MARSHALL
ESTABLISHED 1797
AS SALEM

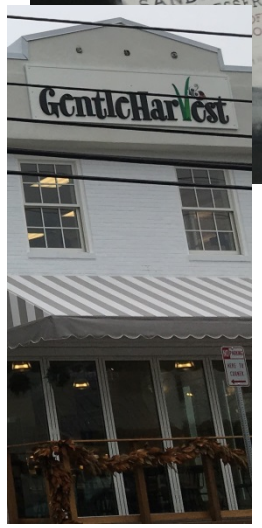
CAUTION
CHILDREN
AT PLAY

THE WHOLE
OX

Riccordino's
HOT SANDWIC

Better Homes and
Gardens Magazine !
Handmade Gifts
Pottery
GIFTS • STUDIO
CLASSES

Red Truck
RURAL BAKERY
BREAKFAST
PASTRIES · BREADS
LUNCH · SOUP


GentleHarvest

FIELD
& MAIN
RESTAURANT

The Authority was first chartered in 1964 and incorporated for a period of 50 years.

In 1975, the Authority was reincorporated for a 50 year period through 2025.

The Authority owns and operates nine public water systems in the areas of New Baltimore, Bealeton, Catlett, Marshall, Paris, Turnbull, The Plains, Opal and Remington, Virginia, serving approximately 9,350 customer accounts.

The Authority also owns and operates three public sewer systems with a 2.0 Million Gallon per Day ("MGD") Wastewater Treatment Plant ("WWTP") in Remington, Virginia, a 0.64 MGD WWTP in Marshall, Virginia and a 0.950 MGD WWTP at Vint Hill Farms, Virginia, serving a total of approximately 8,500 customer accounts.

<u>For Fiscal Year 2018, the Authority is operating with a full-time workforce of 47 and an approved budget of $10,330,666</u>

The Authority was requested to assume the ownership of the System in December 2006 from its previous owner, Marshall Waterworks, Inc.

The Authority borrowed monies and undertook the design and construction of the Phase 1 improvements to the System consisting of significant improvements to the System's infrastructure distribution system and the construction of sorely needed storage space.

In addition, FCWSA conducted an area wide hydrogeological survey in order to methodically develop additional water sources for the System.

Marshall is a “small” CWS

System Size (population served)	Number of CWSs	Population Served (millions)	% of CWSs	% of U.S. Population Served by CWSs
Very Small (25-500)	28,462	4.8	55%	2%
Small (501-3,300)	13,737	19.7	27%	7%
Medium (3,301-10,000)	4,936	28.7	10%	10%
Large (10,001-100,000)	3,802	108.8	7%	36%
Very Large (>100,000)	419	137.3	1%	46%
Total	**51,356**	**299.2**	**100%**	**100%**

US Environmental Protection Agency

WSA Revenue Sources

User Rate

Water

			$
0	-	2,000 gallons	4.35
2,001	-	10,000 gallons	6.08
10,001	-	50,000 gallons	7.82
50,001	+	gallons	9.56

