One Water – An Integrated Approach to Water Management

2023 Nueces Basin Summit

DOUCET

Moderated by:
Nick Dornak,
Water Strategies Lead
ndornak@doucetengineers.com
Doucet and Associates, Inc.

2022 TWDB State Water Plan

Texas population to increase 73% by 2070 from 29.7M to 51.5M

<u>Additional water</u> to meet municipal demands will increase 1,362% from 0.2M AF in 2020 to 3.2M AF in 2070

WHAT IS ONE WATER?

An intentionally INTEGRATED approach to water

One Water promotes the management of **all water** — drinking water, wastewater, stormwater, greywater— as a **single resource**.

Across types of water

Across regions/ watersheds

D&A DOUCET & ASSOCIATES

Scott Moorhead,

Chief Strategy Officer

Texas Water Trade

moorhead@texaswatertrade.org

Troy Dorman,

Water Sustainability Leader

Halff

tDorman@Halff.com

Charriss York,

GIFT Program Director

Texas Community Watershed Partners

charriss.York@ag.tamu.edu

Ashley Bennis,

Senior Resilience Planner

Halff

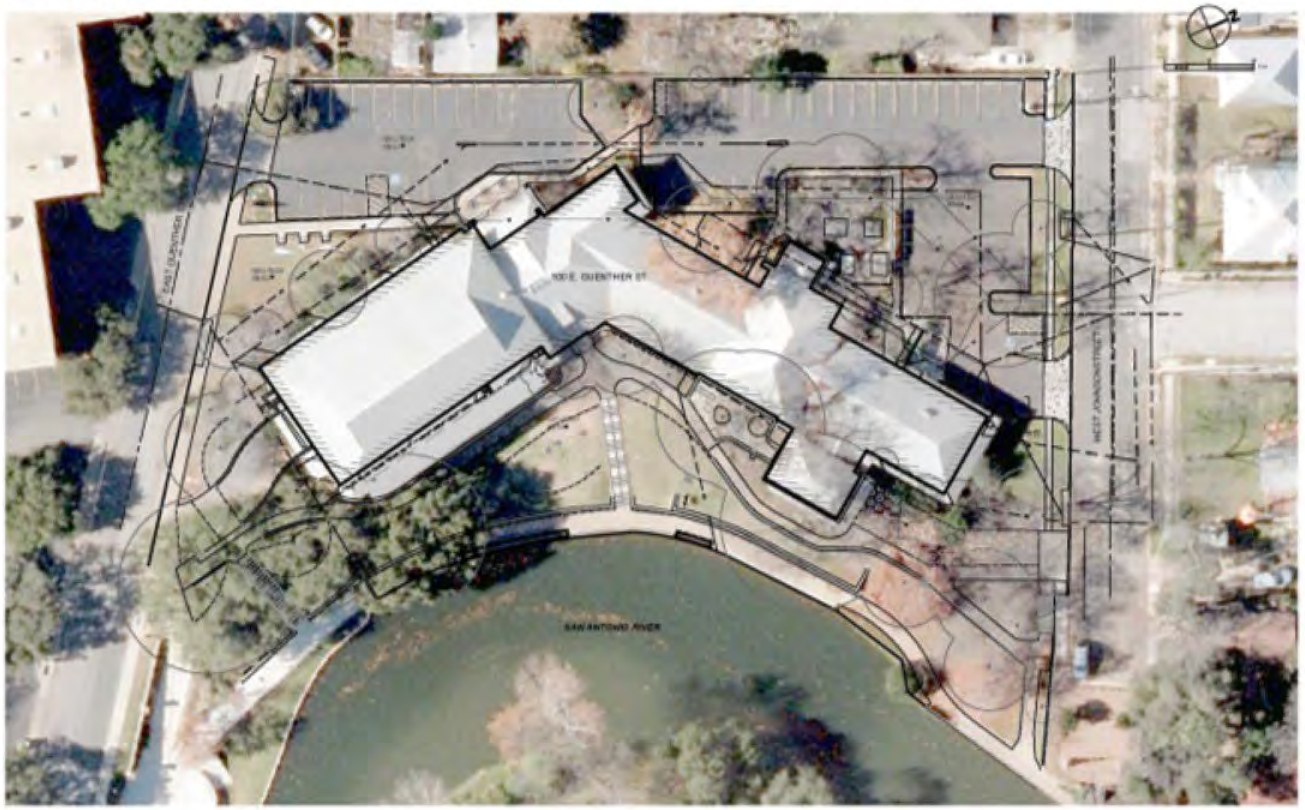
aBennis@halff.com

TROY DORMAN, PH.D, PE, CFM

Modeling, Design, and Construction of a Commercial Low Impact Development Retrofit

