

**Projects Supported by the Water Research Foundation During 2019
Relevant to the Metropolitan Water Reclamation District of Greater Chicago**

1. Project 4551, Terminology for Improved Communication Regarding CECs, Budget - \$99,926
2. Project 4587, Extension and Advancement of Development of Design Equation for Large Diameter Steel Pressure Pipe, Budget - \$212,000
3. Project 4663, Building Workforce Skills for Intelligent Water Operations, Budget - \$90,000
4. Project 4666, Case Study Compilation on Applying Risk Management Principles and Innovative Technologies to Effectively Manage Deteriorating Infrastructure, Budget - \$250,000
5. Project 4668, Managing Water and Wastewater Utility Data to Reduce Energy Consumption and Cost, Budget - \$260,000
6. Project 4670, Considerations for Security and Communications for Intelligent Water Systems, Budget - \$141,291
7. Project 4678, Forging Powerful and Sustainable Relationships Between Clean Water Agencies and the Community, Budget - \$167,625
8. Project 4684, Incentives for Green Infrastructure Implementation on Private Property: Lessons Learned, Budget - \$147,732
9. Project 4694, Development of an Ergonomic Guide through the Use of Participatory Ergonomics Team Approach at Water and Wastewater Utilities, Budget - \$200,000
10. Project 4699, Kinetics Modeling and Experimental Investigation of Chloramine Photolysis in Ultraviolet-driven Advanced Water Treatment, Budget - \$50,000
11. Project 4707, Resilient Water Infrastructure: Improving Understanding and Assessing Needs, Budget - \$75,000
12. Project 4712, Workshop - Advancing Anaerobic Digestion of Wastewater Solids and Food Waste for Energy and Resource Recovery: Science and Solutions, Budget - \$49,942
13. Project 4714, Intelligent Water Networks Summit, Budget - \$159,943
14. Project 4717, Innovative Technologies to Effectively Manage Deteriorating Infrastructure, Budget - \$150,000
15. Project 4718, Battery Storage System Guidance for Water and Wastewater Utilities, Budget - \$110,000
16. Project 4720, Developing Business Cases for Food Waste Co-Digestion, Budget - \$0
17. Project 4729, Mapping Climate Exposure and Climate Information Needs to Utility Business Functions, Budget - \$110,000
18. Project 4734, Real-life Enterprise Resilience, Budget - \$160,000
19. Project 4742, Probability Management for Water Finance and Resource Managers, Budget - \$220,000
20. Project 4743, Optimizing Filter Backwashing Practices to Reduce Selection for Opportunistic Pathogens in Drinking Water, Budget - \$200,000
21. Project 4745, Implementing Ecosystem Service and Natural and Social Capital Accounting Approaches, Budget - \$0
22. Project 4753, Development of Innovative Project Delivery Strategies, Budget - \$78,143
23. Project 4760, 14-02 Establishing Additional Log Reduction Credits for WWTPs, Budget - \$400,000
24. Project 4768, 14-17 White Paper on the Application of Molecular Methods, Budget - \$50,000
25. Project 4770, 15-03 Scorecard for Evaluating Opportunities in Industrial Reuse, Budget - \$200,000
26. Project 4771, 15-04 Characterization and Treatability of TOC from DPR Processes Compared to SurFocus Areaae Water Supplies, Budget - \$400,000
27. Project 4774, 15-07 Molecular Methods for Measuring Pathogen Viability/Infectivity, Budget - \$349,794
28. Project 4786, CEC-17-09 Expert Workshop on Compounds of Emerging Concern Research Needs. Where Do We Go from Here?, Budget - \$35,000
29. Project 4787, CEC5R08d Support of the TOrC Relational Database Associate with WERF Project Diagnostic Tools to Evaluate Trace Organic Compounds, Budget - \$35,000

30. Project 4788, ENER10C13 State of the Science and Issues Related to Heat Recovery from Wastewater, Budget - \$74,082
31. Project 4791, ENER16C15 Design and Validation Protocol for UV Disinfection Systems Used in Municipal Wastewater Treatment and Reuse Application, Budget - \$310,000
32. Project 4792, ENER19C17 Developing Business Cases for Food Waste Co-Digestion at Water Resources Recovery Focus Areas, Budget - \$132,400
