Sustainable urban water futures in developing countries: the centralized, decentralized or hybrid dilemma

Poustie, M.S., Deletic, A., Brown, R.R., Wong, T., de Haan, F.J. and Skinner, R.

This supplementary data endeavours to present the data that was used in the research project and the tables that formed the intermediate steps between collected data and final analysis.

Table S1.1 – S1.5: these tables display all of the possible combinations of technologies which are suitable for providing urban water services in the developing country context of the Pacific region. Each combination includes a source/discharge location; a distribution or collection alternative; and a treatment process. These combinations are identified for all three streams - water supply (both potable and non-potable), wastewater and stormwater

Table S2: This table displays the median results from the five expert options scorecards for water supply (potable). The five experts were provided with this scorecard with the criteria along the top of the table and the technologies along the side of the table and they were asked to score each alternative against the criteria.

Table S3: This table displays the median results from the five expert options scorecards for water supply (non-potable). The five experts were provided with this scorecard with the criteria along the top of the table and the technologies along the side of the table and they were asked to score each alternative against the criteria.

Table S4: This table displays the median results from the five expert options scorecards for wastewater. The five experts were provided with this scorecard with the criteria along the top of the table and the technologies along the side of the table and they were asked to score each alternative against the criteria.

Table S5: This table displays the median results from the five expert options scorecards for stormwater. The five experts were provided with this scorecard with the criteria along the top of the table and the technologies along the side of the table and they were asked to score each alternative against the criteria.

Table S6.1 – S6.3: These tables present the total criteria score (technical, economic, environmental and resilience) for each technical alternative component for each stream of urban water services (water supply, wastewater and stormwater).

Table S1 - this table displays all of the possible combined systems which are suitable for providing urban water services in the developing country context of the Pacific region. Each combined system includes the following: (i) a source/discharge location; (ii) a distribution or collection alternative; and (iii) a treatment process.

These combined systems are identified for all streams - water supply potable (Table S1.1) and non-potable (Table S1.2), wastewater (Table S1.3) and stormwater (Table S1.4)

Table S1.1 - Potable water supply combined systems

		water source	distribution system	treatment process
centralised	1	groundwater	centralised	Centralised disinfection only
	2	groundwater	centralised	Centralised disinfection and filtration
	3	groundwater	centralised	Centralised advanced
	4	surface water	centralised	Centralised disinfection only
	5	surface water	centralised	Centralised disinfection and filtration
	6	surface water	centralised	Centralised advanced
	7	wastewater	centralised	Centralised recycled
	8	stormwater	centralised	Centralised recycled
	9	salt water	centralised	Centralised desalination
decentralised	1	groundwater	decentralised pipe	decentralized disinfection
	2	groundwater	decentralised pipe	decentralized disinfection and filtration
	3	groundwater	no distribution*	decentralized disinfection
	4	groundwater	no distribution	decentralized disinfection and filtration
	5	surface water	decentralised pipe	decentralized disinfection
	6	surface water	decentralised pipe	decentralized disinfection and filtration
	7	surface water	no distribution	decentralized disinfection
	8	surface water	no distribution	decentralized disinfection and filtration
	9	wastewater	decentralised pipe	decentralised recycled
	10	wastewater	decentralised truck	central recycling
	11	stormwater	decentralised pipe	decentralised recycled
	12	stormwater	decentralised truck	central recycling
	13	rain water	no distribution	no treatment
	14	rain water	no distribution	decentralized disinfection

* no distribution means that the water is being sourced from the house/lot scale and will be used on the same lot.

Table S1.2 - Non-potable combined system technical alternatives

	number	source location	distribution system	treatment process
centralised	1	ground water	third pipe	no treatment
	2	surface water	third pipe	no treatment
	3	wastewater	third pipe	centralised disinfection and filtration
	4	stormwater	third pipe	centralised disinfection and filtration
	5	salt water	third pipe	no treatment
decentralised	1	groundwater	lot scale	no treatment
	2	groundwater	decentralised pipe	no treatment
	3	rain water	no distribution	no treatment
	4	wastewater	decentralised pipe	decentralized disinfection and filtration
	5	wastewater	no distribution	decentralized disinfection and filtration
	6	stormwater	decentralised pipe	decentralized disinfection and filtration
	7	stormwater	no distribution	decentralized disinfection and filtration
	8	grey water	decentralised pipe	decentralized disinfection and filtration
	9	grey water	no distribution	decentralized disinfection and filtration
	10	salt water	decentralised pipe	no treatment