SITE LAYOUT

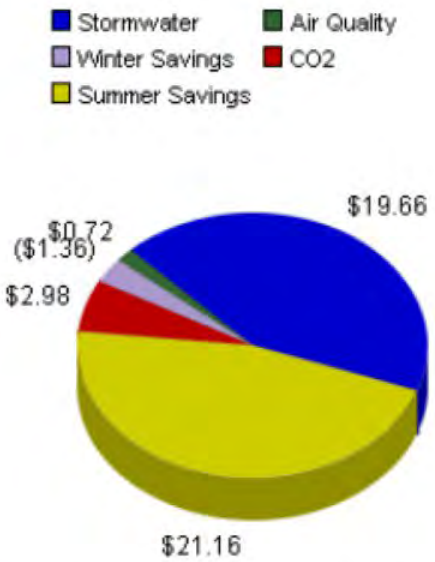
Impervious Area- 55,000 square feet
Flows – 6.5 – 7.5 cfs for 2 – 5 Year storms
Constituents – Bacteria, Sediment, PAHs
Volumes – Annual volume of ~1 Million Gallons



TRIPLE BOTTOM LINE ANALYSIS FACTORS - ECONOMIC

- Pavement Life cycle costs
- Reduced cost of irrigation
- Energy savings
  - Heat Reduction from shading of existing and new trees (large trees preserved
- Improved air quality (amount of pollutant reduced)
- Pounds of sediment and nutrient removed
- Stormwater Infrastructure
  - Average cost ($/cf) of stormwater infrastructure

