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Appendix A Identifying Appropriate Operations - Phase Treatment Measures

Introduction

This appendix provides an overview and screening process to assist in selection of operations-phase treatment measures. Appendix B describes the individual treatment measures in detail.

Selection Screening Concept

The appropriateness of stormwater treatment structures to meet pollution control objectives is dependent on a broad variety of factors including:

- General efficacy of the technology to reduce “target” pollutants to acceptable levels. For example, a gross pollutant trap will have negligible impact on reducing suspended sediment loads or heavy metals.
- The physical size of the structure required to meet the target objective - for example, constructed wetlands generally require a land surface area of 1 to 2 percent of the contributing catchment to remove a significant proportion of heavy metals, This may limit retrofitting into established suburban areas or undulating sites.
- Other potential site constraints which, depending on the treatment measure, may include: depth to groundwater table, groundwater geochemistry, head losses, rate of soil infiltration, maintenance and safety considerations.
- Cost considerations : installation costs and ongoing maintenance.
- Potential for deriving additional amenity benefits.

Selection of treatment measures should include evaluation of site-specific factors and consideration of a “treatment train” approach.

Tables A1 to A4 provide general guidance on a treatment measure applicability for a range of site constraints. These should be employed, initially, to screen out those treatment measures which are not suitable for the site conditions.

These tables should be used in conjunction with treatment measure details provided in Appendix B. A brief description of each table follows.

Treatment Train Approach

Where feasible and cost-effective, consideration should be given to using treatment measures in series, or a ‘treatment train’ approach to achieve the most effective pollutant removal, for example, trash racks with a detention basin or constructed wetland. Combinations of treatment measures in series should achieve a medium to high pollutant removal rating, for the pollutant categories listed in Table A4. For more information on a treatment train approach refer to Section 2.8.

TABLE A1 - Contributing Area Screening Tool

Operations-Phase Treatment Measures		Contributing Catchment Area, ha									
		Preferred			Less Preferred						
		< 1	1-2	2-4	4-6	6-8	8-10	10-15	15-20	20-40	> 40
B1	Permeable paving	A	A	L							
B2	Infiltration trenches	A	A								
B3	Kerbline turf strips	A									
B4	Filter strips	A	A	L							
B5	Vegetated swales	A	A	L							
B6	Oil/grease separators	A									
B7	Catch basins and litter baskets	A	L	L	L						
B8	Infiltration basins (dry ponds)		L	A	A	L					
B9	Sand filters	L	A	A	A	L	L	L	L		
B10	Reed bed systems	A	A	L							
B11	Gross pollutant traps	Device dependent - seek manufacturer's advice									
B12	Dry extended detention basins			L	L	A	A	A	A	A	A
B13	Wet detention basins			L	L	A	A	A	A	A	A
B14	Trash racks and booms			L	L	L	A	A	A	L	
B15	Constructed wetlands			L	L	A	A	A	A	A	A
B16	Outlet protection	A	A	A	A	A	A	A	A	A	A
B17	Waterway and bank protection	A	A	A	A	A	A	A	A	A	A
B18	Street sweeping	A	A	A	A	A	A	A	A	A	A

A : Appropriate for the treatment measure.
 L : Generally limited use for this treatment measure at this scale.
 Blank : Not appropriate scale for the treatment measure.

TABLE A2 – Soil Infiltration Rate Screening Tool

Operations-Phase Treatment Measure		Soil Type for Infiltration Rate Constraint								
		Sand	Loamy sand	Sandy Loam	Loam	Silty loam	Sandy-clay loam	Clay loam	Sandy clay	Silty clay or clay
B1	Permeable paving	P*	L*			L	P	P	P	P
B2	Infiltration trenches	P*	L*			L	P	P	P	P
B3	Kerbline turf strips	L								L
B4	Filter strips	L	L						L	L
B5	Vegetated swales	L	L						L	L
B6	Oil/grease separators									
B7	Catch basins and litter baskets									
B8	Infiltration basins (dry ponds)	P*	L*			L	P	P	P	P
B9	Sand filters									
B10	Reed bed systems	L	L	L	L	L	L	L	L	
B11	Gross pollutant traps	Device dependent - seek manufacturer's advice								
B12	Dry extended detention basins	L	L							
B13	Wet detention basins	L	L	L						
B14	Trash racks and booms									
B15	Constructed wetlands	L	L	L						
B16	Outlet protection									
B17	Waterway and bank protection									
B18	Street sweeping									

P : Usually a problem (constraint) for installing the treatment measure

L : May be a limitation for installing the treatment measure, but can usually be overcome through appropriate design.