Sewer

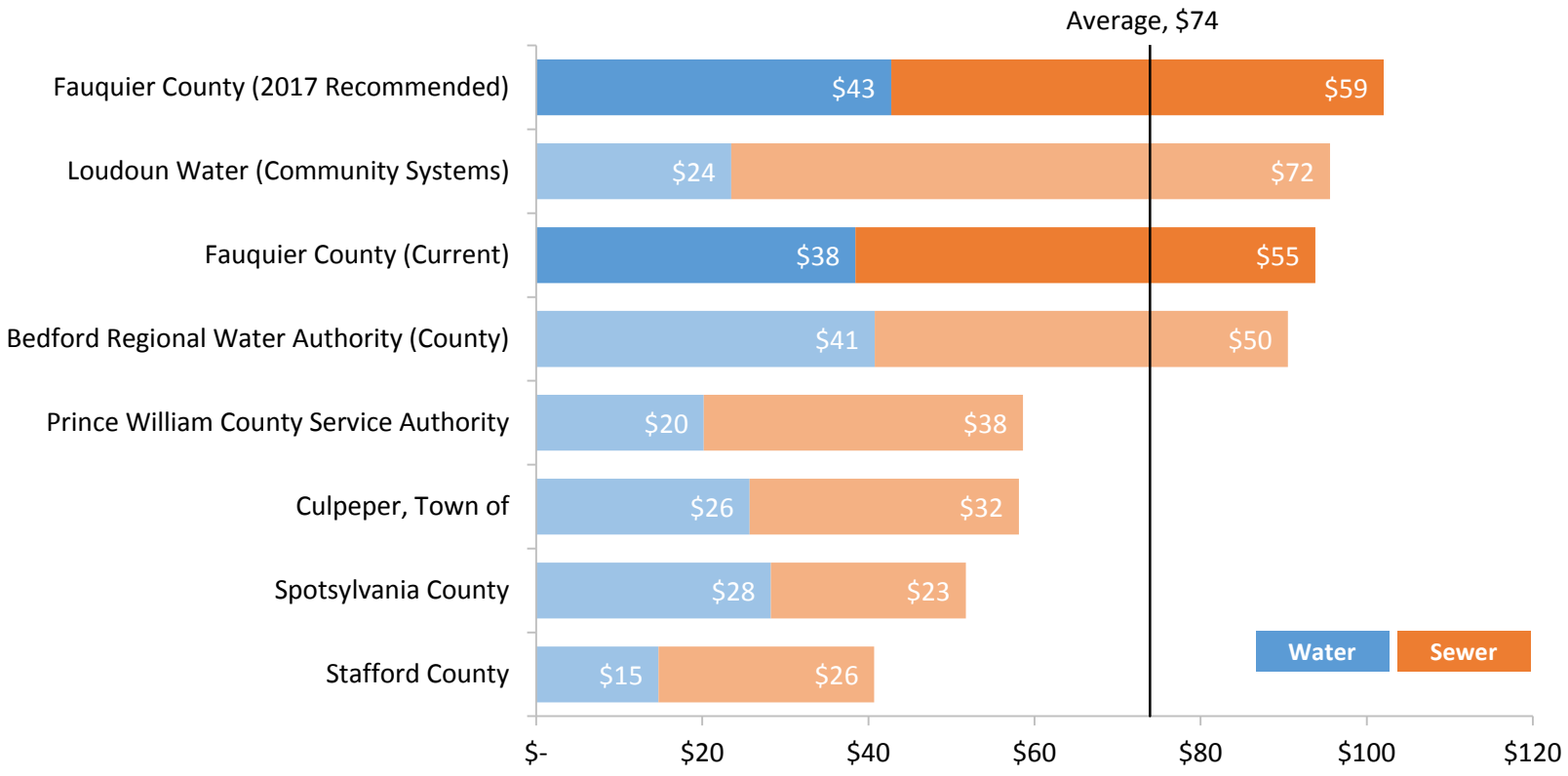
Per	1,000 gallons	9.07

Availability Fees

Meter Size	Water $	Sewer $
5/8” x 3/4”	11,120	14,000
Full 3/4” (3/4”)	16,680	21,000
One Inch (1”)	27,800	35,000
One & One Half (1 1/2”)	55,600	70,000
Two Inch (2”)	88,960	112,000
Three Inch (3”)	194,600	245,000
Four Inch (4”)	333,600	420,000

“Growth pays for growth”