33. Project 4793, ENER20W17 Advancing Anaerobic Digestion of Wastewater Solids and Food Waste for Energy and Resource Recovery: A Framework for Science and Solutions, Budget - \$59,942
34. Project 4795, ENER5R12 More Juice from Wastewater and Solids Treatment, Budget - \$219,818
35. Project 4797, IWS-17-07 Designing Sensor Networks and Locations on an Urban Sewershed Scale with Big Data Management and Analytics, Budget - \$200,000
36. Project 4798, LCASW1SG16 Community-Enabled Lifecycle Analysis of Storm Water Infrastructure Costs, Budget - \$454,643
37. Project 4799, LCASW2SG16 Community-Enabled Lifecycle Analysis of Storm Water Infrastructure Costs, Budget - \$500,498
38. Project 4800, LCASW3SG16 Community-Enabled Lifecycle Analysis of Storm Water Infrastructure Costs, Budget - \$294,968
39. Project 4801, LCASW4SG16 Community-Enabled Lifecycle Analysis of Storm Water Infrastructure Costs, Budget - \$225,000
40. Project 4802, LCASW5SG16 Community-Enabled Lifecycle Analysis of Storm Water Infrastructure Costs, Budget - \$150,000
41. Project 4803, LCASW6SG16 Community-Enabled Lifecycle Analysis of Storm Water Infrastructure Costs, Budget - \$9,501
42. Project 4813, LINK-17-10 A Critical Review and Evaluation of Antibiotic Resistance in the Wastewater Environment - A Risk Assessment, Budget - \$140,000
43. Project 4814, LINK3R16 Evaluation of Data Needs for Nutrient Target-Setting Using the Nutrient Modeling Toolbox, Budget - \$249,232
44. Project 4815, LINK4T17 Modeling Guidance for Developing Site Specific Nutrient Goals - Demonstration, Screening-Level Application, Budget - \$150,000
45. Project 4816, NTRY10T15 Nutrient Recovery Through Urine Separation, Budget - \$44,989
46. Project 4818, NTRY12R16 Testing a Biofloc Model to Understand Dewatering and Solve Dewaterability Issues Related to Resource Recovery, Budget - \$205,000
47. Project 4819, NTRY13R16 Understanding the Impacts of Low-Energy and Low-Carbon Nitrogen Removal Technologies on Bio-P and Nutrient Recovery Processes, Budget - \$215,000
48. Project 4821, NTRY4R14 A Multi-Platform Approach to Recovering High Value Carbon Products from Wastestreams, Budget - \$218,999
49. Project 4823, NTRY7R15 High Quality Biosolids from Wastewater, Budget - \$286,984
50. Project 4824, NTRY8R15 Plasmids and Rare Earth Elements from Wastewater, Budget - \$56,307
51. Project 4826, NUTR-17-06 Towards Innovation-Stimulating Regulations-Nutrient Regulations: a Global Perspective with Implications for the United States, Budget - \$125,000
52. Project 4827, NUTR5R14 Efficient, Cost-Effective Nutrient Removal from Wastewater - TO 6, Budget - \$524,000
53. Project 4833, 17-05 Impact of Wastewater Treatment Performance on Advanced Water Treatment Processes and Finished Water Quality, Budget - \$300,000
54. Project 4835, SENG6R16 Designing Sensor Networks and Locations on an Urban Sewershed Scale (Phase I), Budget - \$60,000
55. Project 4836, SENG7R16 Leveraging Other Industries - Big Data Management (Phase I), Budget - \$75,000
56. Project 4837, SIWM12C15 Incorporating Forestry into Stormwater Management Programs: State of the Science and Business Model Evaluation for Nutrient Reduction and Volume Control, Budget - \$99,984
57. Project 4838, SIWM16R16 Follow-Up Effort on Stream Restoration Crediting Guidance, Budget - \$25,000

58. Project 4839, SIWM-17-12 Annual Update of International Stormwater BMP Database (Urban Component), Budget - \$89,984
59. Project 4840, SIWM-17-13 The Future of Stormwater BMP Database: Strategic Evaluation and Path Forward, Budget - \$10,000
60. Project 4841, SIWM-17-14 Exploratory Effort of Pathways for StormWater Harvesting, Budget - \$20,000
61. Project 4842, SIWM-17-15 Enhancement of Resilience to Extreme Weather and Climate Events, Budget - \$50,000
62. Project 4844, SIWM-17-17 Case Study for Crediting Water Quality Benefits from Stream Restoration, Budget - \$25,000
63. Project 4847, SIWM18R16 Follow-Up Effort on AgBMP Database, Budget - \$40,000
