Chapter 2: Technology/Indicator Analysis

2.1 Introduction

To begin the production theory analysis, specific water quality indicators and technologies that address the indicators were determined. The technologies were ranked and organized to identify those that warranted further analysis. The technology/indicator analysis included the following steps:

1) Develop list of water quality indicators
2) Create technology list
3) Classification of technologies and develop indicator/technology combinations
4) Organize and rank indicator/technology combinations
    a. Develop indicator/technology combinations
    b. Develop ranking matrix for technology screening
    c. Assign primary indicator and combine similar technologies
5) Organize the technologies into six categories:
    a. Technologies to be Analyzed Using the Production Theory
    b. Sewer Separation Technologies
    c. Technologies that Milwaukee Metropolitan Sewerage District (MMSD) is Evaluating in Active Projects
    d. Beneficial Technologies not Analyzed
    e. Technologies that are Existing Policies or Programs
    f. Technologies Eliminated in Screening Process

These steps, and the corresponding work effort, are explained in the following sections of this chapter.

2.2 Development of Indicators

Surface water quality can be assessed by measuring various physical, chemical, and biological indicators. In order to focus the water quality analysis for the Water Quality Initiative (WQI), a joint planning effort for the Regional Water Quality Management Plan Update (RWQMPU) and 2020 Facilities Plan (2020 FP), a discrete set of water quality indicators was needed. The Wisconsin Department of Natural Resources (WDNR), Southeastern Wisconsin Regional Planning Commission (SEWRPC), MMSD, and the 2020 technical team (the team of consultants providing technical analysis to both the RWQMPU and the 2020 FP) held discussions in 2003 and agreed to analyze the following surface water quality indicators:(1)

- Volume and number of combined sewer overflows (CSO)
- Volume and number of sanitary sewer overflows (SSO)
- Fecal coliform and E. coli bacteria
- Phosphorus
- Nitrogen
- Copper
- Zinc
- Mercury
- Temperature
- Dissolved Oxygen (DO)
- Total Suspended Solids (TSS)
- Chlorophyll-a
- Biochemical Oxygen Demand (BOD)

These indicators were chosen based on several factors including:

- Availability of existing data within the GMW
- MMSD Wisconsin Pollution Discharge Elimination System (WPDES) permit requirements
- Significance of indicator to surface water quality
- Adherence to traditional water quality indicators used in historical water quality studies in the Milwaukee area (industry standards)
- Perceived importance to the public
- The ability of the modeling tools to represent each indicator either implicitly or explicitly.

Although not identified on the original list of indicators, debris and chloride were also considered in the WQI because they are important water quality indicators. However, these indicators were not modeled in the same way as the other indicators. The water quality models used for the WQI effort relied on land use and precipitation data to generate loads to the receiving waters. Chloride and debris loads are not generated in this manner; therefore, it was not appropriate to model them using the same water quality models. However, technologies to address these indicators were analyzed in Chapter 4, *Nonpoint Source Technology Analysis,* of this report. These indicators are also discussed in Chapter X of SEWRPC Planning Report No. 50, *Recommended Water Quality Management Plan.*.

Focusing in on these indicators allowed the 2020 technical team to identify water quality issues that needed to be addressed to meet regulatory requirements as well as satisfy the public goals and objectives.

In some cases, polychlorinated biphenyls/polycyclic aromatic hydrocarbons (PCB/PAH), which are toxic and hazardous substances, were identified as an indicator for a technology. The toxic and hazardous substances indicator was not used in the water quality analysis but was documented and included in the indicator/technology combinations evaluation.

2.3 Technology List Development

As with the list of indicators, the technology list was developed early in the planning process. The goal of this step was to develop a comprehensive list of technologies that addressed both point source and nonpoint source pollution to improve water quality. This list was assembled based on experience and research from a variety of sources including the following:

- SEWRPC Staff and Reports
- MMSD Staff and Reports
- 2020 Technical Team
- U.S. Geological Survey Staff and Reports
- U.S. Environmental Protection Agency (USEPA) Reports
- WDNR Staff and Reports
- International Stormwater Best Management Practices Database (3)
- Center for Watershed Protection
- Technical Advisory Team (TAT) – The TAT is comprised primarily of public works directors, city engineers, or other representatives from the communities in the MMSD service area.
- Citizens Advisory Council (CAC) – The CAC consisted of private citizens, businesses, special interest groups and industry representatives who also established goals and objectives (known as publicly-inspired goals and objectives) and provided input during the development of the planning studies.

This initial list consisted of 169 technologies shown in Table 2A-1 of Appendix 2A. The technology list was revised as appropriate during the planning process based on MMSD, SEWRPC and WDNR input; input received at various stakeholder meetings; and the discovery of new technologies or new information regarding the performance and cost of technologies.

2.4 Technologies Classified as Facilities, Programs, Operational Improvements and Policies

Once the initial list of technologies was formed, the technologies were classified as one of the following types: facilities, programs, operational improvements or policies (FPOPs). These categories are described below.

- **Facilities** are the structural assets that are part of the conveyance, treatment, and storage systems used to manage water resources. Some examples include treatment plants, sewers, and detention basins. An example of a recommended action related to facilities is improvements to infrastructure such as additional treatment plant capacity or storage tunnel volume.
- **Programs** are systems of services, opportunities, and projects or actions taken to implement a policy. Programs are implemented to achieve the overarching mission of communities or agencies such as MMSD. An example of a recommended action related to programs is the development of a public involvement and education program. Additional examples include MMSD's Household Hazardous Waste Collection Program, which is used to implement the MMSD hazardous waste policy, and the Capacity, Management, Operation, and Maintenance Program, which is a national effort that uses science-based techniques and assessments to provide better management of assets and improve financial management for sewer infrastructure. Programs may also serve as regulatory tools, such as Runoff Management (Wis. Admin. Code NR 151) or the Storm Water Discharge Permit program (Wis. Admin. Code NR 216), that are employed to achieve a policy or legislative act.
- **Operational Improvements** are methods or manners to improve the efficiency or effectiveness of procedures or system functions.
- **Policies** are courses of action established through legislation, ordinances, and other regulatory actions. An example is MMSD's policy to minimize the flow of stormwater to separated sewers. This policy seeks to prevent stormwater from taking up much needed capacity in the conveyance system. Policies can become legislation, like the Clean Water Act.

2.5 Organizing and Ranking of Indicator/Technology Combinations

After the technologies were classified as a facility, policy, operational improvement or program, they were further organized and ranked as described below.