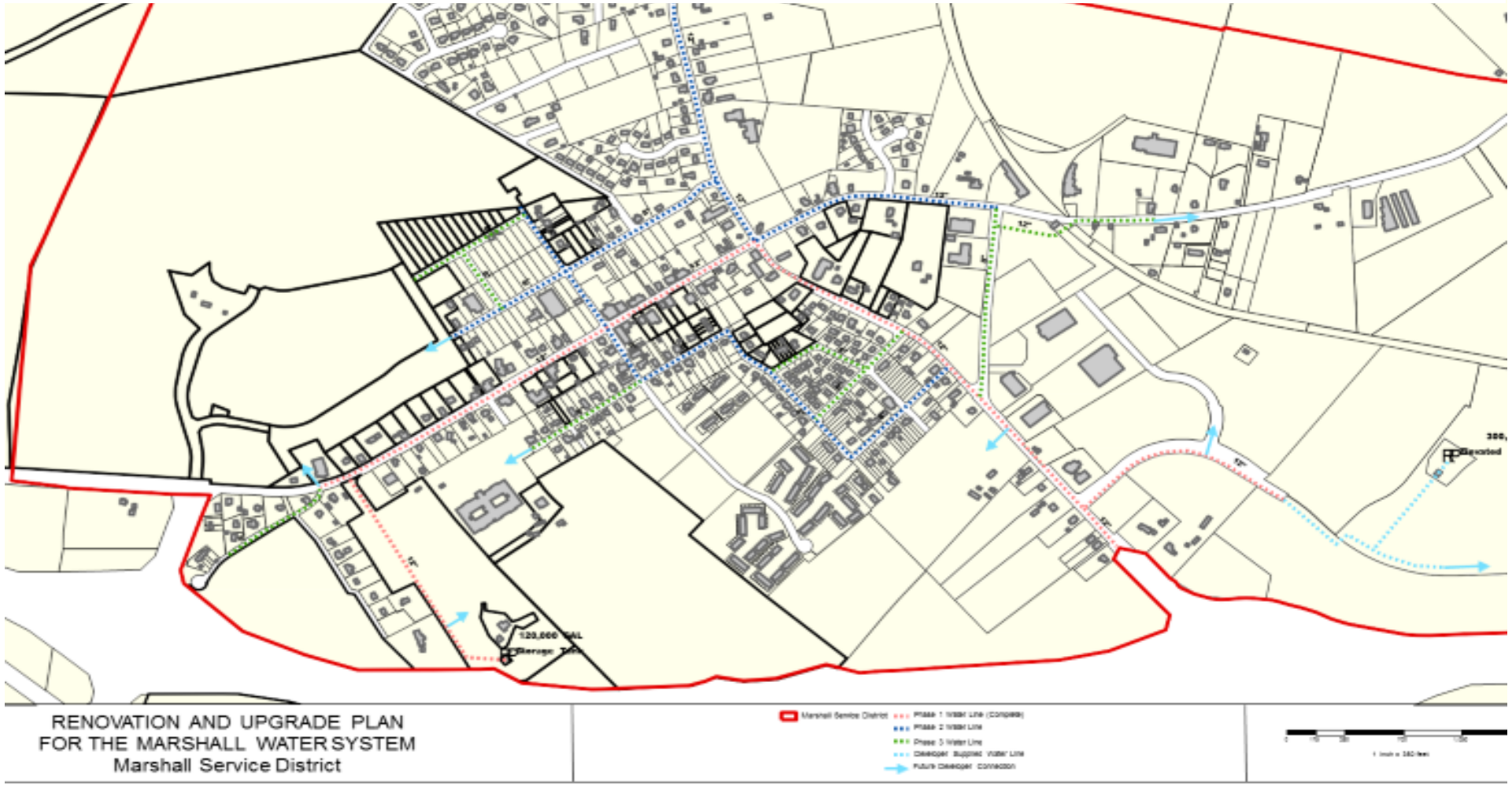
FY 2017 Combined Monthly Bill Comparison*



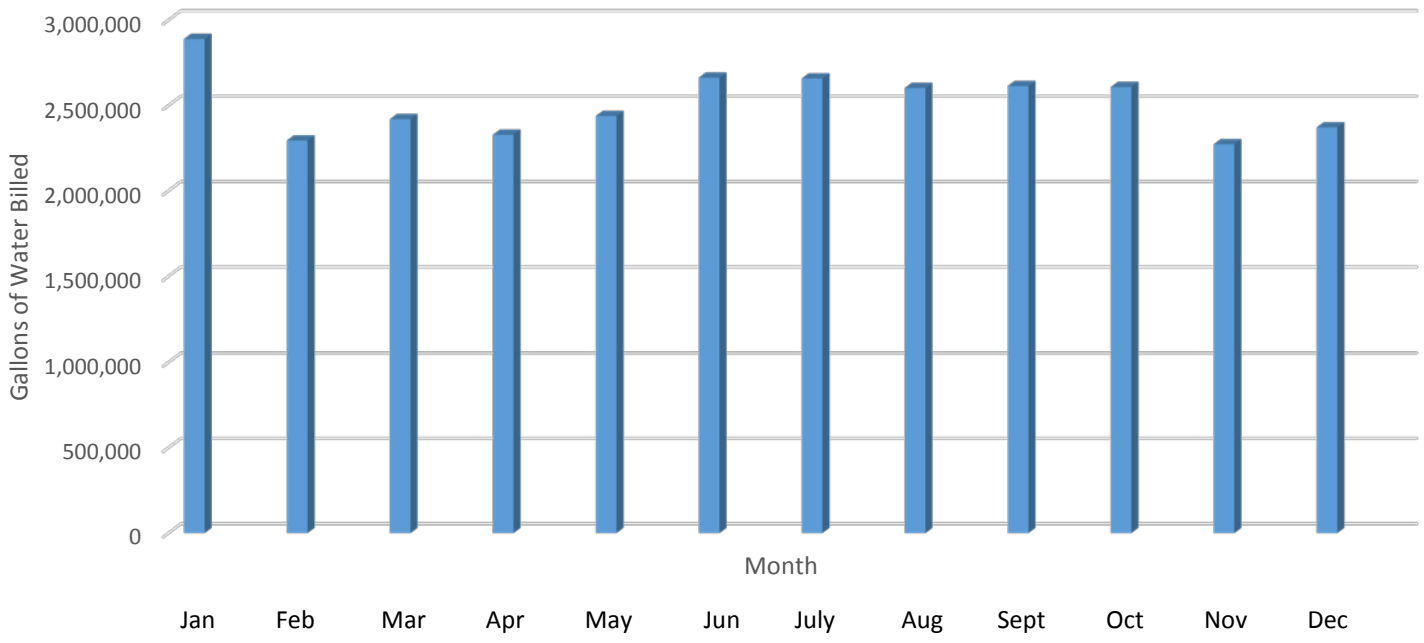
**5/8 x 3/4 inch meter and 4,400 gallons of usage (median for Fauquier County customers)*

