins)	Dip to water (mbGL)
Mean surface Area	1.035			0 0.30		
Time (mins) 75% full	100			1 0.31		
				3 0.31		
Time (mins) 25% full	730			4 0.32		
				5 0.32		
				10 0.35		
				20 0.36		
				30 0.37		
				60 0.39		
				120 0.42		
				180 0.46		
			extrapolated	900	0.70	



Soil Infiltration Rate F (m/s)

2.1E-06

Remarks:

APPENDIX C 1 Photographs



Excavation INFL1A, top, view to south bottom





View northeast to INFL1A top, view to east bottom





View southwest to INFL3A top, view north along footpath bottom





INFL 1A



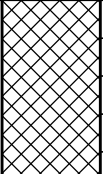
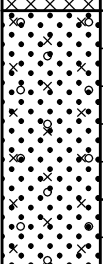
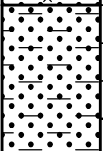
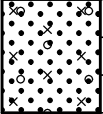
INFL 2A

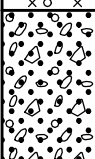
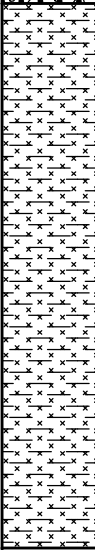


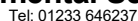
INFL 3A



INFL 4A

 Ground and Environmental Services Limited Unit 2 Montpelier Business Park Dencora Way, Ashford Kent TN23 4FG Tel: 01233 646237					Window Sampler Log No. WS1 Sheet: 1 of 1						
Equipment & Methods. Premier 110 Compact Support Used:None Backfill: Arisings					Project Name: Land at School Road Project Location: Hurst Client: Kentish Projects Ltd					Job No: 13691	
Co-ordinates: E: N:					Ground Level (m):		Date Started: 04/02/2026 Date Completed: 04/02/2026				
Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)			
Depth (m)	No.	Type	Result								
0.40		D		CN=19 2,3/3,4,4,8	MADE GROUND:; Soft moist to wet brown silty clay with rare flint and brick fragments. Also containing occasional fine rootlets			(0.50)			
0.90		D			Medium dense to dense moist light brown gravelly slightly silty SAND, Gravel is subangular fine to coarse flint	-0.50		0.50 (0.70)			
1.50		D			Dense moist light yellowish brown and blue slightly clayey SAND, Also containing rare fine to medium subrounded flint gravel	-1.20		1.20 (0.40)			
1.80		D			Dense to very dense moist orangeish brown silty slightly gravelly SAND, Gravel is subangular fine to medium flint	-1.60		1.60 (0.30)			
				CN=50 9,9/18,26,6 50.0/0.169m		-1.90	End of W/S 1.90 m (Thickness of basal layer not proven)				
Remarks: Groundwater standing at 0.3m upon completion						Logged By: PAD		Checked By: CSS			
						Scale: 1:20		Approved By:			
Notes: For explanation of symbols and abbreviations, see Key Sheet.						FIG No.					

 Ground and Environmental Services Limited Unit 2 Montpellier Business Park Dencora Way, Ashford Kent TN23 4FG Tel: 01233 646237					Window Sampler Log No. WS4 Sheet: 1 of 1						
Equipment & Methods. Premier 110 Compact Support Used:None Backfill: Arisings					Project Name: Land at School Road Project Location: Hurst Client: Kentish Projects Ltd					Job No: 13691	
Co-ordinates: E: N:					Ground Level (m):			Date Started: 18/02/2026 Date Completed: 18/02/2026			
Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)			
Depth (m)	No.	Type	Result								
0.40		D		5,7/5,3,2,2	MADE GROUND:; Soft moist to wet brown silty clay with rare flint and brick fragments. Also containing occasional fine rootlets	-0.30		(0.30)			
					Soft to firm moist brown slightly gravelly SILT, Gravel is subangular fine to medium flint. With rare fine roots			(0.40)			
0.90- 1.00		D			Medium dense to dense moist orangeish brown slightly silty SAND AND GRAVEL, Gravel is subangular fine to coarse flint	-0.70		0.70			
1.50		D	CN=12	2,2/1,2,2,3	Firm becoming stiff moist to wet orangeish brown with greyish blue slightly silty slightly mottled CLAY with rare fine to medium subangular flint gravel	-1.20		1.20			
1.90- 2.00		D									
2.50		D	CN=8	3,3/3,3,4,5	...from 2.20 becoming greyish brown in colour			(1.80)			
			CN=15	3,3/5,7,8,9	No recovery	-3.00		3.00			
			CN=29			-4.00		4.00			
						End of W/S 4.00 m (Thickness of basal layer not proven)					
Remarks: Groundwater standing at 0.4m upon completion.						Logged By: PAD		Checked By: CSS			
						Scale: 1:25		Approved By:			
						FIG No.					
Notes: For explanation of symbols and abbreviations, see Key Sheet.											



Sheet: 1 of 1

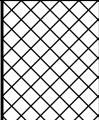
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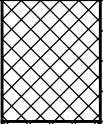
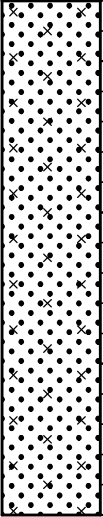
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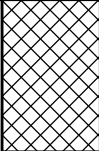
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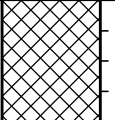
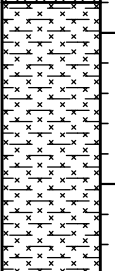
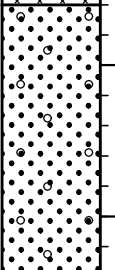
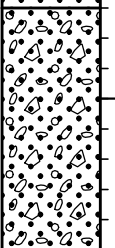
Date Completed:18/02/2026

Notes: For explanation of symbols and abbreviations, see Key Sheet.

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Equipment & Methods. Premier 110 Compact Support Used:None Backfill: Arisings					Project Name: Land at School Road Project Location: Hurst Client: Kentish Projects Ltd					Job No: 13691	
Co-ordinates: E: N:					Ground Level (m):		Date Started: 18/02/2026 Date Completed: 18/02/2026				
Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)			
Depth (m)	No.	Type	Result								
0.30		D		2,4/4,4,3,4	MADE GROUND:; Soft moist to wet brown silty clay with rare flint and brick fragments. Also containing occasional fine rootlets			(0.40)			
					Stiff moist orangeish brown silty slightly sandy CLAY, Also containing rare fine to medium subangular flint gravel	-0.40		0.40			
0.90- 1.00		D	CN=15		Firm to stiff moist orangeish brown very sandy SILT, Also containing rare fine to medium subangular flint gravel	-0.70		0.70			
					Medium dense to dense moist to wet orangeish brown silty SAND AND GRAVEL. Gravel comprising of frequent fine to coarse subangular flint	-1.00		1.00			
1.50		D		2,3/6,7,5,5				(1.00)			
1.90- 2.00		D	CN=23		No recovery	-2.00		2.00			
								(1.00)			
			CN=22	6,6/6,5,5,6							
			CN=35	7,7/7,8,10,10 CPT driven on							
						-3.00		3.00			
						End of W/S 3.00 m (Thickness of basal layer not proven)					
Remarks: Groundwater standing at 0.4m upon completion. Hole unstable so undertook continuous CPT						Logged By: PAD		Checked By: CSS			
						Scale: 1:25		Approved By:			
						FIG No.					
Notes: For explanation of symbols and abbreviations, see Key Sheet.											