2.5.1 Development of Indicator/Technology Combinations

Each technology was assessed for its potential to improve surface water quality in terms of a water quality indicator or indicators discussed in Section 2.2, *Development of Indicators*. Indicators were assigned to each technology as appropriate. The 2020 technical team considered each technology to determine the water quality indicator that could best evaluate benefits. This was called the primary indicator. Many of the technologies could be used to improve water quality for more than one indicator. For example, installing a wet detention basin (a facility)

would not only help reduce the amount of total suspended solids, but also reduce other pollution such as metals, debris, phosphorus, and nitrogen. The additional indicators were called secondary indicators. The process of assigning indicators to the technologies created over 300 indicator/technology combinations, as shown in the last column of Table 2A-2 of Appendix 2A.

2.5.2 Development of Ranking Matrix for Technology Screening

Once the indicator/technology combinations were created, they were scored to determine the best technologies to evaluate using the production theory analysis. Ten factors were considered in the ranking matrix. These factors were developed through collaboration with MMSD, SEWRPC, the 2020 technical team, and stakeholder committees, and are typical factors used in system planning. The factors were then weighted based on input from stakeholder committees and MMSD staff committees. The stakeholder committees consisted of the following:

- Technical Advisory Team (TAT)
- Citizens Advisory Council (CAC)
- MMSD Virtual Team (staff committee representing all MMSD departments)
- MMSD Steering Committee (committee of MMSD executive staff)
- 2020 Technical Team

A detailed description of these committees is provided in Chapter 7, *Goals and Objectives* of the *Facilities Plan Report*.

To determine which factors were the most important to the stakeholders, the stakeholder committees were asked to assign a numerical weight (1-10) to each factor. These responses were then used to determine an average weight for each factor. As shown in Table 2-1, the stakeholder committees weighted the financial impact as most important. Technical feasibility and the overall environmental benefits were weighted the next highest. The ability to implement and the miscellaneous category, which included public perception, institutional acceptability, and safety/risk management, were ranked lowest. The average weights were doubled for use in the final scoring system in order to amplify the differences in the weights.

TABLE 2-1
RESULTS OF STAKEHOLDER COMMITTEE WEIGHTING EXERCISE

	Average Weightings					
Factor	**CAC**	**TAT**	**Virtual**	**Steering**	**Tech**	**Overall**
Technical	4.6	4.5	4.0	4.0	8.0	**5.0**
Implementable	4.5	4.5	4.0	2.0	4.0	**4.0**
Environmental	5.7	5.0	6.0	6.0	4.0	**5.0**
Financial	5.2	6.5	7.0	7.0	4.0	**6.0**
Miscellaneous	3.9	3.5	3.0	5.0	4.0	**4.0**
TOTAL	**24.0**	**24.0**	**24.0**	**24.0**	**24.0**	**24.0**

To conduct the technology ranking and prioritization, the 2020 technical team formulated assessment questions or statements for each factor. Points were assigned to each indicator/technology combination following the standardized scoring methodology. In this exercise, the 2020 technical team assigned a score of 10, 5, or 0 to the factors. The factors and their associated scores are listed below.

1) *Technical Feasibility/Proven* – Is this technology established and used in multiple full-scale installations? If yes: 10 points. Is this technology being developed, with only pilot-scale and limited full-scale applications? If yes: 5 points. Is this technology emerging with only pilot-test results or just a concept that shows promise for the future? If yes: 0 points. If not technically feasible: 0 points.
2) *Implementability/System Feasibility* - Is this technology compatible with existing conveyance and treatment systems? If compatible: 10 points; if somewhat compatible: 5 points; and if not compatible: 0 points.
3) *Implementability/Construction Impacts* - Is this technology easily constructed? This technology does not require unique, difficult, or lengthy construction. If easily constructed: 10 points; if somewhat difficult to construct: 5 points; and if not easily constructed: 0 points.
4) *Scale/Land Requirements* – Does this technology not require extensive land acquisition and negotiations? If extensive land acquisition and negotiations are not required: 10 points; if some land acquisition and negotiations are required: 5 points; if extensive land acquisition and negotiations are required: 0 points.
5) *Operation and Maintenance (O&M) Feasibility/Complexity* – Does this technology not require complex operational systems and extensive maintenance? If no complex operation or maintenance is required: 10 points; if somewhat complex operation or maintenance is required: 5 points; if complex operation or maintenance is required: 0 points.
6) *Financial Impact*
    - *Capital* - This technology has potentially low (10 points), medium (5 points), or high (0 points) capital cost relative to other technologies.
    - *O&M* - This technology has potentially low (10 points), medium (5 points), or high (0 points) O&M cost relative to other technologies.
    - *Sector Impact* - This technology does not result in inequitable cost distribution impacts among stakeholder groups (municipalities, homeowners, industries). If equitable cost distribution relative to other technologies: 10 points; if somewhat equitable cost distribution: 5 points; if not equitable cost distribution: 0 points.
7) *Environmental Benefit*
    - *Positive Impacts* - Does this technology create significant environmental, water quality, or watercourse aesthetic improvements? If significant: 10 points; if moderate 5 points; if none: 0 points.

- *Negative Impacts* - Does this technology create significant negative environmental, water quality, or watercourse aesthetic impacts? If no significant negative impacts: 10 points; if some significant negative impacts: 5 points; if significant negative impacts are created: 0 points.

8) *Public Perception* - Is this type of technology generally accepted by the public and will it improve the public perception of the management agencies? If yes: 10 points; if maybe: 5 points; if no: 0 points.

9) *Institutional Acceptability*

- *Regulatory* - This technology does not require significant regulatory changes to implement. If no significant regulatory changes required: 10 points; if some changes required: 5 points; if significant changes required: 0 points.
- *Intergovernmental* - This technology does not require significant intergovernmental agreements to implement. If no significant agreements required: 10 points; if some agreement is required: 5 points; if significant agreements required: 0 points.

10) *Risk Management/Safety* - This technology is not dangerous to the public, does not create new potential dangers, and does not carry large risks to maintain. If not dangerous or doesn't create new risks: 10 points; if somewhat dangerous or creates some new risk: 5 points; if dangerous and creates new risk: 0 points.

After the rating scores were assigned, the total rating point value for each technology was calculated by multiplying the score for each category times the weight for that category. The points for all ten considerations were then totaled for each technology. The rating totals were used to develop overall rankings of the indicator/technology combinations. The maximum number of points a technology could receive was 480.

