

Drainage Statement – Proposed School of Art and Design Development at Barton Peveril College, Chestnut Avenue

1.0 Existing surface water drainage

1.1 There is an existing public foul sewer in Chestnut Avenue with the existing site connecting directly into the sewer in at least 2 locations.

1.2 The site currently utilises infiltration systems/devices to buildings built within the past 10 years approximately.

1.3 Existing areas of hard landscaping (in the vicinity of the proposed new build) either fall to soft landscaping (footpaths etc) or permeable paving via gullies (tarmacked areas) to soakaways.

1.4 SWH were not made aware of any previous flooding issues to the Barton Peveril site or to adjacent land from uncontrolled discharge off the BPC site.

2.0 Flood Risk

2.1 The Flood Map for Planning shows the site is located in Flood Zone 1: Low probability. This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%). The online Surface Water Flood Map indicates the site is at low risk of surface water flooding. The risk from other sources of flooding including from rivers, sea, reservoirs are assessed to be very low.

3.0 Site investigation works

3.1 A Geoenvironmental and Geotechnical Assessment will be undertaken as part of the RIBA Stage 3 works specifically for this project. For buildings immediately adjacent to the proposed new building site investigations were carried out by Tweedie Evans Consulting. As part of this investigation TEC undertook percolation tests in accordance with BRE Digest 365HBC2014.

3.2 The tests determined a site percolation rate of between 4.428×10^{-5} m/s and 1.224×10^{-6} m/s.

3.3 No groundwater was encountered in any of the boreholes (hence proposed soakage features are not within 1m of ground water).

3.4 For the purposes of the design, the lowest infiltration rate has been used for the design of the soakaways on site.

4.0 Proposed surface water drainage

4.1 Based on the proposed site layout, we are proposing to locate a 220m^3 cellular crate soakaway below the existing playing field to the South East of the building, negating the need to discharge any surface water into Southern Waters existing network.

4.2 In this location the soakaways/attenuation are located 5m from the buildings, and minimum 2m from the site boundary.

4.3 These soakaways will collect and infiltrate the majority of the surface water from the proposed buildings roof. Design calculations have been appended for the 1 in 1 year, 1 in 30 and 1 in 100 year events plus climate change (40%).

4.4 Surface water from areas of hard standing will be dealt with via combination of permeable paving and proposed rain gardens to give three sustainable drainage methods of surface water disposal. Other options such as swales and infiltration basins were investigated but removed from the scope due to potential safety and management issues with the sites usage.

4.5 Given the size of the site, detailed network calculations have not been undertaken for the proposed development at the time of writing this report as the manholes are of a relatively simple arrangement (final network calculations will be produced prior to construction commencement).

4.6 The permeable sub-base to pedestrian paved areas will be located within 5m of the proposed building; however the use of a permeable sub-base ensures the surface water is spread over a larger area on site and replicates the natural drainage arrangement on site. Hence the 5m rule is not required as the infiltration occurs over a larger area.

4.7 In accordance with Building Regulations, single point soakaways should be located a minimum of 5m from any buildings.

5.0 Proposed foul water drainage

5.1 Based on the proposed site layout, we are proposing to discharge the foul drainage into the existing Southern Water foul sewer located in Chestnut Avenue. A formal capacity check and application to connect to the sewer will be undertaken during the RIBA stage 3 of the project.

6.0 Water treatment

6.1 Table 4.3 in chapter 4 of the CIRIA SuDS Manual looks at the land use of a site and identifies the pollution hazard level and requirements for discharge associated with it. The proposed site classifies as 'other roofs' for the buildings and the hard landscaping as low traffic roads. The requirements for discharge to ground water for a site of this land use is the Simple Index Approach.

6.2 The Simple Index Approach characterises hazards and calculates how to reduce risk for discharge to surface water and groundwater in three steps.

- 6.3
- 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 surface waters or groundwater, consider the need for a more precautionary approach.

6.4 The pollution hazard indices for different land use classifications are provided in table 26.2 in CIRIA 753 and have been repeated below:

TABLE 26.2 Pollution hazard indices for different land use classifications				
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
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
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

6.6 It can be seen from the table that for the proposed site, the other roofs and low traffic roads have a Low pollution hazard level.