 Ground and Environmental Services Limited Unit 2 Montpelier Business Park Dencora Way, Ashford Kent TN23 4FG Tel: 01233 646237					Window Sampler Log No. WS7 Sheet: 1 of 1						
Equipment & Methods. Premier 110 Compact Support Used:None Backfill: Arisings					Project Name: Land at School Road Project Location: Hurst Client: Kentish Projects Ltd					Job No: 13691	
Co-ordinates: E: N:					Ground Level (m):		Date Started: 18/02/2026 Date Completed: 18/02/2026				
Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)			
Depth (m)	No.	Type	Result								
0.40		D		2,3/5,5,7,7	MADE GROUND:; Soft moist to wet brown silty clay with rare flint and brick fragments. Also containing occasional fine rootlets	-0.40		(0.40)			
0.90- 1.00		D			Stiff moist orangeish brown silty slightly sandy CLAY, Also containing rare fine to medium subangular flint gravel and fine roots			(0.90)			
1.50		D	CN=24		Dense becoming very dense moist to wet orangeish brown slightly silty medium to coarse SAND. Also containing occasional fine subangular flint gravel.			1.30			
1.90- 2.00		D		2,3/4,6,5,5	...from 2.30 becoming greenish brown in colour	-1.30		(1.70)			
2.50- 2.60		D						(1.70)			
			CN=20	5,4/24,26 50.0/0.125m							
						End of W/S 3.00 m (Thickness of basal layer not proven)					
Remarks: Groundwater standing at 0.4m upon completion.								Logged By: PAD	Checked By: CSS		
								Scale: 1:25	Approved By:		
								FIG No.			
Notes: For explanation of symbols and abbreviations, see Key Sheet.											

 Ground and Environmental Services Limited Unit 2 Montpelier Business Park Dencora Way, Ashford Kent TN23 4FG Tel: 01233 646237					Window Sampler Log No. WS8 Sheet: 1 of 1									
Equipment & Methods. Premier 110 Compact Support Used:None Backfill: Arisings					Project Name: Land at School Road Project Location: Hurst Client: Kentish Projects Ltd					Job No: 13691				
Co-ordinates: E: N:					Ground Level (m):					Date Started:18/02/2026 Date Completed:18/02/2026				
Samples and In situ Testing				Field Records	DESCRIPTION					Reduced Level (m)	Legend	Depth (Thick) (m)		
Depth (m)	No.	Type	Result											
0.50		D		1,0/1,2,1,2	MADE GROUND:; Soft moist to wet brown silty clay with rare flint and brick fragments. Also containing occasional fine rootlets					-0.50		(0.50)		
0.90- 1.00		D			Stiff to very stiff moist orangeish brown silty slightly sandy CLAY, Also containing rare fine to medium subangular flint gravel.							(0.50)		
1.50		D	CN=6		...from 1.40 becoming bluish greyish brown							(1.50)		
1.90- 2.00		D		3,6/9,10,11,12	Dense to very dense moist to wet light brown SAND AND GRAVEL. Gravel comprising of frequent fine to coarse subangular flint					-2.00		2.00		
2.60- 2.70		D	CN=42									(2.00)		
3.60- 3.70		D		11,7/8,8,8,8						-4.00		4.00		
			CN=32											
				6,5/5,5,6,8									End of W/S 4.00 m (Thickness of basal layer not proven)	
Remarks: Groundwater standing at 1.0m upon completion.										Logged By: PAD		Checked By: CSS		
										Scale: 1:25		Approved By:		
Notes: For explanation of symbols and abbreviations, see Key Sheet.										FIG No.				

 Ground and Environmental Services Limited Unit 2 Montpelier Business Park Dencora Way, Ashford Kent TN23 4FG Tel: 01233 646237					Window Sampler Log No. WS9 Sheet: 1 of 1									
Equipment & Methods. Premier 110 Compact Support Used:None Backfill: Arisings					Project Name: Land at School Road Project Location: Hurst Client: Kentish Projects Ltd					Job No: 13691				
Co-ordinates: E: N:					Ground Level (m):					Date Started:18/02/2026 Date Completed:18/02/2026				
Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)						
Depth (m)	No.	Type	Result											
0.40		D		1,1/1,2,8,11	MADE GROUND:; Soft moist to wet brown silty clay with rare flint and brick fragments. Also containing occasional fine rootlets	-0.40		(0.40)						
0.90- 1.00		D	CN=22		Firm to stiff moist orangeish brown silty slightly sandy CLAY, Also containing rare fine to medium subangular flint gravel.	-1.30		(0.90)						
1.50		D			Dense to very dense moist orangeish brown very gravelly medium to coarse SAND, Gravel is subangular fine to coarse flint	-2.20		(0.90)						
1.90- 2.00		D		3,5/7,8,8,9	Very dense moist to wet brown SAND AND GRAVEL. Gravel comprising of frequent fine to coarse subangular flint	-3.00		(0.80)						
2.60- 2.70		D	CN=32											
			CN=53	10,11/12,13,14,14				End of W/S 3.00 m (Thickness of basal layer not proven)						
Remarks: Groundwater standing at 1.0m upon completion.						Logged By: PAD		Checked By: CSS						
						Scale: 1:25		Approved By:						
Notes: For explanation of symbols and abbreviations, see Key Sheet.						FIG No.								

