

## Supplementary Materials

# The Life Cycle Assessment Integrated with the Lex-Iconographic Method for the Multi-Objective Opti-Mization of Community-Based Rainwater Utiliza-Tion

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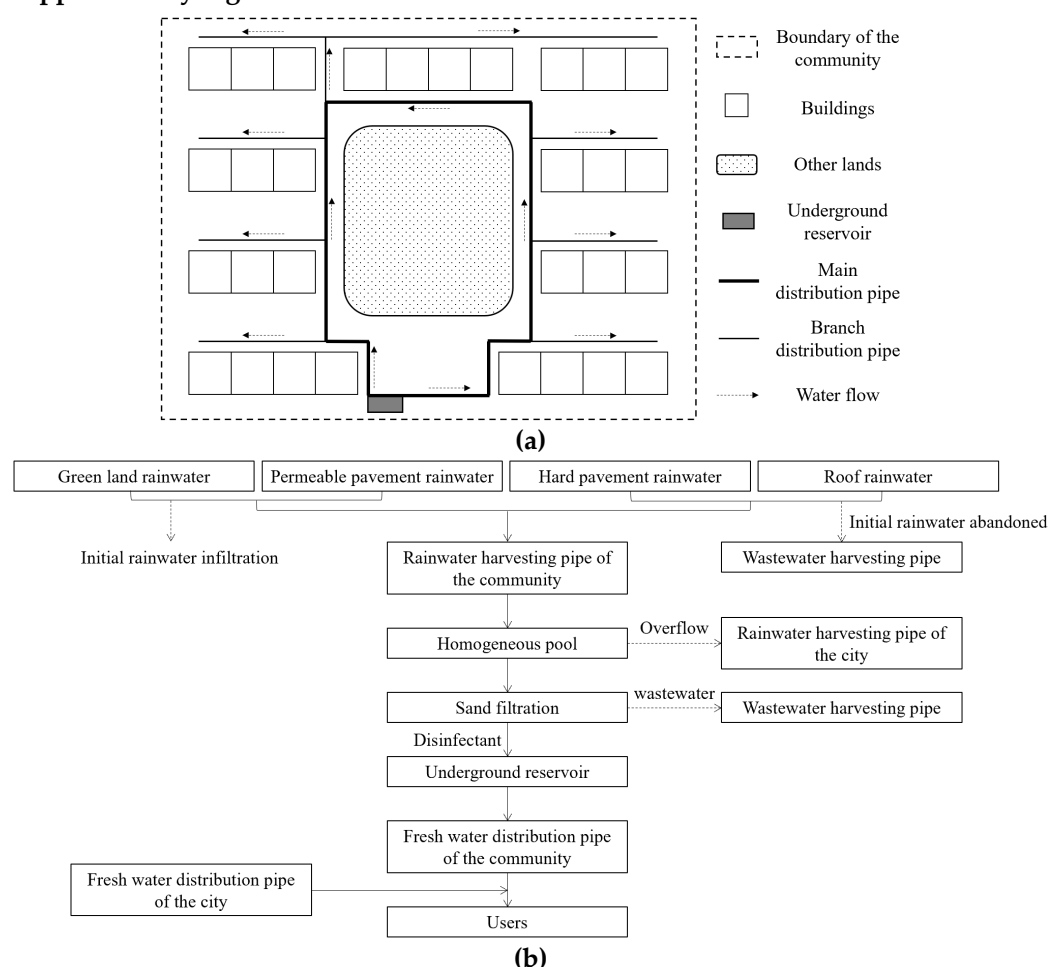
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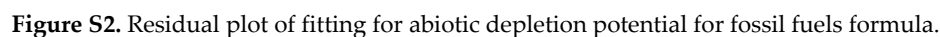
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### Supplementary Figures



**Figure S1.** The rainwater harvesting and utilization system of a community. (a) schematic of residential buildings layout and pipeline network, (b) flow chart for community-based rainwater harvesting and utilization pattern.



**Table S1.** Engineering scale for all scenarios of community-based rainwater harvesting and utilization.

|   |                                     |                |                |                   |                |                |                |                |                   |                |
|---|-------------------------------------|----------------|----------------|-------------------|----------------|----------------|----------------|----------------|-------------------|----------------|
| Floor-Area Ratio (FAR)                                | 1                                   |                |                |                   |                |                |                |                |                   |                |
| Total Runoff Coefficient                              | 0.09                                |                |                |                   |                |                |                |                |                   |                |
| Reservoir Volume (m³)                                 | 33                                  | 66             | 99             | 132               | 165            | 33             | 66             | 99             | 132               | 165            |
| Storage system  |                                     |                |                |                   |                |                |                |                |                   |                |
| 1. Homogeneous pool<br>(Length × Breadth × Height, m) | 4 × 4<br>× 2.1                      | 5 × 6<br>× 2.2 | 6.6 ×<br>5 × 3 | 8 ×<br>5.5 ×<br>3 | 9.2 ×<br>6 × 3 | 4 × 4<br>× 2.1 | 5 × 6<br>× 2.2 | 6.6 ×<br>5 × 3 | 8 ×<br>5.5 ×<br>3 | 9.2 ×<br>6 × 3 |
| Treatment system                                      |                                     |                |                |                   |                |                |                |                |                   |                |
| 2. Filtration pool (L × B × H)                        | 1 × 0.85 × 1 m                      |                |                |                   |                |                |                |                |                   |                |
| 3. Underground reservoir<br>(L × B × H)               | 9.2 × 6 × 3 m                       |                |                |                   |                |                |                |                |                   |                |
| 4. Disinfectant (kg)                                  | 68                                  | 73             | 83             | 88                | 92             | 94             | 103            | 122            | 137               | 148            |
| Distribution system                                   |                                     |                |                |                   |                |                |                |                |                   |                |
| 5. Main distribution pipe                             | Steel pipe, DN200, 370 m            |                |                |                   |                |                |                |                |                   |                |
| 6. Branch distribution pipe                           | Steel pipe, DN100, 520 m            |                |                |                   |                |                |                |                |                   |                |
| 7. Main household<br>distribution pipe                | PPR pipe, DN90, 360 m               |                |                |                   |                |                |                |                |                   |                |
| 8. Branch household<br>distribution pipe              | PPR pipe, DN25, 6480 m              |                |                |                   |                |                |                |                |                   |                |
| 9. Water pump   | IS65-40-200 (2900), 56 kg in weight |                |                |                   |                |                |                |                |                   |                |

**Table S1.** Engineering scale for all scenarios of community-based rainwater harvesting and utilization (continued).

| Floor-Area Ratio (FAR)                | 1                                   |             |             |             |                          |                |             |             |             |             |
|---------------------------------------|-------------------------------------|-------------|-------------|-------------|--------------------------|----------------|-------------|-------------|-------------|-------------|
| Total Runoff Coefficient              | 0.31                                |             |             |             |                          | 0.42           |             |             |             |             |
| Reservoir Colume (m³)                 | 33                                  | 66          | 99          | 132         | 165                      | 33             | 66          | 99          | 132         | 165         |
| Storage system                        |                                     |             |             |             |                          |                |             |             |             |             |
| 1. Homogeneous pool (L × B × H, m)    | 4 × 4 × 2.1                         | 5 × 6 × 2.2 | 6.6 × 5 × 3 | 8 × 5.5 × 3 | 9.2 × 6 × 3              | 4 × 4 × 2.1    | 5 × 6 × 2.2 | 6.6 × 5 × 3 | 8 × 5.5 × 3 | 9.2 × 6 × 3 |
| Treatment system                      |                                     |             |             |             |                          |                |             |             |             |             |
| 2. Filtration pool (L × B × H)        |                                     |             |             |             |                          | 1 × 0.85 × 1 m |             |             |             |             |
| 3. Underground reservoir (L × B × H)  |                                     |             |             |             |                          | 9.2 × 6 × 3 m  |             |             |             |             |
| 4. Disinfectant (kg)                  | 108                                 | 118         | 142         | 160         | 176                      | 117            | 128         | 154         | 175         | 193         |
| Distribution system                   |                                     |             |             |             |                          |                |             |             |             |             |
| 5. Main distribution pipe             |                                     |             |             |             | Steel pipe, DN200, 370 m |                |             |             |             |             |
| 6. Branch distribution pipe           |                                     |             |             |             | Steel pipe, DN100, 520 m |                |             |             |             |             |
| 7. Main household distribution pipe   |                                     |             |             |             | PPR pipe, DN90, 360 m    |                |             |             |             |             |
| 8. Branch household distribution pipe |                                     |             |             |             | PPR pipe, DN25, 6480 m   |                |             |             |             |             |
| 9. Water pump                         | IS65-40-200 (2900), 56 kg in weight |             |             |             |                          |                |             |             |             |             |

**Table S1.** Engineering scale for all scenarios of community-based rainwater harvesting and utilization (continued).

| Floor-area ratio (FAR)               | 1.7         |             |             |              |                          |                 |             |             |              |              |
|--------------------------------------|-------------|-------------|-------------|--------------|--------------------------|-----------------|-------------|-------------|--------------|--------------|
| Total runoff coefficient             | 0.09        |             |             |              |                          | 0.20            |             |             |              |              |
| Reservoir volume (m³)                | 55          | 110         | 165         | 220          | 275                      | 55              | 110         | 165         | 220          | 275          |
| Storage system                       |             |             |             |              |                          |                 |             |             |              |              |
| 1. Homogeneous pool (L × B × H, m)   | 5 × 5 × 2.2 | 7.4 × 5 × 3 | 9.2 × 6 × 3 | 14.7 × 5 × 3 | 15.3 × 6 × 3             | 5 × 5 × 2.2     | 7.4 × 5 × 3 | 9.2 × 6 × 3 | 14.7 × 5 × 3 | 15.3 × 6 × 3 |
| Treatment system                     |             |             |             |              |                          |                 |             |             |              |              |
| 2. Filtration pool (L × B × H)       |             |             |             |              |                          | 1.2 × 1.2 × 1 m |             |             |              |              |
| 3. Underground reservoir (L × B × H) |             |             |             |              |                          | 15.3 × 6 × 3 m  |             |             |              |              |
| 4. Disinfectant (kg)                 | 85          | 89          | 96          | 99           | 102                      | 131             | 141         | 163         | 178          | 189          |
| Distribution system                  |             |             |             |              |                          |                 |             |             |              |              |
| 5. Main distribution pipe            |             |             |             |              | Steel pipe, DN200, 370 m |                 |             |             |              |              |
| 6. Branch distribution pipe          |             |             |             |              | Steel pipe, DN100, 520 m |                 |             |             |              |              |

| Floor-area ratio (FAR)                |                                     |     | 1.7  |     |     |    |      |     |     |     |
|---------------------------------------|-------------------------------------|-----|------|-----|-----|----|------|-----|-----|-----|
| Total runoff coefficient              |                                     |     | 0.09 |     |     |    | 0.20 |     |     |     |
| Reservoir volume (m³)                 | 55                                  | 110 | 165  | 220 | 275 | 55 | 110  | 165 | 220 | 275 |
| 7. Main household distribution pipe   | PPR pipe, DN90, 612 m               |     |      |     |     |    |      |     |     |     |
| 8. Branch household distribution pipe | PPR pipe, DN25, 11016 m             |     |      |     |     |    |      |     |     |     |
| 9. Water pump                         | IS65-40-200 (2900), 56 kg in weight |     |      |     |     |    |      |     |     |     |

