

# A One Water Story – Realizing the Environmental and Economic Value of One Water for the Texas Hill Country

Summer 2012

0 20 miles

Sources: HCA, TNRI, ESRI, TCIQ  
Produced for HCA by Siglo Group

- Edwards Aquifer Recharge Zone
- Edwards Aquifer Contributing Zone
- Trinity Aquifer Recharge Zone
- Carrizo Aquifer Recharge Zone
- River Basin Boundary
- Water Catchment Boundary

© The outline area of the Texas and the surrounding area of the Edwards Aquifer from educational materials.







# THE MEADOWS CENTER FOR WATER AND THE ENVIRONMENT

*No natural resource is more important to our future than Water. Water is what we do.*

RESEARCH | STEWARDSHIP | SERVICE | EDUCATION



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# Primary Threats to Water Quality in the Wimberley Valley

Declining groundwater levels – reduced spring flows result in worsening water quality for Cypress Creek and Blanco River

Impacts of drought – lower flows, increased temperatures negatively affect dissolved oxygen and bacteria growth

Growth, development – increased impervious cover/increased stormwater flows; nonpoint source pollution from homes, cars, businesses; changes in wildlife habitat/patterns; aging infrastructure



# CYPRESS CREEK

Let's keep it **clean**, **clear** & flowing



*Celebrating 10 Years*

Of stakeholder-driven watershed protection in the Cypress Creek Watershed



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*The rising STAR of Texas*



GBRA  
GUADALUPE-BLANCO RIVER AUTHORITY



Texas Water  
Development Board



United States  
Environmental Protection  
Agency



TEXAS COMMISSION  
ON ENVIRONMENTAL QUALITY



City of  
Wimberley

*The City of*  
**Woodcreek**  
IN THE MIDST OF THE TEXAS HILL COUNTRY



TEXAS A&M  
**AGRI LIFE**  
EXTENSION

The Nature  
Conservancy



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TEXAS STREAM TEAM



HAYS TRINITY  
GROUNDWATER  
CONSERVATION DISTRICT



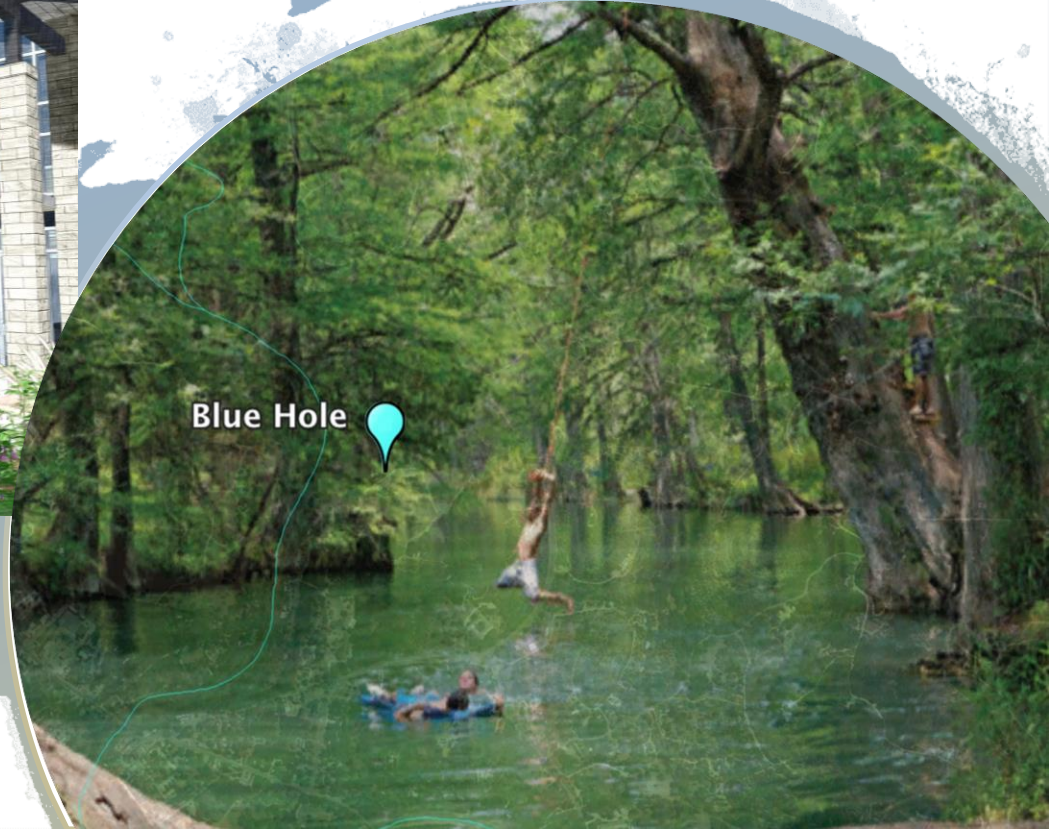
# Cypress Creek Watershed Protection

- Activities to prevent pollution, protect flow
- Preserve water quality through local permitting, ordinances
- Improve tools for decision makers to calculate effects of land use changes on water quality
- Site-specific LID/Green Infrastructure demonstration sites
- Outreach and education efforts
- Monitoring and modeling water quality changes

## *Simply Stated:*

*The Cypress Creek Watershed Protection Plan aims to ensure that the long-term integrity and sustainability of the Cypress Creek watershed is preserved and that water quality standards are maintained for present and future generations.*

