Civils
Construction & Property Solutions

BdR
Civil & Structural
Engineering Consultants

FORMER SYNGENTA WORKS, HAMPSTEAD LANE, YALDING, KENT [BUSINESS PARK]

SURFACE WATER / SuDS MAINTENANCE & MANAGEMENT PLAN

Reference: 22-0042
Revision: Issue 1.0
Date: 15/03/22

DRAINAGE
- Drainage Strategies
- S104 Drainage Design
- SUDS
- Flood Risk Assessments
- CSH SUR1

HIGHWAYS
- Transportation Assessments
- S38/278 Highway Design
- Junction Modelling
- Traffic & Parking Surveys
- Remedial Assessments

STRUCTURAL ENGINEERING
- All Structural Design
- Temporary Works
- Specialist Foundations
- Multi Storey & Basements
- RC Detailing

SPECIALIST SERVICES
- Site Assessments
- CDM 2015 Support
- TEKLA - Steelwork Fabrication drawings
- Expert Witness

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Document Control Sheet

Issue	Status	Prepared / Revised by	Verified By	Date
1.0	Final	 Sara Bengoetxea	 C J Mellett	15/03/22

Contents

1.0 Introduction

1.1 BdR has been appointed by Civils Contracting Ltd (the Client) to undertake a Surface Water / Sustainable Drainage System (SuDS) Maintenance & Management Plan (MMP) for the proposed Business Park at the former Syngenta Works, Hampstead Lane, Yalding, Kent.

1.2 The function of the Surface Water / SuDS MMP is to bring awareness to those responsible for maintenance of the Surface Water / SuDS components regardless of whether individual components are below ground or on the surface.

1.3 Any contractor carrying out maintenance work must carry out a risk assessment and take all necessary precautions to comply with Health and Safety legislation current at the time that the work is to be carried out.

1.4 Where the user of the system is not responsible for the maintenance, then it is important to ensure that they know when the Surface Water / SuDS is not functioning correctly and who to contact if an issue arises.

1.5 This Surface Water / SuDS MMP includes brief details of the surface water design concepts and performance criteria for the development and how the owner or operator should ensure that any works undertaken within the site do not compromise the systems performance.

2.0 Design Concept

2.1 Surface water runoff from the development is intercepted by Type C [No Infiltration] and Type A [Full Infiltration] permeable paving. The Type C systems serve sections of the external hardstanding areas of the B2 units and outfall via a Pollution Control Valve [PCV] manhole to the Flood Conveyance Channel. The Type A systems infiltrate directly to ground.

2.2 The design of the Type A [Full Infiltration] permeable pavements is based on the lowest BRE DG365 soakage test result achieved from 14 tests carried out across the site calculated at 0.4m/hr.

3.0 Performance Criteria

3.1 The surface water network has been designed based on the following performance criteria;

- **Pipe Network:**
  No flooding up to and including the 1 in 100 years event plus 40% climate change.
- **Permeable Paving:**
  No flooding up to and including the 1 in 100 years event plus 40% climate change.

4.0 Surface Water Drainage System

4.1 The above ground surface water system comprises roof drainage, threshold drains and trapped gullies.

4.2 The below ground surface water system includes catchpits, manholes, inspection chambers, solid pipework, Type C [No Infiltration] permeable paving, PVC manholes, Type A [Full Infiltration] permeable paving and fin drains.

5.0 Maintenance Requirements

5.1 Maintenance requirements fall into four categories;

- **Regular maintenance (including inspections and monitoring).**
  Consists of basic tasks done on a frequent and predictable schedule, including vegetation management, litter and debris removal, and inspections.
- **Occasional maintenance**
  Comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).
- **Remedial maintenance**
  Comprises intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.
- **Monitoring**
  Monitoring must be carried out regularly to identify the maintenance required.

5.2 Maintenance should be carried out in accordance with the recommendations of the CIRIA C753 SuDs Manual 2015, which are included in Appendix 2.