Appendix B

HR Wallingford Greenfield calculations

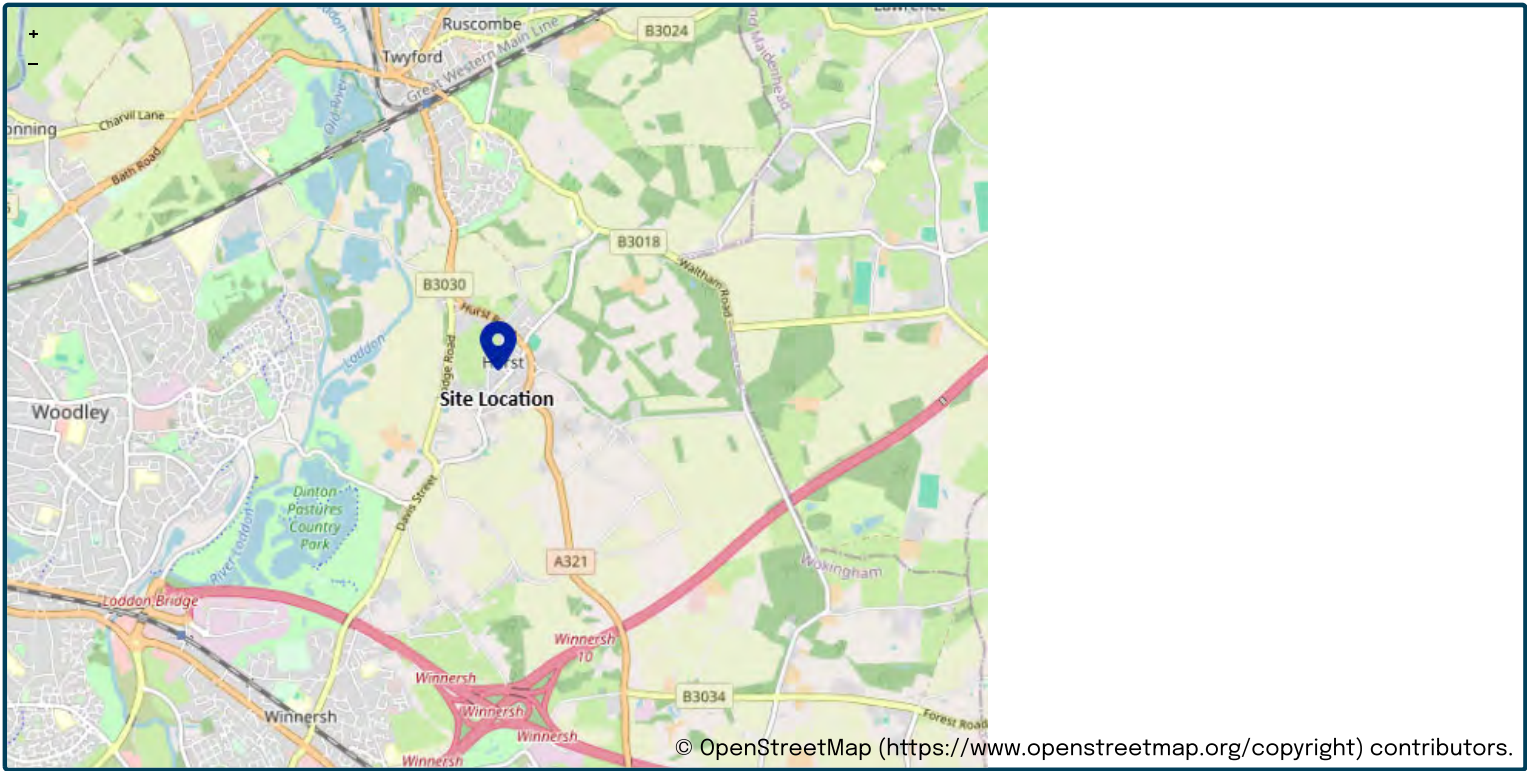
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

Project details

Date	30/06/2025
Calculated by	Ray Clark
Reference	1111-2530
Model version	2.0.1

Location

Site name	SCHOOL ROAD
Site location	HURST



Site easting	479661
Site northing	173451

Site details

Total site area (ha)	0.421	ha
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Greenfield runoff

Method

Method	FEH statistical
--------	-----------------

FEH statistical

	<u>My value</u>		<u>Map value</u>
SAAR (mm)	650	mm	650
BFIHOST	0.492		
QMed-QBar conversion	1.136		1.136
QMed (l/s)	1.03	l/s	
QBar (FEH statistical) (l/s)	1.2	l/s	

Growth curve factors

	<u>My value</u>		<u>Map value</u>
Hydrological region	6		6
1 year growth factor	0.85		
2 year growth factor	0.88		
10 year growth factor	1.62		
30 year growth factor	2.3		
100 year growth factor	3.19		
200 year growth factor	3.74		

Results

Method	FEH statistical	
Flow rate 1 year (l/s)	1	l/s
Flow rate 2 year (l/s)	1	l/s
Flow rate 10 years (l/s)	1.9	l/s
Flow rate 30 years (l/s)	2.7	l/s
Flow rate 100 years (l/s)	3.7	l/s
Flow rate 200 years (l/s)	4.4	l/s

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.0.1) developed by HR Wallingford and available at uksuds.com (<https://www.uksuds.com/>).

The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at [uksuds.com/terms-conditions](https://www.uksuds.com/terms-conditions) (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Appendix C

Drainage Layout



NOTES

CONTRACTORS MUST VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING ANY WORK ON SHOP DRAWINGS

DO NOT SCALE FROM THIS DRAWING

RCD CONSULTANTS LTD COPYRIGHT

NOTES

1. ALL DIMENSIONS IN MILLIMETERS UNLESS NOTED OTHERWISE.

2. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER ENGINEERING DRAWINGS AND CALCULATIONS ASSOCIATED WITH THIS PROJECT.

3. ALL COMPONENTS AND MATERIALS ARE TO BE MANUFACTURED AND SUPPLIED IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, AND LAID AND BACKFILLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND THE RELEVANT BRITISH STANDARDS.

4. THE CONTRACTOR SHALL, BEFORE COMMENCING THE WORKS, VERIFY ALL SITE AND SETTING OUT DIMENSIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TRUE AND PROPER SETTING OUT OF THE WORKS AND FOR THE CORRECTNESS OF THE POSITION, LEVELS, DIMENSIONS, AND ALIGNMENT OF ALL PARTS OF THE WORKS.

CDM REGULATIONS 2015 RESIDUAL HAZARDS

RESIDUAL HAZARDS IDENTIFIED

CONSTRUCTION

1. NO SIGNIFICANT RESIDUAL HAZARDS BEYOND THOSE KNOWN TO AN EXPERIENCED CONTRACTOR.

FUTURE DEMOLITION

A. NO SIGNIFICANT RESIDUAL HAZARDS BEYOND THOSE KNOWN TO AN EXPERIENCED CONTRACTOR.

THIS REGISTER IS A NON-EXHAUSTIVE LIST OF RESIDUAL HAZARDS RELATING TO THE WORKS SHOWN ON THIS DRAWING THAT HAVE BEEN IDENTIFIED DURING THE DESIGN STAGE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A CONTRACTOR WITH THE APPROPRIATE SKILLS, KNOWLEDGE & EXPERIENCE, AND IF THEY ARE AN ORGANISATION, THE ORGANISATIONAL CAPABILITY NECESSARY TO FULFIL THE ROLE.

