

NatureScape/School Board Environmental Partnership

2020-2021 Strategy

Overall Strategy: In the 2020-2021 fiscal year, the Environmental Planning & Community Resilience Division (EPCRD) is committed to bolstering program outcomes with a strong focus on realized district-wide **cost savings**, augmented **staff training**, and enhanced delivery of **STEM-based activities** in the virtual environment. These efforts will be conducted in close coordination with Energy Conservation & Utility Management (EH&S) and Custodial and Grounds Departments (PPO) and sustained technical and field support to identify, document, and implement recommendations that translate potential water savings to real cost reductions. The EPCRD team will take advantage of reduced student presence during the summer and fall months to expand school audits and landscape assessments, and support operational staff in completing improvements while developing a database of broader investment needs for longer-term prioritization and pursuit of grant funds. The EPCRD will continue to expand upon services supporting the Applied Learning Department, especially the development of e-learning modules highlighting applied use of local environmental data and datasets to expanding on and enhancing, e-learning resources and opportunities for teachers and students. These will include but not be limited to

- Sea level rise local impact resources: videos and lessons for all grade levels for teacher professional learning and student project-based learning (PBL);
- Water quality data dashboard analysis with access to, and curriculum driven by, the actual historical and current county water quality data for authentic PBL experiences;
- Coastal transect video-based lessons where students conduct research for PBL around erosion analysis using actual coastal Broward video data;
- Engaging video-based lessons around local/schoolyard habitats to help support PBL during both remote and in person instruction.

District Facilities (short-term)

Over time, the focus of the partnership with EH&S with regards to water savings has shifted from evaluating all District schools to focusing specifically on high water users and providing quick resolution of acute water losses identified through billing. The EPCRD team has aided the District in resolving issues such as leaky/faulty water meters and large breaks in subterranean irrigation lines.

- These and other repairs saved **23 million gallons** and **\$95,759 in FY '19**, and **27 million gallons** and **\$134,000 in FY '20**.

While this approach has been effective, in FY '21 the partnership will tackle more systemic water savings opportunities, focused on installation and function of irrigation rain sensors (resulting in a 10% savings), expanded installation of “smart” irrigation controllers, programmable to activate only in response to appropriate environmental conditions, at priority sites (resulting in a 20-30% savings), and resolution of basic irrigation system repairs in coordination with custodial staff at the time of the site visit (resulting in a 20% savings), with emphasis on trouble shooting chronic losses through regular analysis of water consumption trends, in addition to resolution of acute losses. For example, targeted repair of irrigation system and basic repairs at single site (County Isles Elementary) produced \$1,500 per month/\$18,000

per year in water savings. It is expected that similar investments at as few as 7 sites per year would deliver an **additional \$118,000 in annual program/operational savings**.

Recommendation: Based on program performance to date, a proposed combination of targeted acute and chronic system repairs, as described above and involving ground support of District custodial staff, is anticipated to fully offset the annual cost of the partnership agreement. This offset is in addition to the ROI delivered in the form of donations, sponsorship, and grant awards that fully cover the expenses for the academic environmental recognition and events (e.g., Youth Summit, P3 Eco Challenge).

District Facilities (long-term)

The EPCRD team also recommends a strategy for reducing potable water consumption by shifting demands to surface water sources where feasible. An inventory of proposed sites will be developed. Furthermore, it is important to recognize that the District's water billings include charges for wastewater that may or may not be discharged into the wastewater system. Where the District is being charged for wastewater that is associated with irrigation lines, significant cost savings could be realized by installation of sub-meters on potable irrigation lines. Grant funds may be available to support the acquisition of SMART-submeters that encourage conservation through continuous data management. EPCRD will create an inventory of recommended sites and will evaluate grant opportunities.

Indoor water audits and associated improvements offer another means for sustained cost savings with a single investment. A number of schools have already had water audits completed; however, many repairs/retrofits are pending. Of the 23 schools that have had audits completed, only 8 have been able to make retrofits to date for a realized actual reduction of 9,321,870 gallons of water per year, saving **\$102,662** per year.

For the other identified needed interior retrofits, EPCRD will coordinate with District staff to consider strategies for accelerating these improvements, including possible grant funds with the South Florida Water Management District.