TRIPLE BOTTOM LINE ANALYSIS – ECONOMIC



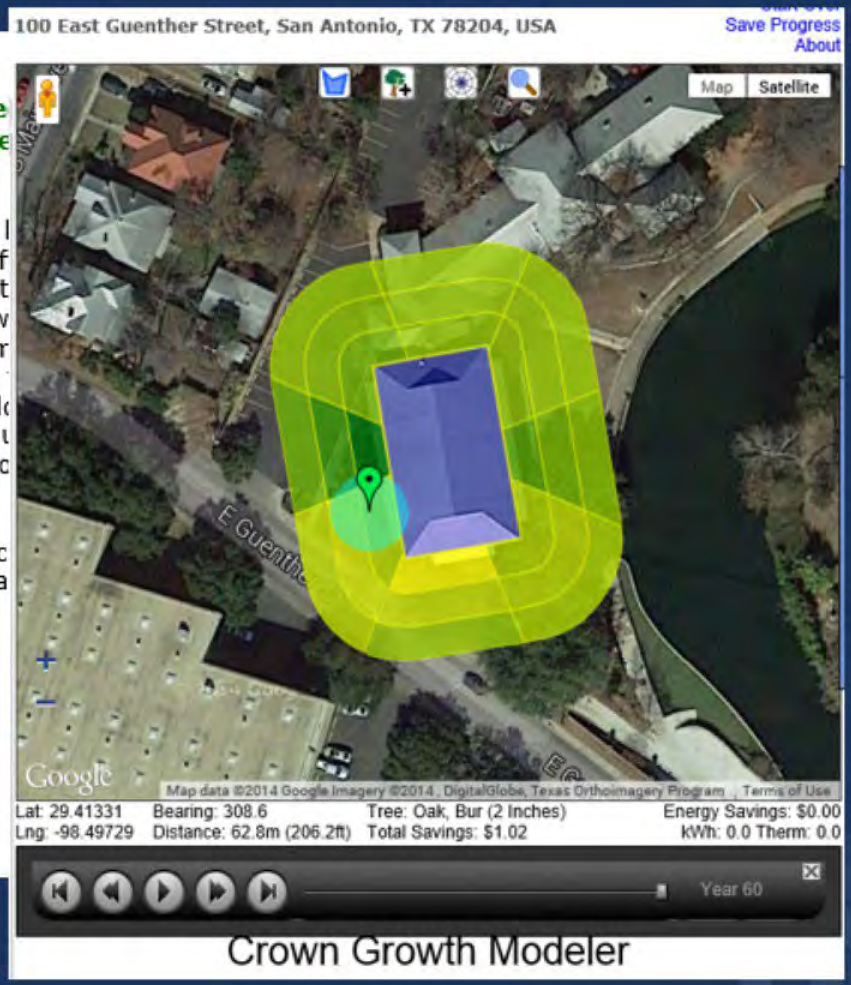
Breakdown of tree benefits

Click on one of the tabs above for more detail

If this bur oak is care
grow to be 12 inche
provide overall annual

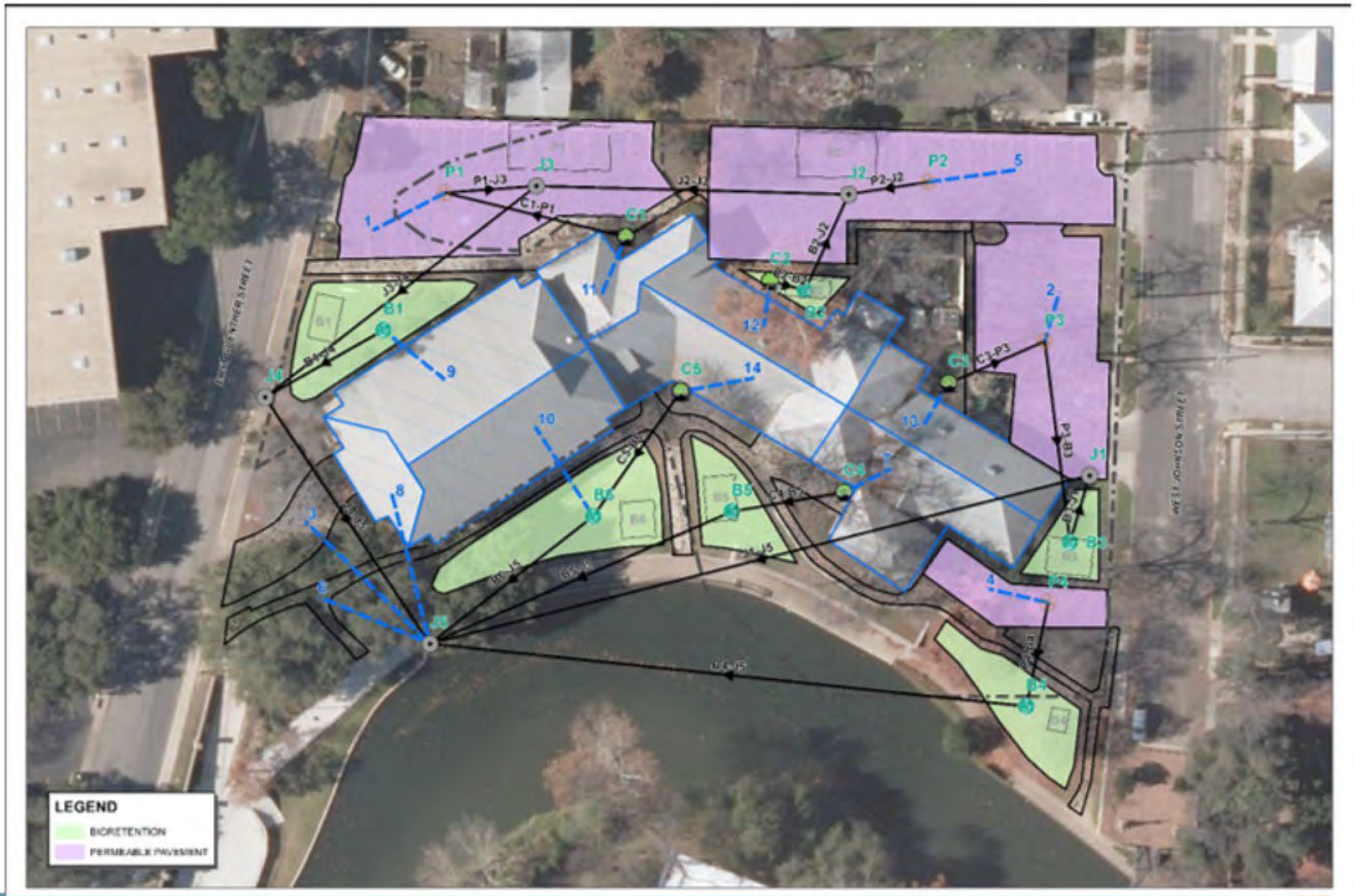
While some functional l
documented, others are dif
social and communal healt
climate, and interactions w
are highly variable and m
much more difficult. Given
presented here shoul
approximations to better u
and economic value assc
placement.