Table S1.3 - Centralised wastewater treatment combined system alternatives

		destination	collection system	treatment system
Centralised Wastewater technical alternatives	1	lotic	waterborne	centralised primary treatment
	2	lotic	waterborne	centralised secondary treatment
	3	lotic	waterborne	centralised passive treatment
	4	lotic	waterborne	centralised tertiary treatment
	5	lotic	vacuum	centralised primary treatment
	6	lotic	vacuum	centralised secondary treatment
	7	lotic	vacuum	centralised passive treatment
	8	lotic	vacuum	centralised tertiary treatment
	9	lakes/wetland	waterborne	centralised primary treatment
	10	lakes/wetland	waterborne	centralised secondary treatment
	11	lakes/wetland	waterborne	centralised passive treatment
	12	lakes/wetland	waterborne	centralised tertiary treatment
	13	lakes/wetland	vacuum	centralised primary treatment
	14	lakes/wetland	vacuum	centralised secondary treatment
	15	lakes/wetland	vacuum	centralised passive treatment
	16	lakes/wetland	vacuum	centralised tertiary treatment
	17	estuarine	waterborne	centralised primary treatment
	18	estuarine	waterborne	centralised secondary treatment
	19	estuarine	waterborne	centralised passive treatment
	20	estuarine	waterborne	centralised tertiary treatment
	21	estuarine	vacuum	centralised primary treatment
	22	estuarine	vacuum	centralised secondary treatment
	23	estuarine	vacuum	centralised passive treatment
	24	estuarine	vacuum	centralised tertiary treatment
	25	open marine	waterborne	centralised primary treatment
	26	open marine	waterborne	centralised secondary treatment
	27	open marine	waterborne	centralised passive treatment
	28	open marine	waterborne	centralised tertiary treatment
	29	open marine	vacuum	centralised primary treatment
	30	open marine	vacuum	centralised secondary treatment
	31	open marine	vacuum	centralised passive treatment
	32	open marine	vacuum	centralised tertiary treatment
	33	irrigation	waterborne	centralised primary treatment
	34	irrigation	waterborne	centralised secondary treatment
	35	irrigation	waterborne	centralised passive treatment
	36	irrigation	waterborne	centralised tertiary treatment
	37	irrigation	vacuum	centralised primary treatment
	38	irrigation	vacuum	centralised secondary treatment
	39	irrigation	vacuum	centralised passive treatment
	40	irrigation	vacuum	centralised tertiary treatment
	41	groundwater	waterborne	centralised primary treatment
	42	groundwater	waterborne	centralised secondary treatment
	43	groundwater	waterborne	centralised passive treatment
	44	groundwater	waterborne	centralised tertiary treatment
	45	groundwater	vacuum	centralised primary treatment
	46	groundwater	vacuum	centralised secondary treatment
	47	groundwater	vacuum	centralised passive treatment
	48	groundwater	vacuum	centralised tertiary treatment

Table S1.4 - Decentralised wastewater treatment

		destination	collection system	treatment system
Decentralised Wastewater technical alternatives	1	lotic	no collection	decentralized passive treatment
	2	lotic	no collection	composting
	3	lotic	no collection	packaged secondary treatment plants
	4	lotic	no collection	packaged tertiary treatment plants
	5	lotic	decentralised truck	septic tanks/septide treatment
	6	lotic	decentralised truck	decentralized passive treatment
	7	lakes/wetland	no collection	decentralized passive treatment
	8	lakes/wetland	no collection	composting
	9	lakes/wetland	no collection	packaged secondary treatment plants
	10	lakes/wetland	no collection	packaged tertiary treatment plants
	11	lakes/wetland	decentralised truck	septic tanks
	12	lakes/wetland	decentralised truck	decentralized passive treatment
	13	estuarine	no collection	decentralized passive treatment
	14	estuarine	no collection	composting
	15	estuarine	no collection	packaged secondary treatment plants
	16	estuarine	no collection	packaged tertiary treatment plants
	17	estuarine	decentralised truck	septic tanks
	18	estuarine	decentralised truck	decentralized passive treatment
	19	open marine	no collection	decentralized passive treatment
	20	open marine	no collection	composting
	21	open marine	no collection	packaged secondary treatment plants
	22	open marine	no collection	packaged tertiary treatment plants
	23	open marine	decentralised truck	septic tanks
	24	open marine	decentralised truck	decentralized passive treatment
	25	irrigation	no collection	decentralized passive treatment
	26	irrigation	no collection	composting
	27	irrigation	no collection	packaged secondary treatment plants
	28	irrigation	no collection	packaged tertiary treatment plants
	29	irrigation	decentralised truck	septic tanks
	30	irrigation	decentralised truck	passive treatment
	31	groundwater	no collection	decentralized passive treatment
	32	groundwater	no collection	composting
	33	groundwater	no collection	packaged secondary treatment plants
	34	groundwater	no collection	packaged tertiary treatment plants
	35	groundwater	decentralised truck	septic tanks
	36	groundwater	decentralised truck	passive treatment