To achieve a more manageable, yet appropriate number of technologies to evaluate, only technologies that received at least 240 points (50% of the maximum points) were included in the next step of the analysis. Using this criterion, effort was not committed to technologies that were unlikely to be considered for final recommendation. Of all technologies, 123 combinations were included for further consideration while 177 scored too low to be considered in the next step of the evaluation. The scoring system is shown in Table 2-2.

Consideration	Wt	Score If			Possible[1]		
		Yes/ True	Maybe	No/ False	High	Med	Low
1. Technical Feasibility					*Weight of category:*		*100*
Proven	10	10	5	0	100	50	0
2. Implementability					*Weight of category:*		*80*
Compatible w/ existing systems	3	10	5	0	30	15	0
Construction Impacts	2	10	5	0	20	10	0
Land requirements	1	10	5	0	10	5	0
Complexity	2	10	5	0	20	10	0
3. Environmental					*Weight of category:*		*100*
Positive impacts	6	10	5	0	60	30	0
Negative impacts	4	10	5	0	40	20	0
4. Financial					*Weight of category:*		*120*
Capital Cost	4.5	10	5	0	45	22.5	0
O&M Cost	4.5	10	5	0	45	22.5	0
Sector impact	3	10	5	0	30	15	0
5. Miscellaneous					*Weight of category:*		*80*
Public perception	2	10	5	0	20	10	0
Regulatory	2	10	5	0	20	10	0
Intergovernmental	2	10	5	0	20	10	0
Safety/ risk management	2	10	5	0	20	10	0
Total Weight	**48**			**Totals**	**480**	**240**	**0**

[1]The "weight" of the consideration is multiplied by the "score."
The columns on the far right indicate a range of possible high, medium, and low results.
Total score possible = 480

Preserving The Environment • Improving Water Quality

TABLE 2-2
INDICATOR/TECHNOLOGY SCORING SYSTEM
2020 STATE OF THE ART REPORT
04/25/07 SOAR_2.T002.07.04.25.cdr

2.5.3 Assign Primary Indicator and Combine Similar Technologies

After the indicator/technology combinations were ranked, the primary indicator was selected for each technology. When appropriate, similar technologies were combined into one technology to eliminate the potential for duplicated effort. This process reduced the total number of technologies on the comprehensive list (discussed in Section 2.3, *Technology List Development*) from 169 to 142. The impacts to secondary indicators were considered in the screening alternative and preliminary alternative analyses when sets of technologies were combined.

2.6 Organize the Technologies into Categories

The 2020 technical team divided the 142 technologies into the six categories listed below. Only the technologies that passed the screening phase, described above, were considered for category one. (Note: Technology characterization is also discussed in Appendix 10A, *CSO Long-Term Control Plan* of the *Facilities Plan Report*.)

1) *Technologies to be Analyzed Using the Production Theory* - Technologies that passed the screening phase and had sufficient data to use for the production theory analysis were included in this category. Ultimately, 53 technologies were identified for analysis, as presented in Table 2-3. A more detailed explanation of how the production theory was used is provided in Appendix 1A, *Production Theory* of this report. The technologies identified for analysis using production theory were separated into point and nonpoint source technologies for further discussion in this report. Point source technologies are analyzed in Chapter 3, *Point Source Technologies* and nonpoint source technologies are analyzed in Chapter 4, *Nonpoint Source Technologies*.

2) *Sewer Separation Technologies* – Eight sewer separation technologies were identified based upon the work done by MMSD in the 1980s as a part of the Water Pollution Abatement Program. These complex technologies were evaluated separately with assistance from stakeholders including the city of Milwaukee, village of Shorewood, and the Wisconsin Underground Contractors' Association and are shown in Table 2-4. Sewer separation technologies are discussed in Chapter 3, *Point Source Technologies*.

3) *Technologies MMSD is Evaluating in Active Projects* – At the time this report was written, MMSD was evaluating 15 technologies in active projects, as identified in Table 2-5. Available data were obtained by MMSD for most of these projects to evaluate these technologies in Chapter 3, *Point Source Technologies* and Chapter 4, *Nonpoint Source Technologies* as applicable. The only technology not discussed in this report is the biological sewage filtration system (zebra mussels).

4) *Beneficial Technologies not Analyzed* – Thirty-seven technologies were identified as providing water quality benefits; however, these technologies were not analyzed because the available data were not sufficient to evaluate using the production theory, or the effectiveness was too variable to be analyzed for this project. These technologies were considered in the Alternatives and Recommended Plan, and are shown in Table 2-6. Beneficial technologies not analyzed are discussed in more detail in Chapter 5, *Beneficial Technologies Not Analyzed*.

5) *Existing Policies or Programs* – Many policies and programs are already in place or are required by existing permits. For the purposes of this report, it was assumed that these policies and programs will continue and, therefore, they are not analyzed separately in the SOAR. Twenty-six existing policies and programs were identified as shown in Table 2-7. Existing policies and programs are discussed in more detail in Chapter 6, *Existing Policies and Programs*.

6) *Technologies Eliminated in Screening Process* – Ten technologies were eliminated from further consideration. These technologies were determined to be infeasible for technical, physical, or political reasons, and are shown in Table 2-8. Technologies that were eliminated in the screening process are discussed in more detail in Chapter 7, *Eliminated Technologies*.

As the review of the technologies identified in the screening process continued, the organization and analysis of some of the technologies were modified based on additional information. Modifications included the following:

- Identification of technologies that were initially included in the production function analysis category for which production functions could not be developed
- Combination of a number of technologies into one production function analysis for more meaningful review
- Slight variations of specific technologies identified to better utilize existing data
- Elimination of technologies from the review that had originally been identified for analysis in multiple categories

Modifications to technologies or organization are noted where appropriate in the chapters identified above.

