**Electronic Supporting Information (ESI)**

**for**

# Life Cycle Assessment (LCA) of Urban Water Infrastructure: Emerging Approaches to Balance Objectives and Inform Comprehensive Decision-Making

Diana M. Byrne[a], Hannah A.C. Lohman[a], Sherri M. Cook[b],
Gregory M. Peters[c,d], Jeremy S. Guest[a,*]

[a] Department of Civil & Environmental Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, USA
[b] Department of Civil, Environmental, and Architectural Engineering, University of Colorado Boulder, Boulder, CO, USA
[c] Division of Environmental Systems Analysis, Chalmers University of Technology, Gothenburg, Sweden
[d] School of Civil and Environmental Engineering, University of New South Wales, Sydney, Australia.
[*] To whom correspondence should be addressed (jsguest@illinois.edu)

12 pages, 3 tables

**S1. Urban Water Infrastructure Paper Search Terms**

**Table S1:** Scopus Search Terms and Results

| Type of Water Infrastructure | Scopus Search Terms | Number of Papers Resulted from Scopus | Number of Papers Selected for Review |
|---|---|---|---|
| Wastewater | life cycle assessment, LCA, life-cycle assessment, life cycle analysis, life-cycle analysis, wastewater, waste water, sewage | 1,581 | 173 |
| Drinking Water | life cycle assessment, LCA, life-cycle assessment, life cycle analysis, life-cycle analysis, drinking water, potable water | 258 | 44 |
| Stormwater | life cycle assessment, LCA, life-cycle assessment, life cycle analysis, life-cycle analysis, stormwater, storm water, drainage | 259 | 17 |
| Integrated Urban Water | no separate terms because it was assumed above search terms would include these water systems | - | 22 |

**S2. List of Papers Meeting Review Criteria**

**Wastewater**


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## S3. LCA Decisions and Assumptions Search Terms

**Table S3:** Search Terms for LCA Decisions and Assumptions

| LCA Decisions and Assumptions | Search Terms Used with *Find* Function |
|---|---|
| Construction | construct, materials, construction |
| Operation | operation, maintenance |
| End of life | end of life, demolition, destruction |
| Biodiversity | biodiversity |
| Eutrophication | eutrophication |
| Water quantity | quantity, water quantity, water footprint |
| Weighting | weight, weighting |
| Sensitivity analysis | sensitiv, sensitivity |
| Risk assessment/health | health, human, risk, risk assessment |
| Social impacts | social |
| Economic impacts | cost, life cycle cost, economic, econom |

**S4 Additional Literature Review Results**

**Table S4:** Comprehensive literature review results

| | Total | | Wastewater | | Drinking Water | | Stormwater | | Integrated Urban Water | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Quantity | % of Total | Quantity | % of WW | Quantity | % of DW | Quantity | % of SW | Quantity | % of IUW |
| **Goal and Scope/Inventory** | | | | | | | | | | |
| *Functional Unit* | | | | | | | | | | |
| Volume | 149 | 58.2 | 106 | 61.3 | 21 | 47.7 | 7 | 41.2 | 15 | 68.2 |
| Volume with Standard | 51 | 19.9 | 26 | 15.0 | 21 | 47.7 | 1 | 5.9 | 3 | 13.6 |
| Area | 9 | 3.5 | 0 | 0.0 | 0 | 0.0 | 9 | 52.9 | 0 | 0.0 |
| Person Equivalent | 22 | 8.6 | 22 | 12.7 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Other | 15 | 5.9 | 13 | 7.5 | 1 | 2.3 | 0 | 0.0 | 1 | 4.5 |
| Not Specified | 10 | 3.9 | 6 | 3.5 | 1 | 2.3 | 0 | 0.0 | 3 | 13.6 |
| *Life Cycle Phases* | | | | | | | | | | |
| Construction | 142 | 55.5 | 86 | 49.7 | 26 | 59.1 | 16 | 94.1 | 14 | 63.6 |
| Operation | 252 | 98.4 | 171 | 98.8 | 42 | 95.5 | 17 | 100.0 | 22 | 100.0 |
| End of Life | 65 | 25.4 | 38 | 22.0 | 14 | 31.8 | 9 | 52.9 | 4 | 18.2 |
| **Impact Assessment** | | | | | | | | | | |
| *Methodology* | | | | | | | | | | |
| CML | 75 | 23.8 | 61 | 27.5 | 7 | 10.8 | 1 | 5.3 | 6 | 19.4 |
| TRACI | 23 | 7.3 | 13 | 5.9 | 5 | 7.7 | 3 | 15.8 | 2 | 6.5 |
| Eco-Indicator | 32 | 10.2 | 17 | 7.7 | 12 | 18.5 | 1 | 5.3 | 2 | 6.5 |
| Eco-points | 6 | 1.9 | 3 | 1.4 | 3 | 4.6 | 0 | 0.0 | 0 | 0.0 |
| EDIP | 14 | 4.4 | 11 | 5.0 | 2 | 3.1 | 0 | 0.0 | 1 | 3.2 |
| Impact 2002+ | 21 | 6.7 | 14 | 6.3 | 4 | 6.2 | 2 | 10.5 | 1 | 3.2 |
| ReCiPe-Midpoint | 33 | 10.5 | 25 | 11.3 | 8 | 12.3 | 6 | 31.6 | 5 | 16.1 |
| ReCiPe-Endpoint | 11 | 3.5 | 14 | 6.3 | 5 | 7.7 | 1 | 5.3 | 2 | 6.5 |
| Other | 24 | 7.6 | 10 | 4.5 | 7 | 10.8 | 3 | 15.8 | 4 | 12.9 |
| Not Specified | 41 | 13.0 | 33 | 14.9 | 3 | 4.6 | 1 | 5.3 | 4 | 12.9 |
| *Eutrophication* | 191 | 76.4 | 130 | 77.4 | 33 | 75.0 | 13 | 76.5 | 16 | 72.7 |
| *Biodiversity* | 4 | 100.0 | 2 | 1.2 | 2 | 4.5 | 0 | 0.0 | 0 | 0.0 |
| *Water Quantity* | 9 | 100.0 | 2 | 1.2 | 0 | 0.0 | 3 | 17.6 | 4 | 18.2 |
| **Interpretation** | | | | | | | | | | |
| *Sensitivity* | 102 | 39.8 | 67 | 38.7 | 19 | 43.2 | 7 | 41.2 | 9 | 40.9 |
| *Weighting – All Methods* | 48 | 18.8 | 24 | 13.9 | 17 | 38.6 | 3 | 17.6 | 4 | 18.2 |
| *Weighting – Midpoint Methods* | 26 | 16.8 | 16 | 14.8 | 8 | 34.8 | 0 | 0.0 | 2 | 14.3 |
| *Health Risk Assessment* | 11 | 4.3 | 5 | 2.9 | 4 | 9.1 | 0 | 0.0 | 2 | 9.1 |
| *Social* | 5 | 2.0 | 1 | 0.6 | 2 | 4.5 | 0 | 0.0 | 2 | 9.1 |
| *Economic* | 62 | 24.2 | 42 | 24.3 | 10 | 22.7 | 7 | 41.2 | 3 | 13.6 |