- No collection means that the treatment will be occurring on the house/lot scale

Table S1.5 - Stormwater management combined systems

		destination	collection system	treatment processes
centralised stormwater alternatives	1	lotic	pit and pipe	zero treatment
	2	lotic	pit and pipe	end of pipe
	3	lakes/wetland	pit and pipe	zero treatment
	4	lakes/wetland	pit and pipe	end of pipe
	5	open marine	pit and pipe	zero treatment
	6	open marine	pit and pipe	end of pipe
	7	estuarine	pit and pipe	zero treatment
	8	estuarine	pit and pipe	end of pipe
	9	irrigation	pit and pipe	zero treatment
	10	irrigation	pit and pipe	end of pipe
	11	groundwater	pit and pipe	zero treatment
	12	groundwater	pit and pipe	end of pipe
Decentralised stormwater alternatives	1	lotic	pit and pipe with infiltration	source treatment
	2	lotic	pit and pipe with infiltration	source and end of pipe treatment
	3	lakes/wetland	pit and pipe with infiltration	source treatment
	4	lakes/wetland	pit and pipe with infiltration	source and end of pipe treatment
	5	open marine	pit and pipe with infiltration	source treatment
	6	open marine	pit and pipe with infiltration	source and end of pipe treatment
	7	estuarine	pit and pipe with infiltration	source treatment
	8	estuarine	pit and pipe with infiltration	source and end of pipe treatment
	9	irrigation	pit and pipe with infiltration	source treatment
	10	irrigation	pit and pipe with infiltration	source and end of pipe treatment
	11	groundwater	pit and pipe with infiltration	source treatment
	12	groundwater	pit and pipe with infiltration	source and end of pipe treatment

- Pit and pipe with infiltration refers to systems which both convey significant events plus provide infiltration from small events – e.g. Swales with overflow pipes, gutters leading to biofilters with overflow pipes etc.

TABLE S2: Median results for potable water supply technical alternative assessments

MEDIAN RESULTS FOR WATER SUPPLY: Potable																				
		Technical			Economic				Environmental				Resilience							
<p>These are the median potable water supply results based on expert elicitation. Each expert was asked to score each technical alternative against the performance indicators and assign a score between 1 (poor performance) and 5 (very good performance)</p>		sustainable resource capacity	supply reliability	risk of failure to meet water quality guidelines	capital costs	operation and maintenance costs	affordability	incremental investment capacity	energy use	chemical use	impact on source environment	waste production	human technical capability	flexibility for changing operational demands	Risk of technology failure	Risk of whole system failure	community fit	political support		
		Source	Groundwater	4	4		4	4	4	5	3		4		4	3	4	3	5	5
			Surface water	3	4		4	3	3	3	4		2		3	3	4	3	5	5
			Recycled wastewater	4	3		2	2	1	4	2		5		1	2	2	2	1	2
			Recycled stormwater	3	2		3	3	3	4	3		5		2	2	3	3	2	2
			Salt water	5	5		2	1	1	3	1		5		1	4	2	1	3	3
			Rainwater tanks	3	3		3	4	3	5	5		5		5	2	4	5	5	4
Distribution system	No distribution required		1	1	5	5	5	5	5				5	5	5	5	5	3		
	Truck distribution		2	4	3	2	2	5	1				4	4	4	3	2	2		
	Centralised single pipe		4	4	2	3	4	3	4				4	3	4	2	5	5		
	Centralised third pipe		4	4	1	2	2	3	2				2	2	4	3	3	3		
	Decentralised piping and pumping		3	3	3	3	3	4	3				3	3	3	4	4	4		
Treatment systems	Zero treatment		1	1	5	5	5	5	5	5		5	5	5	5	5	3	3		
	Centralised disinfection only		3	2	4	4	4	4	4	4		5	4	4	4	2	4	4		
	Centralised filtration and disinfection		4	4	3	3	3	3	4	3		4	3	3	3	1	4	4		
	Centralised advanced treatment		4	5	2	2	2	2	3	2		3	2	2	2	1	3	4		
	Water Recycling plant		3	3	1	1	1	2	2	1		2	1	3	2	2	2	3		
	Centralised Desalination		4	4	1	1	1	2	1	3		2	1	3	2	1	4	3		
	Decentralised disinfection		3	2	4	3	4	5	4	3		5	4	4	4	5	4	3		
	Decentralised filtration and disinfection		3	3	3	3	3	4	3	3		4	3	3	3	4	4	3		