# A New Primary School for Wimberley ISD



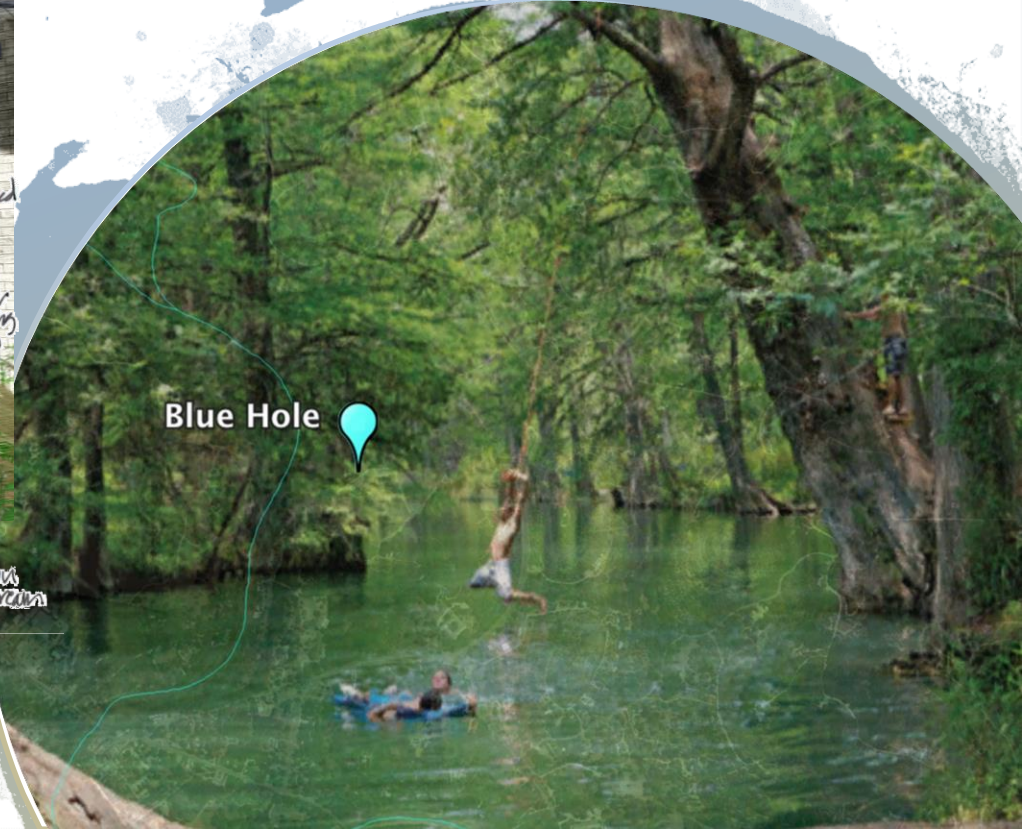


# WISD Primary School Environmental Concerns

- Conversion of native range to developed site
- Standard construction w/ minimal water conservation practices (20 gal. per student/day)
- Wastewater mindset with raw sewage to be transported to off-site WWTP (additional infrastructure including lift station needed)
- Water supply from already stressed Cow Creek aquifer... the source of flow for Jacob's Well Spring
- Stormwater impacts to ephemeral tributary and Cypress Creek with no enhanced GSI
- A MISSED OPPORTUNITY

A solution?