Blank: The listed constraint is generally not applicable or not a limitation for the treatment measure.

* : For treatment measures relying on sub-surface infiltration capability, the potential for groundwater contamination must be considered particularly for permeable soils, shallow groundwater and high traffic density (greater risk of heavy metals or other contaminants) and for locations of relatively high traffic accident risk (e.g. road junctions, sharp bends).

TABLE A3 – Site Constraints Screening Tool

Operations-Phase Treatment Measures		Potential Constraint								
		Steep slope	High water table	Shallow bedrock	Space limitation	Needs subsurface installation	High sediment input	Requires pre-treatment	Hydraulic head loss limitation	Installation in a tidal system
B1	Permeable paving	P	P	P	P		P		L	P
B2	Infiltration trenches	P	P	P	P	L	P		L	P
B3	Kerbline turf strips	P			P		P	L		P
B4	Filter strips	P	P	L	P	P				P
B5	Vegetated swales	P	P	L	P	P				P
B6	Oil/grease separators								P	L
B7	Catch basins and litter baskets						L		L	
B8	Infiltration basins (dry ponds)	P	P	P	P	L	P		L	P
B9	Sand filters							L	P	
B10	Reed bed systems	P	P	P	P		L	L	P	
B11	Gross pollutant traps	Device dependent - seek manufacturer's advice								
B12	Dry extended detention basins	L	L	L	P	P	P		L	L
B13	Wet detention basins	L	L	L	P	P	P		L	L
B14	Trash racks and booms					L	L		P	L
B15	Constructed wetlands	P	L	L	P	P	L		L	L
B16	Outlet protection									
B17	Waterway and bank protection									
B18	Street sweeping									

P : Usually a problem (constraint) for installing the treatment measure

L : May be a limitation for installing the treatment measure, but can usually be overcome through appropriate design.

Blank : The listed constraint is generally not applicable or not a limitation for the treatment measure.

TABLE A4 - Pollutant Management and Cost Considerations

Operations-Phase Treatment Measure		Pollutant Category					Relative Cost		Public Acceptance
		Dis-solved	Fine Sedimt. Assoc.	Fine Sedimt.	Coarse	Gross	Cap.	On-going	
B1	Permeable paving	••	•••	•••	•••••	•	\$\$\$\$	\$\$\$	•••••
B2	Infiltration trenches	••	•••	•••	•••••	•	\$\$\$	\$\$\$	•••••
B3	Kerbline turf strips	•	••	•••	•••	•	\$	\$\$\$	•••••
B4	Filter strips	•	••	••	•••••	••	\$	\$	•••••
B5	Vegetated swales	•	••	••	••••	•	\$	\$	••••
B6	Oil/grease separators	-	•	•	•••	••	\$\$\$\$	\$\$\$\$\$	•••••
B7	Catch basins and litter baskets	-	-	•	••	•••	\$\$	Device Dept.	••••
B8	Infiltration basins (dry ponds)	••	•••	•••	••••	-	\$\$	\$\$\$\$\$	•
B9	Sand filters	•	•••	•••	••••	•	\$\$\$\$	\$\$\$\$	••••
B10	Reed bed systems	•	••	•••	••••	•	\$\$\$\$	\$\$\$	•••••
B11	Gross pollutant traps	-	•	••	••••	•••••	\$\$\$\$	\$\$\$	•••••
B12	Dry extended detention basins	•	••	••	••••	•	\$\$	\$\$\$\$	•
B13	Wet detention basins	•	•••	•••	••••	•	\$\$\$\$	\$\$\$	••••
B14	Trash racks and booms	-	-	-	-	•••	\$	\$\$	••
B15	Constructed wetlands	••	••••	••	••••	••	\$\$\$\$	\$\$\$	•••••
B16	Outlet protection	-	-	*	*	-	\$\$\$\$	\$	•••••
B17	Waterway and bank protection	-	-	*	*	-	\$\$\$\$	\$	•••••
B18	Street sweeping	-	-	-	••	•••	\$\$\$	\$\$\$\$\$	•••••

- : Negligible, < 10% • : Low, 10 to 40% •• : Low to Moderate
 ••• : Moderate, 40 to 60% •••• : Expected Moderate to High
 ••••• : High, 60 to 80% * : Reduced watercourse erosion risk
Relative Cost : Low \$; Low-Mod. \$\$; Mod. \$\$\$; Mod.-High \$\$\$\$; High \$\$\$\$\$

Public Acceptance : Low •; Low-Mod. ••; Mod. •••; Mod.-High ••••; High •••••