6.0 Private Drains & Sewers

6.1 The private drains are those serving a single unit, and typically comprise~~s~~ 100mm to 150mm diameter pipework connected to inspection chambers.

6.2 The private sewers are those serving more than one unit, and typically comprise~~s~~ 100mm to 300mm diameter pipework connected to inspection chambers, manholes, catchpits, and flood conveyance channel.

6.3 The catchpits have a sump to allow silt to settle out of the surface water run-off before discharging to the flood conveyance channel.

7.0 Private Roads/B8 Unit External Parking Areas

7.1 All access roads including any highway drainage are to remain private. The highway drainage infiltrates to ground via Type A [Full Infiltration] permeable paving.

7.2 A geotextile filter fabric underlying the laying course will provide protection against silt/pollutants entering the sub-base material.

8.0 B2 Unit External Parking Areas/ HGV Parking areas

8.1 All parking areas including any highway drainage are to remain private. The highway drainage will discharge freely to the Flood Conveyance Channel via Type C [No infiltration] permeable paving.

8.2 Each separate parking area will incorporate an impermeable geomembrane and PVC manholes to isolate the area in the event of a pollution spill.

9.0 Maintenance Responsibilities

9.1 The maintenance and management of the individual units and their associated external areas will be the responsibility of the owner/tenant. All other common/shared areas will be the responsibility of a Management Company.

9.2 Responsibility for the management of all aspects of the surface water drainage system will be taken on by a site facilities management company appointed by the developer prior to the sale of the first unit on the site.

The site facilities management company will be responsible for all common area maintenance above and below ground including but not limited to;

- Inspection at regular intervals of all observable manhole and inspection chambers associated with the surface water drainage system where such pipework is underground anywhere within the development area.
- Inspection of all metered facilities which are considered to be shared services such a common water, gas or electricity services used within the curtilage of the development area including power requirements of underground pump systems.

9.3 The responsibility for payment of these common area and amenity services including necessary cleaning, servicing, repairs and consumables to pipework and associated equipment costs will be paid on a shared basis by all owners for all properties for the life time of the development as a condition of the contract for the purchase of each unit.

9.4 The operation and maintenance of the development's surface water drainage infrastructure will be the responsibility of the following stakeholders.

System	Responsibility
Private drains/ Permeable Paving serving Individual Units & Associated External Areas	Owner/ Tenant
Private sewers/ Permeable Paving Serving Common/ Shared Areas	Management Company

Appendix 1
Drainage Layout

SURFACE WATER FLOW REGIME

1. All access roads/parking areas to be Type A Permeable Paving Full Infiltration except B2 Unit parking areas which shall be Type C Permeable Paving- No infiltration.
2. Type C permeable paved areas will discharge freely to the Flood Conveyance Channel. Each separate parking area will incorporate a Pollution Control Valve (PCV) to isolate the area in the event of a pollution spill.
3. Type A permeable paved areas infiltrate to ground. An infiltration rate of 0.4m/hr has been calculated based on the lowest recorded BRE DG365 soakage test results undertaken by Civils Contracting Ltd on 21 Dec 2021.
4. Runoff from roofs discharges directly to the Type A Permeable Paved areas via distribution tanks.
5. Runoff from rooffs connects directly to the Flood Conveyance Channel for those units that are located directly adjacent.
6. The surface water networks/SuDS components are designed to convey/contain the 1 in 100 year plus 40% climate change with no flooding.

FOUL WATER FLOW REGIME

The following regime will ensure the on-site foul water drainage systems will be resilient in times of flood:

1. Foul water from each unit connects directly to a gravity foul drain suspended under the raised floor slab.
2. The gravity drain connects to a package pumping station located above the existing ground level within the void space under each unit. The pump station incorporates sealed bolt down covers to prevent the ingress of flood water should this rise above the modelled 1 in 100 year event plus 40% climate change.
3. The pump chamber incorporates dual pumps operating on a duty / standby basis. An audible / visual alarm alerts the owner / tenant of any malfunction.
4. Emergency storage is provided within the pump chamber to cater for mechanical / power failure.
5. Foul flows are pumped through a sealed pressurised lateral main to the common rising main located within the access road adjacent each unit.
6. The common rising main discharges to the head of the on-site gravity sewer located to the west of the flood conveyance channel.
7. The on-site gravity foul sewer manholes incorporate sealed bolt down covers to prevent the ingress of flood water.
8. Foul flow connects to the existing public foul sewer MH at the entrance to the Business Park.