TABLE S3: Median results for non-potable water supply technical alternative assessments

MEDIAN SCORE CARD FOR WATER SUPPLY: Non-Potable																		
		Technical Performance			Economic Performance				Environmental Performance				Resilience Performance					
		sustainable resource capacity	supply reliability	risk of failure to meet water quality guidelines	capital costs	operation and maintenance costs	affordability	incremental investment capacity	energy use	chemical use	impact on source environment	waste production	human technical capability	flexibility for changing operational demands	Risk of technology failure	Risk of whole system failure	community fit	political support
These are the median non-potable water supply results based on expert elicitation. Each expert was asked to score each technical alternative against the performance indicators and assign a score between 1 (poor performance) and 5 (very good performance)																		
Source	Groundwater	4	4		3	4	4	4	3		4		4	3	5	3	5	5
	Surface water	3	4		3	3	3	3	4		3		3	3	4	3	5	5
	Recycled wastewater	4	3		1	2	1	4	2		5		1	2	3	2	1	2
	Recycled stormwater	3	3		3	3	3	4	3		5		2	2	4	3	2	3
	Salt water	5	5		2	1	1	3	1		4		2	4	2	5	3	3
	Rainwater tanks	3	3		4	5	3	5	5		5		5	2	5	5	5	4
Distribution system	No distribution required		1	1	5	5	5	5	5				5	5	5	1	3	3
	Truck distribution		2	4	3	1	2	5	2				4	4	4	2	2	2
	Centralised single pipe		4	4	2	4	4	3	4				4	3	4	4	5	5
	Centralised third pipe		4	3	1	2	2	3	2				2	2	4	3	3	3
	Decentralised piping and pumping		3	3	2	3	3	4	3				3	3	3	4	4	4
Treatment systems	Zero treatment		1	1	5	5	5	5	5			5	5	5	5	5	1	1
	Centralised disinfection only		3	2	4	4	4	4	4			5	4	4	4	3	3	4
	Centralised filtration and disinfection		4	3	3	3	3	3	3			4	3	3	3	3	4	5
	Decentralised disinfection		3	2	4	3	4	5	4			5	4	4	2	5	3	4
	Decentralised filtration and disinfection		3	3	3	3	3	4	3			4	3	3	4	4	4	4