No.	TYPE	PI	TECHNOLOGY
1	PS	VOL	Additional deep tunnel pumping
2	NP	TSS	Agricultural practices — bench terraces
3	NP	TSS	Agricultural practices — buffer strips
4	PS	VOL	Blending of primary effluent at wastewater treatment plant with disinfection
5	NP	TSS	Catch basin cleaning
6	NP	TSS	Catch basin filter
7	PS	VOL	Cavern storage for CSO/ SSO
8	NP	TSS	Conservation crop rotation
9	PS	VOL	Conveyance enhancements — local and MIS sewers for SSO
10	PS	VOL	Covered near surface CSO/ SSO storage
11	NP	DO	Dam removal
12	NP	DEB	Debris/ trash management (litter control)
13	PS	VOL	Deep tunnel pumping modes and methods
14	PS	VOL	Deep tunnel storage
15	NP	DEB	End of pipe CSO nets
16	PS	COLI	End of pipe disinfection (SW/ SSO/ CSO)
17	NP	DEB	End of pipe outfall booms
18	NP	DEB	End of pipe outfall manual screens
19	PS	VOL	End of pipe physical chemical innovative treatment with disinfection for CSO/ SSO
20	NP	TSS	End of pipe stormwater high-rate filtration
21	NP	TSS	End of pipe stormwater microstrainer
22	NP	DEB	End of pipe vortex separators
23	NP	TSS	Fine screens (SW/ SSO/ CSO) — at local outfalls
24	NP	DO	Flushing tunnel management
25	NP	TSS	Infiltration basin

No.	TYPE	PI	TECHNOLOGY
26	NP	TSS	Infiltration swales
27	PS	VOL	Inlet restrictors and street storage in CSO areas
28	PS	VOL	Manhole rehab MIS or local sewers for SSO reduction
29	PS	VOL	MIS in-system storage using inflatable dams for SSO
30	PS	VOL	Private property — lateral repair or replace
31	PS	VOL	Private property — foundation drain disconnect (SSO)
32	PS	VOL	Public ROW lateral repair or replace (main to property line)
33	NP	CL	Road salt management
34	PS	VOL	Rooftop storage (CSO)
35	NP	VOL	Sewer rehabilitation — local and MIS sewers for SSO
36	NP	DEB	Skimmer boat operation
37	NP	VOL	Stormwater trees
38	NP	TSS	Street sweeping
39	PS	P	Wastewater treatment plant — biological phosphorous removal
40	PS	P,N	Wastewater treatment plant — BNR treatment
41	PS	VOL	Wastewater treatment plant — chemical enhanced primary
42	PS	P	Wastewater treatment plant — chemical phosphorous removal
43	PS	N	Wastewater treatment plant — denitrification
44	PS	TSS	Wastewater treatment plant — final effluent filtration
45	PS	VOL	Wastewater treatment plant — full secondary treatment with disinfection
46	PS	N	Wastewater treatment plant — nitrification
47	PS	COLI	Wastewater treatment plant — UV disinfection
48	PS	COLI	Wastewater treatment plant — membrane effluent filtration as disinfection
49	NP	DO	Watercourse aeration — in-stream
50	NP	DO	Watercourse aeration — side stream
51	NP	DO	Watercourse channel rehabilitation (concrete removal)

No.	TYPE	PI	TECHNOLOGY
52	NP	COLI	Waterfowl control measures
53	NP	TSS	Wet detention basin

PS = point source technology

DO = dissolved oxygen

NP = nonpoint source technology

N = nitrogen

PI = primary indicator

P = phosphorus

CL = chloride

TSS = total suspended solids

COLI = coliforms

VOL = volume

DEB = debris

No.	TYPE	PI	TECHNOLOGY
1	PS	VOL	New pressure sewer — small diameter sanitary — including private property
2	PS	VOL	New pressure sewer — small diameter sanitary — no private property
3	PS	VOL	New sanitary and storm — including private property
4	PS	VOL	New sanitary and storm — no private property
5	PS	VOL	New sanitary sewers — including private property
6	PS	VOL	New sanitary sewers — no private property
7	PS	VOL	New storm sewers — including private property
8	PS	VOL	New storm sewers — no private property

PS = point source technology

PI = primary indicator

VOL = volume

No.	TYPE	PI	TECHNOLOGY
1	PS	COLI	Biological sewage filtration system (Zebra Mussels)
2	NP	VOL	Cistern — residential (CSO)
3	NP	VOL	Cistern with rain garden
4	NP	VOL	Downspout disconnection (CSO)
5	NP	VOL	Green roof (CSO)
6	NP	TSS	Local bioretention/ constructed wetland (SW)
7	PS	VOL	Opportunistic separation — new sanitary sewer
8	PS	VOL	Opportunistic separation — new storm sewer
9	NP	VOL	Parking lot stormwater storage and treatment (green parking lots) (CSO)
10	NP	VOL	Pervious parking lots (CSO)
11	NP	VOL	Porous pavement (CSO)
12	NP	VOL	Rain barrels (CSO)
13	NP	VOL	Rain garden (CSO)
14	NP	VOL	Stormwater park (CSO)
15	PS	VOL	Wastewater treatment plant — physical-chemical treatment with disinfection

Note: As of January 2006, the MMSD had completed pilot projects that incorporated green roofs, rain gardens, porous pavement, grassed swales, underground cisterns, wetland systems, stormwater park (design), rain barrels, cistern/ bioretention cell system and pervious parking lot (paver blocks).

PS = point source technology

CL = chloride

NP = nonpoint source technology

TSS = total suspended solids

PI = primary indicator

VOL = volume

No.	TYPE	PI	TECHNOLOGY
1	NP	TSS	Agricultural practices — base slope storage
2	NP	TSS	Channel stabilization
3	NP	TSS	Compost amendments for erosion control
4	NP	TSS	Conservation cover
5	NP	TSS	Contour farming
6	PS	VOL	Contract terms — MMSD contract with United Water Services
7	NP	TSS	Drop structure removal
8	NP	TSS	Farm manure and farm waste management programs
9	NP	TSS	Filter fabric, straw, sedimentation trap — construction erosion controls
10	NP	TSS	Filter strip
11	NP	TSS	French drains/ dry wells
12	NP	P	Golf course fertilizer management
13	NP	TSS	Grade stabilization structure
14	NP	TSS	Grassed swale
15	NP	TSS	Grassed waterway
16	NP	TSS	Infiltration sumps
17	NP	TSS	Lawn management
18	NP	TSS	Mulching
19	NP	P	Nutrient management
20	PS	VOL	Operational objective changes
21	NP	T&H	Pesticide/ herbicide management
22	NP	TSS	Pocket wetlands
23	NP	N	Prescribed burning
24	NP	TSS	Prescribed grazing
25	NP	all	Public education programs
26	NP	TSS	Residue management
27	NP	TSS	Revegetation measures — new development
28	PS	VOL	RTC for storage/ treatment
29	NP	TSS	Runoff diversion to reduce nonpoint pollution
30	NP	TSS	Stream bank and shoreline restoration
31	NP	DO	Stream day-lighting
32	NP	TSS	Strip cropping
33	NP	TSS	Waste storage facilities
34	NP	CL	Water softener salt alternative