WATER QUALITY MANAGEMENT

The effect of the proposed work on local water quality has been assessed using the simple qualitative method as set out in CIRIA Report C753 the SUDS Manual 2015 [CHAPTER 26].

BOX 26.2 Steps of the simple index approach

Step 1 – Allocate suitable pollution hazard indices for the proposed land use

Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index

Step 3 – Where the discharge is to protected[1] surface waters or groundwater, consider the need for a more precautionary approach

Note:
1 Designated as those protected for the supply of drinking water (Table 4.3).

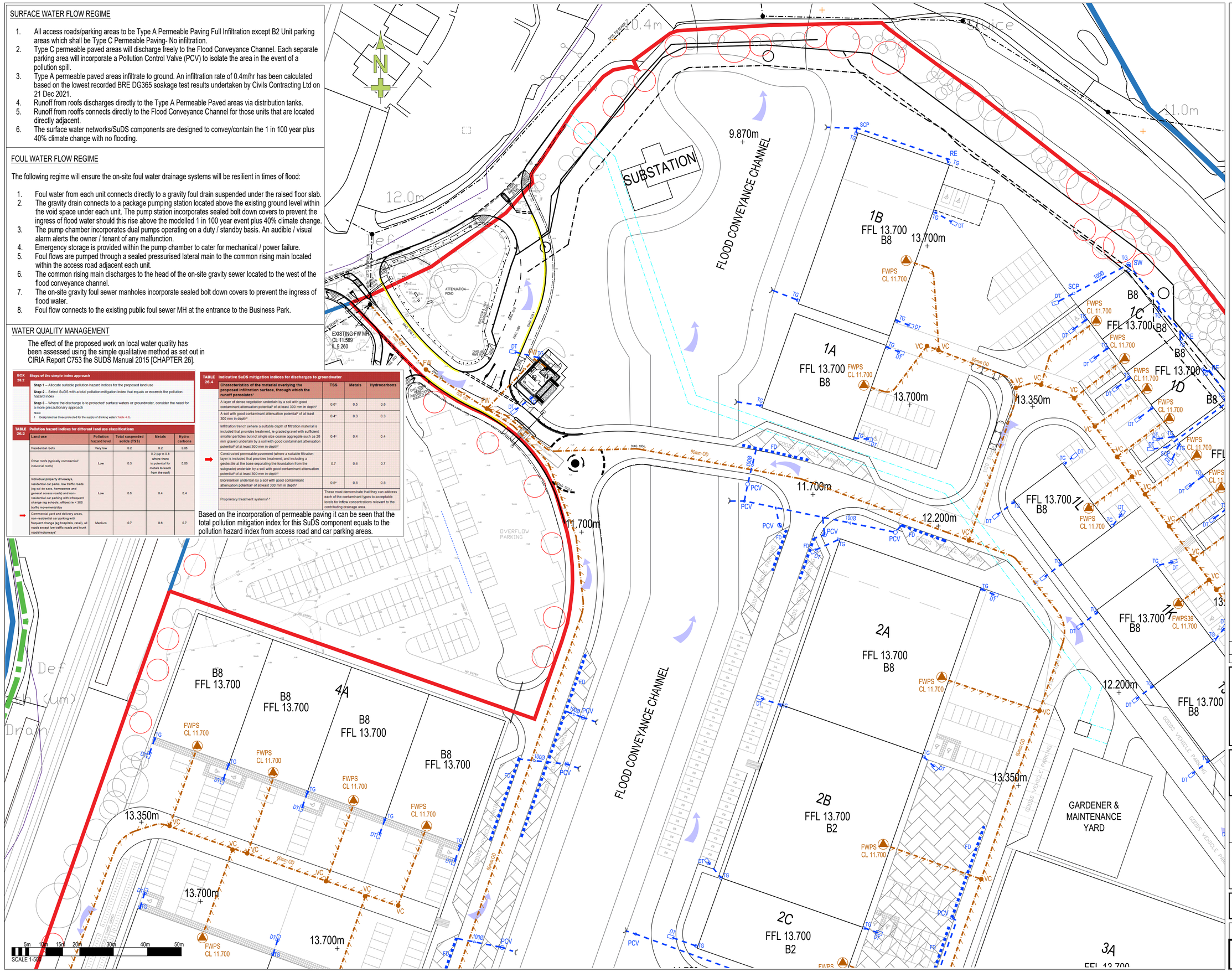
TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7