P5	DRAINAGE AMENDED.	28.04.2026	RAC
P4	ROAD WIDTH AMENDED.	31.03.2026	RAC
P3	RAINFALL BUTTS ADDED.	12.07.2025	RAC
P2	PRELIMINARY ISSUE	23.05.2025	RAC
P1	PRELIMINARY ISSUE	19.05.2025	RAC
REV	AMENDMENT	DATE	CHKD

DRAWING STATUS

PRELIMINARY

RCD

RCD CONSULTANTS LTD

EMAIL: ray@rcd-consultants.com

CLIENT

PROJECT

PROPOSED RESIDENTIAL DEVELOPMENT

SCHOOL ROAD

HURST

DRAWING TITLE

DRAINAGE LAYOUT

SHEET 2 OF 2

CIVILS

SCALE	DRAWN BY	CHECKED	DATE
1:200 @ A1	STC	RAC	MAY 2025
1:400 @ A3			

DRAWING NUMBER	REVISION
1111-2530-CIV-11	P5

Appendix D

Post Development surface water calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	0.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
S1	0.045	5.00	38.950	1200	1.000
S2	0.015	5.00	38.800	1200	0.950
SOAKAWAY			38.900	300	1.150
DUMMY	0.000	5.00	38.900	100	0.400
CARPARK 1	0.039		38.900	100	0.450
SIC2	0.000	5.00	38.900	100	0.400
CARPARK 2	0.023		38.900	100	0.450
SIC3	0.000	5.00	38.750	100	0.400
CARPARK 3	0.044		38.750	100	0.450
SIC4	0.000	5.00	39.100	100	0.400
CARPARK 4	0.108		39.100	100	0.450
SIC5	0.000	5.00	39.300	100	0.400
CARPARK 5	0.154		39.300	100	0.450

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	28.000	0.600	37.950	37.850	0.100	280.0	300	5.50	0.0
1.001	S2	SOAKAWAY	14.000	0.600	37.850	37.750	0.100	140.0	300	5.68	0.0
2.000	DUMMY	CARPARK 1	5.000	0.600	38.500	38.450	0.050	100.0	150	5.08	0.0
3.000	SIC2	CARPARK 2	5.000	0.600	38.500	38.450	0.050	100.0	150	5.08	0.0
4.000	SIC3	CARPARK 3	5.000	0.600	38.350	38.300	0.050	100.0	150	5.08	0.0
5.000	SIC4	CARPARK 4	5.000	0.600	38.700	38.650	0.050	100.0	150	5.08	0.0
6.000	SIC5	CARPARK 5	5.000	0.600	38.900	38.850	0.050	100.0	150	5.08	0.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.934	66.0	0.0	0.700	0.650	0.045	0.0	0	0.000
1.001	1.327	93.8	0.0	0.650	0.850	0.060	0.0	0	0.000
2.000	1.005	17.8	0.0	0.250	0.300	0.000	0.0	0	0.000
3.000	1.005	17.8	0.0	0.250	0.300	0.000	0.0	0	0.000
4.000	1.005	17.8	0.0	0.250	0.300	0.000	0.0	0	0.000
5.000	1.005	17.8	0.0	0.250	0.300	0.000	0.0	0	0.000
6.000	1.005	17.8	0.0	0.250	0.300	0.000	0.0	0	0.000

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	28.000	280.0	300	Circular	38.950	37.950	0.700	38.800	37.850	0.650
1.001	14.000	140.0	300	Circular	38.800	37.850	0.650	38.900	37.750	0.850
2.000	5.000	100.0	150	Circular	38.900	38.500	0.250	38.900	38.450	0.300
3.000	5.000	100.0	150	Circular	38.900	38.500	0.250	38.900	38.450	0.300
4.000	5.000	100.0	150	Circular	38.750	38.350	0.250	38.750	38.300	0.300
5.000	5.000	100.0	150	Circular	39.100	38.700	0.250	39.100	38.650	0.300
6.000	5.000	100.0	150	Circular	39.300	38.900	0.250	39.300	38.850	0.300

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1200	Manhole	Adoptable	S2	1200	Manhole	Adoptable
1.001	S2	1200	Manhole	Adoptable	SOAKAWAY	300	Manhole	Adoptable
2.000	DUMMY	100	Manhole	Adoptable	CARPARK 1	100	Manhole	Adoptable
3.000	SIC2	100	Manhole	Adoptable	CARPARK 2	100	Manhole	Adoptable
4.000	SIC3	100	Manhole	Adoptable	CARPARK 3	100	Manhole	Adoptable
5.000	SIC4	100	Manhole	Adoptable	CARPARK 4	100	Manhole	Adoptable
6.000	SIC5	100	Manhole	Adoptable	CARPARK 5	100	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S1	38.950	1.000	1200					
				0	1.000	37.950	300	
S2	38.800	0.950	1200		1	1.000	37.850	300
				0	1.001	37.850	300	
SOAKAWAY	38.900	1.150	300		1	1.001	37.750	300
DUMMY	38.900	0.400	100					
				0	2.000	38.500	150	
CARPARK 1	38.900	0.450	100		1	2.000	38.450	150
SIC2	38.900	0.400	100					
				0	3.000	38.500	150	
CARPARK 2	38.900	0.450	100		1	3.000	38.450	150

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SIC3	38.750	0.400	100					
				0	4.000	38.350	150	
CARPARK 3	38.750	0.450	100		1	4.000	38.300	150
SIC4	39.100	0.400	100					
				0	5.000	38.700	150	
CARPARK 4	39.100	0.450	100		1	5.000	38.650	150
SIC5	39.300	0.400	100					
				0	6.000	38.900	150	
CARPARK 5	39.300	0.450	100		1	6.000	38.850	150

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	10080	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	35	0	0

Node SOAKAWAY Online Head/Flow Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 37.750

Head (m) 0.001
Flow (l/s) 0.000

Node CARPARK 2 Online Head/Flow Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 38.450

Head Flow
(m) (l/s)
0.001 0.000

Node CARPARK 3 Online Head/Flow Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 38.300

Head Flow
(m) (l/s)
0.001 0.000

Node SOAKAWAY Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00650	Invert Level (m)	37.650	Depth (m)	0.750
Side Inf Coefficient (m/hr)	0.00650	Time to half empty (mins)	2970	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	8.000	Number Required	1
Porosity	0.95	Pit Length (m)	9.000		

Node CARPARK 1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00650	Invert Level (m)	38.450	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00650	Time to half empty (mins)	409	Depth (m)	
Safety Factor	2.0	Width (m)	15.000	Inf Depth (m)	
Porosity	0.30	Length (m)	26.000		