No.	TYPE	PI	TECHNOLOGY
35	NP	TSS	Wetland storage and treatment
36	NP	TSS	Windbreak establishment
37	PS	DO	WWTP outfall diffuser

PS = point source technology

CL = chloride

NP = nonpoint source technology

TSS = total suspended solids

PI = primary indicator

VOL = volume

No.	TYPE	PI	TECHNOLOGY
1	NP	TSS	Agriculture practices — crop management — EPA/ DNR
2	NP	TSS	Agriculture practices — feed lots — EPA/ DNR
3	NP	TSS	Agriculture practices — irrigation — EPA/ DNR
4	NP	TSS	Construction erosion controls
5	NP	TSS	Critical areas protection
6	NP	TSS	Development rights for watershed protection
7	NP	P	Fertilizer management
8	PS	T&H	Household hazardous waste
9	NP	TSS	Illicit discharge control
10	NP	T&H	Industrial and commercial chemical management controls and materials storage and containment
11	NP	TSS	Industrial stormwater management
12	NP	TSS	Infiltration basin
13	NP	TSS	Infiltration swales
14	NP	TSS	Leaf disposal program
15	PS	T&H	MMSD pretreatment program
16	NP	COLI	Pet litter control
17	NP	COLI	Residential and other on-site sewage systems management
18	PS	VOL	Residential sump pump disconnect
19	NP	TSS	Spill prevention plans
20	NP	TSS	Stormwater rules and redevelopment
21	NP	TSS	Surface drainage management
22	NP	COLI	Use controls (beach closings)
23	PS	VOL	Wastewater treatment plant discharge permits
24	NP	T&H	Watercourse dredging to address contamination
25	PS	TEMP	WPDES cooling water permits
26	NP	TSS	Zoning or land use restrictions

PS = point source technology
P = phosphorus
NP = nonpoint source technology
TEMP = temperature
PI = primary indicator
TSS = total suspended solids
COLI = coliforms
VOL = volume
T&H = toxic and hazardous substances
EPA = Environmental Protection Agency
DNR = Department of Natural Resources
WPDES = Wastewater Wisconsin pollutant discharge elimination system
RTC = Real-time control
WWTP = Wastewater treatment plan

No.	TYPE	PI	TECHNOLOGY
1	NP	TSS	Satellite treatment of agricultural runoff
2	NP	TSS	Alum treatment
3	PS	VOL	Equalization basin at WWTP
4	PS	VOL	In-line storage in CSSA
5	PS	VOL	MBR at WWTP
6	NP	VOL	Storage by block (home removal)
7	NP	TSS	Stormwater sedimentation tanks
8	NP	TSS	Vortex separators — with chemical addition
9	PS	CL	Water softener prevention program
10	PS	VOL	Wet weather open storage — satellite

PS = point source technology

CL = chloride

NP = nonpoint source technology

TSS = total suspended solids

PI = primary indicator

VOL = volume

References

(1) Mary Recktenwalt and Jeremy Nitka (Triad Engineering), and Tom Sear and Laura Gerold (Tetra Tech MPS), *Point Source Loadings for Purposes of Watercourse Modeling; MMSD Planning Area*, (Draft Memo: December 13, 2004), pp.2-3

(2) California Regional Water Quality Control Board Los Angeles Region, *Trash Total Maximum Daily Loads for the Los Angeles River Watershed*, July 7, 2006, available from http://www.waterboards.ca.gov/losangeles/html/bpaRes/bpa_td/50_New/Staff%20Report_Los%20Angeles%20River%20Trash%20TMDL.pdf

(3) International Stormwater Best Management Practices Database [Internet], (no date), available at http://www.bmpdatabase.org/cgi-bin/DataEntry.asp

Appendix 2A:
Technology List and Technology/Indicator Combinations

Appendix 2A: Technology List and Technology/Indicator Combinations

2A.1 Introduction

The initial technology list was developed early in the planning process. As discussed in Section 2.3, *Technology List Development*, the goal of this step was to develop a comprehensive list of technologies that addressed both point source and nonpoint source pollution to improve water quality. The list of 169 technologies, shown in Table 2A-1, was assembled based on experience and research from a variety of sources.

Each of the 169 technologies was assessed for its potential to improve surface water quality in terms of a water quality indicator or indicators discussed in Section 2.2, *Development of Indicators*. Table 2A-2 shows the primary and secondary indicators assigned to each technology. The process of assigning indicators to the technologies created over 300 indicator/technology combinations.

TECHNOLOGY	
No.	**Conveyance**
1	Flow slippage (inlet restrictors, street storage)
2	Interceptor relief sewers
3	Community relief sewers
4	Sewer separation — open cut
5	Opportunistic separation
6	Partial separation
7	Sewer separation by land category, first flush
8	Community system pipe rehab — control I/I
9	Private lateral rehab — control I/I (public main to property line)
10	Foundation drain disconnect — control I/I (private property)
11	Community system manhole rehab — control I/I
12	Downspout disconnection — control I/I
13	Sump pump disconnect — control I/I
14	Interceptor relief pump stations
15	Community relief pump stations
16	Interceptor pipe rehab
17	Interceptor manhole rehab
18	Interceptor real-time control enhancements
19	Storage system real-time control enhancements
No.	**Treatment**
20	Conventional full secondary treatment w/disinfection at WWTP
21	Physical/ chemical treatment at WWTP
22	New Technology high rate treatment and disinfection at WWTP
23	MBR at WWTP
24	Satellite treatment (CSOs) — physical/chemical/disinfection
25	Satellite treatment (CSOs) — high rate/disinfection
26	Satellite treatment (SSOs) — physical/chemical/disinfection
27	Satellite treatment (SSOs) — high rate/disinfection
28	Satellite treatment (CSOs) — disinfection
29	Satellite treatment (SSOs) — disinfection
30	Fine screens (SW/SSO/CSO — in basin)
31	Final effluent filtration at WWTP
32	Membrane effluent filtration