TABLE 26.4 Indicative SuDS mitigation indices for discharges to groundwater

Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates[1]	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.6[4]	0.5	0.6
A soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.8[4]	0.8	0.8
Proprietary treatment systems[4, 5]	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Based on the incorporation of permeable paving it can be seen that the total pollution mitigation index for this SuDS component equals to the pollution hazard index from access road and car parking areas.



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CDM REGULATIONS 2015 - SIGNIFICANT RISKS -

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DRAINAGE KEY

- SITE BOUNDARY
- EXISTING FOUL WATER SEWER
- SURFACE WATER DRAINAGE - DIA GRADIENT/PIPE NUMBER
- SCP — SW INSPECTION CHAMBER MIN 300DIA CATCHPIT
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- RE — RODDING EYE
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FOR THE DISCHARGE OF PLANNING CONDITIONS 13 AND 38

THE DRAINAGE LAYOUT MAY VARY DEPENDING ON THE EVENTUAL NATURE AND LAYOUT OF THE UNITS, HOWEVER THE PRINCIPLES OF THE DRAINAGE STRATEGY WILL REMAIN THE SAME.

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A	FOR APPROVAL	SBR	CJM	15.03.22

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Drawing
DRAINAGE LAYOUT[ILLUSTRATIVE]
SHEET 1 OF 3

FOR APPROVAL

Scale @ A1	Date	Drawn by	Checked
1:500	FEB22	SBR	CJM

Job No.	Drg. No.	Rev
22-0042	C10501	A

SURFACE WATER FLOW REGIME

1. All access roads/parking areas to be Type A Permeable Paving Full Infiltration except B2 Unit parking areas which shall be Type C Permeable Paving- No infiltration.
2. Type C permeable paved areas will discharge freely to the Flood Conveyance Channel. Each separate parking area will incorporate a Pollution Control Valve (PCV) to isolate the area in the event of a pollution spill.
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Note:
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Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7

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A soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.8[4]	0.8	0.8
Proprietary treatment systems[4,5]	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Based on the incorporation of permeable paving it can be seen that the total pollution mitigation index for this suds component equals to the pollution hazard index from access road and car parking areas.

