The supplementary materials include two parts.

The first parts comprise the figures and MUSIC (Model for Urban Stormwater Improvement Conceptualization) files of five designed scenarios in the study area. The arrows represent the direction of assumed stormwater flows and the university square is assumed as the outlet of the study area. These files are compressed in the same file as this document

The second parts comprise the questionnaire results and calculation procedures of sub-criteria in economic, social, and environmental aspect. They are provided and shown in this document.

Supplementary material A: Questionnaire results

Expert 1:

Date: 07/05/2020

Question 1: Are you familiar with the stormwater management in the study area or have you read the provided information at the first page?

☒ Yes ☐ No

Question 2: What is/are your best field(s)? (can choose more than one option)

☒ Urban Water Management
☐ Water Policy and Governance
☒ Underground Water
☐ Green Stormwater Infrastructure
☒ Flooding Issues
☐ Water Quality and Biodiversity
☐ Sustainable Development
☐ Waste Water Management
☒ Urban Water Planning
☐ Water Resource management
☐ Water Supply and Network
☐ Ecosystem
Other fields _____

Question 3: Complete the following table。

ATTRIBUTE	Flooding Control	Water Quality Improvement	Capital cost	O&M cost	Land Use Cost	Water Reuse Function	Livability	Water Retaining Function	Carbon Emission	Ecosystem Value
Flooding Control	1	1	5	7	2	1	-	2	1	2
Water Quality Improvement	-	1	5	7	-	-	1	1	1	1
Capital Cost	-	-	1	2	-	-	-	-	-	-
O&M Cost	-	-	-	1	-	-	-	-	-	-
Land Use Cost	-	2	2	2	1	-	1	1	-	2
Water Reuse Function	-	-	8	9	2	1	1	1	1	2
Livability	2	-	7	7	-	-	1	1	1	3
Water Retaining Function	-	-	8	8	-	-	-	1	1	2
Carbon Emission	-	-	7	9	2	-	-	-	1	2
Ecosystem Value	-	-	2	2	-	-	-	-	-	1

Signature:

Expert 2:

Date: 08/05/2020

Question 1: Are you familiar with the stormwater management in the study area or have you read the provided information at the first page?

☒ Yes ☐ No

Question 2: What is/are your best field(s)? (can choose more than one option)

☒ Urban Water Management
☐ Water Policy and Governance
☐ Underground Water
☒ Green Stormwater Infrastructure
☐ Flooding Issues
☒ Water Quality and Biodiversity
☐ Sustainable Development
☐ Waste Water Management
☒ Urban Water Planning
☒ Water Resource management
☐ Water Supply and Network
☐ Ecosystem
Other fields _____

Question 3: Complete the following table.

ATTRIBUTE	Flooding Control	Water Quality Improvement	Capital cost	O&M cost	Land Use Cost	Water Reuse Function	Livability	Water Retaining Function	Carbon Emission	Ecosystem Value
Flooding Control	1	1	3	4	3	-	1	-	-	2
Water Quality Improvement	-	1	3	4	4	1	-	-	-	2
Capital Cost	-	-	1	3/2	3/2	-	-	-	-	-
O&M Cost	-	-	-	1	1	-	-	-	-	-
Land Use Cost	-	-	-	-	1	-	-	-	-	1
Water Reuse Function	2	-	5	7	3	1	2	2	1	2
Livability	-	5/4	4	6	2	-	1	1	1	3/2
Water Retaining Function	6/5	5/4	5	7	3	-	-	1	1	2
Carbon Emission	6/5	5/4	5	7	2	-	-	-	1	2
Ecosystem Value	-	-	2	3	-	-	-	-	-	1

Signature:

Expert 3:

Date: 07/05/2020

Question 1: Are you familiar with the stormwater management in the study area or have you read the provided information at the first page?

☒ Yes ☐ No

Question 2: What is/are your best field(s)? (can choose more than one option)

☒ Urban Water Management
☒ Water Policy and Governance
☐ Underground Water
☒ Green Stormwater Infrastructure
☒ Flooding Issues
☐ Water Quality and Biodiversity
☒ Sustainable Development
☐ Waste Water Management
☐ Urban Water Planning
☒ Water Resource management
☐ Water Supply and Network
☐ Ecosystem
Other fields _____

Question 3: Complete the following table.

