

**APPENDIX D – CIRIA TABLE 26.2**

**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 <sup>1</sup>	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 <sup>1</sup>	High	0.8 <sup>2</sup>	0.8 <sup>2</sup>	0.9 <sup>2</sup>

**Notes**

- 1 Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).
- 2 These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.

Where a site land use falls outside the defined categories, the indices should be adapted (and agreed with the drainage approving body) or else the more detailed risk assessment method should be adopted.

Where nutrient or bacteria and pathogen removal is important for a particular receiving water, equivalent indices should be developed for these pollutants (if acceptable to the drainage approving body) or the risk assessment method adopted.

Where the mitigation index of an individual component is insufficient, two components (or more) in series will be required, where:

$$\text{Total SuDS mitigation index} = \text{mitigation index}_1 + 0.5 (\text{mitigation index}_2)$$

Where:

$$\text{mitigation Index}_n = \text{mitigation index for component } n$$

A factor of 0.5 is used to account for the reduced performance of secondary or tertiary components associated with already reduced inflow concentrations.

**TABLE 26.3** Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	Mitigation indices <sup>1</sup>		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 <sup>2</sup>	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 <sup>4</sup>	0.7 <sup>3</sup>	0.7	0.5
Wetland	0.8 <sup>3</sup>	0.8	0.8
Proprietary treatment systems <sup>5,6</sup>	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

**Notes**

- 1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.
- 2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.
- 3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.
- 4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.
- 5 See **Chapter 14** for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: <http://tinyurl.com/qf7yuj7>
- 6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

**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 <sup>1</sup>	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential <sup>2</sup> of at least 300 mm in depth <sup>3</sup>	0.6 <sup>4</sup>	0.5	0.6
A soil with good contaminant attenuation potential <sup>2</sup> of at least 300 mm in depth <sup>3</sup>	0.4 <sup>4</sup>	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 <sup>2</sup> of at least 300 mm in depth <sup>3</sup>	0.4 <sup>4</sup>	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 <sup>2</sup> of at least 300 mm in depth <sup>3</sup>	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential <sup>2</sup> of at least 300 mm in depth <sup>3</sup>	0.8 <sup>4</sup>	0.8	0.8
Proprietary treatment systems <sup>5,6</sup>	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

**Notes**

- All designs must include a minimum of 1 m unsaturated depth of aquifer material between the infiltration surface and the maximum likely groundwater level (as required in infiltration design – **Chapter 25**).
- For example as recommended in Sniffer (2008a and 2008b), Scott Wilson (2010) or other appropriate guidance.
- Alternative depths may be considered where it can be demonstrated that the combination of the proposed depth and soil characteristics will provide equivalent protection to the underlying groundwater – see note 1.
- If significant volumes of sediment are allowed to enter an infiltration system, there will be a high risk of rapid clogging and subsequent system failure.
- See **Chapter 14** for approaches to demonstrate product performance. Note: a British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: [www.britishwater.co.uk/Publications/codes-of-practise.aspx](http://www.britishwater.co.uk/Publications/codes-of-practise.aspx)
- SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution, where there is a requirement to retrofit treatment. WAT-RM-08 (SEPA, 2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

The following should be noted:

- Where the indices are not considered representative by the designer, a risk assessment can be undertaken (**Section 26.7.3**).
- Components should always be designed for treatment, as described in the design guidance set out in the individual component chapters. If they are undersized, incorrectly designed or constructed or inadequately maintained, their treatment performance could be significantly affected. Component checklists (**Appendix B**) can be used to confirm design and construction adequacy and set appropriate maintenance regimes.
- Where the infiltration component itself does not provide sufficient pollution mitigation, the design should include upstream SuDS components that are lined to prevent infiltration from occurring. The mitigation indices set out in **Table 26.3** (for discharges to surface water) should be used for any upstream treatment.

**TABLE 26.5 Risk matrix (from Highways Agency, 2009, after Scott Wilson, 2010)**

Risk element (RE)		Risk score (RS)			Weighting factor (WF)
Element number	Element description	Low risk (score 1)	Medium risk (score 2)	High risk (score 3)	
1	Pollution hazard Traffic density	All standard urban land use types (excluding high hazard and trunk roads/motorways)			15
2	Standard Average Annual Rainfall depth	< 740 mm	740–1060 mm	> 1060 mm	15
3	Type of SuDS	Continuous unlined linear collection and conveyance components (eg filter strips, swales)	Shallow soakaway (eg infiltration basin/ trench, permeable pavement) draining < 5000 m <sup>2</sup> runoff area		15
4	Unsaturated zone depth (ie depth of between infiltration surface and groundwater table)	> 15 m	5–15 m	1–5 m	20
5	Predominant flow type through soils between infiltration surface and groundwater	Intergranular flow (occurs in unconsolidated or non-fractured consolidated deposits and fine or medium sands)	Mixed fracture and intergranular flow (occurs in fractured consolidated deposits and medium or coarse sands)	Fractured flow (occurs in heavily consolidated sedimentary deposits, igneous and metamorphic rocks and very coarse sands)	20
6	Unsaturated zone material: clay content	> 15% clay	1–15% clay	< 1% clay	5
7	Unsaturated zone organic carbon content: soil organic matter (SOM) content	> 15% SOM	1–15% SOM	< 1% SOM	5
8	Unsaturated zone material: soil pH	> 8	5–8	< 5	5