# A One Water School for Wimberley ISD



# 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

## ALL WATER IS ONE WATER



ADVANCING  
**ONE WATER**  
IN TEXAS



THE CYNTHIA & GEORGE  
**MITCHELL**  
FOUNDATION

<https://cgmf.org/p/one-water-report.html>

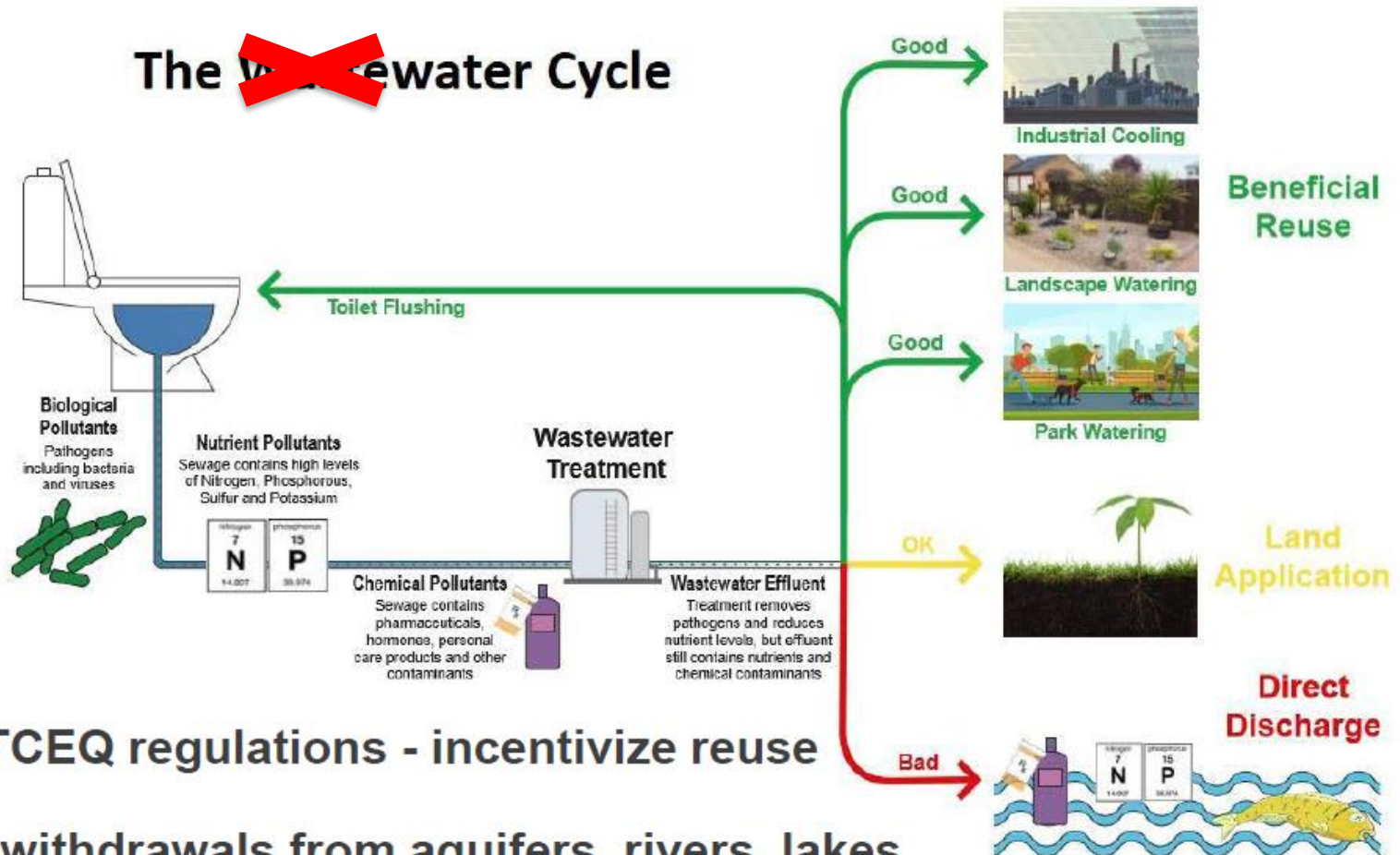
# Pathways to a *One Water* Future

- *Collaboration...* with a wide variety of stakeholders and engagement with the community
- *Economics and finance...* that recognize the true cost of water, prices it accordingly, and are attractive for public and private investors
- *Green Infrastructure...* that works with and mimics nature
- *Closed-loop system...* that enhance nutrient and energy recovery and encourage water sensitive behaviors
- *Built Environment...* with multifunctional infrastructure that supplements the natural environment
- *Enabling conditions...* that foster innovative institutional and management arrangements
- *Flexible and adaptive...* to allow for innovation and strengthen

*One Water standards as presented by Howe, C. and Mukhebeir, P., "Pathways to One Water: A guide for Institutional Innovation." Water Environment & Reuse Foundation, 2015*

# ~~Wastewater~~ as a Water Supply

## The ~~Wastewater~~ Cycle



- Modify TCEQ regulations - incentivize reuse
- Reduce withdrawals from aquifers, rivers, lakes