ATTRIBUTE	Flooding Control	Water Quality Improvement	Capital cost	O&M cost	Land Use Cost	Water Reuse Function	Livability	Water Retaining Function	Carbon Emission	Ecosystem Value
Flooding Control	1	2	6	7	2	-	-	-	-	1
Water Quality Improvement	-	1	4	6	1	-	-	-	-	-
Capital Cost	-	-	1	3/2	-	-	-	-	-	-
O&M Cost	-	-	-	1	-	-	-	-	-	-
Land Use Cost	-	-	5/2	3	1	-	-	-	-	-
Water Reuse Function	6/5	2	6	9	2	1	5/4	5/4	-	1
Livability	5/4	2	8	7	3/2	-	1	1	-	2
Water Retaining Function	3/2	2	7	7	4/3	-	-	1	-	2
Carbon Emission	2	3	9	9	3	2	2	2	1	3
Ecosystem Value	-	2	5	5	2	-	-	-	-	1

Signature: J. Santzevarian

Expert 4:

Date: 07/05/2020

Question 1: Are you familiar with the stormwater management in the study area or have you read the provided information at the first page?

☒ Yes ☐ No

Question 2: What is/are your best field(s)? (can choose more than one option)

☐ Urban Water Management
☐ Water Policy and Governance
☒ Underground Water
☐ Green Stormwater Infrastructure
☐ Flooding Issues
☐ Water Quality and Biodiversity
☐ Sustainable Development
☒ Waste Water Management
☐ Urban Water Planning
☒ Water Resource management
☒ Water Supply and Network
☐ Ecosystem
Other fields _____

Question 3: Complete the following table.

ATTRIBUTE	Flooding Control	Water Quality Improvement	Capital cost	O&M cost	Land Use Cost	Water Reuse Function	Livability	Water Retaining Function	Carbon Emission	Ecosystem Value
Flooding Control	1	1	2	2	3	1	-	1	-	-
Water Quality Improvement	-	1	3	4	2	1	-	2	-	1
Capital Cost	-	-	1	1	2	-	-	-	-	-
O&M Cost	-	-	-	1	1	-	-	-	-	-
Land Use Cost	-	-	-	-	1	-	-	-	-	-
Water Reuse Function	-	-	3	2	4	1	2	2	1	-
Livability	2	2	3	4	5	-	1	2	1	1
Water Retaining Function		-	2	3	4	-	-	1	-	1
Carbon Emission	2	3	4	6	6	-	-	2	1	2
Ecosystem Value	2	-	5	4	6	2	-	-	-	1

Signature:

After questionnaire assessment, the main fields of expert 4 (wastewater management, water supply and network, water resource management and underground water) are NOT relevant to the paper. Therefore, the results of expert 1, 2 and 3 are accepted.

Supplementary material B: Calculation procedures for sub-criteria in economic, social, and environmental aspect

Scenario 1:

Scenario 1	Area (kL or m^2)	Unit cost (AU$/kL or m^2)	O&M cost (AU$/unit/yr)	Net carbon footprint (kg CO2-e/m^2)	House price increase (AU$/unit)
Stormwater tank	1500 kL or 525 m^2 (900 kL or 225 m^2 is existing)	1000/kL	0.5/kL	80	0
Pond	150 m^2 (300 m^2 in normal level)	150	10	8.1	0.0646
Bioretention areas	30 m^2	1000	5	2.5	0.0408
Swale	0	25	3	3.5	0.0408
Capital cost	600 x 1000+300 x 150+30 x 1000 = $675000				
O&M cost	0.5 x 1500+10 x 300+5 x 30= $3900/yr				
Total size	525+150+30 = 705 m^2				
Total house increase	0.0646 x 150+0.0408 x 30 = 10.914				
Retaining function of tank and pond	1500+300 = 1800 kL				
Retaining function of bioretention areas and swale	30 m^2				
Water reuse function	1500+300 = 1800 kL				
Carbon emission	80 x 525+8.1 x 150+2.5 x 30 = 43290 kg CO2-e in 30 yrs				
Ecosystem values	0.0120				

Water retaining function = 1800 m^2 x 8.68% + 20 m^2 x 5.79% = 158.00 m^2

Scenario 2:

Scenario 2	Area (kL or m^2)	Unit cost (AU$/kL or m^2)	O&M cost (AU$/unit/yr)	Net carbon footprint (kg CO2-e/m^2)	House price increase (AU$/unit)
Stormwater tank	1350 kL or 450 m^2 (900 kL or 225 m^2 is existing)	1000/kL	0.5/kL	80	0
Pond	100 m^2 (200 m^2 in normal level)	150	10	8.1	0.0646
Bioretention areas	150 m^2	1000	5	2.5	0.0408
Swale	50 m^2	25	3	3.5	0.0408
Capital cost	450 x 1000+200 x 150+150 x 1000+50 x 25 = $631250				
O&M cost	0.5 x 1200+10 x 100+5 x 90+3 x 150= $3575/yr				
Total size	450+100+150+50 = 750 m^2				
Total house increase	0.0646 x 100+0.0408 x 150+0.0408 x 50 = 14.620				
Retaining function of tank and pond	1350+200 = 1550 kL				
Retaining function of bioretention areas and swale	150+50 = 200 m^2				
Water reuse function	1350+200 = 1550 kL				
Carbon emission	80 x 450+8.1 x 100+2.5 x 150+3.5 x 100 = 37535 kg CO2-e in 30 yrs				
Ecosystem values	0.0204				