**Table S1.** Engineering scale for all scenarios of community-based rainwater harvesting and utilization (continued).

|                                       |                                     |             |             |              |                          |             |             |             |              |              |  |
|---------------------------------------|-------------------------------------|-------------|-------------|--------------|--------------------------|-------------|-------------|-------------|--------------|--------------|--|
| Floor-area ratio (FAR)                | 1.7                                 |             |             |              |                          |             |             |             |              |              |  |
| Total runoff coefficient              | 0.31                                |             |             |              |                          | 0.42        |             |             |              |              |  |
| Reservoir volume (m³)                 | 55                                  | 110         | 165         | 220          | 275                      | 55          | 110         | 165         | 220          | 275          |  |
| Storage system                        |                                     |             |             |              |                          |             |             |             |              |              |  |
| 1. Homogeneous pool (L × B × H, m)    | 5 × 5 × 2.2                         | 7.4 × 5 × 3 | 9.2 × 6 × 3 | 14.7 × 5 × 3 | 15.3 × 6 × 3             | 5 × 5 × 2.2 | 7.4 × 5 × 3 | 9.2 × 6 × 3 | 14.7 × 5 × 3 | 15.3 × 6 × 3 |  |
| Treatment system                      |                                     |             |             |              |                          |             |             |             |              |              |  |
| 2. Filtration pool (L × B × H)        | 1.2 × 1.2 × 1 m                     |             |             |              |                          |             |             |             |              |              |  |
| 3. Underground reservoir (L × B × H)  | 15.3 × 6 × 3 m                      |             |             |              |                          |             |             |             |              |              |  |
| 4. Disinfectant (kg)                  | 155                                 | 168         | 199         | 222          | 240                      | 172         | 186         | 223         | 251          | 273          |  |
| Distribution system                   |                                     |             |             |              |                          |             |             |             |              |              |  |
| 5. Main distribution pipe             |                                     |             |             |              | Steel pipe, DN200, 370 m |             |             |             |              |              |  |
| 6. Branch distribution pipe           |                                     |             |             |              | Steel pipe, DN100, 520 m |             |             |             |              |              |  |
| 7. Main household distribution pipe   |                                     |             |             |              | PPR pipe, DN90, 612 m    |             |             |             |              |              |  |
| 8. Branch household distribution pipe |                                     |             |             |              | PPR pipe, DN25, 11016 m  |             |             |             |              |              |  |
| 9. Water pump                         | IS65-40-200 (2900), 56 kg in weight |             |             |              |                          |             |             |             |              |              |  |

**Table S1.** Engineering scale for all scenarios of community-based rainwater harvesting and utilization (continued).

|                                    |                 |             |            |              |              |             |             |            |              |              |
|------------------------------------|-----------------|-------------|------------|--------------|--------------|-------------|-------------|------------|--------------|--------------|
| Floor-area ratio (FAR)             | 2.4             |             |            |              |              |             |             |            |              |              |
| Total runoff coefficient           | 0.09            |             |            |              |              | 0.20        |             |            |              |              |
| Reservoir volume (m <sup>3</sup> ) | 78              | 156         | 234        | 312          | 390          | 78          | 156         | 234        | 312          | 390          |
| Storage system                     |                 |             |            |              |              |             |             |            |              |              |
| 1. Homogeneous pool (L × B × H, m) | 5 × 6 × 2.6     | 8.7 × 6 × 3 | 13 × 6 × 3 | 20.8 × 5 × 3 | 21.7 × 6 × 3 | 5 × 6 × 2.6 | 8.7 × 6 × 3 | 13 × 6 × 3 | 20.8 × 5 × 3 | 21.7 × 6 × 3 |
| Treatment system                   |                 |             |            |              |              |             |             |            |              |              |
| 2. Filtration pool (L × B × H)     | 1.5 × 1.4 × 1 m |             |            |              |              |             |             |            |              |              |

| Floor-area ratio (FAR)                   |  |    |     | 2.4            |                                     |     |     |      |     |     |     |
|--|--|----|-----|----------------|-------------------------------------|-----|-----|------|-----|-----|-----|
| Total runoff coefficient                 |  |    |     | 0.09           |                                     |     |     | 0.20 |     |     |     |
| Reservoir volume (m³)                    |  | 78 | 156 | 234            | 312                                 | 390 | 78  | 156  | 234 | 312 | 390 |
| 3. Underground reservoir<br>(L × B × H)  |  |    |     | 21.7 × 6 × 3 m |                                     |     |     |      |     |     |     |
| 4. Disinfectant (kg)                     |  | 93 | 96  | 101            | 104                                 | 105 | 157 | 168  | 188 | 200 | 208 |
| Distribution system                      |  |    |     |                |                                     |     |     |      |     |     |     |
| 5. Main distribution pipe                |  |    |     |                | Steel pipe, DN200, 370 m            |     |     |      |     |     |     |
| 6. Branch distribution pipe              |  |    |     |                | Steel pipe, DN100, 520 m            |     |     |      |     |     |     |
| 7. Main household<br>distribution pipe   |  |    |     |                | PPR pipe, DN90, 864 m               |     |     |      |     |     |     |
| 8. Branch household<br>distribution pipe |  |    |     |                | PPR pipe, DN25, 15552 m             |     |     |      |     |     |     |
| 9. Water pump                            |  |    |     |                | IS65-40-200 (2900), 56 kg in weight |     |     |      |     |     |     |

**Table S1.** Engineering scale for all scenarios of community-based rainwater harvesting and utilization (continued).

| Floor-area ratio (FAR)                   | 2.4                                 |                |               |                 |                 |                |                |               |                 |                 |
|--|-------------------------------------|----------------|---------------|-----------------|-----------------|----------------|----------------|---------------|-----------------|-----------------|
| Total runoff coefficient                 | 0.31                                |                |               |                 |                 | 0.42           |                |               |                 |                 |
| Reservoir volume (m³)                    | 78                                  | 156            | 234           | 312             | 390             | 78             | 156            | 234           | 312             | 390             |
| Storage system                           |                                     |                |               |                 |                 |                |                |               |                 |                 |
| 1. Homogeneous pool (L × B × H, m)       | 5 × 6<br>× 2.6                      | 8.7 ×<br>6 × 3 | 13 × 6<br>× 3 | 20.8 ×<br>5 × 3 | 21.7 ×<br>6 × 3 | 5 × 6<br>× 2.6 | 8.7 ×<br>6 × 3 | 13 × 6<br>× 3 | 20.8 ×<br>5 × 3 | 21.7 ×<br>6 × 3 |
| Treatment system                         |                                     |                |               |                 |                 |                |                |               |                 |                 |
| 2. Filtration pool (L × B × H)           | 1.5 × 1.4 × 1 m                     |                |               |                 |                 |                |                |               |                 |                 |
| 3. Underground reservoir<br>(L × B × H)  | 21.7 × 6 × 3 m                      |                |               |                 |                 |                |                |               |                 |                 |
| 4. Disinfectant (kg)                     | 193                                 | 208            | 242           | 265             | 282             | 216            | 234            | 277           | 308             | 332             |
| Distribution system                      |                                     |                |               |                 |                 |                |                |               |                 |                 |
| 5. Main distribution pipe                | Steel pipe, DN200, 370 m            |                |               |                 |                 |                |                |               |                 |                 |
| 6. Branch distribution pipe              | Steel pipe, DN100, 520 m            |                |               |                 |                 |                |                |               |                 |                 |
| 7. Main household<br>distribution pipe   | PPR pipe, DN90, 864 m               |                |               |                 |                 |                |                |               |                 |                 |
| 8. Branch household<br>distribution pipe | PPR pipe, DN25, 15552 m             |                |               |                 |                 |                |                |               |                 |                 |
| 9. Water pump                            | IS65-40-200 (2900), 56 kg in weight |                |               |                 |                 |                |                |               |                 |                 |

**Table S1.** Engineering scale for all scenarios of community-based rainwater harvesting and utilization (continued).

| Floor-area ratio (FAR)                | 3.1                                 |              |            |              |                          |                 |              |            |              |            |
|---------------------------------------|-------------------------------------|--------------|------------|--------------|--------------------------|-----------------|--------------|------------|--------------|------------|
| Total runoff coefficient              | 0.09                                |              |            |              |                          | 0.20            |              |            |              |            |
| Reservoir volume (m <sup>3</sup> )    | 100                                 | 200          | 300        | 400          | 500                      | 100             | 200          | 300        | 400          | 500        |
| Storage system                        |                                     |              |            |              |                          |                 |              |            |              |            |
| 1. Homogeneous pool (L × B × H, m)    | 8 × 5 × 2.5                         | 13.4 × 5 × 3 | 20 × 5 × 3 | 22.3 × 6 × 3 | 21 × 6 × 4               | 8 × 5 × 2.5     | 13.4 × 5 × 3 | 20 × 5 × 3 | 22.3 × 6 × 3 | 21 × 6 × 4 |
| Treatment system                      |                                     |              |            |              |                          |                 |              |            |              |            |
| 2. Filtration pool (L × B × H)        |                                     |              |            |              |                          | 1.9 × 1.4 × 1 m |              |            |              |            |
| 3. Underground reservoir (L × B × H)  |                                     |              |            |              |                          | 21 × 6 × 4 m    |              |            |              |            |
| 4. Disinfectant (kg)                  | 98                                  | 100          | 104        | 106          | 107                      | 175             | 185          | 203        | 213          | 219        |
| Distribution system                   |                                     |              |            |              |                          |                 |              |            |              |            |
| 5. Main distribution pipe             |                                     |              |            |              | Steel pipe, DN200, 370 m |                 |              |            |              |            |
| 6. Branch distribution pipe           |                                     |              |            |              | Steel pipe, DN100, 520 m |                 |              |            |              |            |
| 7. Main household distribution pipe   |                                     |              |            |              | PPR pipe, DN90, 1116 m   |                 |              |            |              |            |
| 8. Branch household distribution pipe |                                     |              |            |              | PPR pipe, DN25, 20088 m  |                 |              |            |              |            |
| 9. Water pump                         | IS65-40-200 (2900), 56 kg in weight |              |            |              |                          |                 |              |            |              |            |