Benefits of trees do not ac
with trees' long-term care a

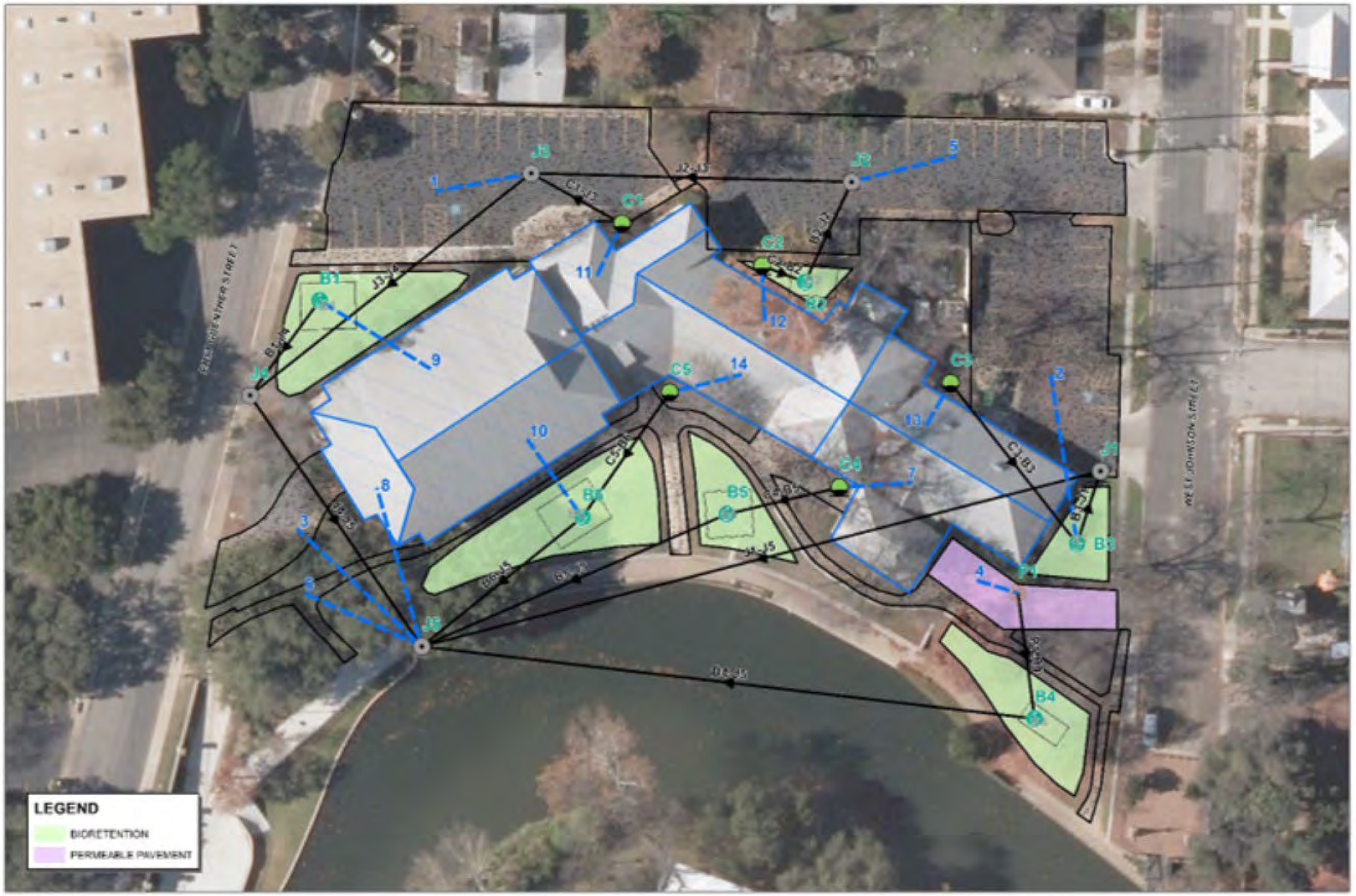


Crown Growth Modeler

SCENARIO 1 - OPTIMIZED FOR BACTERIA USING PERMEABLE PAVING



SCENARIO 4 – OPTIMIZED FOR VOLUME – NO TREATMENT OF PARKING AREAS 1 AND 2



COMPARISON OF OPTIMUM SCENARIOS

	Bacteria	PAH	Volume
Permeable Pavement	$114,000 60% 1.11 in.	$295,000 70% 3.01 in	$247,000 70% 2.62 in.
Sand Filter	$86,000 60% 1.09 in	$201,000 71% 2.54 in.	$93,000 39% 1.18 in
Untreated Parking	$59,000 39% 0.71 in	$141,000 46% 1.65 in	$92,000 39% 1.18 in

RAINWATER STORAGE

Beneficial Reuse (retention)

Temporary Storage (detention)

Treatment Train Element

BIORETENTION

Treatment through soil media

Native Plants and Habitat

Replace Traditional Landscaping

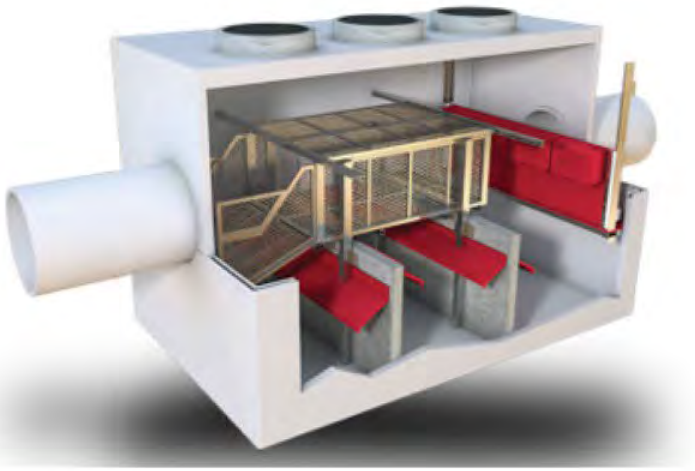
Low (or no) water use

TREATMENT TRAIN

Combination of multiple BMPs

Most commonly storage before treatment but can be pre-treatment

Flexible integration into sites



Blue Hole Primary School

Wimberley, TX

Green Stormwater Infrastructure to reduce stormwater runoff and encourage aquifer recharge

3,865 ft^2 of permeable pavers

792,332 gal of extended detention

63,623 ft^2 of vegetated swales

2 raingardens

Curbless parking lots

200,000+ gal of storage for rainwater and HVAC condensate

Site-Harvested Water Supply: The campus has over 200,000 gallons of storage for rainwater and AC condensate capture.

Onsite black/gray water treatment using Orenco AdvanTex© AX100 biofiltration-concept treatment unit

Subsurface drip irrigation for athletic field = beneficial reuse of up to 5,000 GPD of treated effluent.

A One Water Learning Lab

- Showcases STEM principles in practice
- Involves students and families in solutions for community challenges
- Highlights innovation through design concepts
- Provides opportunity for curriculum to test One Water performance

Blue Hole Primary School

Wimberley, TX

237 Acre Feet of groundwater conserved over 30 years.

Potable water demand reduced by 90% over industry standard.

Reclaimed water supports 99% of toilet flushing and landscape irrigation

Approx. $1,000,000 in water/sewer savings over 30 years.

Fun with numbers!

Blue Hole Primary Performance in April 2021

- 22 school days
- 25,400 gal. potable water use
- 550 students
- 2.1 gal. per-student-per-day
- 37.6% of Jacob's Well Elementary use
- 10% of industry standard!