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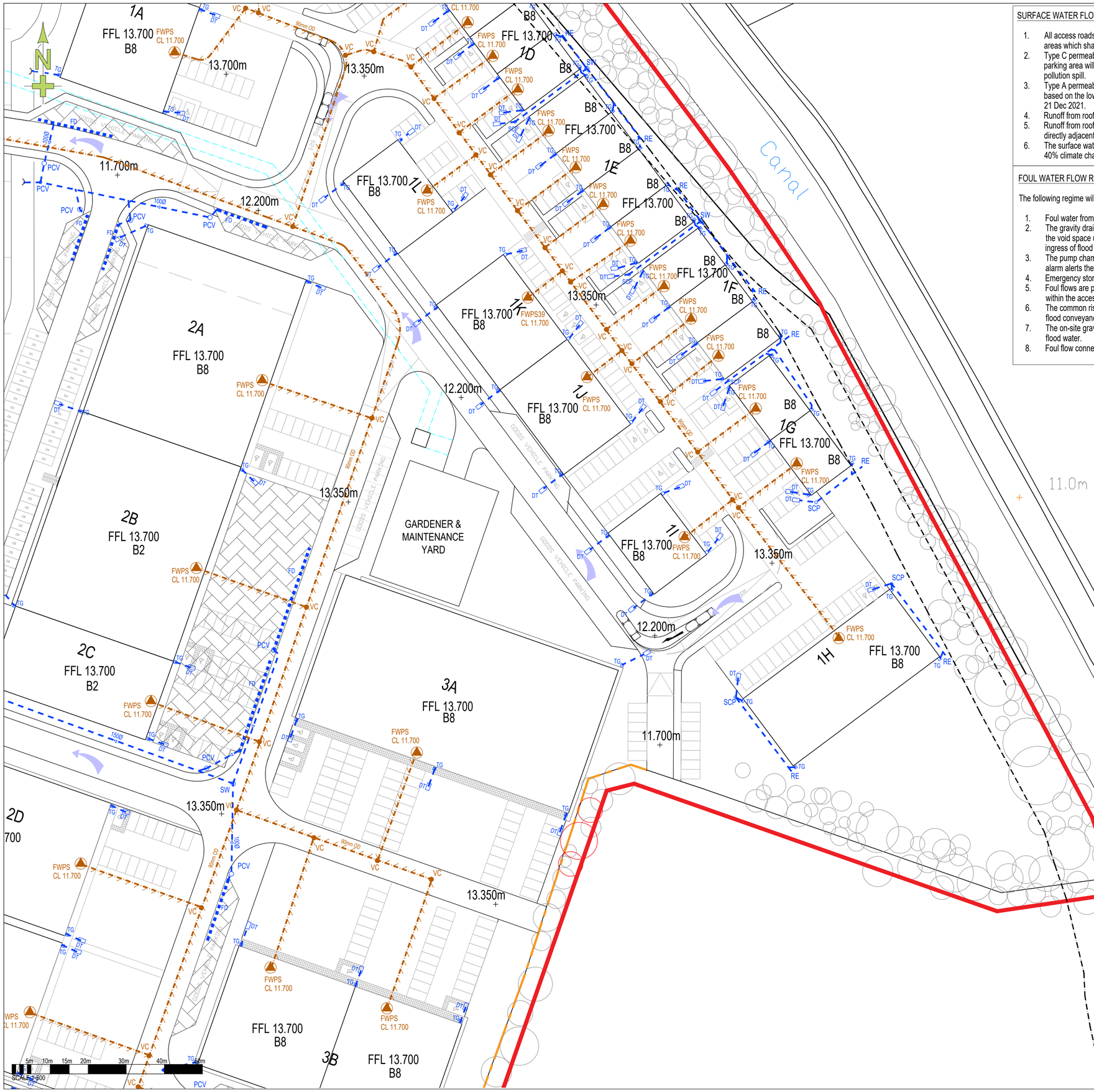
Job No.	Drg. No.	Rev
22-0042	C10502	A

SCALE 1-500



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Proprietary treatment systems*,*	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Based on the incorporation of permeable paving it can be seen that the total pollution mitigation index for this suds component equals to the pollution hazard index from access road and car parking areas.

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3. THE DEVELOPMENT LAYOUT AND SURVEY HAVE BEEN TAKEN FROM CIVILS CONTRACTING LTD'S FOUL DRAINAGE LAYOUT DRG. NO. 2210-50 REV A DATED JANUARY 22.