TECHNOLOGY	
33	Chemical phosphorus removal
34	Biological phosphorus removal
35	Equalization basin (POTW)
36	Ultraviolet disinfection (POTW)
37	Chlorine disinfection/dechlorination
38	Nitrification facilities (POTW)
39	Denitrification facilities (POTW)
40	BNR facilities (POTW)
41	Wet-weather op. strategies — blending at WWTP
42	Real-time control for storage/ treatment
No.	**Storage**
43	Deep tunnel storage
44	Near surface storage (covered near surface CSO/ SSO storage)
45	In-line sewer storage (MIS in-system storage (SSO))
46	Wet-weather basin storage
47	EQ basin (large remote storage — regional)
48	Operational objective changes
49	Contract terms (United Water)
50	In-line storage in CSSA
No.	**Technologies for Stormwater**
51	Buffer strips (ag land)
52	Satellite treatment (ag land)
53	Satellite treatment (greenways, swales)
54	Satellite treatment (wet detention basin)
55	Stormwater basin
56	Rain barrels
57	Rain garden
58	Stormwater park
59	Green roof
60	Bioretention facilities
61	Storage by block (home removal)
62	Roof storage
63	Storm-trap (covered concrete basin)
64	Street storage

TECHNOLOGY	
65	Farm manure and waste management programs
66	Debris/ trash management
67	Lawn management
68	Leaf disposal program
69	Pet litter control
70	Waterfowl control (geese, sea gulls)
71	Water softener salt alternative (salt-free water softeners and/ or low-salt consumption water softeners)
72	Water softener salt-management program
73	Channel stabilization
74	Conservation cover
75	Conservation crop rotation
76	Contour buffer strips
77	Contour farming
78	Diversion
79	Filter strip
80	Grade stabilization structure
81	Grassed waterway
82	Mulching
83	Nutrient management
84	Pesticide/ herbicide management
85	Prescribed burning
86	Prescribed grazing
87	Residue management
88	Sediment basin (construction erosion controls)
89	Stream bank and shoreline protection
90	Strip cropping
91	Surface drainage management
92	Waste storage facilities
93	Water and sediment control basin
94	Wetland storage and treatment (constructed wetland)
95	Windbreak establishment
No.	**Conservation Practices - Other**
96	Fertilizer management
97	Road salt management

	TECHNOLOGY
98	Grassed swales
99	Stormwater infiltration
100	Stormwater storage
101	Stormwater treatment
102	Infiltration sumps
103	Infiltration basin
104	Infiltration swales
105	Pocket wetlands
106	Stormwater rules and redevelopment policies
107	Critical areas protection
108	Ag practices — feed lots — EPA/ DNR
109	Ag practices — crop management — EPA/ DNR
110	Ag practices — irrigation — EPA/ DNR
111	Ag practices — base of slope storage
112	Ag practices — bench terraces
113	Compost amendments
114	Golf course management
115	Cisterns — home stormwater storage
116	Erosion/ sediment control — EPA/sDNR
117	Revegetation measures — new development
118	Filter fabric, straw, sediment trap, etc.
119	Channel restoration/ rehabilitation (concrete removal)
120	Green parking lots
121	Parking lot stormwater storage and treatment
122	Porous pavement
123	Street sweeping
124	Catch basin cleaning
125	Stormwater trees
126	Onsite filtering practices
127	French drains and dry wells
128	Public education programs
No.	**Miscellaneous**
129	Industrial stormwater management
130	Illicit discharge — disconnects

TECHNOLOGY	
131	Chemical management controls
132	Spill prevention plans
133	Materials storage and runoff control facilities
134	Hazardous waste collection program (household hazardous waste)
135	WWTP outfall diffuser
136	Stormwater vortex separators
137	Stormwater fine screens
138	Stormwater sedimentation tanks
139	Stormwater microstrainer
140	Stormwater high-rate filtration
141	Stormwater disinfection
142	CSO nets
143	Alum treatment
144	Flushing tunnel management
145	On-site systems management programs
146	Sanitary sewer connection programs
147	Use controls (beach closings)
148	Stream aeration (side stream)
149	Dredging
150	Development rights (purchase/ transfer)
151	Overlay districts
152	Catch basin filter
153	Outfall booms
154	Outfall manual screens
155	Skimmer boat operation
156	WPDES cooling water permits
157	MMSD pretreatment program
No.	**Additional Technologies**
158	Stormwater vortex separators — with chemical addition
159	Dam removal
160	Aeration — in stream
161	Cavern storage
162	Public lateral rehab/ replace (main to property line)
163	High rate treatment — ballasted flocculation

	TECHNOLOGY
164	Additional deep tunnel pump capacity
165	Pervious parking lots
166	Drop structure removal
167	Sediment clean-up/ removal
168	Stream day-lighting
169	Storm sewer lining