**Table S1.** Engineering scale for all scenarios of community-based rainwater harvesting and utilization (continued).

| Floor-area ratio (FAR)                | 3.1         |              |            |              |                          |                 |              |            |              |            |
|---------------------------------------|-------------|--------------|------------|--------------|--------------------------|-----------------|--------------|------------|--------------|------------|
| Total runoff coefficient              | 0.31        |              |            |              |                          | 0.42            |              |            |              |            |
| Reservoir volume (m <sup>3</sup> )    | 100         | 200          | 300        | 400          | 500                      | 100             | 200          | 300        | 400          | 500        |
| Storage system                        |             |              |            |              |                          |                 |              |            |              |            |
| 1. Homogeneous pool (L × B × H, m)    | 8 × 5 × 2.5 | 13.4 × 5 × 3 | 20 × 5 × 3 | 22.3 × 6 × 3 | 21 × 6 × 4               | 8 × 5 × 2.5     | 13.4 × 5 × 3 | 20 × 5 × 3 | 22.3 × 6 × 3 | 21 × 6 × 4 |
| Treatment system                      |             |              |            |              |                          |                 |              |            |              |            |
| 2. Filtration pool (L × B × H)        |             |              |            |              |                          | 1.9 × 1.4 × 1 m |              |            |              |            |
| 3. Underground reservoir (L × B × H)  |             |              |            |              |                          | 21 × 6 × 4 m    |              |            |              |            |
| 4. Disinfectant (kg)                  | 222         | 238          | 271        | 293          | 307                      | 254             | 273          | 319        | 351          | 374        |
| Distribution system                   |             |              |            |              |                          |                 |              |            |              |            |
| 5. Main distribution pipe             |             |              |            |              | Steel pipe, DN200, 370 m |                 |              |            |              |            |
| 6. Branch distribution pipe           |             |              |            |              | Steel pipe, DN100, 520 m |                 |              |            |              |            |
| 7. Main household distribution pipe   |             |              |            |              | PPR pipe, DN90, 1116 m   |                 |              |            |              |            |
| 8. Branch household distribution pipe |             |              |            |              | PPR pipe, DN25, 20088 m  |                 |              |            |              |            |

| Floor-area ratio (FAR)             |     |     | 3.1                                 |     |     |     |      |     |     |     |
|------------------------------------|-----|-----|-------------------------------------|-----|-----|-----|------|-----|-----|-----|
| Total runoff coefficient           |     |     | 0.31                                |     |     |     | 0.42 |     |     |     |
| Reservoir volume (m <sup>3</sup> ) | 100 | 200 | 300                                 | 400 | 500 | 100 | 200  | 300 | 400 | 500 |
| 9. Water pump                      |     |     | IS65-40-200 (2900), 56 kg in weight |     |     |     |      |     |     |     |

**Table S2.** Life cycle assessment list of all scenarios for community-based rainwater harvesting and utilization.

| Floor-area ratio (FAR)                 |          |          | 1        |          |          |          |          |          |          |          |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Total runoff coefficient               |          |          | 0.09     |          |          |          | 0.20     |          |          |          |
| Reservoir volume (m <sup>3</sup> )     | 33       | 66       | 99       | 132      | 165      | 33       | 66       | 99       | 132      | 165      |
| <b>Construction phase</b>              |          |          |          |          |          |          |          |          |          |          |
| 1. Polypropylene (PP, kg)              | 1.17E-01 | 1.37E-01 | 1.39E-01 | 1.46E-01 | 1.55E-01 | 9.09E-02 | 9.71E-02 | 9.34E-02 | 9.40E-02 | 9.64E-02 |
| 2. Quartz sand (kg)                    | 1.39E-02 | 1.39E-02 | 1.24E-02 | 1.16E-02 | 1.11E-02 | 1.08E-02 | 9.89E-03 | 8.33E-03 | 7.46E-03 | 6.88E-03 |
| 3. Polyethylene (PE, kg)               | 6.61E-04 | 6.61E-04 | 5.87E-04 | 5.49E-04 | 5.26E-04 | 5.14E-04 | 4.70E-04 | 3.96E-04 | 3.54E-04 | 3.27E-04 |
| 4. Steel (kg)                          | 7.91E-02 | 7.91E-02 | 7.02E-02 | 6.57E-02 | 6.30E-02 | 6.14E-02 | 5.62E-02 | 4.73E-02 | 4.24E-02 | 3.91E-02 |
| 5. Pentatricopeptide repeats (PPR, kg) | 1.94E-02 | 1.94E-02 | 1.72E-02 | 1.61E-02 | 1.54E-02 | 1.51E-02 | 1.38E-02 | 1.16E-02 | 1.04E-02 | 9.58E-03 |
| 6. Polyvinyl chloride (PVC, kg)        | 3.82E-04 | 3.82E-04 | 3.39E-04 | 3.17E-04 | 3.04E-04 | 2.97E-04 | 2.72E-04 | 2.29E-04 | 2.05E-04 | 1.89E-04 |
| 7. Concrete (kg)                       | 1.18E-01 | 1.41E-01 | 1.29E-01 | 1.36E-01 | 1.45E-01 | 9.16E-02 | 1.00E-01 | 8.73E-02 | 8.78E-02 | 9.00E-02 |
| 8. Geomembrane (kg)                    | 1.36E-03 | 1.57E-03 | 1.51E-03 | 1.55E-03 | 1.61E-03 | 1.06E-03 | 1.12E-03 | 1.02E-03 | 1.00E-03 | 1.00E-03 |
| 9. Limestone (kg)                      | 3.32E-01 | 3.32E-01 | 2.95E-01 | 2.76E-01 | 2.65E-01 | 2.58E-01 | 2.36E-01 | 1.99E-01 | 1.78E-01 | 1.64E-01 |

[illegible]

**Table S2.** Life cycle assessment list of all scenarios for community-based rainwater harvesting and utilization (continued).

| Floor-area ratio (FAR)   |             | 1        |          |          |          |          |          |          |          |          |          |
|--------------------------|-------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Total runoff coefficient |             | 0.31     |          |          |          |          | 0.42     |          |          |          |          |
| Reservoir volume (m³)    |             | 33       | 66       | 99       | 132      | 165      | 33       | 66       | 99       | 132      | 165      |
| Construction phase       |             |          |          |          |          |          |          |          |          |          |          |
| 1.                       | PP          | 7.95E-02 | 8.47E-02 | 8.05E-02 | 8.02E-02 | 8.13E-02 | 7.34E-02 | 7.81E-02 | 7.40E-02 | 7.34E-02 | 7.42E-02 |
| 2.                       | Quartz sand | 9.45E-03 | 8.63E-03 | 7.18E-03 | 6.36E-03 | 5.80E-03 | 8.73E-03 | 7.97E-03 | 6.60E-03 | 5.82E-03 | 5.29E-03 |
| 3.                       | PE          | 4.49E-04 | 4.10E-04 | 3.41E-04 | 3.02E-04 | 2.76E-04 | 4.15E-04 | 3.78E-04 | 3.14E-04 | 2.76E-04 | 2.51E-04 |
| 4.                       | Steel       | 5.37E-02 | 4.90E-02 | 4.08E-02 | 3.61E-02 | 3.30E-02 | 4.96E-02 | 4.53E-02 | 3.75E-02 | 3.31E-02 | 3.01E-02 |
| 5.                       | PPR         | 1.32E-02 | 1.20E-02 | 1.00E-02 | 8.86E-03 | 8.08E-03 | 1.22E-02 | 1.11E-02 | 9.20E-03 | 8.11E-03 | 7.37E-03 |
| 6.                       | PVC         | 2.59E-04 | 2.37E-04 | 1.97E-04 | 1.75E-04 | 1.59E-04 | 2.40E-04 | 2.19E-04 | 1.81E-04 | 1.60E-04 | 1.45E-04 |



|  |          |          |          |          |          |          |          |          |          |          |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 7.<br>Concrete<br>(kg)                 | 8.01E-02 | 8.74E-02 | 7.53E-02 | 7.48E-02 | 7.59E-02 | 7.40E-02 | 8.06E-02 | 6.92E-02 | 6.85E-02 | 6.93E-02 |
| 8.<br>Geomembrane (kg)                 | 9.25E-04 | 9.75E-04 | 8.80E-04 | 8.53E-04 | 8.45E-04 | 8.54E-04 | 9.00E-04 | 8.09E-04 | 7.81E-04 | 7.71E-04 |
| 9.<br>Limestone<br>(kg)                | 2.26E-01 | 2.06E-01 | 1.71E-01 | 1.52E-01 | 1.38E-01 | 2.08E-01 | 1.90E-01 | 1.58E-01 | 1.39E-01 | 1.26E-01 |
| 10.<br>Water (kg)                      | 3.13E+00 | 2.86E+00 | 2.38E+00 | 2.11E+00 | 1.92E+00 | 2.89E+00 | 2.64E+00 | 2.19E+00 | 1.93E+00 | 1.76E+00 |
| <b>Operation and maintenance phase</b> |          |          |          |          |          |          |          |          |          |          |
| 11.<br>Rainwater<br>(kg)               | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 |
| 12.<br>Chlorine (kg)                   | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 |
| <b>End disposal phase</b>              |          |          |          |          |          |          |          |          |          |          |
| 13. Coal<br>(kg)                       | 3.90E-01 | 4.06E-01 | 3.79E-01 | 3.73E-01 | 3.74E-01 | 3.60E-01 | 3.75E-01 | 3.49E-01 | 3.41E-01 | 3.41E-01 |
| 14. Oil<br>(kg)                        | 5.71E-02 | 5.95E-02 | 5.56E-02 | 5.46E-02 | 5.48E-02 | 5.27E-02 | 5.49E-02 | 5.11E-02 | 5.00E-02 | 5.00E-02 |
| 15. Natural gas<br>(m <sup>3</sup> )   | 7.62E-03 | 7.94E-03 | 7.42E-03 | 7.29E-03 | 7.31E-03 | 7.03E-03 | 7.33E-03 | 6.82E-03 | 6.67E-03 | 6.67E-03 |
| 16. Electricity<br>(kw·h)              | 3.11E-01 | 3.24E-01 | 3.02E-01 | 2.97E-01 | 2.98E-01 | 2.87E-01 | 2.99E-01 | 2.78E-01 | 2.72E-01 | 2.72E-01 |

**Table S2.** Life cycle assessment list of all scenarios for community-based rainwater harvesting and utilization (continued).

| Floor-area ratio (FAR)                 |  | 1.7      |          |          |          |          |          |          |          |          |          |
|--|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Total runoff coefficient               |  | 0.09     |          |          |          |          | 0.20     |          |          |          |          |
| Reservoir volume (m <sup>3</sup> )     |  | 55       | 110      | 165      | 220      | 275      | 55       | 110      | 165      | 220      | 165      |
| <b>Construction phase</b>              |  |          |          |          |          |          |          |          |          |          |          |
| 1. PP (kg)                             |  | 1.69E-01 | 1.88E-01 | 1.99E-01 | 2.16E-01 | 2.34E-01 | 1.09E-01 | 1.18E-01 | 1.17E-01 | 1.21E-01 | 9.64E-02 |
| 2. Quartz sand (kg)                    |  | 2.04E-02 | 1.95E-02 | 1.81E-02 | 1.74E-02 | 1.70E-02 | 1.32E-02 | 1.22E-02 | 1.06E-02 | 9.72E-03 | 6.88E-03 |
| 3. PE (kg)                             |  | 8.62E-04 | 8.23E-04 | 7.63E-04 | 7.35E-04 | 7.17E-04 | 5.56E-04 | 5.17E-04 | 4.47E-04 | 4.10E-04 | 3.27E-04 |
| 4. Steel (kg)                          |  | 6.84E-02 | 6.54E-02 | 6.06E-02 | 5.84E-02 | 5.70E-02 | 4.42E-02 | 4.11E-02 | 3.55E-02 | 3.26E-02 | 3.91E-02 |
| 5. PPR (kg)                            |  | 2.85E-02 | 2.72E-02 | 2.53E-02 | 2.43E-02 | 2.37E-02 | 1.84E-02 | 1.71E-02 | 1.48E-02 | 1.36E-02 | 9.58E-03 |
| 6. PVC (kg)                            |  | 3.31E-04 | 3.16E-04 | 2.93E-04 | 2.82E-04 | 2.75E-04 | 2.13E-04 | 1.98E-04 | 1.72E-04 | 1.57E-04 | 1.89E-04 |
| 7. Concrete (kg)                       |  | 1.68E-01 | 1.76E-01 | 1.86E-01 | 2.01E-01 | 2.18E-01 | 1.08E-01 | 1.11E-01 | 1.09E-01 | 1.13E-01 | 9.00E-02 |
| 8. Geomembrane (kg)                    |  | 1.77E-03 | 1.91E-03 | 1.97E-03 | 2.13E-03 | 2.24E-03 | 1.14E-03 | 1.20E-03 | 1.16E-03 | 1.19E-03 | 1.00E-03 |
| 9. Limestone (kg)                      |  | 2.87E-01 | 2.75E-01 | 2.55E-01 | 2.45E-01 | 2.39E-01 | 1.85E-01 | 1.72E-01 | 1.49E-01 | 1.37E-01 | 1.64E-01 |
| 10. Water (kg)                         |  | 4.00E+00 | 3.82E+00 | 3.54E+00 | 3.41E+00 | 3.33E+00 | 2.58E+00 | 2.40E+00 | 2.07E+00 | 1.91E+00 | 2.28E+00 |
| <b>Operation and maintenance phase</b> |  |          |          |          |          |          |          |          |          |          |          |
| 11. Rainwater (kg)                     |  | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 |
| 12. Chlorine (kg)                      |  | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 |
| <b>End disposal phase</b>              |  |          |          |          |          |          |          |          |          |          |          |
| 13. Coal (kg)                          |  | 8.26E-01 | 9.00E-01 | 9.38E-01 | 1.00E+00 | 1.08E+00 | 5.33E-01 | 5.65E-01 | 5.49E-01 | 5.60E-01 | 4.43E-01 |