Current Plan for Marshall:
Phase I is complete - great job WSA!
Phase II and III must be completed asap for existing customers - but is on hold because it is "*…dependent on availability of funding…*".

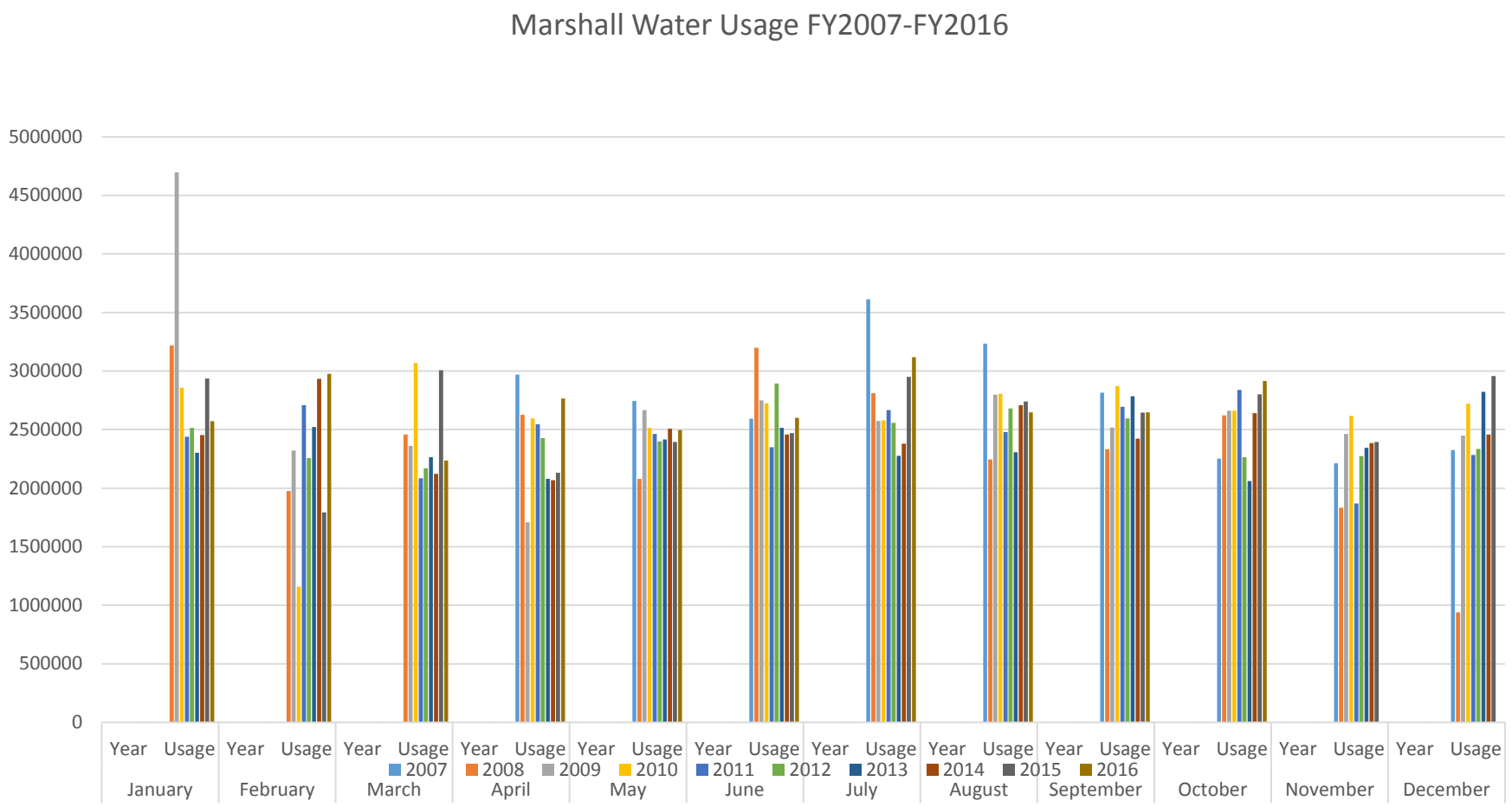
Note: Phase I, II, and III were not intended to be an integrated water management plan for Marshall.