6.7 For the indicative SuDS mitigation indices for discharge to groundwater, mitigation indices are applied for different SuDS components. Table 26.4 from CIRIA 753 is repeated below:

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 ²	0.6 ⁴	0.5	0.6	
A soil with good contaminant attenuation potential ² of at least 300 mm in depth ²	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 ²	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 ²	0.7	0.6	0.7	
Bioretention underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ²	0.8 ⁴	0.8	0.8	
Proprietary treatment systems ^{3, 4}	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.			

6.8 For the roof areas (with the Source Protection Zone 3 kept in mind) the proposed mitigation method will be the provision of silt traps (with removable buckets for maintenance) achieving

greater performance than the minimum required (detailed above). Permeable paving will be provided to the low traffic roads'

6.9 This provides sufficient treatment in accordance with SuDS manual C753.

7.0 Maintenance

7.1 This section sets out the inspection and maintenance requirements for long term management of the developments surface water drainage strategy. This work is to be undertaken by a private maintenance company.

7.2 All those responsible for maintenance should take appropriate health, safety and welfare precautions for all activities including lone working, if relevant, and risk assessments should always be undertaken. The sites infrastructure Health and Safety File should be consulted before carrying out any works either inside or outside of the development's boundary and information regarding the location of existing utilities passed on to operatives.

7.3 The requirements of the Health and Safety at Work Act 1974 and The Construction (Design and Management) Regulations 2015 should be adhered to and any residual risks identified in the Health and Safety File should be managed and information passed on the maintenance operatives through task specific risk assessments.

7.4 There are three types of maintenance activities associated with surface water drainage systems. The SuDS Manual, CIRIA C753, defines these as:

- Regular Maintenance – 'basic tasks undertaken on a frequent and predictable schedule' including vegetation management, litter and debris removal, and inspections.'
- Occasional Maintenance – '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 – '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 found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.'

Operation and Maintenance Activity	SuDs Component		
	Piped Network / Inspection Chambers	Cellular / Modular Storage	Permeable Pavement
Regular Maintenance			
Inspection	■	■	■
Litter and debris removal	■	□	■
Grass cutting		□	□
Weed and invasive plant control			□
Occasional Maintenance			
Sediment management	■	■	■
Vacuum sweeping and brushing			■
Remedial Maintenance			
Structure rehabilitation/ repair	□	□	□
Infiltration surface reconditioning			□
■ Will be required □ May be required			
Extract from The SuDs Manual Table 32.1 : Typical key SuDs components operation and maintenance activities			

Piped Network/Chambers Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required take remedial action	Monthly for three months, then six monthly
	Debris removal from catchment surface / gratings (where may cause risks to performance)	Monthly (and after large storms)
	Remove sediment from trapped sumps, manholes and catchpits.	Annually or as required
Remedial Maintenance	Repair / rehabilitation of gratings, inlets and outlets	As required
Monitoring	Inspect / check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed	Annually and after large storm events
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of features or pipework is required.	As required

Permeable Pavement Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over the whole surface). Care should be taken in adjusting vacuuming equipment to avoid removal of jointing material if present. Any lost material should be replaced.	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturers' recommendations – pay particular attention to areas where water runs from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weed or management using glyphosate applied directly to the weeds by an applicator rather than spraying.	As required – once per year on less frequently used pavements
Remedial Maintenance	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structured 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 year or as required (if infiltration and filtration 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, forty-eight hours after large rainfall events in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually
The SuDS Manual Table 20.15: Operation and maintenance requirements for pervious pavements		

Cellular Storage Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required take remedial action	Monthly for three months, then annually.
	Remove debris from catchment surface (where may cause risks to performance)	Monthly
	Remove debris from catchment surface (where may cause risks to performance)	Annually or as required
Remedial Maintenance	Repair / rehabilitate inlets, outlets, overflows and vents	As required
Monitoring	Inspect / check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually and after large storm events
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of storage units is required.	As required
The SuDS Manual Table 21.3: Operation and maintenance requirements for attenuation storage tanks		

Scott White and Hookins
December 2022