Node CARPARK 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00650	Invert Level (m)	38.400	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00650	Time to half empty (mins)	1230	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	24.000		

Node CARPARK 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00650	Invert Level (m)	38.150	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00650	Time to half empty (mins)	1440	Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	19.000		

Node CARPARK 4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00650	Invert Level (m)	38.600	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00650	Time to half empty (mins)	542	Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	57.000		

Node CARPARK 5 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00650	Invert Level (m)	38.700	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00650	Time to half empty (mins)	804	Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	69.000		

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Approval Settings

Node Size	✓	Minimum Full Bore Velocity (m/s)	
Node Losses	✓	Maximum Full Bore Velocity (m/s)	3.000
Link Size	✓	Proportional Velocity	✓
Minimum Diameter (mm)	150	Return Period (years)	
Link Length	✓	Minimum Proportional Velocity (m/s)	0.750
Maximum Length (m)	100.000	Maximum Proportional Velocity (m/s)	3.000
Coordinates	✓	Surcharged Depth	✓
Accuracy (m)	1.000	Return Period (years)	
Crossings	✓	Maximum Surcharged Depth (m)	0.100
Cover Depth	✓	Flooding	✓
Minimum Cover Depth (m)		Return Period (years)	30
Maximum Cover Depth (m)	3.000	Time to Half Empty	x
Backdrops	✓	Discharge Rates	✓
Minimum Backdrop Height (m)		Discharge Volume	✓
Maximum Backdrop Height (m)	1.500	100 year 360 minute (m ³)	
Full Bore Velocity	✓		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	101.779	28.800	2 year 4320 minute summer	2.424	0.634
2 year 15 minute winter	71.424	28.800	2 year 4320 minute winter	1.596	0.634
2 year 30 minute summer	65.026	18.400	2 year 5760 minute summer	2.051	0.525
2 year 30 minute winter	45.632	18.400	2 year 5760 minute winter	1.327	0.525
2 year 60 minute summer	43.138	11.400	2 year 7200 minute summer	1.797	0.458
2 year 60 minute winter	28.660	11.400	2 year 7200 minute winter	1.160	0.458
2 year 120 minute summer	31.426	8.305	2 year 8640 minute summer	1.620	0.413
2 year 120 minute winter	20.879	8.305	2 year 8640 minute winter	1.046	0.413
2 year 180 minute summer	25.628	6.595	2 year 10080 minute summer	1.493	0.381
2 year 180 minute winter	16.659	6.595	2 year 10080 minute winter	0.963	0.381
2 year 240 minute summer	20.823	5.503	30 year +35% CC 15 minute summer	406.685	115.078
2 year 240 minute winter	13.835	5.503	30 year +35% CC 15 minute winter	285.393	115.078
2 year 360 minute summer	16.180	4.164	30 year +35% CC 30 minute summer	265.736	75.194
2 year 360 minute winter	10.517	4.164	30 year +35% CC 30 minute winter	186.482	75.194
2 year 480 minute summer	12.750	3.369	30 year +35% CC 60 minute summer	176.968	46.767
2 year 480 minute winter	8.470	3.369	30 year +35% CC 60 minute winter	117.573	46.767
2 year 600 minute summer	10.397	2.844	30 year +35% CC 120 minute summer	109.127	28.839
2 year 600 minute winter	7.104	2.844	30 year +35% CC 120 minute winter	72.502	28.839
2 year 720 minute summer	9.212	2.469	30 year +35% CC 180 minute summer	83.060	21.374
2 year 720 minute winter	6.191	2.469	30 year +35% CC 180 minute winter	53.991	21.374
2 year 960 minute summer	7.471	1.967	30 year +35% CC 240 minute summer	64.871	17.144
2 year 960 minute winter	4.949	1.967	30 year +35% CC 240 minute winter	43.099	17.144
2 year 1440 minute summer	5.328	1.428	30 year +35% CC 360 minute summer	48.221	12.409
2 year 1440 minute winter	3.581	1.428	30 year +35% CC 360 minute winter	31.345	12.409
2 year 2160 minute summer	3.778	1.044	30 year +35% CC 480 minute summer	37.028	9.785
2 year 2160 minute winter	2.603	1.044	30 year +35% CC 480 minute winter	24.601	9.785
2 year 2880 minute summer	3.144	0.843	30 year +35% CC 600 minute summer	29.663	8.114
2 year 2880 minute winter	2.113	0.843	30 year +35% CC 600 minute winter	20.268	8.114

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +35% CC 720 minute summer	25.935	6.951	30 year +35% CC 4320 minute summer	5.924	1.549
30 year +35% CC 720 minute winter	17.430	6.951	30 year +35% CC 4320 minute winter	3.902	1.549
30 year +35% CC 960 minute summer	20.639	5.435	30 year +35% CC 5760 minute summer	4.858	1.244
30 year +35% CC 960 minute winter	13.672	5.435	30 year +35% CC 5760 minute winter	3.144	1.244
30 year +35% CC 1440 minute summer	14.323	3.839	30 year +35% CC 7200 minute summer	4.147	1.058
30 year +35% CC 1440 minute winter	9.626	3.839	30 year +35% CC 7200 minute winter	2.677	1.058
30 year +35% CC 2160 minute summer	9.846	2.721	30 year +35% CC 8640 minute summer	3.656	0.933
30 year +35% CC 2160 minute winter	6.784	2.721	30 year +35% CC 8640 minute winter	2.360	0.933
30 year +35% CC 2880 minute summer	7.994	2.143	30 year +35% CC 10080 minute summer	3.302	0.842
30 year +35% CC 2880 minute winter	5.373	2.143	30 year +35% CC 10080 minute winter	2.131	0.842