- Preserve aquifers and streams natural character

# WISD *One Water* Opportunities

- Rainwater Harvesting and HVAC Condensate Collection
- Green Stormwater Infrastructure
- Onsite sewage treatment and beneficial reuse
- Water-efficient plumbing fixtures
- Incorporate *One Water* Education
- Reduce potable water demand and protect springflow
- Demonstrate economic benefits of *One Water* approach



# WISD *One Water* Challenges

- Timing
- Requires Education
  - Elected officials, general contractor, architects, ENGINEERS, watershed stakeholders, and US!
- Requires Courage
  - Technology is still innovative w/ few Texas examples
  - Permitting processes do not incentivize reuse... treat wastewater as a nuisance that needs to be “disposed”
- Requires Investment
- Dare to Lead!

# *Overcoming* **WISD** *One Water* **Challenges**

- Getting started
  - *Crucial Conversations* – “start with heart”
  - *7 Habits* – “begin with the end in mind”
- Project research, stakeholder feedback, identifying key players
- Coffee with the Superintendent No. 1
- Coffee with the Superintendent No. 2
- A little help from our friends: a *WISD One Water Team*
- Technical and feasibility study
- Meeting with the WISD project team – GC, Architect, Engineer
- Presentation to the School Board No. 1
- More work...technical and fundraising
- Presentation to the School Board No. 2