One Water vs. Waste…water

Need I say more?

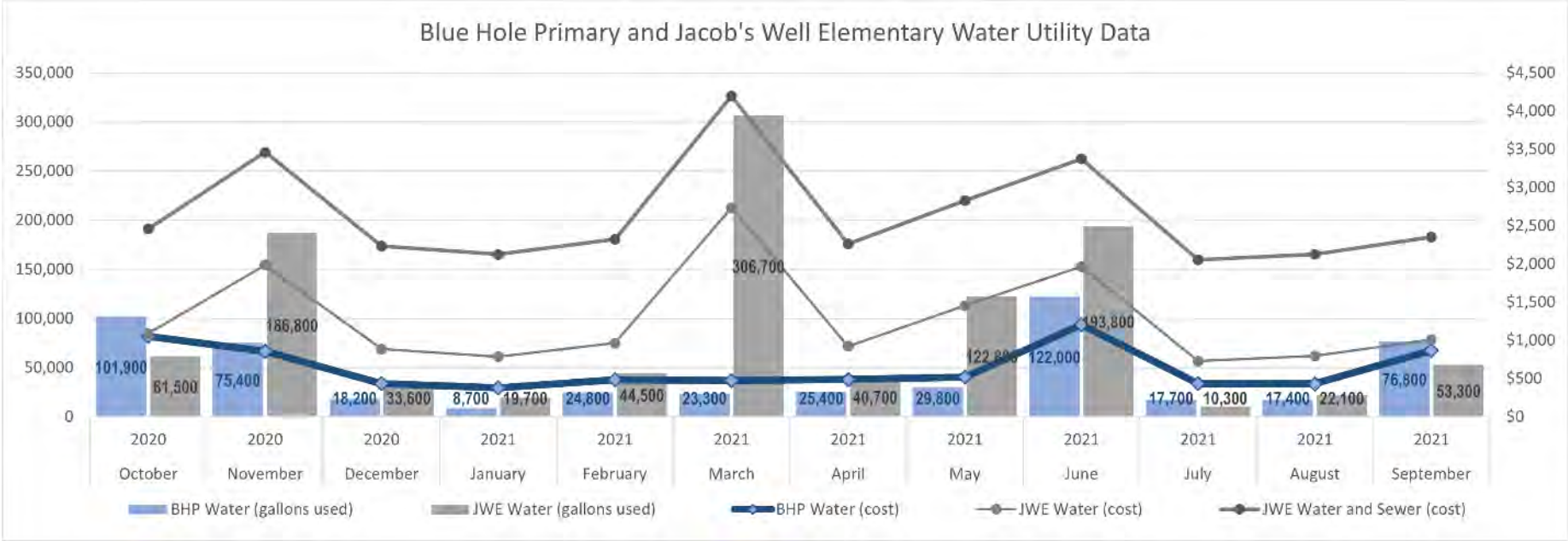
Supplemental Information

Projected cost comparisons for Blue Hole Primary One Water vs. Conventional build

WATER SUBSYSTEM	COST TYPE	CONVENTIONAL	ONE WATER
Wastewater & Reuse	Capital	$750,000	$446,778
	Annual Operations and Maintenance	$26,695	$6,000
Water Supply (Conventional vs. Rainwater & AC Condensate supplement for non-potable demands)	Capital	$0	$250,000
	Annual Operations and Maintenance	$19,488	$10,188
Stormwater Management (Conventional vs. Green Infrastructure additions)	Capital	$0	$125,000
	Annual Operations and Maintenance	$0	$0
Summary of all Subsystems	Capital + 30-year Operations and Maintenance	$2,135,490	$1,307,418

Comparing Blue Hole Primary School to Jacob's Well Elementary in Wimberley, TX

2020-21 School Year



Comparing Blue Hole Primary School to Jacob's Well Elementary in Wimberley, TX

2020-21 School Year

Blue Hole Primary potable water use*

- 541,000 gal.
- 49.4%less than Jacob's Well
- Paid 49.8%less than Jacob's Well

**39 more students than Jacob's Well*

Blue Hole Primary total water utilities

- $7,630 compared to $31,780 for Jacob's Well Elementary
- 76%less cost than Jacob's Well Elementary
- $724,500 in savings over 30 years