

FAO. Mr. J. Coxon
Emery Planning
2-4 South Park Court
Hobson Street
Macclesfield
SK11 8BS

Dear John,

This technical note has been prepared to support the discharge of condition (7) relating to a sustainable drainage management and maintenance plan for the lifetime of the development.

"7. Prior to occupation of the development a sustainable drainage management and maintenance plan for the lifetime of the development shall be submitted to the local planning authority and agreed in writing. The sustainable drainage management and maintenance plan shall include as a minimum:

- a) Arrangements for adoption by an appropriate public body or statutory undertaker, or, management and maintenance by a resident's management company; and*
- b) Arrangements for inspection and on-going maintenance of all elements of the sustainable drainage system to secure the operation of the surface water drainage scheme throughout its lifetime."*

Sustainable Drainage Management and Maintenance Plan

The site is relatively small with no 'estate road' simply roof areas and some private driveways. The proposals are for permeable driveways and shared parking areas to be constructed with a permeable surface to gain maximum benefit in terms of water quality improvement. This is only a part solution as the ground conditions are cohesive with limited infiltration potential.

Filtration through the permeable surface will aid and assist improve water quality with particular benefit to the initial 5mm of runoff. When infiltration cannot occur, discharge is to the adjacent watercourse via a flow control device in accordance with the approved drainage strategy. There is a water quality technical note that was prepared for discharge of condition (6) which is attached for completeness.

Permeable Paving

Regular inspection and maintenance are important for the effective operation of pervious pavements. Before private driveways are handed over to the property owners they should be inspected for clogging, litter, weeds and water ponding and all failures rectified. After hand-over the pavement should be inspected regularly, preferably during and after heavy rainfall to check effective operation and to identify 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.” (CIRIA, 2015).

Maintenance activities can be broadly defined as: 1) regular, 2) occasional and 3) remedial maintenance. It is proposed that maintenance regime for permeable paving follow the CIRIA 753 SuDS Manual guidance (table 20.15).

TABLE 20.15 Operation and maintenance requirements for pervious pavements

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 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	As required
	Removal of weeds or management using glyphosate 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 been raised to within 50 mm of the level of the paving	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 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 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually



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Below Ground Cellular Storage & Flow Control Manhole

There is a small surface water below ground piped system with an adjoining bank of cellular storage designed to cater for the 100 year return period storm event with an allowance of 40% climate change on the peak rainfall intensity.

Flow is attenuated by a vortex flow control device (Hydrobrake) located in the final manhole before outfall; the schedule below for the maintenance of the cellular attenuation is also appropriate for the hydrobrake manhole.

Maintenance activities can be broadly defined as: 1) regular and 2) remedial maintenance. It is proposed that maintenance regime for permeable paving follow the CIRIA 753 SuDS Manual guidance (table 21.3).

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, 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
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Outlet headwall and culvert inlet trash screen

There is a small 150mm diameter outlet pipe from the proposed drainage system into the watercourse. The vegetation on the bank of the watercourse should be maintained regularly and this is of particular importance at the outfall location to reduce the risk of blockage. Grass cutting, vegetation and debris clearance should be at an appropriate frequency dependant on the season and rate of growth. Initially a precautionary approach should be undertaken, and the regime should be monitored and adjusted to suit after the first year.



There is an existing trash screen on the watercourse at the inlet structure where it goes from open channel to culvert beneath The Shaw (road). There has been historical overland runoff from this location when the inlet structure has become blocked by debris and particularly due to sands mobilised from further up the network.

This inlet trash screen should be regularly checked for blockages and debris removal undertaken. This should be done at regular intervals; initially a precautionary approach should be undertaken, with monthly inspection and the regime should be monitored and adjusted to suit after the first year. In addition to the regular maintenance the trash screen should be inspected following heavy rainfall events as the risk of debris being mobilised and causing a blockage are greater.

I trust the above is clear, however should you have any queries or require clarification please do not hesitate to contact me to discuss further.

Yours sincerely

Richard Nicholas BEng(Hons) MBA GMICE MCIWEM
Director
BETTS HYDRO

Enc. Technical Note 01 – Water Quality Design

FAO. Mr. W. Treves
Flood Risk Management Team
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DE4 3AG

Dear William,

This technical note has been prepared to support the discharge of condition (6) relating to surface water management and SUDS (Appeal ref. APP/H1033/W/18/3203082). The note specifically relates to the water quality comment (ref. point 8) *“8. Please can the applicant detail the level of treatment stages from the resultant surface water discharge, in line with Table 4.3 of the CIRIA SuDS Manual C753 or a similar SuDS audit”*.

Water Quality Design

The overall impact of the site on water quality in the receiving waters is dependent on the following:

- Types of pollutants on the site, as these have different effects on the receiving water body
- Peak pollutant concentrations in the runoff from site, as these can cause acute (short-term) toxicity in the receiving waters
- Total pollutant load likely to be conveyed in the runoff from the site to the receiving environment, as this can cause chronic (long-term) pollution and gradual deterioration, owing to cumulative build-up of pollutants.

Minimum water quality management requirements for discharges to receiving surface waters, Table 4.3 (extract only) C753

Land use	Pollution hazard level	Requirement for discharge to surface waters	Requirements for discharge to groundwater
Residential roofs	Very low	Removal of gross solids and sediments only	
Individual property driveways, residential car parks	Low	Simple index approach	

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



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Step 3 – Where the discharge is to protected¹ surface waters or groundwater, consider the need for a more precautionary approach

¹ Designated as those protected for the supply of drinking water

Pollution hazard indices for different land use classifications, Table 26.2 (extract only) C753

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Individual property driveways, residential car parks	Low	0.3	0.2	0.05

Indicative SUDS mitigation indices for discharges to surface waters, Table 26.3 (extract only) C753

Types of SUDS component	Mitigation indices		
	Total suspended solids (TSS)	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8

SUDS and mitigation proposed

Residential roofs have a very low pollution hazard level, and the only requirement is for removal of gross solids and sediments; this is achieved via RWP trapped outlets and the flow control sump.

The individual property driveways and small shared drives have a low hazard level and have been subject to a water quality index assessment in accordance with C753 (SUDS Manual, CIRIA). The total pollution mitigation index exceeds the pollution hazard index for all categories assessed; TSS, Metals and Hydrocarbons (see table 1 for evidence below).

Summary of pollution hazard and mitigation indices, Table 1 (Betts Hydro, 2020)

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Individual property driveways, residential car parks	Low	0.3	0.2	0.05
Type of SUDS proposed		Total suspended solids (TSS)	Metals	Hydrocarbons
Permeable pavement		0.7	0.6	0.7

I trust the above is clear, however should you have any queries or require clarification please do not hesitate to contact me to discuss further.

Yours sincerely



Richard Nicholas BEng(Hons) MBA GMICE MCIWEM
 Director
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