MMSD = Milwaukee Metropolitan Sewerage District

WPDES = Wisconsin Pollutant Discharge Elimination System

MBR = membrane bio-reactor

CSOs = combined sewer overflows

SSOs = sanitary sewer overflows

SW = stormwater

BNR = biological nutrient reduction

WWTP = Wastewater Treatment Plant

EQ = equalization

CSSA = Combined Sewer Service Area

Ag = agriculture

EPA = Environmental Protection Agency

DNR = Department of Natural Resources

		Type			Location			Indicator to be Analyzed - Primary Indicator in BOLD												TOTAL COMBINATIONS
	Technology	Fac	Pol/Prog	Oper	Rural	Urban	Constr.	Vol.	TSS	Debris	E. Coli	P	N	Cu	Zn	Me	Chlor	Temp	PCB/PAH	DO	
								V	T	D	E	P	N	U	Z	M	C	T	H	O	
#	**Conveyance**																				
1	Flow slippage (inlet restrictors, street storage)	X				X		**X**	X												2
2	Interceptor relief sewers	X				X		**X**	X												2
3	Community relief sewers	X				X		**X**	X												2
4	Sewer separation - open cut	X				X		**X**	X		X										3
5	Opportunistic separation	X				X		**X**	X		X										3
6	Partial separation	X				X		**X**	X		X										3
7	Sewer separation by land category, first flush	X				X		**X**	X		X										3
8	Community system pipe rehab - control I/I	X				X		**X**	X												2
9	Private lateral rehab - control I/I (public main to property line)	X				X		**X**	X												2
10	Foundation drain disconnect - control I/I (private property)	X				X		**X**	X												2
11	Community system manhole rehab - control I/I	X				X		**X**	X												2
12	Downspout disconnection - control I/I	X				X		**X**	X												2
13	Sump pump disconnection - control I/I	X				X		**X**	X												2
14	Interceptor relief pump stations	X				X		**X**	X												2
15	Community relief pump stations	X				X		**X**	X												2
16	Interceptor pipe rehab	X				X		**X**	X												2
17	Interceptor manhole rehab	X				X		**X**	X												2
18	Interceptor real-time control enhancements			X		X		**X**	X												2
19	Storage system real-time control enhancements			X		X		**X**	X												2
#	**Treatment**																				
20	Conventional full secondary treatment w/ disinfection at WWTP	X				X		**X**	X		X										3
21	Physical/ chemical treatment (chemical enhanced primary) at WWTP	X				X		**X**	X		X										3
22	New technology high rate treatment and disinfection at WWTP	X				X		**X**	X		X										3
23	MBR at WWTP	X				X		**X**													1
24	Satellite treatment (CSOs) - physical/ chemical/ disinfection	X				X		**X**	X		X										3
25	Satellite treatment (CSOs) - high rate/ disinfection	X				X		**X**	X		X										3
26	Satellite treatment (SSOs) - physical/ chemical/ disinfection	X				X		**X**	X		X										3
27	Satellite treatment (SSOs) - high rate/ disinfection	X				X		**X**	X		X										3
28	Satellite treatment (CSOs) - disinfection	X				X					**X**										1
29	Satellite treatment (SSOs) - disinfection	X				X					**X**										1
30	Fine screens (SW/ SSO/ CSO - in basin)	X				X				**X**											1
31	Final effluent filtration at WWTP	X				X			**X**			X	X								3
32	Membrane effluent filtration	X				X			X		**X**										2
33	Chemical phosphorus removal	X				X						**X**									1
34	Biological phosphorus removal	X				X						**X**									1
35	Equalization basin (POTW)	X				X		**X**		X											2
36	Ultraviolet disinfection (POTW)	X				X					**X**										1
37	Chlorine disinfection/ dechlorination	X				X					**X**										1
38	Nitrification facilities (POTW)	X				X							**X**								1
39	Denitrification facilities (POTW)	X				X							**X**								1
40	BNR facilities (POTW)	X				X						**X**	**X**								2
41	Wet-weather operational strategies - blending at WWTP			X		X		**X**	X	X											3
42	Real time control for storage/ treatment			X		X		**X**	X	X											3

Preserving The Environment • Improving Water Quality

TABLE 2A-2 SHEET 1 OF 4

LIST OF TECHNOLOGY/ INDICATOR COMBINATIONS

2020 STATE OF THE ART REPORT

4/26/07 SOAR_2A.T002.07.04.26.cdr

		Type			Location			Indicator to be Analyzed - Primary Indicator in BOLD												TOTAL COMBINATIONS
	Technology	Fac	Pol/Prog	Oper	Rural	Urban	Constr.	Vol.	TSS	Debris	E. Coli	P	N	Cu	Zn	Me	Chlor	Temp	PCB/PAH	DO	
								V	T	D	E	P	N	U	Z	M	C	T	H	O	
#	**Storage**																				
43	Deep tunnel storage	X				X		**X**	X		X										3
44	Near surface storage (covered near surface CSO/SSO storage)	X				X		**X**	X		X										3
45	In-line sewer storage (MIS in-system storage (SSO))	X		X		X		**X**	X		X										3
46	Wet-weather basin storage	X				X		**X**	X		X										3
47	EQ basin (large remote storage - regional)	X				X		**X**	X		X										3
48	Operational objective changes			X		X		**X**	X		X										3
49	Contract terms (United Water)		X			X		**X**	X		X										3
50	In-line storage in CSSA	X		X		X		**X**	X		X										3
#	**Technologies for Stormwater**																				
	Conservation Practices - NRCS																				
51	Buffer strips (Ag land)	X	X		X				**X**												1
52	Satellite treatment (Ag land)	X			X				**X**		X	X	X								4
53	Satellite treatment (greenways, swales)	X			X	X			**X**												1
54	Satellite treatment (wet detention basin)	X			X				**X**												1
55	Stormwater basin	X				X		X	**X**		X										3
56	Rain barrels		X			X		X	**X**		X										3
57	Rain garden	X				X		X	**X**		X										3
58	Stormwater park	X				X		X	**X**		X										3
59	Green roof	X				X		X	**X**		X										3
60	Bioretention facilities	X				X		X	**X**		X										3
61	Storage by block (home removal)	X				X		X	**X**		X										3
62	Roof storage	X				X		X	**X**		X										3
63	Storm-trap (covered concrete basin)	X				X		X	**X**		X										3
64	Street storage	X				X		X	**X**		X										3
65	Farm manure and waste management programs		X		X				X		X	X	**X**								4
66	Debris/ trash management		X			X			**X**	X											2
67	Lawn management		X			X			**X**			X									2
68	Leaf disposal program		X			X			**X**	X											2
69	Pet litter control		X			X			X		**X**										2
70	Waterfowl control (geese, seagulls)		X			X					**X**										1
71	Water softener salt alternative (salt free water softeners and/ or low salt consumption water softeners)	X				X											**X**				1
72	Water softener salt management program		X			X											**X**				1
73	Channel stabilization	X			X	X			**X**												1
74	Conservation cover		X		X				**X**												1
75	Conservation crop rotation		X		X				**X**												1
76	Contour buffer strips		X		X				**X**												1
77	Contour farming		X		X				**X**												1
78	Diversion	X			X				**X**												1
79	Filter strip	X			X	X			**X**												1
80	Grade stabilization structure	X			X				**X**												1
81	Grassed waterway	X			X	X			**X**												1
82	Mulching		X		X	X			**X**												1
83	Nutrient management		X		X	X			X			**X**	X								3
84	Pesticide/herbicide management		X		X	X			X											**X**	2
85	Prescribed burning		X		X				**X**												1
86	Prescribed grazing		X		X				**X**												1
87	Residue management		X		X				**X**												1
88	Sediment basin (construction erosion controls)	X			X	X			**X**												1
89	Stream bank and shoreline protection	X			X	X			**X**												1
90	Strip cropping		X		X				**X**												1
91	Surface drainage management	X	X		X				**X**												1
92	Waste storage facilities	X			X				**X**												1
93	Water and sediment control basin	X			X				**X**	X		X	X	X	X						6
94	Wetland storage and treatment (constructed wetland)	X			X				**X**		X										2
95	Windbreak establishment	X			X				**X**												1

Preserving The Environment • Improving Water Quality

TABLE 2A-2 SHEET 2 OF 4
LIST OF TECHNOLOGY/ INDICATOR COMBINATIONS
2020 STATE OF THE ART REPORT
4/26/07 SOAR_2A.T002.07.04.26.cdr