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	38.011	0.061	5.9	0.0691	0.0000	OK
15 minute winter	S2	11	37.910	0.060	7.8	0.0681	0.0000	OK
1440 minute winter	SOAKAWAY	1380	37.838	0.088	0.5	12.8721	0.0000	OK
15 minute summer	DUMMY	1	38.500	0.000	0.0	0.0000	0.0000	OK
240 minute winter	CARPARK 1	184	38.496	0.046	1.3	4.8882	0.0000	OK
15 minute summer	SIC2	1	38.500	0.000	0.0	0.0000	0.0000	OK
600 minute winter	CARPARK 2	435	38.496	0.046	0.4	3.3727	0.0000	OK
15 minute summer	SIC3	1	38.350	0.000	0.0	0.0000	0.0000	OK
480 minute winter	CARPARK 3	440	38.270	-0.030	0.9	6.7326	0.0000	OK
15 minute summer	SIC4	1	38.700	0.000	0.0	0.0000	0.0000	OK
360 minute winter	CARPARK 4	288	38.696	0.046	2.7	15.3532	0.0000	OK
15 minute summer	SIC5	1	38.900	0.000	0.0	0.0000	0.0000	OK
360 minute winter	CARPARK 5	336	38.817	-0.033	3.8	22.7808	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	5.8	0.577	0.088	0.2818	
15 minute winter	S2	1.001	SOAKAWAY	7.7	0.794	0.083	0.1367	
1440 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
1440 minute winter	SOAKAWAY	Infiltration		0.1				
15 minute summer	DUMMY	2.000	CARPARK 1	0.0	0.000	0.000	0.0036	
240 minute winter	CARPARK 1	Infiltration		0.3				
15 minute summer	SIC2	3.000	CARPARK 2	0.0	0.000	0.000	0.0000	
600 minute winter	CARPARK 2	Head/Flow		0.0				0.0
600 minute winter	CARPARK 2	Infiltration		0.1				
15 minute summer	SIC3	4.000	CARPARK 3	0.0	0.000	0.000	0.0000	
480 minute winter	CARPARK 3	Head/Flow		0.0				0.0
480 minute winter	CARPARK 3	Infiltration		0.2				
15 minute summer	SIC4	5.000	CARPARK 4	0.0	0.000	0.000	0.0000	
360 minute winter	CARPARK 4	Infiltration		0.5				
15 minute summer	SIC5	6.000	CARPARK 5	0.0	0.000	0.000	0.0000	
360 minute winter	CARPARK 5	Infiltration		0.6				

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	S1	1410	38.204	0.254	1.0	0.2877	0.0000	OK
1440 minute winter	S2	1410	38.204	0.354	1.3	0.4008	0.0000	SURCHARGED
1440 minute winter	SOAKAWAY	1410	38.204	0.454	1.2	37.9534	0.0000	OK

240 minute winter	DUMMY	236	38.615	0.115	0.0	0.0009	0.0000	OK
240 minute winter	CARPARK 1	236	38.615	0.165	3.9	18.4650	0.0000	OK

720 minute winter	SIC2	690	38.732	0.232	0.0	0.0019	0.0000	FLOOD RISK
720 minute winter	CARPARK 2	690	38.732	0.282	0.9	11.8659	0.0000	OK

480 minute winter	SIC3	472	38.576	0.226	0.1	0.0018	0.0000	FLOOD RISK
480 minute winter	CARPARK 3	472	38.576	0.276	2.5	24.1672	0.0000	OK

480 minute winter	SIC4	472	38.943	0.243	0.0	0.0019	0.0000	FLOOD RISK
480 minute winter	CARPARK 4	472	38.943	0.293	6.2	57.4901	0.0000	OK

480 minute winter	SIC5	472	39.117	0.217	0.1	0.0017	0.0000	FLOOD RISK
480 minute winter	CARPARK 5	472	39.117	0.267	8.8	84.9176	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	S1	1.000	S2	1.0	0.323	0.015	1.8776	
1440 minute winter	S2	1.001	SOAKAWAY	1.2	0.389	0.013	0.9859	
1440 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
1440 minute winter	SOAKAWAY	Infiltration		0.1				
240 minute winter	DUMMY	2.000	CARPARK 1	0.0	-0.011	-0.002	0.0804	
240 minute winter	CARPARK 1	Infiltration		0.4				
720 minute winter	SIC2	3.000	CARPARK 2	0.0	-0.009	-0.002	0.0880	
720 minute winter	CARPARK 2	Head/Flow		0.0				0.0
720 minute winter	CARPARK 2	Infiltration		0.1				
480 minute winter	SIC3	4.000	CARPARK 3	-0.1	-0.014	-0.003	0.0880	
480 minute winter	CARPARK 3	Head/Flow		0.0				0.0
480 minute winter	CARPARK 3	Infiltration		0.2				
480 minute winter	SIC4	5.000	CARPARK 4	0.0	-0.012	-0.003	0.0880	
480 minute winter	CARPARK 4	Infiltration		0.6				
480 minute winter	SIC5	6.000	CARPARK 5	-0.1	-0.016	-0.003	0.0880	
480 minute winter	CARPARK 5	Infiltration		0.7				

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	0.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
S1	0.045	5.00	38.950	1200	1.000
S2	0.015	5.00	38.800	1200	0.950
SOAKAWAY			38.900	300	1.150
DUMMY	0.000	5.00	38.900	100	0.400
CARPARK 1	0.039		38.900	100	0.450
SIC2	0.000	5.00	38.900	100	0.400
CARPARK 2	0.023		38.900	100	0.450
SIC3	0.000	5.00	38.750	100	0.400
CARPARK 3	0.044		38.750	100	0.450
SIC4	0.000	5.00	39.100	100	0.400
CARPARK 4	0.108		39.100	100	0.450
SIC5	0.000	5.00	39.300	100	0.400
CARPARK 5	0.154		39.300	100	0.450

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	28.000	0.600	37.950	37.850	0.100	280.0	300	5.50	0.0
1.001	S2	SOAKAWAY	14.000	0.600	37.850	37.750	0.100	140.0	300	5.68	0.0
2.000	DUMMY	CARPARK 1	5.000	0.600	38.500	38.450	0.050	100.0	150	5.08	0.0
3.000	SIC2	CARPARK 2	5.000	0.600	38.500	38.450	0.050	100.0	150	5.08	0.0
4.000	SIC3	CARPARK 3	5.000	0.600	38.350	38.300	0.050	100.0	150	5.08	0.0
5.000	SIC4	CARPARK 4	5.000	0.600	38.700	38.650	0.050	100.0	150	5.08	0.0
6.000	SIC5	CARPARK 5	5.000	0.600	38.900	38.850	0.050	100.0	150	5.08	0.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.934	66.0	0.0	0.700	0.650	0.045	0.0	0	0.000
1.001	1.327	93.8	0.0	0.650	0.850	0.060	0.0	0	0.000
2.000	1.005	17.8	0.0	0.250	0.300	0.000	0.0	0	0.000
3.000	1.005	17.8	0.0	0.250	0.300	0.000	0.0	0	0.000
4.000	1.005	17.8	0.0	0.250	0.300	0.000	0.0	0	0.000
5.000	1.005	17.8	0.0	0.250	0.300	0.000	0.0	0	0.000
6.000	1.005	17.8	0.0	0.250	0.300	0.000	0.0	0	0.000

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	28.000	280.0	300	Circular	38.950	37.950	0.700	38.800	37.850	0.650
1.001	14.000	140.0	300	Circular	38.800	37.850	0.650	38.900	37.750	0.850
2.000	5.000	100.0	150	Circular	38.900	38.500	0.250	38.900	38.450	0.300
3.000	5.000	100.0	150	Circular	38.900	38.500	0.250	38.900	38.450	0.300
4.000	5.000	100.0	150	Circular	38.750	38.350	0.250	38.750	38.300	0.300
5.000	5.000	100.0	150	Circular	39.100	38.700	0.250	39.100	38.650	0.300
6.000	5.000	100.0	150	Circular	39.300	38.900	0.250	39.300	38.850	0.300