Facilities Training: EPCRD will augment training for District facilities staff through virtual delivery and targeted technical workshops designed to expand staff capacity to undertake improvements and increase familiarity with newer technology. Recently, an e-learning training module developed by EPCRD was provided to EH&S staff, a portion of which will be used in the upcoming virtual Custodial Training Rodeo in June. Additional training modules will focus on the use of flowmeters, measuring distribution uniformity/irrigation efficiency, and proper usage, types of irrigation controllers, and their installation, and smart irrigation meters that can be monitored remotely. These instructional workshops and data from field assessments and smart irrigation meters can also provide the basis for class STEM PBL curriculum.

STEM+CS Environmental Stewardship E-learning

Once it was identified that schools would be operating virtually for the remainder of the school year in March, EPCRD approached STEM+CS staff about preparing virtual lessons and modules to be shared with teachers and students. As listed above, a series of modules has already been delivered on topics of water quality data assessments, environmental assessment of the benthic marine environment, and sea level rise planning and adaptation. Each of these modules provides hands-on instruction in the use of local

environmental data and includes student-based activities and assessments adaptable for multiple grade levels. EPCRD staff is committed to developing and refining these and new modules to support STEM curriculum and instructor training to further E-instruction, including expanded resources related to climate change and sea-level rise, NatureScape trainings that have historically been presented on school campuses, and teacher climate change training, including a Game of Floods module currently under development.

Technical Back-Up

Irrigation Evaluations (Actual Water Savings (AWS)):

Date Range	Gallons per Year (AWS)	Annual Cost Savings
July 2018-June 2019	23,767,491	\$ 95,759
July 2019-Mar 2020	27,648,424	\$111,395
Apr 2020– May 2020	10,980,000	\$71,062 (McFatter repair pending)

Case Studies of Specific Savings included in the summary table above:

School Name	Issue Resolved	Gallons per Year (AWS)	Cost Savings
McFatter	Major leak (pipe break) lasting 4 months @90,000 Gallons per day	10,980,000	\$25,843/4 months
Country Isles Elem	Chronic irrigation breaks		\$1,500/month
Stranahan High	Pool leak	30,000 Gallons per day	\$75,000/year
Westglades Middle	Water meter leak	2,102,400	\$12,338/year

The following irrigation controllers/soil sensors were provided by EPCRD to the schools:

Stranahan High School	ESP-SMTe(controller) \$ 149
Deerfield Beach Elementary School	Rain Bird SMS(soil moisture sensor) \$99
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Plantation High School	Rain Bird SMS(soil moisture sensor) \$99
Oakland Park Elementary School	Rain Bird SMS(soil moisture sensor) \$99

These replacement smart irrigation controllers and soil moisture sensors reduce irrigation water use by conservative estimates of a 20% yearly reduction, per unit over the models that were replaced. Installation of rain sensors only would save at least an additional 247,000 gallons per year at an elementary school, with higher savings for far larger properties, middle and high schools and other larger properties through minor investment and savings, but significant conservation measure for consumptive use permit reporting. Installation of smart controller at a typical elementary school would save an additional 814,847 gallons per year or \$404 per year

standard rate (\$33.67 per month) to \$3,244 per year extreme drought rate (\$270.33 per month). Average water savings realized by the exterior irrigation evaluation program is 33%.

Interior Water Audits

Through interior water audits at 23 schools, 41,128,376 gallons per year (GPY) in potential annual water saving were identified.

Individual Actual Water Savings (AWS) numbers from schools that received indoor retrofits:

School Name	Gallons Annual AWS	Annual Actual Water Savings (estimated)
Northside Elementary	503,517	\$4,718
Sunland Park	47,551	\$1,296
Bayview Elementary	279,313	\$2,617
Stranahan High	2,752,206	\$34,045
Driftwood Middle	1,735,891	\$21,473
Maplewood Elementary	1,199,931	\$14,843
Meadowbrook Elementary	895,950	\$2,935
Olsen Middle	1,907,511	\$20,735
TOTAL retrofit savings	9,321,870	\$102,662

Should sub-meters be pursued to separate use potable water and wastewater for further savings, a 2" water meter costs between \$2,000-\$5,000, depending on which municipality/utility installs the meter.