Table S4: Median results for wastewater technical alternative assessments

MEDIAN RESULTS FOR WASTEWATER																				
		Technical Performance				Economic Performance				Environmental Performance				Resilience Performance						
These are the median wastewater results based on expert elicitation. Each expert was asked to score each technical alternative against the performance indicators and assign a score between 1 (poor performance) and 5 (very good performance)		Risk to public health	Reliability of system: Quantity	Reliability of system: Water quality	Risk to receiving environment	capital costs	operation and maintenance costs	affordability	incremental investment capacity	energy use	chemical use	impact on receiving environment	resource recovery	waste production	human technical capability	flexibility for changing operational demands	Risk of technology failure	Risk of whole system failure	community fit	political support
Destination	Lotic freshwater systems	2			2	4	5	5	4	5		2	3		5	3	5	5	4	4
	Freshwater lake or wetland	2			2	4	4	4	4	5		1	3		5	3	4	5	3	3
	Estuarine environments	3			2	4	4	4	4	5		3	2		5	3	5	5	3	3
	Open marine environments	4			3	3	3	3	5	3		4	1		4	4	5	5	4	5
	Irrigation	4			2	2	2	2	2	2		4	5		3	2	2	3	3	4
	Groundwater	3			3	3	3	3	2	3		3	2		3	3	3	3	4	3
Collection	No collection required	2	2	2		5	5	5	5	5			1		5	5	5	5	1	1
	Centralised water-borne collection	3	4	3		3	3	3	2	3			3		3	2	4	3	4	5
	Truck collection	2	3	3		2	1	2	3	2			4		4	3	3	3	3	3
	Decentralised water-borne collection	2	4	4		3	3	3	4	4			3		3	3	4	4	4	4
	Vacuum collection	2	4	4		1	2	2	3	2			3		2	2	2	2	3	2
Treatment systems	Centralised zero treatment	1	1	1		5	5	5	5	5	5	1	1	1	5	1	1	1	1	1
	Centralised conventional primary treatment	2	4	3		4	4	4	3	4	4	2	2	3	3	3	4	3	2	3
	Centralised conventional secondary treatment	3	4	3		2	3	3	3	2	3	3	3	2	2	3	3	3	4	5
	Centralised 'Passive' secondary treatment	3	3	3		3	3	3	2	4	4	3	3	3	3	3	4	3	4	4
	Centralised tertiary treatment plant	4	4	4		1	1	1	3	1	2	4	3	2	1	3	3	3	5	3
	Decentralised zero treatment	1	1	1		5	5	5	5	5	5	1	1	1	5	1	1	1	1	1
	Composting toilets/source separation	3	4	3		4	4	5	4	5	5	3	4	4	4	5	4	5	4	4
	Decentralised primary treatment (septic tanks)	3	3	3		4	4	4	4	5	5	2	2	4	4	4	3	5	5	4
	Decentralised secondary 'Passive' treatment (wetlands/lagoons)	3	4	3		3	3	4	3	4	5	3	3	3	3	3	4	1	3	4
	Package treatment plant - secondary treatment	3	4	3		2	2	2	4	2	2	3	3	3	2	3	3	1	3	2
	Packaged treatment plant - tertiary treatment	4	4	4		1	1	1	4	2	1	4	3	2	1	3	3	1	3	2

Table S5: Median results for stormwater technical alternative assessments

MEDIAN RESULTS FOR STORMWATER																
		Technical			Economic				Environmental			Resilience				
		meet flood protection guidelines	meet stormwater quality guidelines	risk of failure to receiving water	capital costs	operation and maintenance costs	affordability	incremental investment capacity	energy use	impact on receiving environment	resource recovery	human technical capability	multifunctionality	flexibility for changing operational demands	community fit	political support
These are the median stormwater results based on expert elicitation. Each expert was asked to score each technical alternative against the performance indicators and assign a score between 1 (poor performance) and 5 (very good performance)																
Destination	Lotic freshwater systems		3	3	4	5	5	4	5	2	2	5	3	4	4	5
	Freshwater lake or wetland		4	2	4	4	5	4	4	2	3	5	3	4	4	5
	Estuarine environments		3	3	4	4	4	4	5	3	1	5	2	4	4	5
	Open marine environments		2	4	3	4	4	5	4	4	1	5	1	5	4	5
	Irrigation		3.5	3	3	3	3	3	2	5	5	3	4	2	4	3
	Groundwater		3.5	3	3	3	3	2	3	3	4	4	4	3	4	4
collection system	Pit and pipe or open drains	3	1		3	4	3	3	5	2	3	4	2	2	4	5
	Pit and pipe or open drains with infiltration and/or detention	4	3		2	3	2	3	5	4	3	3	4	3	4	4
Treatment systems	Zero treatment - direct discharge		1		5	5	5	5	5	2	1	5	1	5	3	3
	Treatment at end of pipe only		4		3	3	3	2	4	4	3	3	4	3	4	3
	Treatment at source only		4		4	2	3	4	5	4	3	3	4	3	4	2
	Treatment at source and end of pipe		5		2	2	2	3	5	5	4	3	5	4	4	2

Table S6 - These tables below present the resultant scores for the criteria themes (technical, economic, environmental, and resilience). These scores are the average scores from the tables above.

e.g – the technical criteria score is the average of all the technical performance indicator scores for that technical alternative and its economic criteria score is the average of all the economic performance indicator scores etc.

Table S6.1: Criteria theme scores for each technical alternative for potable and non-potable water supply systems

