Supplementary Information

Title: Towards cost-effective design of stormwater infiltration trenches: A hybrid model integrating cost-benefit analysis and an analytical stochastic approach

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Appendix: Notation

Symbol	Meaning	Unit
A_c	the adjacent catchment area	m^2
A_t	the surface area of infiltration trench	m^2
A_v	cross-sectional area of a trench	m^2
b	inter-event time of rainfall events	h
C_{ve}	components of the initial construction cost: unit cost of trench excavation	RMB/m^3
C_{vf}	components of the initial construction cost: unit cost of crushed stone fill	RMB/m^3
C_{nm}	components of the initial construction cost: unit cost of mobilization-demobilization	RMB/trench
C_{nw}	components of the initial construction cost: unit cost of monitoring well	RMB/trench
C_{as}	components of the initial construction cost: unit cost of sod	RMB/m^2
C_{af}	components of the initial construction cost: unit cost of geotextile fabric	RMB/m^2
C_{nc}	components of the initial construction cost: unit cost of clearing and grubbing	RMB/trench
C_{ns}	components of the initial construction cost: unit cost of hydrodynamic separator	RMB/trench
C_{an}	components of the initial construction cost: unit cost of manhole and inlet attachment	RMB/trench
D_m	depth of the trench's storage reservoir	mm
E_a	the average evaporation rate	mm/h
E_r	long-term average runoff reduction ratio	dimensionless
f_b	infiltration rate through the infiltration trench's bottom	mm/h
f_t	conversion coefficient of funds in year t to present value	dimensionless
f_n	conversion coefficient of funds in year n to present value	dimensionless
H	design rainfall depth	mm
H_a	appropriate design criteria	mm
ICC	initial construction cost	RMB
k	discount rate	dimensionless
k_c	components of the initial construction cost: contingencies	%
L	design length of an infiltration trench	m
LCC	life cycle cost of the trench	RMB
m	inter-arrival time of rainfall events	h
n	number of designed life cycle	years
n_t	porosity of the storage layer of an infiltration trench	dimensionless
OMC	operation and maintenance cost	RMB

PV	present value	RMB
$Q(S_s)$	total water loss rate of the trench	mm/h
$q(s)$	normalized water loss rate of the trench	1/h
R_a	area ratio between the adjacent catchment area and the surface area of infiltration trench	dimensionless
r	normalized form of total volume of inflow into trench	dimensionless
r_v	void ratio between the total void volume and the total solid volume of the storage reservoir	dimensionless
s	saturation degree of the infiltration trench at the beginning of the rainfall event	dimensionless
S_c	physical storage capacity of the trench	mm
S_c^*	critical value of S_c	mm
S_{dc}	depression storage of the adjacent catchment area	mm
S_{dt}	depression storage of trench surface	mm
S_d	composite depression storage over the entire area of the trench surface area and its adjacent catchment area	mm
S_m	effective storage capacity of an infiltration trench	mm
S_s	amount of water storage in the trench at the beginning of a random inflow event	mm
SV	salvage value	RMB
t	the t^{th} year within the designed lifespan of the trench	year
t_s	drawdown time	h
u	rainfall event duration	h
V	water quality volume	L
v	rainfall event depth	mm
v_i	total volume of inflow into trench	mm
V_L	water storage per meter of length	m^3
W	the trench width	m
α_b	safety factor	dimensionless
γ	distribution parameter for the PDF of dimensionless individual inflow event depth	dimensionless
δ	adjustment factor of the average water loss rate during an average rainfall event time	dimensionless
$\delta_{\min}$	minimum threshold value of δ corresponding to a small value of S_c	dimensionless
λ	distribution parameter of rainfall event duration u	1/h
μ	Poisson process arrival rate between two consecutive rainfall events	1/h
μ'	Poisson process arrival rate between two consecutive inflow events	1/h
ζ	distribution parameter of rainfall event volume v	1/mm

ϕ	runoff coefficient of the adjacent catchment	dimensionless
ψ	distribution parameter of rainfall inter-event duration b	1/h