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1200	Manhole	Adoptable	S2	1200	Manhole	Adoptable
1.001	S2	1200	Manhole	Adoptable	SOAKAWAY	300	Manhole	Adoptable
2.000	DUMMY	100	Manhole	Adoptable	CARPARK 1	100	Manhole	Adoptable
3.000	SIC2	100	Manhole	Adoptable	CARPARK 2	100	Manhole	Adoptable
4.000	SIC3	100	Manhole	Adoptable	CARPARK 3	100	Manhole	Adoptable
5.000	SIC4	100	Manhole	Adoptable	CARPARK 4	100	Manhole	Adoptable
6.000	SIC5	100	Manhole	Adoptable	CARPARK 5	100	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	38.950	1.000	1200				
					0	1.000	37.950
S2	38.800	0.950	1200				
					1	1.000	37.850
				0	1.001	37.850	300
SOAKAWAY	38.900	1.150	300				
					1	1.001	37.750
				1	1.001	37.750	300
DUMMY	38.900	0.400	100				
					0	2.000	38.500
CARPARK 1	38.900	0.450	100				
					1	2.000	38.450
				1	2.000	38.450	150
SIC2	38.900	0.400	100				
					0	3.000	38.500
CARPARK 2	38.900	0.450	100				
					1	3.000	38.450
				1	3.000	38.450	150

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SIC3	38.750	0.400	100					
				0	4.000	38.350	150	
CARPARK 3	38.750	0.450	100		1	4.000	38.300	150
SIC4	39.100	0.400	100					
				0	5.000	38.700	150	
CARPARK 4	39.100	0.450	100		1	5.000	38.650	150
SIC5	39.300	0.400	100					
				0	6.000	38.900	150	
CARPARK 5	39.300	0.450	100		1	6.000	38.850	150

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	10080	Check Discharge Volume	x

Storm Durations

360

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	0	0	0

Node SOAKAWAY Online Head/Flow Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 37.750

Head (m)	Flow (l/s)
0.001	0.000

Node CARPARK 2 Online Head/Flow Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 38.450

Head (m) 0.001
Flow (l/s) 0.000

Node CARPARK 3 Online Head/Flow Control

Flap Valve x Replaces Downstream Link ✓ Invert Level (m) 38.300

Head (m) 0.001
Flow (l/s) 0.000

Node SOAKAWAY Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00650	Invert Level (m)	37.650	Depth (m)	0.750
Side Inf Coefficient (m/hr)	0.00650	Time to half empty (mins)	1248	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	8.000	Number Required	1
Porosity	0.95	Pit Length (m)	9.000		

Node CARPARK 1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00650	Invert Level (m)	38.450	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00650	Time to half empty (mins)	409	Depth (m)	
Safety Factor	2.0	Width (m)	15.000	Inf Depth (m)	
Porosity	0.30	Length (m)	26.000		

Node CARPARK 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00650	Invert Level (m)	38.400	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00650	Time to half empty (mins)	1104	Depth (m)	
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	24.000		

Node CARPARK 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00650	Invert Level (m)	38.150	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00650	Time to half empty (mins)	1224	Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	19.000		

Node CARPARK 4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00650	Invert Level (m)	38.600	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00650	Time to half empty (mins)	542	Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	57.000		

Node CARPARK 5 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00650	Invert Level (m)	38.700	Slope (1:X)	5000.0
Side Inf Coefficient (m/hr)	0.00650	Time to half empty (mins)	804	Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	69.000		

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Approval Settings

Node Size	✓	Minimum Full Bore Velocity (m/s)	
Node Losses	✓	Maximum Full Bore Velocity (m/s)	3.000
Link Size	✓	Proportional Velocity	✓
Minimum Diameter (mm)	150	Return Period (years)	
Link Length	✓	Minimum Proportional Velocity (m/s)	0.750
Maximum Length (m)	100.000	Maximum Proportional Velocity (m/s)	3.000
Coordinates	✓	Surcharged Depth	✓
Accuracy (m)	1.000	Return Period (years)	
Crossings	✓	Maximum Surcharged Depth (m)	0.100
Cover Depth	✓	Flooding	✓
Minimum Cover Depth (m)		Return Period (years)	30
Maximum Cover Depth (m)	3.000	Time to Half Empty	x
Backdrops	✓	Discharge Rates	✓
Minimum Backdrop Height (m)		Discharge Volume	✓
Maximum Backdrop Height (m)	1.500	100 year 360 minute (m³)	
Full Bore Velocity	✓		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year 360 minute summer	44.724	11.509	100 year 360 minute winter	29.072	11.509

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	S1	360	38.097	0.147	3.1	0.1659	0.0000	OK
360 minute winter	S2	360	38.097	0.247	4.1	0.2790	0.0000	OK
360 minute winter	SOAKAWAY	360	38.097	0.347	4.1	30.5787	0.0000	OK
360 minute winter	DUMMY	344	38.601	0.101	0.0	0.0008	0.0000	OK
360 minute winter	CARPARK 1	344	38.601	0.151	2.6	16.8122	0.0000	OK
360 minute winter	SIC2	360	38.711	0.211	0.1	0.0017	0.0000	FLOOD RISK
360 minute winter	CARPARK 2	360	38.711	0.261	1.6	11.0944	0.0000	OK
360 minute winter	SIC3	360	38.533	0.183	0.1	0.0015	0.0000	FLOOD RISK
360 minute winter	CARPARK 3	360	38.533	0.233	3.0	21.7460	0.0000	OK
360 minute winter	SIC4	352	38.914	0.214	0.1	0.0017	0.0000	FLOOD RISK
360 minute winter	CARPARK 4	352	38.914	0.264	7.3	52.6110	0.0000	OK
360 minute winter	SIC5	360	39.078	0.178	0.1	0.0014	0.0000	FLOOD RISK
360 minute winter	CARPARK 5	360	39.078	0.228	10.4	76.8571	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	S1	1.000	S2	3.1	0.491	0.047	1.3467	
360 minute winter	S2	1.001	SOAKAWAY	4.1	0.588	0.044	0.9268	
360 minute winter	SOAKAWAY	Head/Flow		0.0				0.0
360 minute winter	SOAKAWAY	Infiltration		0.1				
360 minute winter	DUMMY	2.000	CARPARK 1	0.0	-0.008	-0.001	0.0755	
360 minute winter	CARPARK 1	Infiltration		0.4				
360 minute winter	SIC2	3.000	CARPARK 2	-0.1	-0.011	-0.003	0.0880	
360 minute winter	CARPARK 2	Head/Flow		0.0				0.0
360 minute winter	CARPARK 2	Infiltration		0.1				
360 minute winter	SIC3	4.000	CARPARK 3	-0.1	-0.021	-0.003	0.0880	
360 minute winter	CARPARK 3	Head/Flow		0.0				0.0
360 minute winter	CARPARK 3	Infiltration		0.2				
360 minute winter	SIC4	5.000	CARPARK 4	-0.1	-0.012	-0.003	0.0880	
360 minute winter	CARPARK 4	Infiltration		0.6				
360 minute winter	SIC5	6.000	CARPARK 5	-0.1	-0.013	-0.003	0.0880	
360 minute winter	CARPARK 5	Infiltration		0.7				