[illegible]

**Table S2.** Life cycle assessment list of all scenarios for community-based rainwater harvesting and utilization (continued).

[illegible]

| Operation and maintenance phase |          |          |          |          |          |          |          |          |          |          |
|---------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 11.<br>Rainwater<br>(kg)        | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 |
| 12.<br>Chlorine (kg)            | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 |
| End disposal phase              |          |          |          |          |          |          |          |          |          |          |
| 13. Coal<br>(kg)                | 4.50E-01 | 4.74E-01 | 4.50E-01 | 4.48E-01 | 4.56E-01 | 4.07E-01 | 4.28E-01 | 4.03E-01 | 3.97E-01 | 4.00E-01 |
| 14. Oil<br>(kg)                 | 6.59E-02 | 6.95E-02 | 6.59E-02 | 6.57E-02 | 6.68E-02 | 5.97E-02 | 6.28E-02 | 5.90E-02 | 5.82E-02 | 5.86E-02 |
| 15. Natural gas<br>(m³)         | 8.80E-03 | 9.27E-03 | 8.80E-03 | 8.77E-03 | 8.92E-03 | 7.96E-03 | 8.38E-03 | 7.88E-03 | 7.77E-03 | 7.82E-03 |
| 16. Electricity<br>(kw·h)       | 3.58E-01 | 3.78E-01 | 3.59E-01 | 3.57E-01 | 3.64E-01 | 3.25E-01 | 3.42E-01 | 3.21E-01 | 3.17E-01 | 3.19E-01 |

[illegible]

|  |             |         |         |         |         |         |         |         |         |         |         |
|--|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 7.                                     |             | 2.09E-  | 2.30E-  | 2.49E-  | 2.73E-  | 2.99E-  | 1.24E-  | 1.32E-  | 1.34E-  | 1.42E-  | 1.52E-  |
| Concrete                               |             | 01      | 01      | 01      | 01      | 01      | 01      | 01      | 01      | 01      | 01      |
| (kg)                                   |             |         |         |         |         |         |         |         |         |         |         |
| 8.                                     |             | 2.15E-  | 2.36E-  | 2.52E-  | 2.78E-  | 2.96E-  | 1.28E-  | 1.35E-  | 1.36E-  | 1.44E-  | 1.50E-  |
| Geomembra                              |             | 03      | 03      | 03      | 03      | 03      | 03      | 03      | 03      | 03      | 03      |
| ne (kg)                                |             |         |         |         |         |         |         |         |         |         |         |
| 9.                                     |             | 2.61E-  | 2.53E-  | 2.40E-  | 2.34E-  | 2.31E-  | 1.55E-  | 1.45E-  | 1.30E-  | 1.22E-  | 1.17E-  |
| Limestone                              |             | 01      | 01      | 01      | 01      | 01      | 01      | 01      | 01      | 01      | 01      |
| (kg)                                   |             |         |         |         |         |         |         |         |         |         |         |
| 10.                                    |             | 3.63E+0 | 3.52E+0 | 3.35E+0 | 3.27E+0 | 3.23E+0 | 2.16E+0 | 2.02E+0 | 1.81E+0 | 1.70E+0 | 1.63E+0 |
| Water (kg)                             |             | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
| <b>Operation and maintenance phase</b> |             |         |         |         |         |         |         |         |         |         |         |
| 11.                                    |             | 1.00E+0 | 1.00E+0 | 1.00E+0 | 1.00E+0 | 1.00E+0 | 1.00E+0 | 1.00E+0 | 1.00E+0 | 1.00E+0 | 1.00E+0 |
| Rainwater                              |             | 3       | 3       | 3       | 3       | 3       | 3       | 3       | 3       | 3       | 3       |
| (kg)                                   |             |         |         |         |         |         |         |         |         |         |         |
| 12.                                    |             | 1.00E-  | 1.00E-  | 1.00E-  | 1.00E-  | 1.00E-  | 1.00E-  | 1.00E-  | 1.00E-  | 1.00E-  | 1.00E-  |
| Chlorine (kg)                          |             | 03      | 03      | 03      | 03      | 03      | 03      | 03      | 03      | 03      | 03      |
| <b>End disposal phase</b>              |             |         |         |         |         |         |         |         |         |         |         |
| 13.                                    | Coal        | 1.06E+0 | 1.17E+0 | 1.25E+0 | 1.36E+0 | 1.47E+0 | 6.30E-  | 6.73E-  | 6.76E-  | 7.05E-  | 7.45E-  |
| (kg)                                   |             | 0       | 0       | 0       | 0       | 0       | 01      | 01      | 01      | 01      | 01      |
| 14.                                    | Oil         | 1.55E-  | 1.72E-  | 1.83E-  | 1.99E-  | 2.16E-  | 9.22E-  | 9.87E-  | 9.90E-  | 1.03E-  | 1.09E-  |
| (kg)                                   |             | 01      | 01      | 01      | 01      | 01      | 02      | 02      | 02      | 01      | 01      |
| 15.                                    | Natural gas | 2.07E-  | 2.29E-  | 2.45E-  | 2.65E-  | 2.88E-  | 1.23E-  | 1.32E-  | 1.32E-  | 1.38E-  | 1.46E-  |
| (m <sup>3</sup> )                      |             | 02      | 02      | 02      | 02      | 02      | 02      | 02      | 02      | 02      | 02      |
| 16.                                    | Electricity | 8.45E-  | 9.34E-  | 9.98E-  | 1.08E+0 | 1.17E+0 | 5.02E-  | 5.37E-  | 5.39E-  | 5.62E-  | 5.94E-  |
| (kw·h)                                 |             | 01      | 01      | 01      | 0       | 0       | 01      | 01      | 01      | 01      | 01      |

**Table S2.** Life cycle assessment list of all scenarios for community-based rainwater harvesting and utilization (continued).

|   |    |             |            |            |            |            |             |            |            |            |            |
|---|----|-------------|------------|------------|------------|------------|-------------|------------|------------|------------|------------|
| <b>Floor-area ratio (FAR)</b>           |    | <b>2.4</b>  |            |            |            |            |             |            |            |            |            |
| <b>Total runoff coefficient</b>         |    | <b>0.31</b> |            |            |            |            | <b>0.42</b> |            |            |            |            |
| <b>Reservoir volume (m<sup>3</sup>)</b> |    | <b>78</b>   | <b>156</b> | <b>234</b> | <b>312</b> | <b>390</b> | <b>78</b>   | <b>156</b> | <b>234</b> | <b>312</b> | <b>390</b> |
| <b>Construction phase</b>               |    |             |            |            |            |            |             |            |            |            |            |
| 1.                                      | PP | 1.63E-      | 1.05E-     | 1.14E-     | 1.12E-     | 1.15E-     | 1.20E-      | 9.37E-     | 1.01E-     | 9.76E-     | 9.86E-     |
| (kg)                                    |    | 01          | 01         | 01         | 01         | 01         | 01          | 02         | 01         | 02         | 02         |

|  |                               |          |          |          |          |          |          |          |          |          |          |
|--|-------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 2.                                     | Quartz sand (kg)              | 1.21E-02 | 1.31E-02 | 1.21E-02 | 1.04E-02 | 9.50E-03 | 8.93E-03 | 1.16E-02 | 1.07E-02 | 9.10E-03 | 8.17E-03 |
| 3.                                     | PE (kg)                       | 4.57E-04 | 4.93E-04 | 4.57E-04 | 3.92E-04 | 3.58E-04 | 3.37E-04 | 4.39E-04 | 4.05E-04 | 3.43E-04 | 3.08E-04 |
| 4.                                     | Steel (kg)                    | 2.79E-02 | 3.01E-02 | 2.79E-02 | 2.39E-02 | 2.19E-02 | 2.05E-02 | 2.68E-02 | 2.47E-02 | 2.09E-02 | 1.88E-02 |
| 5.                                     | PPR (kg)                      | 1.64E-02 | 1.77E-02 | 1.64E-02 | 1.41E-02 | 1.29E-02 | 1.21E-02 | 1.58E-02 | 1.45E-02 | 1.23E-02 | 1.11E-02 |
| 6.                                     | PVC (kg)                      | 1.35E-04 | 1.45E-04 | 1.35E-04 | 1.16E-04 | 1.06E-04 | 9.92E-05 | 1.29E-04 | 1.19E-04 | 1.01E-04 | 9.08E-05 |
| 7.                                     | Concrete (kg)                 | 1.52E-01 | 1.01E-01 | 1.06E-01 | 1.04E-01 | 1.07E-01 | 1.12E-01 | 9.00E-02 | 9.44E-02 | 9.11E-02 | 9.20E-02 |
| 8.                                     | Geomembrane (kg)              | 1.50E-03 | 1.04E-03 | 1.09E-03 | 1.05E-03 | 1.09E-03 | 1.10E-03 | 9.27E-04 | 9.68E-04 | 9.22E-04 | 9.36E-04 |
| 9.                                     | Limestone (kg)                | 1.17E-01 | 1.26E-01 | 1.17E-01 | 1.00E-01 | 9.18E-02 | 8.63E-02 | 1.13E-01 | 1.04E-01 | 8.79E-02 | 7.89E-02 |
| 10.                                    | Water (kg)                    | 1.63E+00 | 1.76E+00 | 1.63E+00 | 1.40E+00 | 1.28E+00 | 1.20E+00 | 1.57E+00 | 1.45E+00 | 1.22E+00 | 1.10E+00 |
| <b>Operation and maintenance phase</b> |                               |          |          |          |          |          |          |          |          |          |          |
| 11.                                    | Rainwater (kg)                | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 |
| 12.                                    | Chlorine (kg)                 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 |
| <b>End disposal phase</b>              |                               |          |          |          |          |          |          |          |          |          |          |
| 13.                                    | Coal (kg)                     | 5.13E-01 | 5.42E-01 | 5.23E-01 | 5.31E-01 | 5.49E-01 | 4.57E-01 | 4.81E-01 | 4.58E-01 | 4.57E-01 | 4.66E-01 |
| 14.                                    | Oil (kg)                      | 7.51E-02 | 7.95E-02 | 7.67E-02 | 7.78E-02 | 8.04E-02 | 6.69E-02 | 7.05E-02 | 6.71E-02 | 6.69E-02 | 6.83E-02 |
| 15.                                    | Natural gas (m <sup>3</sup> ) | 1.00E-02 | 1.06E-02 | 1.02E-02 | 1.04E-02 | 1.07E-02 | 8.93E-03 | 9.41E-03 | 8.95E-03 | 8.93E-03 | 9.11E-03 |
| 16.                                    | Electricity (kw·h)            | 4.09E-01 | 4.32E-01 | 4.17E-01 | 4.23E-01 | 4.37E-01 | 3.64E-01 | 3.84E-01 | 3.65E-01 | 3.64E-01 | 3.71E-01 |