			Tech	Eco	Environ	Res
water supply potable	source	Groundwater	4.00	4.25	2.50	4.00
		Surface water	3.50	3.25	4.00	3.83
		Recycled wastewater	3.50	2.25	1.50	1.67
		Recycled stormwater	2.50	3.25	2.00	2.33
		Salt water	5.00	1.75	1.00	2.33
		Rainwater tanks	3.00	3.75	3.00	4.17
	distribution	No distribution required	1.00	5.00	5.00	4.67
		Truck distribution	3.00	3.00	1.00	3.17
		Centralised single pipe	4.00	3.00	4.00	3.83
		Centralised third pipe	4.00	2.00	2.00	2.83
		Decentralised piping and pumping	3.00	3.25	3.00	3.50
	treatment	Zero treatment	1.00	5.00	5.00	4.33
		Centralised disinfection only	2.50	4.00	4.33	3.67
		Centralised filtration and disinfection	4.00	3.00	3.67	3.00
		Centralised advanced treatment	4.50	2.00	2.67	2.33
		Water Recycling plant	3.00	1.25	1.67	2.17
		Centralised Desalination	4.00	1.25	2.00	2.33
		Decentralised disinfection	2.50	4.00	4.00	4.00
		Decentralised filtration and disinfection	3.00	3.25	3.33	3.33
water supply non potable	source	Groundwater	4.00	3.75	2.50	4.17
		Surface water	3.50	3.00	3.50	3.83
		Recycled wastewater	3.50	2.00	1.50	1.83
		Recycled stormwater	3.00	3.25	2.00	2.67
		Salt water	5.00	1.75	1.50	3.17
		Rainwater tanks	3.00	4.25	3.00	4.33
	distribution	No distribution required	1.00	5.00	5.00	3.67
		Truck distribution	3.00	2.75	2.00	3.00
		Centralised single pipe	4.00	3.25	4.00	4.17
		Centralised third pipe	3.50	2.00	2.00	2.83
		Decentralised piping and pumping	3.00	3.00	3.00	3.50
	treatment	Zero treatment	1.00	5.00	5.00	3.67
		Centralised disinfection only	2.50	4.00	4.33	3.67
		Centralised filtration and disinfection	3.50	3.00	3.33	3.50
		Decentralised disinfection	2.50	4.00	4.33	3.67
		Decentralised filtration and disinfection	3.00	3.25	3.33	3.67

Table S6.2: Criteria theme scores for each technical alternative for wastewater systems

			Tech	Eco	Environ	Res
wastewater	destination	Lotic freshwater systems	2.00	4.50	3.33	4.33
		Freshwater lake or wetland	2.00	4.00	3.00	3.83
		Estuarine environments	2.50	4.00	3.33	4.00
		Open marine environments	3.50	3.50	2.67	4.50
		Irrigation	3.00	2.00	3.67	2.83
		Groundwater	3.00	2.75	2.67	3.17
	collection	No collection required	1.00	5.00	3.00	3.67
		Centralised water-borne collection	3.33	2.75	3.00	3.50
		Truck collection	2.67	2.00	3.00	3.17
		Decentralised water-borne collection	3.33	3.25	3.50	3.67
		Vacuum collection	3.33	2.00	2.50	2.17
	treatment	Centralised zero treatment	1.00	5.00	2.60	3.67
		Centralised conventional primary treatment	3.00	3.75	3.00	3.00
		Centralised conventional secondary treatment plant	3.33	2.75	2.60	3.33
		Centralised 'Passive' secondary treatment	3.00	2.75	3.40	3.50
		Centralised tertiary treatment plant	4.00	1.50	2.40	3.00
		Decentralised zero treatment	1.00	5.00	2.60	3.67
		Composting toilets/source separation	3.33	4.25	4.20	4.33
		Decentralised primary treatment (septic tanks)	3.00	4.00	3.60	4.17
		Decentralised secondary 'Passive' treatment (wetlands/lagoons)	3.33	3.25	3.60	3.00
		Package treatment plant - secondary treatment	3.33	2.50	2.60	2.33
		Packaged treatment plant - tertiary treatment	4.00	1.75	2.40	2.17

Table S6.2: Criteria theme scores for each technical alternative for stormwater systems

stormwater	destination	Lotic freshwater systems	3.00	4.50	3.67	4.20
		Freshwater lake or wetland	3.00	4.25	3.67	4.20
		Estuarine environments	3.00	4.00	3.00	4.00
		Open marine environments	3.00	4.00	2.33	4.00
		Irrigation	3.25	3.00	2.67	3.20
		Groundwater	3.25	2.75	3.33	3.80
	collection	Pit and pipe or open drains	1.00	3.25	4.00	3.40
		Pit and pipe or open drains with infiltration and/or detention	3.00	2.50	3.33	3.60
	treatment	Zero treatment - direct discharge	1.00	5.00	3.33	3.40
		Treatment at end of pipe only	4.00	2.75	3.00	3.40
		Treatment at source only	4.00	3.25	3.33	3.20
		Treatment at source and end of pipe	5.00	2.25	3.33	3.60