Appendix E

Flood exceedance plan



NOTES
CONTRACTORS MUST VERIFY ALL DIMENSIONS ON SITE BEFORE
COMMENCING ANY WORK ON SHOP DRAWINGS
DO NOT SCALE FROM THIS DRAWING
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FLOOD EXCEEDANCE ROUTE

P2	PRELIMINARY ISSUE	28.04.2026	RAC
P1	PRELIMINARY ISSUE	12.07.2025	RAC
REV	AMENDMENT	DATE	CHKD

DRAWING STATUS

PRELIMINARY

RCD

RCD CONSULTANTS LTD
EMAIL: ray@rcd-consultants.com

CLIENT

PROJECT
PROPOSED RESIDENTIAL DEVELOPMENT
SCHOOL ROAD
HURST

DRAWING TITLE
FLOOD EXCEEDANCE PLAN

CIVILS

SCALE	DRAWN BY	CHECKED	DATE
1:250 @ A1	STC	RAC	JUL 2025
1:500 @ A3			

DRAWING NUMBER	REVISION
1111-2530-CIV-FEP	P2

Appendix F**SUDS operation and maintenance schedules**

Operation and Maintenance Schedule - Porous paving		
Maintenance Schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduce frequency as required, based upon site-specific observations of clogging or manufacturer's recommendations - pay particular attention to areas where water runs onto pervious surface from adjacent impermeabl areas as this area is most likely to collect the most sediment.
Occassional Maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weeds or management using gylphosphate applied directly into the weeds by an applicator rather than spraying.	As required - once per year on less frequently used pavements.
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip has occurred.	As required.
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required.
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10-15 years or as required (if infiltration performance is reduced due to significant clogging).
Monitoring	Initial inspection.	Monthly for three months after installation.
	Inspect for evidence of poor operation and/or weed growth - if required, take remdial action.	Three monthly, 48 hours after large storms in first six months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.

Operation and Maintenance Schedule - Cellular Storage Tank		
Maintenance Schedule	Required action	Typical frequency
Regular maintenance	Clean all gutters and downpipes.	Annually.
	Check for sediment build-up or debris in the upstream chambers and the pipe running through the cellular storage tank. Remove all debris and sediment.	Annually.
Occassional Maintenance	Clean all gutters and downpipes. Check for sediment build-up or debris in the upstream chambers and the pipe running through the cellular storage tank. Remove all debris and sediment.	As required based upon inspections.
Remedial Actions	Reconstruct cellular storage tank and/or replace or clean void fill, if performace deteriorates or failure occurs.	As required based upon inspections.
	Replacement of damaged geotextile (will require reconstruction of cellular storage tank).	As required based upon inspections.
Monitoring	Inspect catch pits and note rate of sediment accumulation.	Monthly in first year and then annually, increase frequency of regular maintenancence if heavy siltation occurs more frequently.
	Check cellular storage tank to ensure emptying is occurring.	Annually.

Proprietary systems classified on basis of main treatment process			
Proprietary systems	Description	Treatment processes	Leisenring (2012) classification
Proprietary bioretention systems in concrete (or other material) structures	Filtration devices that use soils (or other filter media) and which support plants or bacterial biofilms	Filtration, absorption, bioremediation	Biological filtration
Treatment channels	Channels that are designed to collect and treat water rather than convey it along the channel ; can include proprietary filter media within the channel ; can include weir and baffles at intervals to trap oils and floatables	Physical removal of sediment , oils and floatables ; wetting and drying to promote degradation	Does not include test results for this type of system (note that there are examples in Europe that are certified by DiBT in Germany)
Hydrodynamic or vortex separators	Structures that use gravity and centrifugal force to separate out and collect medium-sized (63 to 250 um) sediments and other litter or debris; smaller particles may be able to be removed by varying the flow rate into the system.	Physical removal of sediment by gravity	Manufactured device - physical
Proprietary filtration systems	Devices that filter water by passing it through various filter media; they are constructed below ground in chambers and do not support vegetation.	Filtration and absorption	Filtration
Oil separators	Structures designed to separate gross amounts of oil and large size (> 250 um) suspended solids from water ; they do this by allowing light non-aqueous phase liquids (LNAPL) to float and large sediment particles to sink; many also have baffles, coalescers and oil skimmers to speed -up or enhance performance.	Physical removal of floatables, physical removal of sediment by gravity	Oil/grit separators and baffle boxes
Multi-process	Systems that include multiple treatment processes in series .	Various	Multi-process

Operation and Maintenance Schedule - catchpit		
Maintenance Schedule	Required action	Typical frequency
Regular maintenance	Clean all gutters and downpipes.	Annually
	Inspect for sediment and debris in the chamber and remove.	Six monthly
Occassional Maintenance	Inspect for sediment and debris in the chamber.	As required based upon inspections.
Remedial Actions	Replace chamber if damaged.	As required.
Monitoring	Inspect catchpit and take note of sedimentation.	Monthly in first year and then annually, increase frequency of regular maintenancence if heavy siltation occurs more frequently.

Operation and Maintenance Schedule - Soakaway		
Maintenance Schedule	Required action	Typical frequency
Regular maintenance	Clean all gutters and downpipes.	Annually.
	Check for sediment build-up or debris in the upstream chambers and the pipe running through the cellular storage tank. Remove all debris and sediment.	Annually.
Occassional Maintenance	Clean all gutters and downpipes. Check for sediment build-up or debris in the upstream chambers and the pipe running through the cellular storage tank. Remove all debris and sediment.	As required based upon inspections.
Remedial Actions	Reconstruct soakaway and/or replace or clean void fill, if performace deteriorates or failure occurs.	As required based upon inspections.
	Replacement of clogged geotextile (will require reconstruction of soakaway.	As required based upon inspections.
Monitoring	Inspect catch pits and note rate of sediment accumulation.	Monthly in first year and then annually, increase frequency of regular maintenancence if heavy siltation occurs more frequently.
	Check soakaway to ensure emptying is occurring.	Annually.