64. Project 4849, SIWM20R16 Exploring Designated Uses to Support Water Quality Compliance, Budget - \$50,000
65. Project 4851, SIWM22T17 Support of Data Analysis and Standardization Task for the CLASIC Project, Through the "International Stormwater BMP Database", Budget - \$20,000
66. Project 4852, SIWM4T17 Framework and Tools for Quantifying Green Infrastructure Co-Benefits and Linking with Triple Bottom Line Analysis, Budget - \$149,785
67. Project 4853, SIWM5R13 Joining-Up Urban Water Management with Urban Planning and Design, Budget - \$100,000
68. Project 4854, SIWM9R14 Toolbox for Completing an Alternatives Analysis as Part of an Integrated Planning Approach to Water Quality Compliance, Budget - \$100,000
69. Project 4855, STAR_N2R14 Development and Implementation of a Process Technology Toolbox for Sustainable Biological Nitrogen Removal Using Mainstream Deammonification, Budget - \$575,720
70. Project 4857, STAR_N6R14 Finding and Adding Agricultural BMP Performance Studies to the Agricultural BMP Database, Budget - \$24,999
71. Project 4863, TIRR2R15 Hybrid Anaerobic Primary and Secondary Treatment with Energy Recovery, Budget - \$101,593
72. Project 4864, TIRR3C15 Bioaugmentation of Activated Sludge with High Activity Nitrifying Granules/Flocs: Population Selection, Survival, Biokinetics, Budget - \$130,000
73. Project 4865, TIRR4C15 Advancing the Oxygenic Photogranule Process for Energy Positive Wastewater Treatment, Budget - \$15,000
74. Project 4866, TIRR5C15 Biofilm-Enhanced Anaerobic Membrane Bioreactor for Low Temperature Domestic Wastewater Treatment, Budget - \$15,000
75. Project 4867, TOB12R15 Developing Exposure and Toxicity Data for Priority Trace Organics in Biosolids, Budget - \$250,000
76. Project 4868, TOB13R17 Knowledge Gap Analysis for Plant Uptake Models, Budget - \$34,000
77. Project 4869, U1R13 Investigate the Mechanism for Optimization and Design of Side-Stream EBPR Process as a Sustainable Approach for Achieving Stable and Efficient Phosphorus Removal, Budget - \$139,820
78. Project 4870, U1R14 Balancing Flocs and Granules for Activated Sludge Process Intensification in Plug Flow Configurations, Budget - \$118,926
79. Project 4871, U1R15 Nationwide Meta-Omics Survey of Anaerobic Digestion and Fermentation Processes for Resource Recovery from Biosolids and Other Organics, Budget - \$151,576
80. Project 4876, U2R15 Next Generation Anaerobic Membrane Bioreactor for Low Temperature Domestic Wastewater Treatment: Pilot, Budget - \$163,294
81. Project 4879, U3R14 Carbon Capture and Management Strategies for Energy Harvest from Wastewater, Budget - \$106,471
82. Project 4882, U4R14 Phase-3 Development of Wastewater Pipeline Deterioration Model, Budget - \$142,500
83. Project 4883, U4R15 Intensified Hydrolysis for High Solids Destruction: Testing the Limits of Advanced Digestion, Budget - \$147,495
84. Project 4884, U4R16 Estimating the Comammox Contribution to Ammonia Oxidation in Nitrogen Removal Systems, Budget - \$122,764

85. Project 4892, ENER1721 Characterizing the Quality of Biogas Derived from Wastewater Solids Codigested Organic Wastes and Other Digestion Enhancements, Budget - \$100,000
86. Project 4898, STARN5R14 Tool for Evaluating Resource Recovery Terry Nutrient Recovery from Agriculture, Budget - \$61,826
87. Project 4899, STARN7R14 Comparative Life Cycle Assessment Of Urine Derived Fertilizer, Budget - \$50,000
88. Project 4900, WRF-17-22 Unlocking the Potential of Mixed-Microbial Fermentation for Enhancing Carbonaceous Resource Recovery from organic "Wastes", Budget - \$138,447
89. Project 4901, WRF1723 Combining Nitrite Stunt Anammox Process with the Sidestream Enhanced Biological Phosphorous Removal EBPR Process for Simultaneous and Sustainable Nitrogen and Phosphorous Removal, Budget - \$136,099
90. Project 4902, WRF1724 Leveraging Big-Data and Deep Learning for Economical Condition Assessment of Wastewater Pipelines, Budget - \$150,000
91. Project 4904, WRF1726 Full Scale Validation of Cryptosporidium and Giardia Log Reduction in Secondary Biological Treatment, Budget - \$49,810