**Table S2.** Life cycle assessment list of all scenarios for community-based rainwater harvesting and utilization (continued).

| Floor-area ratio (FAR)                 |  | 3.1      |          |          |          |          |          |          |          |          |          |
|--|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Total runoff coefficient               |  | 0.09     |          |          |          |          | 0.20     |          |          |          |          |
| Reservoir volume (m <sup>3</sup> )     |  | 100      | 200      | 300      | 400      | 500      | 100      | 200      | 300      | 400      | 500      |
| <b>Construction phase</b>              |  |          |          |          |          |          |          |          |          |          |          |
| 1. PP (kg)                             |  | 2.65E-01 | 3.02E-01 | 3.33E-01 | 3.68E-01 | 4.06E-01 | 1.48E-01 | 1.64E-01 | 1.71E-01 | 1.83E-01 | 1.98E-01 |
| 2. Quartz sand (kg)                    |  | 3.25E-02 | 3.18E-02 | 3.06E-02 | 3.02E-02 | 2.99E-02 | 1.82E-02 | 1.73E-02 | 1.58E-02 | 1.50E-02 | 1.46E-02 |
| 3. PE (kg)                             |  | 1.15E-03 | 1.13E-03 | 1.09E-03 | 1.07E-03 | 1.06E-03 | 6.46E-04 | 6.13E-04 | 5.59E-04 | 5.32E-04 | 5.17E-04 |
| 4. Steel (kg)                          |  | 5.91E-02 | 5.78E-02 | 5.56E-02 | 5.48E-02 | 5.43E-02 | 3.31E-02 | 3.14E-02 | 2.86E-02 | 2.73E-02 | 2.64E-02 |
| 5. PPR (kg)                            |  | 4.49E-02 | 4.39E-02 | 4.23E-02 | 4.16E-02 | 4.13E-02 | 2.51E-02 | 2.38E-02 | 2.17E-02 | 2.07E-02 | 2.01E-02 |
| 6. PVC (kg)                            |  | 2.85E-04 | 2.79E-04 | 2.69E-04 | 2.65E-04 | 2.62E-04 | 1.60E-04 | 1.52E-04 | 1.38E-04 | 1.32E-04 | 1.28E-04 |
| 7. Concrete (kg)                       |  | 2.06E-01 | 2.34E-01 | 2.63E-01 | 2.98E-01 | 2.86E-01 | 1.16E-01 | 1.27E-01 | 1.35E-01 | 1.48E-01 | 1.39E-01 |
| 8. Geomembrane (kg)                    |  | 2.30E-03 | 2.61E-03 | 2.87E-03 | 3.12E-03 | 3.20E-03 | 1.29E-03 | 1.42E-03 | 1.48E-03 | 1.55E-03 | 1.56E-03 |
| 9. Limestone (kg)                      |  | 2.48E-01 | 2.43E-01 | 2.34E-01 | 2.30E-01 | 2.28E-01 | 1.39E-01 | 1.32E-01 | 1.20E-01 | 1.14E-01 | 1.11E-01 |
| 10. Water (kg)                         |  | 3.45E+00 | 3.38E+00 | 3.26E+00 | 3.21E+00 | 3.18E+00 | 1.93E+00 | 1.84E+00 | 1.68E+00 | 1.60E+00 | 1.55E+00 |
| <b>Operation and maintenance phase</b> |  |          |          |          |          |          |          |          |          |          |          |
| 11. Rainwater (kg)                     |  | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 | 1.00E+03 |
| 12. Chlorine (kg)                      |  | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 | 1.00E-03 |
| <b>End disposal phase</b>              |  |          |          |          |          |          |          |          |          |          |          |
| 13. Coal (kg)                          |  | 1.29E+00 | 1.44E+00 | 1.56E+00 | 1.70E+00 | 1.86E+00 | 7.22E-01 | 7.82E-01 | 8.02E-01 | 8.48E-01 | 9.04E-01 |

|               |             |              |              |              |              |              |              |              |              |              |              |
|---------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 14.<br>(kg)   | Oil         | 1.89E-<br>01 | 2.11E-<br>01 | 2.28E-<br>01 | 2.50E-<br>01 | 2.72E-<br>01 | 1.06E-<br>01 | 1.15E-<br>01 | 1.17E-<br>01 | 1.24E-<br>01 | 1.32E-<br>01 |
| 15.<br>(m³)   | Natural gas | 2.52E-<br>02 | 2.82E-<br>02 | 3.05E-<br>02 | 3.33E-<br>02 | 3.63E-<br>02 | 1.41E-<br>02 | 1.53E-<br>02 | 1.57E-<br>02 | 1.66E-<br>02 | 1.77E-<br>02 |
| 16.<br>(kw·h) | Electricity | 1.03E+0<br>0 | 1.15E+0<br>0 | 1.24E+0<br>0 | 1.36E+0<br>0 | 1.48E+0<br>0 | 5.76E-<br>01 | 6.23E-<br>01 | 6.39E-<br>01 | 6.76E-<br>01 | 7.20E-<br>01 |

**Table S2.** Life cycle assessment list of all scenarios for community-based rainwater harvesting and utilization (continued).

[illegible]



**Table S3.** Life cycle assessment results of community-based rainwater utilization (ADPF: abiotic depletion potential for fossil fuels, ADP elements: abiotic depletion potential elements, AP: acidification potential, MAETP: marine aquatic ecotoxicity potential, TETP: terrestrial ecotoxicity potential, EP: eutrophication potential, FAETP: freshwater aquatic ecotoxicity potential, GWP: global warming potential, HTP: human toxicity potential, POCP: photochemical ozone creation potential).

[illegible]

|                          |                                     |          |          |          |          |          |              |              |              |              |          |
|--------------------------|-------------------------------------|----------|----------|----------|----------|----------|--------------|--------------|--------------|--------------|----------|
| EP                       | k                                   |          |          |          |          |          |              |              |              |              |          |
|                          | g PO <sub>4</sub> <sup>3-</sup> eq. | 0.0014   | 0.00158  | 0.00146  | 0.00145  | 0.0015   | 0.00088<br>2 | 0.00085<br>8 | 0.00068<br>1 | 0.00061<br>4 | 0.00058  |
| FAETP                    | k                                   |          |          |          |          |          |              |              |              |              |          |
|                          | g DCB eq.                           | 0.0314   | 0.0336   | 0.0325   | 0.0322   | 0.033    | 0.0257       | 0.0255       | 0.0236       | 0.0229       | 0.0226   |
| GWP                      | k                                   |          |          |          |          |          |              |              |              |              |          |
|                          | g CO <sub>2</sub> eq.               | 6.37     | 6.85     | 6.59     | 6.57     | 6.71     | 5.09         | 5.04         | 4.62         | 4.46         | 4.39     |
| HTP                      | k                                   |          |          |          |          |          |              |              |              |              |          |
|                          | g DCB eq.                           | 0.949    | 1        | 0.956    | 0.944    | 0.96     | 0.783        | 0.769        | 0.709        | 0.684        | 0.673    |
| POCP                     | k                                   |          |          |          |          |          |              |              |              |              |          |
|                          | g Ethene eq.                        | 0.00349  | 0.00338  | 0.00322  | 0.0032   | 0.00326  | 0.00251      | 0.00247      | 0.00224      | 0.00215      | 0.00211  |
| Total runoff coefficient |                                     | 0.31     |          |          |          | 0.42     |              |              |              |              |          |
| ADPF                     | M                                   | 57.8     | 58.8     | 54.6     | 53.1     | 52.7     | 53.8         | 54.8         | 50.6         | 49.1         | 48.6     |
|                          | J                                   |          |          |          |          |          |              |              |              |              |          |
| ADP elements             | k                                   |          |          |          |          |          |              |              |              |              |          |
|                          | g Sb eq.                            | 6.67E-07 | 6.27E-07 | 5.43E-07 | 4.99E-07 | 4.71E-07 | 6.20E-07     | 5.85E-07     | 5.05E-07     | 4.62E-07     | 4.35E-07 |
| AP                       | k                                   |          |          |          |          |          |              |              |              |              |          |
|                          | g SO <sub>2</sub> eq.               | 0.0316   | 0.031    | 0.0278   | 0.0263   | 0.0255   | 0.0293       | 0.0288       | 0.0257       | 0.0243       | 0.0235   |
| MAET                     | k                                   |          |          |          |          |          |              |              |              |              |          |
| P                        | g DCB eq.                           | 398      | 391      | 361      | 347      | 340      | 375          | 371          | 339          | 327          | 319      |
| TETP                     | k                                   |          |          |          |          |          |              |              |              |              |          |
|                          | g DCB eq.                           | 0.0196   | 0.0189   | 0.0171   | 0.0162   | 0.0157   | 0.0184       | 0.0179       | 0.0161       | 0.0152       | 0.0147   |
| EP                       | k                                   |          |          |          |          |          |              |              |              |              |          |
|                          | g PO <sub>4</sub> <sup>3-</sup> eq. | 0.000658 | 0.000629 | 0.000462 | 0.000385 | 0.000346 | 0.000536     | 0.000511     | 0.000349     | 0.000274     | 0.000234 |
| FAETP                    | k                                   |          |          |          |          |          |              |              |              |              |          |
|                          | g DCB eq.                           | 0.0232   | 0.0229   | 0.0211   | 0.0203   | 0.0199   | 0.0218       | 0.0216       | 0.0198       | 0.0191       | 0.0187   |
| GWP                      | k                                   |          |          |          |          |          |              |              |              |              |          |
|                          | g CO <sub>2</sub> eq.               | 4.52     | 4.47     | 4.07     | 3.88     | 3.79     | 4.22         | 4.18         | 3.78         | 3.6          | 3.51     |

[illegible]