CDM REGULATIONS 2015 - SIGNIFICANT RISKS -

1. EXISTING FOUL WATER SEWER IN THE VICINITY IS PRESENT AND HAS BEEN TAKEN FROM RECORDS OBTAINED FROM SOUTHERN WATER. THERE IS A RISK OF UNCHARTED SERVICES BEING PRESENT.
2. THE CONTRACTOR MUST TAKE ADEQUATE PRECAUTIONS FROM THE POSSIBLE PRESENCE AND CONTAMINATION FROM LEPTOSPIROSIS (WEILS DISEASE).
3. THE WORKS WILL INVOLVE THE MOVEMENT OF PLANT AND MACHINERY IN A LIVE CARRIAGEWAY. THERE IS A RISK OF POTENTIAL CONFLICT BETWEEN PLANT AND ROAD/PEDESTRIAN USERS.
4. THE WORKS WILL INVOLVE WORKING WHERE THERE IS A DANGER OF SUDDEN RISES IN WATER LEVELS AND THE ASSOCIATED DANGER OF DROWNING.

DRAINAGE KEY

- SITE BOUNDARY
- 150Ø 1:80 — EXISTING FOUL WATER SEWER
- 2250_1:80 / 150Ø — SURFACE WATER DRAINAGE - DIA GRADIENT/PIPE NUMBER
- SCP1 — SW INSPECTION CHAMBER MIN 300DIA CATCHPIT
- S1 — SW INSPECTION CHAMBER MIN 450DIA
- SW1.0 — SW MANHOLE
- PCV — SW POLLUTION CONTROL VALVE MANHOLE
- RE — RODDING EYE
- FD — FIN DRAIN
- 2250_1:80 / 150Ø — FOUL WATER DRAINAGE - DIA GRADIENT/PIPE NUMBER
- F1 — FW INSPECTION CHAMBER MIN 450DIA
- VC — FW VALVE CHAMBER
- FW1.0 — FW MANHOLE
- PUMPING STATION — FOUL WATER PUMPING STATION
- RISING MAIN FW
- TG — TRAPPED GULLY DRAIN OUTLET TO BE 100 DIA UNLESS STATED OTHERWISE
- DT — DISTRIBUTION TANK
- EXCEEDANCE FLOW ROUTE
- RWP — RAINWATER PIPE. DRAIN OUTLETS TO BE 100 DIA
- TYPE C NO INFILTRATION PERMEABLE PAVING
- 33.108m — PROPOSED LEVEL
- HEADWALL

FOR THE DISCHARGE OF PLANNING CONDITIONS 13 AND 38

THE DRAINAGE LAYOUT MAY VARY DEPENDING ON THE EVENTUAL NATURE AND LAYOUT OF THE UNITS, HOWEVER THE PRINCIPLES OF THE DRAINAGE STRATEGY WILL REMAIN THE SAME.

Rev	Description	Drn	Chk	Date
A	FOR APPROVAL	SBR	CJM	15.03.22

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Drawing
DRAINAGE LAYOUT[ILLUSTRATIVE]
SHEET 3 OF 3

FOR APPROVAL

Scale @ A1	Date	Drawn by	Checked
1:500	FEB22	SBR	CJM

Job No.	Drg. No.	Rev
22-0042	C10503	A

Appendix 2
SuDS Maintenance & Management Notes/Tables/Specifications

Contents

Manholes and Inspection Chambers

Description:

Manholes are designed to allow for operatives to access. Manholes should only be accessed following a risk assessment, and the specification of the safe system of work, paying regard to confined space risks.

Inspection Chambers are designed to providing rodding and jetting access to pipework.

Maintenance Issues:

Manholes and inspection chambers are unlikely to present maintenance issues in themselves. However, they provide access to the drainage infrastructure and allow visual inspection from the surface of any major maintenance issues.

Maintenance Regime:

Schedule	Action Required	Frequency
Regular maintenance	Lift covers and ensure there are no blockages. Inspect and identify any parts that are not operating correctly and rectify.	For 3 months following installation
	Ensure covers are in a good state of repair.	Monthly
	Inspect manholes, and inspection chambers, to ensure that the drainage system is running freely.	Six monthly and every Autumn after leaf fall
Occasional maintenance	High pressure jetting (to Water Jetting Associationstandards) and CCTV where necessary.	Every 2 – 4 years
Remedial maintenance	Silt removal. Inlet/outlet repair. Erosion repair. System rehabilitation following a pollution event. Manhole cover replacement. Repairs to brickwork or concrete. Channel repair.	As required (tasks to repair problems due to wear, damage or vandalism).