# Stormwater Management

- Protect Water Quality & Conserve Water Quantity

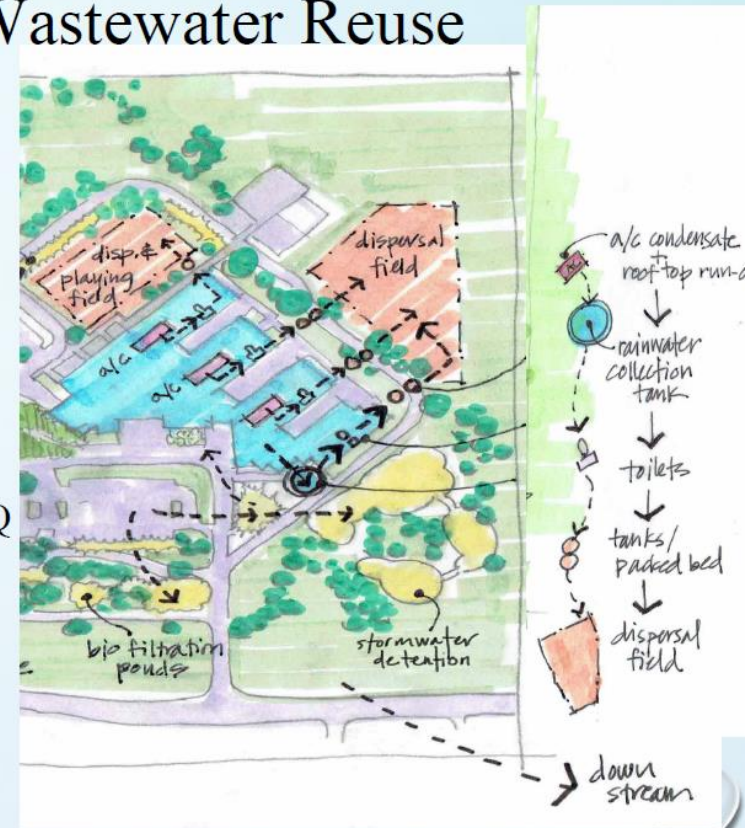


# Water Collection + Onsite Wastewater Reuse

- RECIRCULATING PACKED-BED FILTER SYSTEM
- FIRST COST SAVINGS - \$300,000 \*based on 7500/day system
- POTENTIAL SAVINGS VS CONVENTIONAL SYSTEM
  - OVER 30 YEARS ANNUALLY \$20,000 - \$30,000
- CASE STUDY – ORENCO SCHOOL – ADVANTEX
- PARALLEL PERMITTING APPROACH WITH HAYS & TCEQ



Andrada Polytechnic and Patano High School, Arizona.



## Conventional vs One-Water Cost Summary

WATER SUBSYSTEM	COST TYPE	CONVENTIONAL	ONE-WATER
WASTE WATER + REUSE	CAPITAL COST	\$ 750,000	\$ 446,778
	ANNUAL O & M COST	\$ 26,695	\$ 6,000
RAINWATER + AC CONDENSATE COLLECTION FOR TOILET FLUSHING	CAPITAL	\$ -	\$ 250,000
	ANNUAL O & M COST	\$ 19,488	\$ 10,188
STORMWATER MANAGEMENT (LID & GREEN INFRASTRUCTURE)	CAPITAL COST	\$ -	\$ 125,000
	ANNUAL O & M COST	\$ -	\$ -
SUM TOTAL ALL WATER SYSTEMS	CAPITAL + 30 YEAR O & M COST	\$ 2,135,490	\$ 1,307,418

# Benefits: Bringing It All Together

- FOR WISD:
  - Reduced capital and operating costs
  - Establish leadership in the community on a flagship site
- FOR THE COMMUNITY
  - A catalyst for creating a watershed culture
  - A Living Lab for integrated water management
- FOR THE CHILDREN
  - Healthier and smarter kids
  - Engaging and Inspirational Learning Experience



# *Overcoming* **WISD** *One Water* **Challenges**

- Unanimous approval of WISD Board of Trustees:
  - Memorandum of Understanding to embed *One Water Team* for developing final design, bid and construction oversight



LOCAL

## Wimberley school to make history as first 'One Water' school in Texas

A 'One Water' school means it will use 90 percent less groundwater than a typical school of this size.