Water retaining function = 1550 m^2 x 8.68% + 200 m^2 x 5.79% = 146.13 m^2

Scenario 3:

Scenario 3	Area (kL or m^2)	Unit cost (AU$/kL or m^2)	O&M cost (AU$/unit/yr)	Net carbon footprint (kg CO2-e/m^2)	House price increase (AU$/unit)
Stormwater tank	1200 kL or 375 m^2 (900 kL or 225 m^2 is existing)	1000/kL	0.5/kL	80	0
Pond	100 m^2 (200 m^2 in normal level)	150	10	8.1	0.0646
Bioretention areas	120 m^2	1000	5	2.5	0.0408
Swale	150 m^2	25	3	3.5	0.0408
Capital cost	300 x 1000+200 x 150+120 x 1000+150 x 25 = $453750				
O&M cost	0.5 x 1200+10 x 200+5 x 120+3 x 150= $3650/yr				
Total size	375+100+120+100 = 695 m^2				
Total house increase	0.0646 x 100+0.0408 x 120+0.0408 x 100 = 17.476				
Retaining function of tank and pond	1200+200 = 1400 kL				
Retaining function of bioretention areas and swale	120+150 = 270 m^2				
Water reuse function	1200+200 = 1400 kL				
Carbon emission	80 x 375+8.1 x 100+2.5 x 150+3.5 x 50 = 31635 kg CO2-e in 30 yrs				
Ecosystem values	0.0192				

Water retaining function = 1400 x 8.68% + 270 x 5.79% = 137.16

Scenario 4:

Scenario 4	Area (kL or m^2)	Unit cost (AU$/kL or m^2)	O&M cost (AU$/unit/yr)	Net carbon footprint (kg CO2-e/m^2)	House price increase (AU$/unit)
Stormwater tank	950 kL or 250 m^2 (900 kL or 225 m^2 is existing)	1000/kL	0.5/kL	80	0
Pond	50 m^2 (100 m^2 in normal level)	150	10	8.1	0.0646
Bioretention areas	170 m^2	1000	5	2.5	0.0408
Swale	150 m^2	25	3	3.5	0.0408
Capital cost	50 x 1000+100 x 150+170 x 1000+150 x 25 = $238750				
O&M cost	0.5 x 750+10 x 100+5 x 170+3 x 150= 2775$/yr				
Total size	250+50+170+150 = 620 m^2				
Total house increase	0.0646 x 50+0.0408 x 170+0.0408 x 150 = 16.286				
Retaining function of tank and pond	950+100 = 1050 kL				
Retaining function of bioretention areas and swale	170+150 = 320 m^2				
Water reuse function	950+100 = 1050 kL				
Carbon emission	80 x 250+8.1 x 50+2.5 x 170+3.5 x 150 = 21355 kg CO2-e in 30 yrs				
Ecosystem values	0.0241				

Water retaining function = 1050 m^2 x 8.68% + 320 m^2 x 5.79% = 109.67 m^2

Scenario 5:

Scenario 5	Area (kL or m^2)	Unit cost (AU$/kL or m^2)	O&M cost (AU$/unit/yr)	Net carbon footprint (kg CO2-e/m^2)	House price increase (AU$/unit)
Stormwater tank	300 kL or 150 m^2 (150 kL or 75 m^2 is existing)	1000/kL	0.5/kL	80	0
Pond	50 m^2 (100 m^2 in normal level)	150	10	8.1	0.0646
Bioretention areas	250 m^2	1000	5	2.5	0.0408
Swale	200 m^2	25	3	3.5	0.0408
Capital cost	150 x 1000+100 x 150+250 x 1000+200 x 25 = $420000				
O&M cost	0.5 x 300+10 x 100+5 x 250+3 x 200= 3000$/yr				
Total size	150+50+250+200 = 650 m^2				
Total house increase	0.0646 x 50+0.0408 x 250+0.0408 x 200 = 21.590				
Retaining function of tank and pond	300+100 = 400 kL				
Retaining function of bioretention areas and swale	250+200 = 450 m^2				
Water reuse function	300+100 = 400 kL				
Carbon emission	80 x 150+8.1 x 50+2.5 x 250+3.5 x 200 = 13730 kg CO2-e in 30 yrs				
Ecosystem values	0.0271				

Water retaining function = 400 x 8.68% + 450 x 5.79% = 60.77