Catchpits

Description:

Catchpits are similar to manholes and inspection chambers but include a sump of 300mm to 600 mm to the base which is designed to capture silt and prevent it reaching other parts of the drainage network. Catchpits provide a convenient location to remove silt from drainage networks. Catchpits should only be accessed following a risk assessment, and the specification of the safe system of work, paying regard to confined space risks.

Maintenance Issues:

If the silt captured in catchpits is not removed regularly it will cause silt to migrate downstream to other part of the drainage network, some of which may be less accessible, or inaccessible.

Maintenance Regime:

Schedule	Action Required	Frequency
Regular maintenance	Lift covers and ensure there are no blockages. Inspect and identify any parts that are not operating correctly and rectify. Inspect silt storage in sump. Remove silt as required using sub-contractor with vacuum suction plant.	For 3 months following installation
	Ensure covers are in a good state of repair. Repair/replace as necessary.	Monthly
	Inspect catchpits to ensure that the drainage is running freely, and free of debris. Inspect silt storage in sump. Remove silt as required using sub-contractor with vacuum suction plant.	Six Monthly and every autumn after leaf fall
Occasional maintenance	High pressure jetting (to Water Jetting Associationstandards) and CCTV where necessary. Remediate any chamber structural defects, or any defects that mayreduce the free flow of water.	Every 2 – 4 Years
Remedial maintenance	Silt removal. Inlet/outlet repair. Erosion repair. System rehabilitation following a pollution event. Manhole cover replacement. Repairs to brickwork or concrete.	As required (tasks to repair problems due to wear, damage or vandalism).

Gullies

Description:

Surface Water is drained over impermeable areas towards grated gullies at low points. These connect to the below ground pipework.

Maintenance Issues:

Gullies can become blocked by silt or debris, increasing the risk of flooding.

Gullies include integral silt traps which can cause siltation of downstream drainage infrastructure if not adequality maintained.

Gullies often include a trapped outlet which prevents liquids lighter than water (ie oil and fuel) leaving the gully. If silt and light liquids are not removed regularly silt and oil will migrate downstream to other part of the drainage network, some of which may be less accessible, or inaccessible.

Maintenance Regime:

Schedule	Action Required	Frequency
Regular maintenance	Inspect to ensure that there are no blockages at surface level, and that the outfall is operating effectively. Inspect and identify any parts that are not operating correctly and rectify.	For 3 months following installation
	Ensure that there are no blockages at surface level.	Monthly
	Lift covers to check for blockages or siltation.	Six Monthly and every autumn after leaf fall
Occasional maintenance	Remove oil and silt using specialist vacuum suction plant.	Every 1 – 2 Years
Remedial maintenance	Silt removal. Inlet/outlet repair. Erosion repair. System rehabilitation following a pollution event. Cover replacement. Structural failure of gully pot. Ensure that impermeable surfaces surrounding linear drains have not settled below top of gully cover level, causing ponding.	As required (tasks to repair problems due to wear, damage or vandalism).

Pipework

Description:

Below ground drainage pipework connects drainage inlets (gullies, linear drains etc) to inspection chamber and manholes and provides connections between inspection chambers and manholes.

Maintenance Issues:

Pipes can become blocked by silt, debris, fat, grease, or collapse. It is also possible for pipe joints to become displaced or for roots to grow from the surrounding ground into pipes.

These factors cause a reduction in, or loss of, the hydraulic capacity of the pipes which can increase the risk of flooding to land and buildings. Defects in pipes can also cause a reduction in stability to ground underlying foundations, which can cause settlement and damage to buildings and external surfaces.

The material of pipes and associated couplings can be degraded if aggressive liquids are passed through the pipes. It is recommended that trees are not planted within 3m of pipes to minimize the risk of root ingress.