**Table S3.** Life cycle assessment results of community-based rainwater utilization (continued).

| Floor-area ratio<br>(FAR)   |  | 1.7          |              |              |              |              |              |              |              |              |              |
|-----------------------------|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Total runoff<br>coefficient |  | 0.09         |              |              |              |              | 0.20         |              |              |              |              |
| Reservoir<br>volume (m³)    |  | 55           | 110          | 165          | 220          | 275          | 55           | 110          | 165          | 220          | 275          |
| ADPF                        | M  |              |              |              |              |              |              |              |              |              |              |
|                             | J  | 113          | 121          | 124          | 130          | 139          | 75.3         | 78.2         | 75.1         | 75.7         | 77.5         |
| ADP<br>element<br>s         | k<br>g Sb<br>eq.                               | 1.35E-<br>06 | 1.32E-<br>06 | 1.26E-<br>06 | 1.24E-<br>06 | 1.24E-<br>06 | 8.92E-<br>07 | 8.52E-<br>07 | 7.63E-<br>07 | 7.22E-<br>07 | 6.98E-<br>07 |
| AP                          | k<br>g SO <sub>2</sub><br>eq.                  | 0.0635       | 0.0651       | 0.0644       | 0.066        | 0.0682       | 0.0418       | 0.0418       | 0.0388       | 0.038        | 0.038        |
| MAET<br>P                   | k<br>g DCB<br>eq.                              |              |              |              |              |              |              |              |              |              |              |
|                             |  | 704          | 721          | 717          | 733          | 757          | 493          | 493          | 466          | 459          | 460          |
| TETP                        | k<br>g DCB<br>eq.                              |              |              |              |              |              |              |              |              |              |              |
|                             |  | 0.0324       | 0.0327       | 0.032        | 0.0323       | 0.033        | 0.0226       | 0.0223       | 0.0207       | 0.0202       | 0.02         |
| EP                          | k<br>g<br>PO <sub>4</sub> <sup>3-</sup><br>eq. | 0.0023<br>8  | 0.00248      | 0.00246      | 0.00255      | 0.00268      | 0.0012<br>1  | 0.00122      | 0.00106      | 0.00102      | 0.00103      |
| FAETP                       | k<br>g DCB<br>eq.                              |              |              |              |              |              |              |              |              |              |              |
|                             |  | 0.0419       | 0.0432       | 0.0431       | 0.0443       | 0.046        | 0.029        | 0.0292       | 0.0276       | 0.0273       | 0.0274       |
| GWP                         | k<br>g CO <sub>2</sub><br>eq.                  |              |              |              |              |              |              |              |              |              |              |
|                             |  | 8.73         | 9.02         | 9.01         | 9.28         | 9.64         | 5.84         | 5.88         | 5.52         | 5.45         | 5.48         |
| HTP                         | k<br>g DCB<br>eq.                              |              |              |              |              |              |              |              |              |              |              |
|                             |  | 1.25         | 1.27         | 1.26         | 1.28         | 1.32         | 0.879        | 0.875        | 0.823        | 0.808        | 0.807        |

|                                 |                                 |        |             |         |         |         |        |             |         |         |         |
|---------------------------------|---------------------------------|--------|-------------|---------|---------|---------|--------|-------------|---------|---------|---------|
| POCP                            | k                               |        |             |         |         |         |        |             |         |         |         |
|                                 | g                               | 0.0042 |             |         |         |         | 0.0028 |             |         |         |         |
|                                 | Ethene                          | 9      | 0.0044      | 0.00437 | 0.00448 | 0.00464 | 5      | 0.00285     | 0.00266 | 0.00261 | 0.00261 |
|                                 | eq.                             |        |             |         |         |         |        |             |         |         |         |
| <b>Total runoff coefficient</b> |                                 |        | <b>0.31</b> |         |         |         |        | <b>0.42</b> |         |         |         |
| ADPF                            | M                               | 64.5   | 66.6        | 62.6    | 61.7    | 62.2    | 58.9   | 60.7        | 56.7    | 55.4    | 55.2    |
|                                 | J                               |        |             |         |         |         |        |             |         |         |         |
| ADP                             | k                               |        |             |         |         |         |        |             |         |         |         |
| element                         | g Sb                            | 7.62E- | 7.27E-      | 6.36E-  | 5.91E-  | 5.64E-  | 6.98E- | 6.63E-      | 5.78E-  | 5.31E-  | 5.01E-  |
| s                               | eq.                             | 07     | 07          | 07      | 07      | 07      | 07     | 07          | 07      | 07      | 07      |
| AP                              | k                               |        |             |         |         |         |        |             |         |         |         |
|                                 | g SO <sub>2</sub>               | 0.0357 | 0.0355      | 0.0322  | 0.0309  | 0.0304  | 0.0326 | 0.0323      | 0.0291  | 0.0277  | 0.0269  |
|                                 | eq.                             |        |             |         |         |         |        |             |         |         |         |
| MAET                            | k                               |        |             |         |         |         |        |             |         |         |         |
| P                               | g DCB                           | 433    | 432         | 401     | 388     | 384     | 402    | 400         | 370     | 357     | 350     |
|                                 | eq.                             |        |             |         |         |         |        |             |         |         |         |
| TETP                            | k                               |        |             |         |         |         |        |             |         |         |         |
|                                 | g DCB                           | 0.0198 | 0.0195      | 0.0179  | 0.0171  | 0.0168  | 0.0184 | 0.018       | 0.0165  | 0.0157  | 0.0153  |
|                                 | eq.                             |        |             |         |         |         |        |             |         |         |         |
| EP                              | k                               |        |             |         |         |         |        |             |         |         |         |
|                                 | g PO <sub>4</sub> <sup>3-</sup> | 0.0008 | 0.00087     | 0.00070 | 0.00063 | 0.00061 | 0.0007 | 0.00070     | 0.00053 | 0.00045 | 0.00042 |
|                                 | eq.                             | 8      | 4           | 4       | 5       | 1       | 1      | 1           | 3       | 9       | 2       |
| FAETP                           | k                               |        |             |         |         |         |        |             |         |         |         |
|                                 | g DCB                           | 0.0254 | 0.0255      | 0.0237  | 0.0229  | 0.0227  | 0.0235 | 0.0235      | 0.0217  | 0.021   | 0.0206  |
|                                 | eq.                             |        |             |         |         |         |        |             |         |         |         |
| GWP                             | k                               |        |             |         |         |         |        |             |         |         |         |
|                                 | g CO <sub>2</sub>               | 5.03   | 5.04        | 4.64    | 4.48    | 4.43    | 4.61   | 4.6         | 4.21    | 4.04    | 3.95    |
|                                 | eq.                             |        |             |         |         |         |        |             |         |         |         |
| HTP                             | k                               |        |             |         |         |         |        |             |         |         |         |
|                                 | g DCB                           | 0.774  | 0.769       | 0.711   | 0.686   | 0.677   | 0.72   | 0.712       | 0.657   | 0.632   | 0.617   |
|                                 | eq.                             |        |             |         |         |         |        |             |         |         |         |
| POCP                            | k                               |        |             |         |         |         |        |             |         |         |         |
|                                 | g                               | 0.0024 |             |         |         |         | 0.0022 |             |         |         |         |
|                                 | Ethene                          | 4      | 0.00243     | 0.00222 | 0.00213 | 0.0021  | 8      | 0.00222     | 0.00201 | 0.00192 | 0.00187 |
|                                 | eq.                             |        |             |         |         |         |        |             |         |         |         |

Table S3. Life cycle assessment results of community-based rainwater utilization (continued).

|                                 |  |             |  |  |  |             |  |  |  |  |  |
|---------------------------------|--|-------------|--|--|--|-------------|--|--|--|--|--|
| <b>Floor-area ratio (FAR)</b>   |  | <b>2.4</b>  |  |  |  |             |  |  |  |  |  |
| <b>Total runoff coefficient</b> |  | <b>0.09</b> |  |  |  | <b>0.20</b> |  |  |  |  |  |

|                          |      |      |
|--------------------------|------|------|
| Total runoff coefficient | 0.31 | 0.42 |
|--------------------------|------|------|

|               |          |          |          |          |          |          |          |          |          |          |          |
|---------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| ADPF          | M        | 71.9     | 74.6     | 71.3     | 71.6     | 73.2     | 64.8     | 66.9     | 63.1     | 62.3     | 63       |
| J             | k        |          |          |          |          |          |          |          |          |          |          |
| ADP element s | g Sb eq. | 8.57E-07 | 8.17E-07 | 7.27E-07 | 6.86E-07 | 6.62E-07 | 7.72E-07 | 7.31E-07 | 6.44E-07 | 5.99E-07 | 5.72E-07 |

**Table S3.** Life cycle assessment results of community-based rainwater utilization (continued).

| Floor-area ratio<br>(FAR)   |                          | 3.1          |              |              |              |              |              |              |              |              |              |
|-----------------------------|--------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Total runoff<br>coefficient |                          | 0.09         |              |              |              |              | 0.20         |              |              |              |              |
| Reservoir volume<br>(m³)    |                          | 100          | 200          | 300          | 400          | 500          | 100          | 200          | 300          | 400          | 500          |
| ADPF                        | M                        | 171          | 202          | 200          | 215          | 232          | 98.5         | 105          | 106          | 110          | 116          |
|                             | J                        |              |              |              |              |              |              |              |              |              |              |
| ADP<br>element              | kg<br>Sb eq.             | 2.06E-<br>06 | 2.16E-<br>06 | 2.03E-<br>06 | 2.05E-<br>06 | 2.07E-<br>06 | 1.18E-<br>06 | 1.15E-<br>06 | 1.08E-<br>06 | 1.05E-<br>06 | 1.04E-<br>06 |
| s                           |                          |              |              |              |              |              |              |              |              |              |              |
| AP                          | k                        |              |              |              |              |              |              |              |              |              |              |
|                             | g SO <sub>2</sub><br>eq. | 0.0967       | 0.102        | 0.104        | 0.109        | 0.115        | 0.0553       | 0.0563       | 0.055        | 0.0557       | 0.0573       |

[illegible]

|      |                            |             |             |             |             |             |        |             |             |             |         |
|------|----------------------------|-------------|-------------|-------------|-------------|-------------|--------|-------------|-------------|-------------|---------|
| GWP  | kg<br>CO <sub>2</sub> eq.  | 6.12        | 6.19        | 5.89        | 5.86        | 5.95        | 5.42   | 5.46        | 5.34        | 4.99        | 4.99    |
| HTP  | kg<br>DCB                  | 0.914       | 0.914       | 0.869       | 0.856       | 0.833       | 0.823  | 0.821       | 0.838       | 0.749       | 0.745   |
| POCP | eq.<br>kg<br>Ethene<br>eq. | 0.0029<br>4 | 0.0029<br>7 | 0.0028<br>1 | 0.0027<br>8 | 0.0027<br>1 | 0.0026 | 0.0026<br>1 | 0.0026<br>3 | 0.0023<br>6 | 0.00236 |