Average Monthly Usage- Marshall Service Area FY2007- FY2016



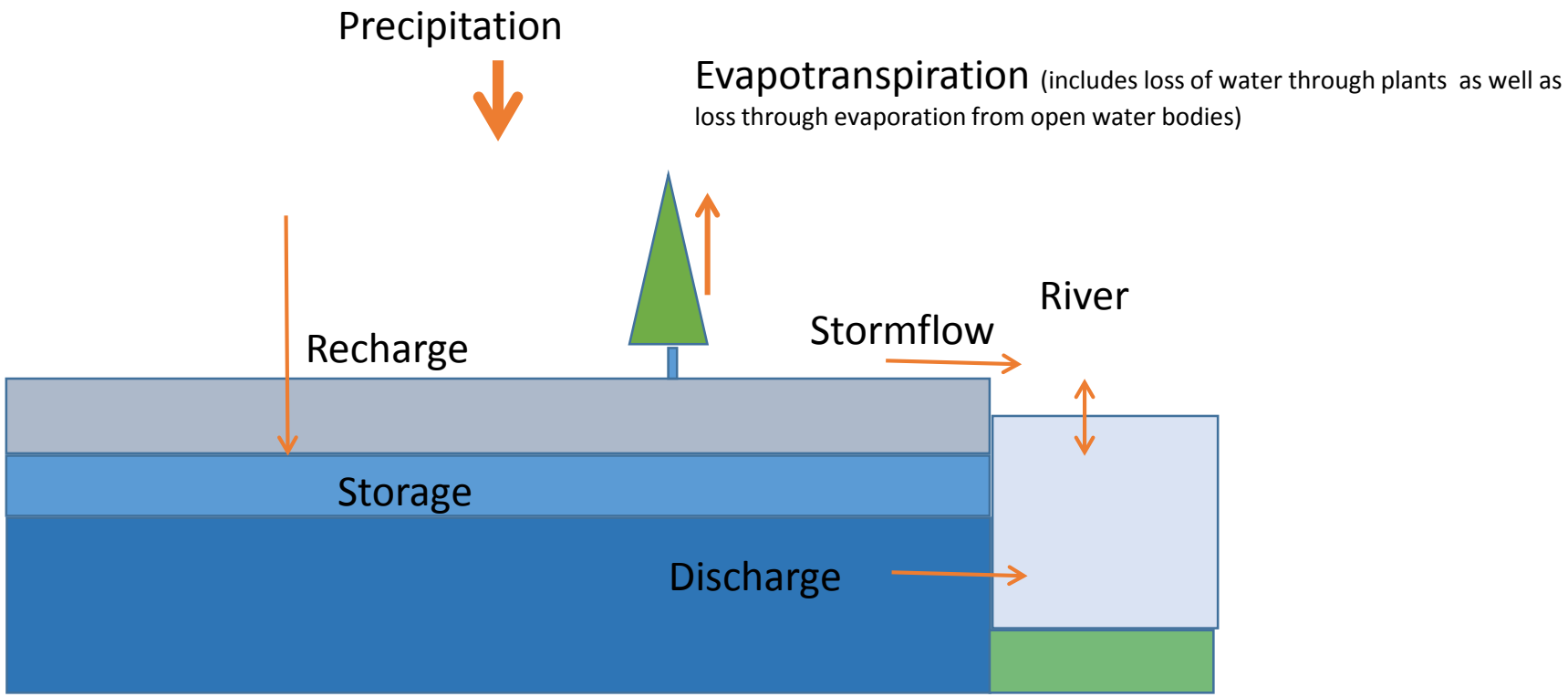
Approximately
83,000 gallons/day

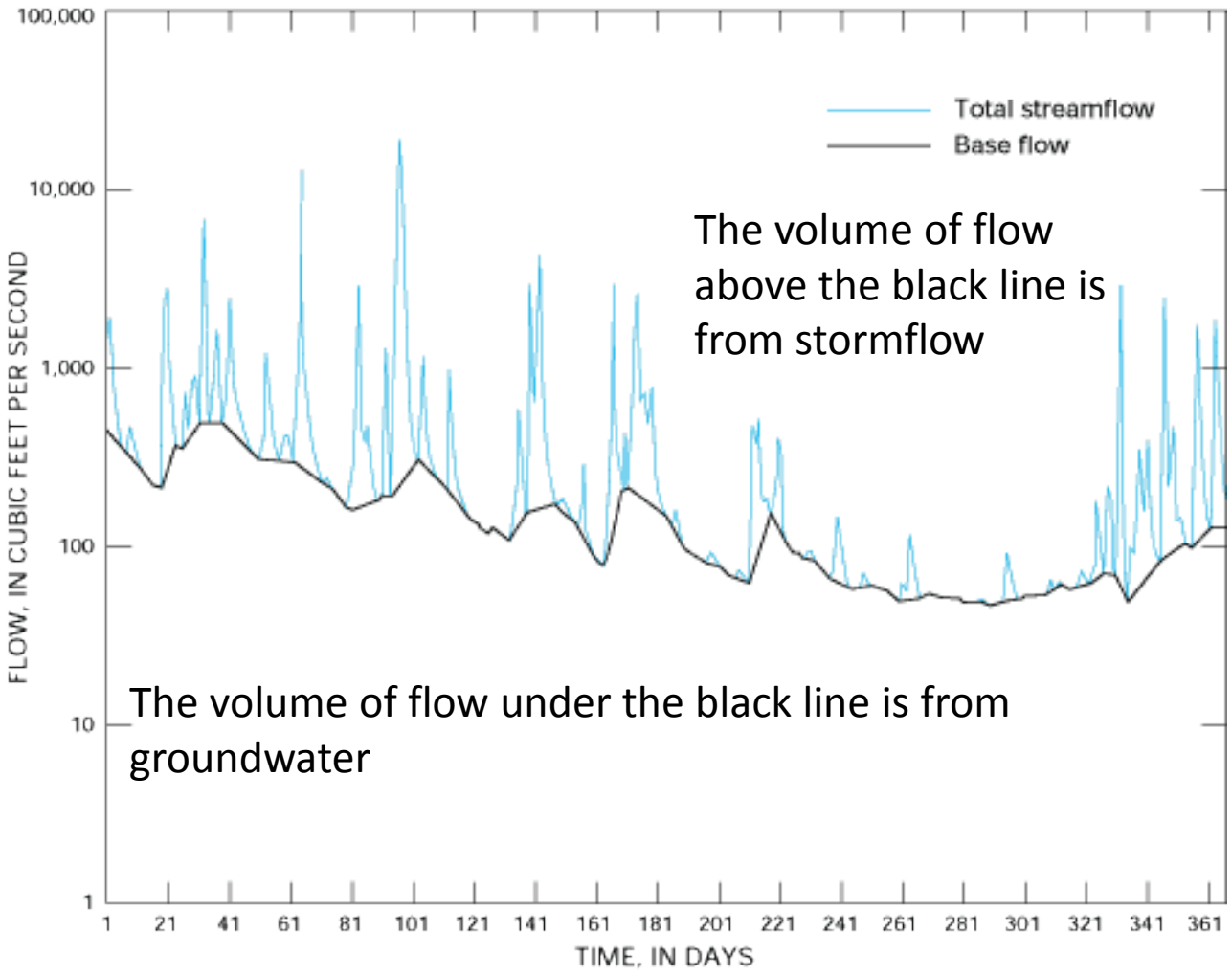

Marshall Water Usage FY2007-FY2016
5000000
4500000
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
Year Usage
January
February
March
April
May
June
July
August
September
October
November
December
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016