Maintenance Regime:

Schedule	Action Required	Frequency
Regular maintenance	Refer to manufacturer's specification. Inspect and identify any parts that are not operating correctly,consult supplier and rectify as required.	For 3 months following installation
	Monitor working of drainage at ground level. If there is localised flooding check the condition of all system elements.	Monthly
	Lift manholes covers to check for blockages. Remove sediment from pre-treatment structures, gullies, catchpits etc.	Six Monthly and every autumn after leaf fall
Occasional maintenance	Jetting of pipe runs (to Water Jetting Association standards). Remediate as necessary.	Every 1 – 2 Years
Remedial maintenance	Inspect, and carry out remediation works to ensure that the features are in fully working order.	As required (tasks to repair problems due to wear, damage or vandalism).

Pervious Pavements

Description:

Pervious Pavements together with their associated substructures are an efficient means of managing surface water runoff close to it's source – intercepting runoff, reducing the volume and frequency of runoff, and providing a treatment medium.

Maintenance Issues:

The silt and other sediments should be cleaned regularly to preserve the pervious pavement infiltration capacity.

Maintenance Regime:

Regular inspection and maintenance is important for the effective operation of pervious pavements. Maintenance responsibility for a pervious pavement and its surrounding area should be placed with an appropriate responsible organization. Before handing over the pavement to the client, it should be inspected for clogging, litter, weeds and water ponding, and all failures should be rectified. After handover, the pavement should be inspected regularly, preferably during and after heavy rainfall to check effective operation and to identify any areas of ponding.

Pervious pavements need to be regularly cleaned of silt and other sediments to preserve their infiltration capacity. Extensive experience suggests that sweeping once per year should be sufficient to maintain an acceptable infiltration rate on most sites. However, in some instances, more or less sweeping may be required and the frequency should be adjusted to suit site-specific circumstances and should be informed by inspection reports.

A brush and suction cleaner (which can be a lorry-mounted device or a smaller precinct sweeper) should be used for regular sweeping. Care should be taken in adjusting vacuuming equipment to avoid removal of jointing material. Any lost material should be replaced. It is also possible to clean the surface using lightweight rotating brush cleaners combined with power spraying using hot water, as shown in ***Figure 20.30 of CIRIA SuDS Manual 2015***.

If the surface has clogged then a more specialist sweeper with water jetting and oscillating and rotating brushes may be required to restore the surface infiltration rate to an acceptable level. For concrete block permeable paving the design life should be no different from standard paving, assuming that an effective maintenance regime is in place to minimize risks of infiltration clogging.

Materials removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and may need to be disposed of as controlled waste. Sediment testing should be carried out before disposal to confirm its classification and appropriate disposal methods.

The table provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive and some actions may not always be required.

Maintenance Plans and schedules should be prepared during the design phase. Specific maintenance needs of the pervious pavement should be monitored, and maintenance schedules adjusted to suit requirements.

Activity	Action Required	Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas. Removal of weeds or management using glyphospate applied directly into weeds by an applicator rather than spraying.	As required
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving. 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 to 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 remedial action.	Three-monthly, 48 hr after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies. Monitor inspection chambers	Annually

Many of the specific maintenance activities for pervious pavements can be undertaken as part of a general site cleaning contract (many car parks or roads are swept to remove litter and for visual reasons to keep them tidy) and therefore, if litter management is already required at site, this should have marginal cost implications.

Generally, pervious pavements require less frequent gritting in winter to prevent ice formation. There is also less risk of ice formation after snow melt, as the melt water drains directly into the underlying sub-base and does not have chance to refreeze. A slight frost may occur more frequently on the surface of pervious pavements compared to adjacent impermeable surfaces, but this is only likely to last for a few hours. It does not happen in all installations and, if necessary, this can be dealt with by application of salt. It is not likely to pose a hazard to vehicle movements.

CDM 2015 requires designers to ensure that all maintenance risks have been identified, eliminated, reduced and/or controlled where appropriate. This information will be required as part of the health and safety file.