**Table S4.** Normalization results of community-based rainwater utilization.

|   |             |           |           |            |            |             |           |           |            |            |
|---|-------------|-----------|-----------|------------|------------|-------------|-----------|-----------|------------|------------|
| <b>Floor-area ratio<br/>(FAR)</b>           | <b>1</b>    |           |           |            |            |             |           |           |            |            |
| <b>Total runoff<br/>coefficient</b>         | <b>0.09</b> |           |           |            |            | <b>0.20</b> |           |           |            |            |
| <b>Reservoir<br/>volume (m<sup>3</sup>)</b> | <b>33</b>   | <b>66</b> | <b>99</b> | <b>132</b> | <b>165</b> | <b>33</b>   | <b>66</b> | <b>99</b> | <b>132</b> | <b>165</b> |
| ADPF  | 3.94E-07    | 4.37E-07  | 4.33E-07  | 4.38E-07   | 4.56E-07   | 3.12E-07    | 3.19E-07  | 2.98E-07  | 2.96E-07   | 2.94E-07   |
| ADP elements                                | 4.56E-15    | 4.68E-15  | 4.29E-15  | 4.10E-15   | 4.03E-15   | 3.62E-15    | 3.42E-15  | 2.98E-15  | 2.76E-15   | 2.63E-15   |
| AP  | 1.36E-13    | 1.45E-13  | 1.38E-13  | 1.37E-13   | 1.39E-13   | 1.07E-13    | 1.05E-13  | 9.49E-14  | 9.07E-14   | 8.9E-14    |
| MAETP                                       | 1.04E-12    | 1.11E-12  | 1.06E-12  | 1.05E-12   | 1.07E-12   | 8.57E-13    | 8.46E-13  | 7.83E-13  | 7.58E-13   | 7.46E-13   |
| TETP  | 9.85E-14    | 1.03E-13  | 9.67E-14  | 9.18E-14   | 9.67E-14   | 8.07E-14    | 7.81E-14  | 7.10E-14  | 6.77E-14   | 6.58E-14   |
| EP  | 1.06E-14    | 1.2E-14   | 1.11E-14  | 1.1E-14    | 1.14E-14   | 6.68E-15    | 6.5E-15   | 5.16E-15  | 4.65E-15   | 4.39E-15   |
| FAETP                                       | 1.54E-14    | 1.65E-14  | 1.59E-14  | 1.58E-14   | 1.62E-14   | 1.26E-14    | 1.25E-14  | 1.16E-14  | 1.12E-14   | 1.11E-14   |
| GWP   | 1.53E-13    | 1.65E-13  | 1.59E-13  | 1.58E-13   | 1.62E-13   | 1.23E-13    | 1.21E-13  | 1.11E-13  | 1.07E-13   | 1.06E-13   |
| HTP   | 1.66E-14    | 1.75E-14  | 1.67E-14  | 1.65E-14   | 1.68E-14   | 1.37E-14    | 1.35E-14  | 1.24E-14  | 1.2E-14    | 1.18E-14   |
| POCP  | 4.02E-14    | 3.89E-14  | 3.71E-14  | 3.68E-14   | 3.75E-14   | 2.89E-14    | 2.84E-14  | 2.58E-14  | 2.47E-14   | 2.43E-14   |
| <b>Total<br/>runoff<br/>coefficient</b>     | <b>0.31</b> |           |           |            |            | <b>0.42</b> |           |           |            |            |
| ADPF  | 2.77E-07    | 2.81E-07  | 2.61E-07  | 2.54E-07   | 2.52E-07   | 2.57E-07    | 2.62E-07  | 2.42E-07  | 2.35E-07   | 2.33E-07   |



|              |          |          |          |          |          |          |          |          |          |          |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| ADP elements | 3.21E-15 | 3.01E-15 | 2.61E-15 | 2.40E-15 | 2.26E-15 | 2.98E-15 | 2.81E-15 | 2.43E-15 | 2.22E-15 | 2.09E-15 |
| AP           | 9.43E-14 | 9.25E-14 | 8.3E-14  | 7.85E-14 | 7.61E-14 | 8.75E-14 | 8.6E-14  | 7.67E-14 | 7.25E-14 | 7.01E-14 |
| MAETP        | 7.77E-13 | 7.64E-13 | 7.05E-13 | 6.78E-13 | 6.64E-13 | 7.32E-13 | 7.25E-13 | 6.62E-13 | 6.39E-13 | 6.23E-13 |
| TETP         | 7.29E-14 | 7.03E-14 | 6.36E-14 | 6.02E-14 | 5.84E-14 | 6.84E-14 | 6.65E-14 | 5.99E-14 | 5.65E-14 | 5.46E-14 |
| EP           | 4.98E-15 | 4.77E-15 | 3.50E-15 | 2.92E-15 | 2.62E-15 | 4.06E-15 | 3.87E-15 | 2.64E-15 | 2.08E-15 | 1.77E-15 |
| FAETP        | 1.14E-14 | 1.12E-14 | 1.03E-14 | 9.95E-15 | 9.75E-15 | 1.07E-14 | 1.06E-14 | 9.71E-15 | 9.36E-15 | 9.17E-15 |
| GWP          | 1.09E-13 | 1.08E-13 | 9.81E-14 | 9.35E-14 | 9.13E-14 | 1.02E-13 | 1.01E-13 | 9.11E-14 | 8.67E-14 | 8.46E-14 |
| HTP          | 1.24E-14 | 1.22E-14 | 1.12E-14 | 1.07E-14 | 1.05E-14 | 1.17E-14 | 1.16E-14 | 1.06E-14 | 1.01E-14 | 9.88E-15 |
| POCP         | 2.57E-14 | 2.51E-14 | 2.27E-14 | 2.15E-14 | 2.09E-14 | 2.38E-14 | 2.35E-14 | 2.11E-14 | 1.99E-14 | 1.93E-14 |

Table S4. Normalization results of community-based rainwater utilization (continued).

| Floor-area ratio (FAR)             | 1.7      |          |          |          |          |          |          |          |          |          |
|------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Total runoff coefficient           | 0.09     |          |          |          |          | 0.20     |          |          |          |          |
| Reservoir volume (m <sup>3</sup> ) | 55       | 110      | 165      | 220      | 275      | 55       | 110      | 165      | 220      | 275      |
| ADPF                               | 5.41E-07 | 5.79E-07 | 5.93E-07 | 6.22E-07 | 6.65E-07 | 3.60E-07 | 3.74E-07 | 3.59E-07 | 3.62E-07 | 3.71E-07 |
| ADP elements                       | 6.49E-15 | 6.35E-15 | 6.06E-15 | 5.96E-15 | 5.96E-15 | 4.29E-15 | 4.10E-15 | 3.67E-15 | 3.47E-15 | 3.36E-15 |
| AP                                 | 1.90E-13 | 1.94E-13 | 1.92E-13 | 1.97E-13 | 2.04E-13 | 1.25E-13 | 1.25E-13 | 1.16E-13 | 1.13E-13 | 1.13E-13 |
| MAETP                              | 1.38E-12 | 1.41E-12 | 1.40E-12 | 1.43E-12 | 1.48E-12 | 9.63E-13 | 9.63E-13 | 9.10E-13 | 8.96E-13 | 8.98E-13 |
| TETP                               | 1.20E-13 | 1.22E-13 | 1.19E-13 | 1.20E-13 | 1.23E-13 | 8.40E-14 | 8.29E-14 | 7.70E-14 | 7.51E-14 | 7.43E-14 |
| EP                                 | 1.80E-14 | 1.88E-14 | 1.86E-14 | 1.93E-14 | 2.03E-14 | 9.17E-15 | 9.24E-15 | 8.03E-15 | 7.73E-15 | 7.80E-15 |
| FAETP                              | 2.05E-14 | 2.12E-14 | 2.11E-14 | 2.17E-14 | 2.25E-14 | 1.42E-14 | 1.43E-14 | 1.35E-14 | 1.34E-14 | 1.34E-14 |
| GWP                                | 2.10E-13 | 2.17E-13 | 2.17E-13 | 2.24E-13 | 2.32E-13 | 1.41E-13 | 1.42E-13 | 1.33E-13 | 1.31E-13 | 1.32E-13 |

|                                 |             |          |          |          |          |             |          |          |          |          |
|---------------------------------|-------------|----------|----------|----------|----------|-------------|----------|----------|----------|----------|
| HTP                             | 2.19E-14    | 2.22E-14 | 2.21E-14 | 2.24E-14 | 2.31E-14 | 1.54E-14    | 1.53E-14 | 1.44E-14 | 1.42E-14 | 1.41E-14 |
| POCP                            | 4.94E-14    | 5.06E-14 | 5.03E-14 | 5.16E-14 | 5.34E-14 | 3.28E-14    | 3.28E-14 | 3.06E-14 | 3.00E-14 | 3.00E-14 |
| <b>Total runoff coefficient</b> | <b>0.31</b> |          |          |          |          | <b>0.42</b> |          |          |          |          |
| ADPF                            | 3.09E-07    | 3.19E-07 | 3.00E-07 | 2.95E-07 | 2.98E-07 | 2.82E-07    | 2.90E-07 | 2.71E-07 | 2.65E-07 | 2.64E-07 |
| ADP elements                    | 3.66E-15    | 3.50E-15 | 3.06E-15 | 2.84E-15 | 2.71E-15 | 3.36E-15    | 3.19E-15 | 2.78E-15 | 2.55E-15 | 2.41E-15 |
| AP                              | 1.07E-13    | 1.06E-13 | 9.61E-14 | 9.22E-14 | 9.07E-14 | 9.73E-14    | 9.64E-14 | 8.69E-14 | 8.27E-14 | 8.03E-14 |
| MAETP                           | 8.46E-13    | 8.44E-13 | 7.83E-13 | 7.58E-13 | 7.50E-13 | 7.85E-13    | 7.81E-13 | 7.23E-13 | 6.97E-13 | 6.84E-13 |
| TETP                            | 7.36E-14    | 7.25E-14 | 6.65E-14 | 6.36E-14 | 6.25E-14 | 6.84E-14    | 6.69E-14 | 6.13E-14 | 5.84E-14 | 5.69E-14 |
| EP                              | 6.67E-15    | 6.62E-15 | 5.33E-15 | 4.81E-15 | 4.63E-15 | 5.38E-15    | 5.31E-15 | 4.04E-15 | 3.48E-15 | 3.20E-15 |
| FAETP                           | 1.25E-14    | 1.25E-14 | 1.16E-14 | 1.12E-14 | 1.11E-14 | 1.15E-14    | 1.15E-14 | 1.06E-14 | 1.03E-14 | 1.01E-14 |
| GWP                             | 1.21E-13    | 1.21E-13 | 1.12E-13 | 1.08E-13 | 1.07E-13 | 1.11E-13    | 1.11E-13 | 1.01E-13 | 9.73E-14 | 9.52E-14 |
| HTP                             | 1.36E-14    | 1.35E-14 | 1.25E-14 | 1.20E-14 | 1.19E-14 | 1.26E-14    | 1.25E-14 | 1.15E-14 | 1.11E-14 | 1.08E-14 |
| POCP                            | 2.81E-14    | 2.80E-14 | 2.55E-14 | 2.45E-14 | 2.42E-14 | 2.62E-14    | 2.55E-14 | 2.31E-14 | 2.21E-14 | 2.15E-14 |