92. Project 4907, WRF1729 Leading Water Utility Innovation, Budget - \$450,850
93. Project 4915, Characterization and Contamination Testing of Source Separated Organic Feedstocks and Slurries for Co-Digestion at Resource Recovery Focus Areailities, Budget - \$390,000
94. Project 4920, Decision Support Framework for Drinking Water Treatment Plants Experiencing Lake Recovery, Budget - \$215,000
95. Project 4935, STAR_N9R18 WE&RF'S National Research Center for Resource Recovery and Nutrient Management - Seminar, Budget - \$50,000
96. Project 4936, WRF-18-02 Determining the Fate and Major Removal Mechanisms of Microplastics in Water and Resource Recovery Focus Areailities (Compounds of Emerging Concern/Trace Organics), Budget - \$25,000
97. Project 4940, WERF4PR16 Peer Review on Metagenomics for MWRDGC, Budget - \$50,000
98. Project 4941, Multi-Objective Evolutionary Algorithm Application Guidance for Utility Planning, Budget - \$180,000
99. Project 4947, NTRY11T15 High-Tech Analysis of Low-Tech Methods for Sustainable Class A Biosolids Production, Budget - \$87,906
100. Project 4951, Quantitative Microbial Risk Assessment Implementation, Budget - \$200,000
101. Project 4952, Pathogen Research, Budget - \$618,600
102. Project 4961, The Use of Next Generation Sequencing (NGS) and Metagenomics Approaches to Evaluate Anti-Microbial Resistance, Plant Challenge, Biological Removal Processes, Budget - \$300,000
103. Project 4965, Development of a Community-Based Lead Risk and Mitigation Model, Budget - \$2,042,031
104. Project 4968, Annual Update of International Stormwater BMP Database and Expanding Communication on the Database, Budget - \$85,000
105. Project 4969, One Water Cities: One Water Cities: Development of Guidance Documents and Assessment Metrics, Budget - \$90,000
106. Project 4971, Leveraging the Role of Pretreatment Programs in One Water Initiatives: Synthesis of Best Practices and Path Forward, Budget - \$100,000
107. Project 4972, Expanding the Use of Wastewater Epidemiology Tools to Identify Population within Service Area under Stress and Explore Potential to Affect Change, Budget - \$200,000
108. Project 4973, Guidelines for Optimizing Nutrient Removal Plant Performance, Budget - \$130,000
109. Project 4974, New Regulatory Approaches for Improved Nutrient Removal, Budget - \$150,000
110. Project 4975, Practices to Enhance Internal Fermentation, Budget - \$125,000
111. Project 4976, New Approaches for Reduced Aeration Energy Plus Nutrient Removal, Budget - \$30,000
112. Project 4977, Further Understanding of Co-Digestion Workshop: Parameters to Calibrate Anaerobic Models for Co-Digestion and High Strength Waste Digestion, Budget - \$0
113. Project 4978, Application of Big Data for Energy Management at Water Utilities, Budget - \$50,000

114. Project 4980, Toolkit to Communicate Technical Findings to a Non-Expert Audience, Budget - \$80,000
115. Project 4982, Strategic Workforce Plan and Employee Value Proposition, Budget - \$41,271
116. Project 4984, Impact of Intermittent Operation on Biofilter Performance, Budget - \$196,980
117. Project 4988, Pathogen Prescreening Method Optimization Study, Budget - \$24,500
118. Project 4989, Measure Pathogens in Wastewater, Budget - \$174,900
119. Project 4992, Low Molecular Weight Unknown Compounds, Budget - \$32,000
120. Project 4994, Follow-Up Efforts on Urban Planning and Water Management, Budget - \$3,000
121. Project 4996, Co-Digestion of Organic Waste-Addressing Operational Side-effects, Budget - \$253,022
122. Project 4998, Risk Benefit Assessment of Chlorite as a Co-Disinfectant for Nitrification Control in Chlorinated Drinking Water Systems, Budget - \$150,000
123. Project 5004, Demonstrating the CalPrex System, Budget - \$75,000
124. Project 5011, ESTCP PFASs Groundwater, Budget - \$990,451
125. Project 5012, Enhancing the International Stormwater BMP Database to Serve as a Highway Specific BMP Database, Budget - \$80,000