		Type			Location			Indicator to be Analyzed - Primary Indicator in BOLD												TOTAL COMBINATIONS
	Technology	Fac	Pol/Prog	Oper	Rural	Urban	Constr.	Vol.	TSS	Debris	E. Coli	P	N	Cu	Zn	Me	Chlor	Temp	PCB/PAH	DO	
								V	T	D	E	P	N	U	Z	M	C	T	H	O	
#	Conservation Practices - Other																				
96	Fertilizer management		X		X	X			X		X	**X**	X								4
97	Road salt management		X			X											**X**				1
98	Grassed swales	X				X		X	**X**												2
99	Stormwater infiltration	X				X			**X**												1
100	Stormwater storage	X				X			**X**												1
101	Stormwater treatment	X				X			**X**	X											2
102	Infiltration sumps	X				X		**X**													1
103	Infiltration basin	X				X		**X**	X												2
104	Infiltration swales	X				X		**X**	X												2
105	Pocket wetlands	X				X		X	**X**	X											3
106	Stormwater rules and redevelopment policies		X			X		X	**X**	X											3
107	Critical areas protection		X		X	X			**X**												1
108	Ag practices - feed lots - EPA/DNR		X		X				**X**	X											2
109	Ag practices - crop management - EPA/DNR		X		X				**X**												1
110	Ag practices - irrigation - EPA/DNR		X		X			X	**X**												2
111	Ag practices - base of slope storage	X			X			X	**X**												2
112	Ag practices - bench terraces	X			X				**X**												1
113	Compost amendments		X			X			**X**												1
114	Golf course management		X		X	X			X			**X**									2
115	Cisterns - home stormwater storage	X				X		**X**													1
116	Erosion/ sediment control - EPA/DNR		X				X		**X**	X											2
117	Revegetation measures - new development	X	X				X	X	**X**									X			3
118	Filter fabric, straw, sediment trap, etc.	X	X				X		**X**	X											2
119	Channel restoration/rehabilitation (concrete removal)	X			X	X		X	**X**												2
120	Green parking lots	X				X		X	**X**									X			3
121	Parking lot stormwater storage and treatment	X				X		X	**X**									X			3
122	Porous pavement	X				X		X	**X**			X	X		X						5
123	Street sweeping		X			X			**X**	X		X									3
124	Catch basin cleaning			X		X		X	**X**	X											3
125	Stormwater trees	X				X		**X**													1
126	Onsite filtering practices	X				X		X	**X**												2
127	French drains and dry wells	X				X		**X**													1
128	Public education programs		X		X	X	X	X	**X**	X	X	X	X	X	X	X	X				10

Preserving The Environment • Improving Water Quality

TABLE 2A-2 SHEET 3 OF 4
LIST OF TECHNOLOGY/ INDICATOR COMBINATIONS
2020 STATE OF THE ART REPORT
4/26/07 SOAR_2A.T002.07.04.26.cdr

		Type			Location			Indicator to be Analyzed - Primary Indicator in BOLD													TOTAL COMBINATIONS
	Technology	Fac	Pol/Prog	Oper	Rural	Urban	Constr.	Vol.	TSS	Debris	E. Coli	P	N	Cu	Zn	Me	Chlor	Temp	PCB/PAH	DO	
								V	T	D	E	P	N	U	Z	M	C	T	H	O	
#	**Miscellaneous**																				
129	Industrial stormwater management		X		X	X			**X**												1
130	Illicit discharge - disconnects		X		X	X	X		**X**		X										2
131	Chemical management controls		X		X	X	X					**X**	X	X	X						4
132	Spill prevention plans		X		X	X	X		X			X							**X**		3
133	Materials storage and runoff control facilities	X			X	X	X		**X**												2
134	Hazardous waste collection program (household hazardous waste)		X		X	X								X	X	X	X		X		5
135	WWTP outfall diffuser	X				X					X									X	2
136	Stormwater vortex separators	X				X			**X**	X											2
137	Stormwater fine screens	X				X			**X**	X											2
138	Stormwater sedimentation tanks	X				X			**X**	X											2
139	Stormwater microstrainer	X				X			**X**	X											2
140	Stormwater high-rate filtration	X				X			**X**	X											2
141	Stormwater disinfection	X				X					**X**										1
142	CSO nets	X				X				**X**											1
143	Alum treatment	X			X	X			**X**												1
144	Flushing tunnel management	X	X			X			X	X										**X**	3
145	On-site systems management programs		X		X						**X**										1
146	Sanitary sewer connection programs	X	X			X					**X**										1
147	Use controls (beach closings)		X			X					**X**										1
148	Stream aeration (side stream)	X			X	X														**X**	1
149	Dredging	X			X	X													**X**	X	2
150	Development rights (purchase/ transfer)		X		X	X			**X**												1
151	Overlay districts		X			X			**X**												1
152	Catch basin filter	X				X				**X**											1
153	Outfall booms	X			X	X				**X**											1
154	Outfall manual screens	X			X	X				**X**											1
155	Skimmer boat operation	X				X				**X**											1
156	WPDES cooling water permits		X		X	X												**X**		X	2
157	MMSD pretreatment program		X			X								X	X	**X**					4
	SUM	**108**	**49**	**8**	**52**	**129**	**8**	**67**	**121**	**27**	**47**	**16**	**12**	**5**	**6**	**3**	**5**	**4**	**4**	**5**	**322**
#	**Additional Technologies**																				
158	Stormwater vortex separators - with chemical addition	X				X			**X**	X											2
159	Dam removal	X			X	X														X	1
160	Aeration - in stream	X				X														X	1
161	Cavern storage	X				X		**X**													1
162	Public lateral rehab/replace (main to property line)	X				X		**X**													1
163	High rate treatment - ballasted flocculation	X				X		**X**	X												2
164	Additional deep tunnel pump capacity	X				X		**X**													1
165	Pervious parking lots	X				X		**X**	X			X	X	X	X	X					7
166	Drop structure removal	X			X	X														**X**	1
167	Sediment clean-up/removal			X	X	X													**X**	X	2
168	Stream day-lighting	X			X	X															0
169	Storm sewer lining	X				X		**X**													1
	Revised SUM	**119**	**49**	**9**	**56**	**141**	**8**	**73**	**124**	**28**	**47**	**17**	**13**	**6**	**7**	**4**	**5**	**4**	**5**	**9**	**342**

Preserving The Environment • Improving Water Quality

TABLE 2A-2 SHEET 4 OF 4
LIST OF TECHNOLOGY/ INDICATOR COMBINATIONS
2020 STATE OF THE ART REPORT
4/26/07 SOAR_2A.T002.07.04.26.cdr