**Table S4.** Normalization results of community-based rainwater utilization (continued).

|   |             |            |            |            |            |             |            |            |            |            |
|---|-------------|------------|------------|------------|------------|-------------|------------|------------|------------|------------|
| <b>Floor-area ratio (FAR)</b>           | <b>2.4</b>  |            |            |            |            |             |            |            |            |            |
| <b>Total runoff coefficient</b>         | <b>0.09</b> |            |            |            |            | <b>0.20</b> |            |            |            |            |
| <b>Reservoir volume (m<sup>3</sup>)</b> | <b>78</b>   | <b>156</b> | <b>234</b> | <b>312</b> | <b>390</b> | <b>78</b>   | <b>156</b> | <b>234</b> | <b>312</b> | <b>390</b> |
| ADPF                                    | 6.79E-07    | 7.37E-07   | 7.75E-07   | 8.28E-07   | 8.90E-07   | 4.16E-07    | 4.36E-07   | 4.33E-07   | 4.45E-07   | 4.65E-07   |
| ADP elements                            | 8.17E-15    | 8.13E-15   | 7.93E-15   | 7.88E-15   | 7.98E-15   | 5.00E-15    | 4.81E-15   | 4.42E-15   | 4.27E-15   | 4.20E-15   |
| AP                                      | 2.39E-13    | 2.48E-13   | 2.52E-13   | 2.61E-13   | 2.73E-13   | 1.45E-13    | 1.46E-13   | 1.40E-13   | 1.40E-13   | 1.42E-13   |
| MAETP                                   | 1.68E-12    | 1.75E-12   | 1.78E-12   | 1.85E-12   | 1.92E-12   | 1.09E-12    | 1.09E-12   | 1.06E-12   | 1.06E-12   | 1.08E-12   |

|                          |          |          |          |          |          |          |          |          |          |          |
|--------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| TETP                     | 1.41E-13 | 1.45E-13 | 1.45E-13 | 1.49E-13 | 1.54E-13 | 9.14E-14 | 9.07E-14 | 8.66E-14 | 8.62E-14 | 8.70E-14 |
| EP                       | 2.48E-14 | 2.63E-14 | 2.70E-14 | 2.84E-14 | 3.02E-14 | 1.20E-14 | 1.21E-14 | 1.14E-14 | 1.14E-14 | 1.18E-14 |
| FAETP                    | 2.52E-14 | 2.64E-14 | 2.70E-14 | 2.82E-14 | 2.95E-14 | 1.61E-14 | 1.63E-14 | 1.59E-14 | 1.60E-14 | 1.63E-14 |
| GWP                      | 2.63E-13 | 2.75E-13 | 2.82E-13 | 2.94E-13 | 3.08E-13 | 1.62E-13 | 1.64E-13 | 1.59E-13 | 1.60E-13 | 1.64E-13 |
| HTP                      | 2.68E-14 | 2.77E-14 | 2.80E-14 | 2.89E-14 | 2.99E-14 | 1.74E-14 | 1.74E-14 | 1.67E-14 | 1.67E-14 | 1.70E-14 |
| POCP                     | 6.11E-14 | 6.38E-14 | 6.50E-14 | 6.77E-14 | 7.09E-14 | 3.74E-14 | 3.79E-14 | 3.64E-14 | 3.65E-14 | 3.73E-14 |
| <hr/>                    |          |          |          |          |          |          |          |          |          |          |
| Total runoff coefficient | 0.31     |          |          |          |          | 0.42     |          |          |          |          |
| <hr/>                    |          |          |          |          |          |          |          |          |          |          |
| ADPF                     | 3.44E-07 | 3.57E-07 | 3.41E-07 | 3.43E-07 | 3.50E-07 | 3.10E-07 | 3.20E-07 | 3.02E-07 | 2.98E-07 | 3.01E-07 |
| ADP elements             | 4.12E-15 | 3.93E-15 | 3.50E-15 | 3.30E-15 | 3.18E-15 | 3.71E-15 | 3.51E-15 | 3.10E-15 | 2.88E-15 | 2.75E-15 |
| AP                       | 1.19E-13 | 1.19E-13 | 1.10E-13 | 1.07E-13 | 1.07E-13 | 1.07E-13 | 1.07E-13 | 9.70E-14 | 9.31E-14 | 9.16E-14 |
| MAETP                    | 9.22E-13 | 9.22E-13 | 8.67E-13 | 8.54E-13 | 8.54E-13 | 8.46E-13 | 8.44E-13 | 7.85E-13 | 7.62E-13 | 7.56E-13 |
| TETP                     | 7.77E-14 | 7.66E-14 | 7.10E-14 | 6.95E-14 | 6.88E-14 | 7.10E-14 | 7.03E-14 | 6.47E-14 | 6.21E-14 | 6.10E-14 |
| EP                       | 8.41E-15 | 8.41E-15 | 7.23E-15 | 6.90E-15 | 6.89E-15 | 6.76E-15 | 6.71E-15 | 5.45E-15 | 4.95E-15 | 4.81E-15 |
| FAETP                    | 1.36E-14 | 1.37E-14 | 1.29E-14 | 1.27E-14 | 1.27E-14 | 1.25E-14 | 1.25E-14 | 1.16E-14 | 1.13E-14 | 1.12E-14 |
| GWP                      | 1.34E-13 | 1.35E-13 | 1.26E-13 | 1.24E-13 | 1.25E-13 | 1.21E-13 | 1.22E-13 | 1.12E-13 | 1.09E-13 | 1.08E-13 |
| HTP                      | 1.48E-14 | 1.47E-14 | 1.38E-14 | 1.35E-14 | 1.34E-14 | 1.36E-14 | 1.35E-14 | 1.25E-14 | 1.21E-14 | 1.19E-14 |
| POCP                     | 3.10E-14 | 3.10E-14 | 2.88E-14 | 2.82E-14 | 2.82E-14 | 2.80E-14 | 2.78E-14 | 2.55E-14 | 2.46E-14 | 2.43E-14 |

**Table S4.** Normalization results of community-based rainwater utilization (continued).

|   |             |            |            |            |            |             |            |            |            |            |
|---|-------------|------------|------------|------------|------------|-------------|------------|------------|------------|------------|
| <b>Floor-area ratio (FAR)</b>           | <b>3.1</b>  |            |            |            |            |             |            |            |            |            |
| <b>Total runoff coefficient</b>         | <b>0.09</b> |            |            |            |            | <b>0.20</b> |            |            |            |            |
| <b>Reservoir volume (m<sup>3</sup>)</b> | <b>100</b>  | <b>200</b> | <b>300</b> | <b>400</b> | <b>500</b> | <b>100</b>  | <b>200</b> | <b>300</b> | <b>400</b> | <b>500</b> |

|                                 |             |          |          |          |          |             |          |          |          |          |
|---------------------------------|-------------|----------|----------|----------|----------|-------------|----------|----------|----------|----------|
| ADPF                            | 8.18E-07    | 9.67E-07 | 9.57E-07 | 1.03E-06 | 1.11E-06 | 4.71E-07    | 5.02E-07 | 5.07E-07 | 5.26E-07 | 5.55E-07 |
| ADP elements                    | 9.90E-15    | 1.04E-14 | 9.76E-15 | 9.86E-15 | 9.95E-15 | 5.67E-15    | 5.53E-15 | 5.19E-15 | 5.05E-15 | 5.00E-15 |
| AP                              | 2.89E-13    | 3.04E-13 | 3.10E-13 | 3.25E-13 | 3.43E-13 | 1.65E-13    | 1.68E-13 | 1.64E-13 | 1.66E-13 | 1.71E-13 |
| MAETP                           | 1.99E-12    | 2.11E-12 | 2.15E-12 | 2.25E-12 | 2.36E-12 | 1.21E-12    | 1.23E-12 | 1.21E-12 | 1.23E-12 | 1.26E-12 |
| TETP                            | 1.63E-13    | 1.70E-13 | 1.72E-13 | 1.78E-13 | 1.85E-13 | 9.96E-14    | 1.00E-13 | 9.74E-14 | 9.78E-14 | 9.93E-14 |
| EP                              | 3.17E-14    | 3.42E-14 | 3.52E-14 | 3.73E-14 | 3.97E-14 | 1.47E-14    | 1.52E-14 | 1.48E-14 | 1.52E-14 | 1.58E-14 |
| FAETP                           | 3.00E-14    | 3.38E-14 | 3.27E-14 | 3.45E-14 | 3.64E-14 | 1.80E-14    | 1.85E-14 | 1.82E-14 | 1.86E-14 | 1.91E-14 |
| GWP                             | 3.16E-13    | 3.42E-13 | 3.45E-13 | 3.64E-13 | 3.86E-13 | 1.83E-13    | 1.88E-13 | 1.85E-13 | 1.89E-13 | 1.95E-13 |
| HTP                             | 3.17E-14    | 3.36E-14 | 3.36E-14 | 3.52E-14 | 3.68E-14 | 1.93E-14    | 1.96E-14 | 1.91E-14 | 1.93E-14 | 1.98E-14 |
| POCP                            | 7.32E-14    | 7.83E-14 | 7.95E-14 | 8.37E-14 | 8.80E-14 | 4.22E-14    | 4.32E-14 | 4.23E-14 | 4.30E-14 | 4.44E-14 |
| <b>Total runoff coefficient</b> | <b>0.31</b> |          |          |          |          | <b>0.42</b> |          |          |          |          |
| ADPF                            | 3.78E-07    | 3.95E-07 | 3.85E-07 | 3.91E-07 | 4.05E-07 | 3.33E-07    | 3.47E-07 | 3.35E-07 | 3.31E-07 | 3.38E-07 |
| ADP elements                    | 4.54E-15    | 4.36E-15 | 3.95E-15 | 3.76E-15 | 3.66E-15 | 4.00E-15    | 3.83E-15 | 3.84E-15 | 3.20E-15 | 3.07E-15 |
| AP                              | 1.32E-13    | 1.32E-13 | 1.24E-13 | 1.23E-13 | 1.20E-13 | 1.16E-13    | 1.16E-13 | 1.11E-13 | 1.04E-13 | 1.03E-13 |
| MAETP                           | 1.00E-12    | 1.01E-12 | 9.59E-13 | 9.51E-13 | 9.63E-13 | 8.98E-13    | 9.02E-13 | 9.41E-13 | 8.28E-13 | 8.28E-13 |
| TETP                            | 8.22E-14    | 8.18E-14 | 7.73E-14 | 7.58E-14 | 7.62E-14 | 7.40E-14    | 7.36E-14 | 6.99E-14 | 6.62E-14 | 6.58E-14 |
| EP                              | 1.02E-14    | 1.02E-14 | 9.24E-15 | 9.09E-15 | 8.86E-15 | 7.95E-15    | 8.03E-15 | 7.80E-15 | 6.44E-15 | 6.39E-15 |
| FAETP                           | 1.48E-14    | 1.50E-14 | 1.43E-14 | 1.43E-14 | 1.45E-14 | 1.33E-14    | 1.34E-14 | 1.31E-14 | 1.24E-14 | 1.24E-14 |
| GWP                             | 1.47E-13    | 1.49E-13 | 1.42E-13 | 1.41E-13 | 1.43E-13 | 1.31E-13    | 1.32E-13 | 1.29E-13 | 1.20E-13 | 1.20E-13 |
| HTP                             | 1.60E-14    | 1.60E-14 | 1.52E-14 | 1.50E-14 | 1.46E-14 | 1.44E-14    | 1.44E-14 | 1.47E-14 | 1.31E-14 | 1.30E-14 |
| POCP                            | 3.38E-14    | 3.42E-14 | 3.23E-14 | 3.20E-14 | 3.12E-14 | 2.99E-14    | 3.00E-14 | 3.03E-14 | 2.72E-14 | 2.72E-14 |