Author: Shawna Reding

Published: 8:04 AM CST December 3, 2018

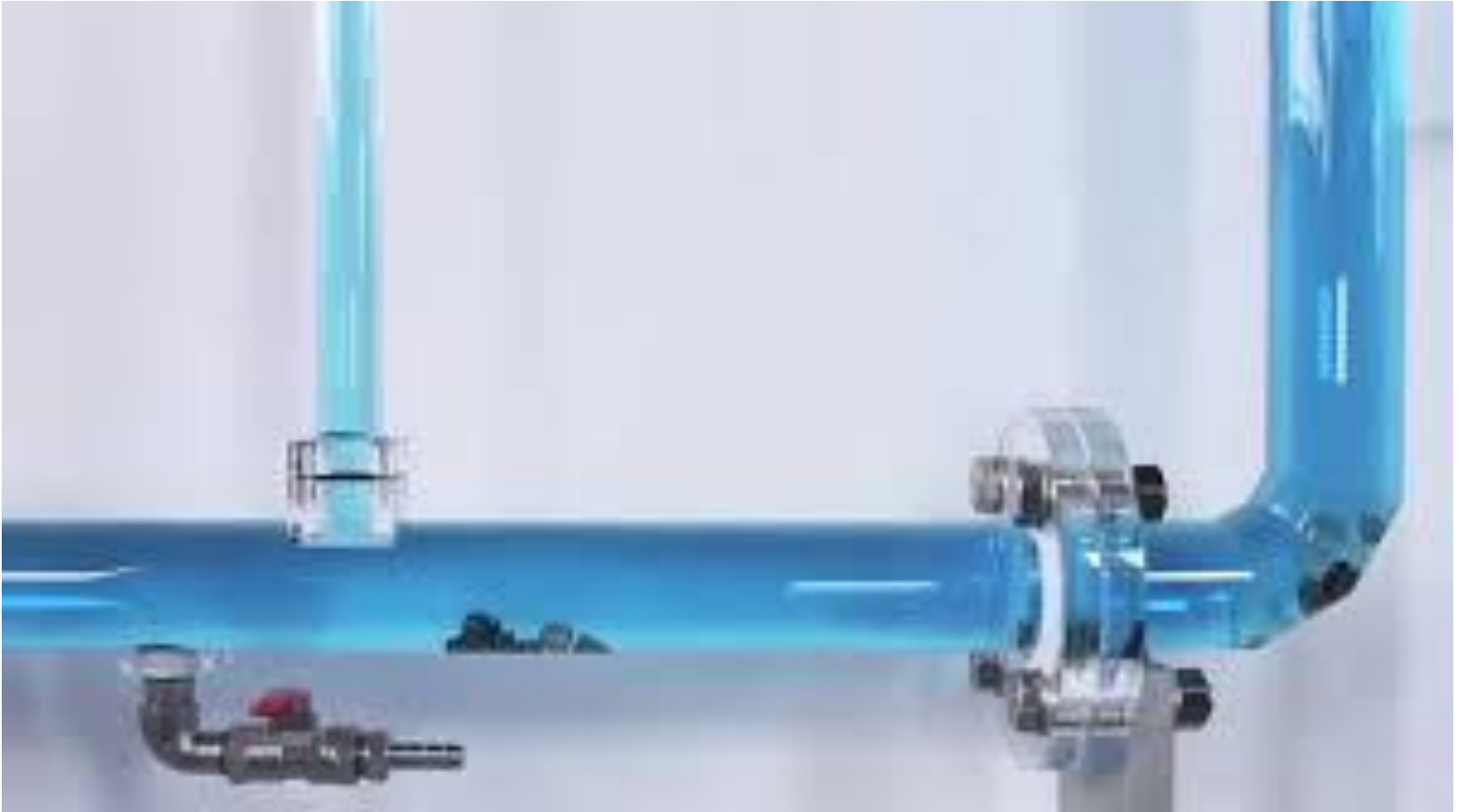
Updated: 11:06 AM CST December 3, 2018



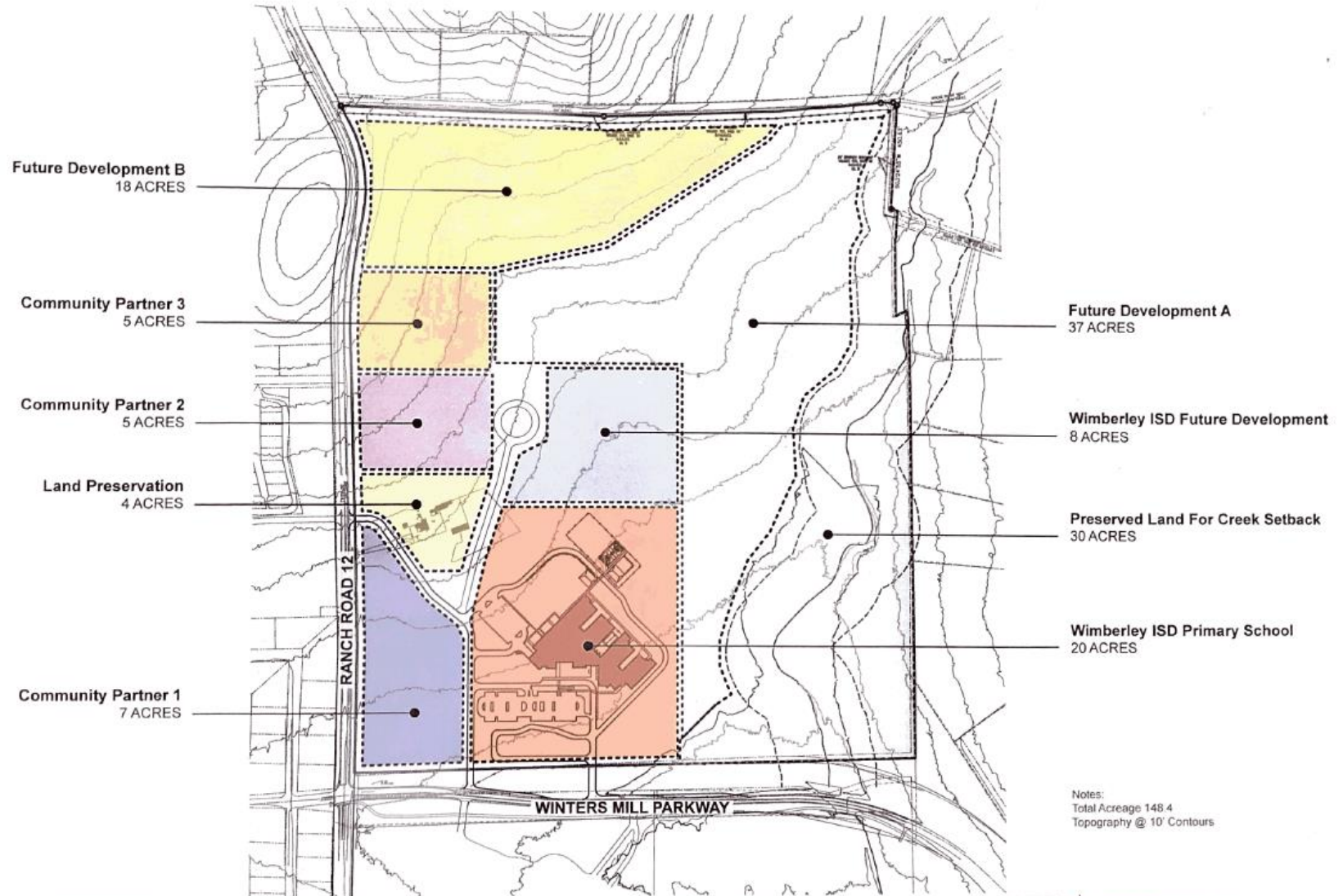
# Realizing *One Water* Opportunities

- Rainwater Harvesting and HVAC Condensate Collection
  - Dual plumbing for toilet flushing with RWH & HVAC
  - Supplemental irrigation for landscape and school gardens
- Green Stormwater Infrastructure
  - Raingardens, pervious surfaces
  - Pollutant reduction, flood mitigation, groundwater recharge
- Onsite sewage treatment and beneficial reuse
  - Reliable, Low Energy, packed bed recirculating filter treatment system with subsurface drip irrigation for athletic fields
- Efficiencies - Potable water demand reduced by 90% protecting springflow
- WISD will save an estimated \$1,000,000 over the next 30 years on water/wastewater O&M costs

# EDUCATION: from Good to *One Water* Great!



# Next Step: A *One Water* Master Plan:



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Executive Director

Nick Dornak  
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