Existing wells currently or previously in our portfolio for Marshall

Source	GPM	GPD
Online		
Salem 4	50	72,000
17/66 (1 and 2)	150	217,200
Piedmont	13	18,720
Planned		
Salem 3	125	100,000
Permitted/Off		
Lawrence	35	20,000
Lane	20	28,800
Closed		
Marshall Manor		
Anderson		

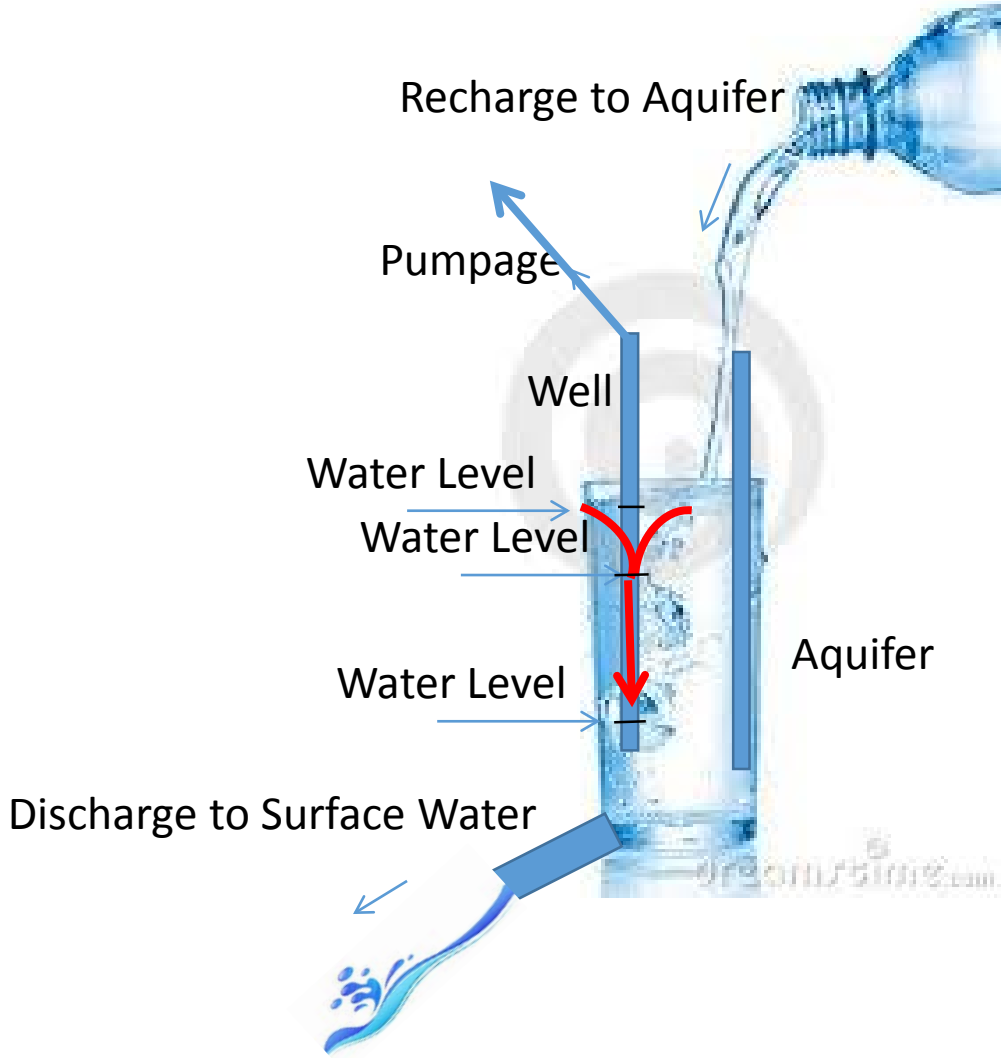
Groundwater and Surface Water: A Single Resource



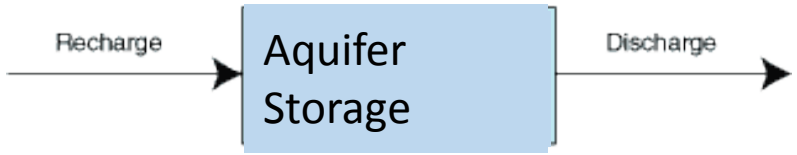


Baseflow is groundwater discharging from our aquifers!

Input – Output = Change in Storage



A Groundwater Budget



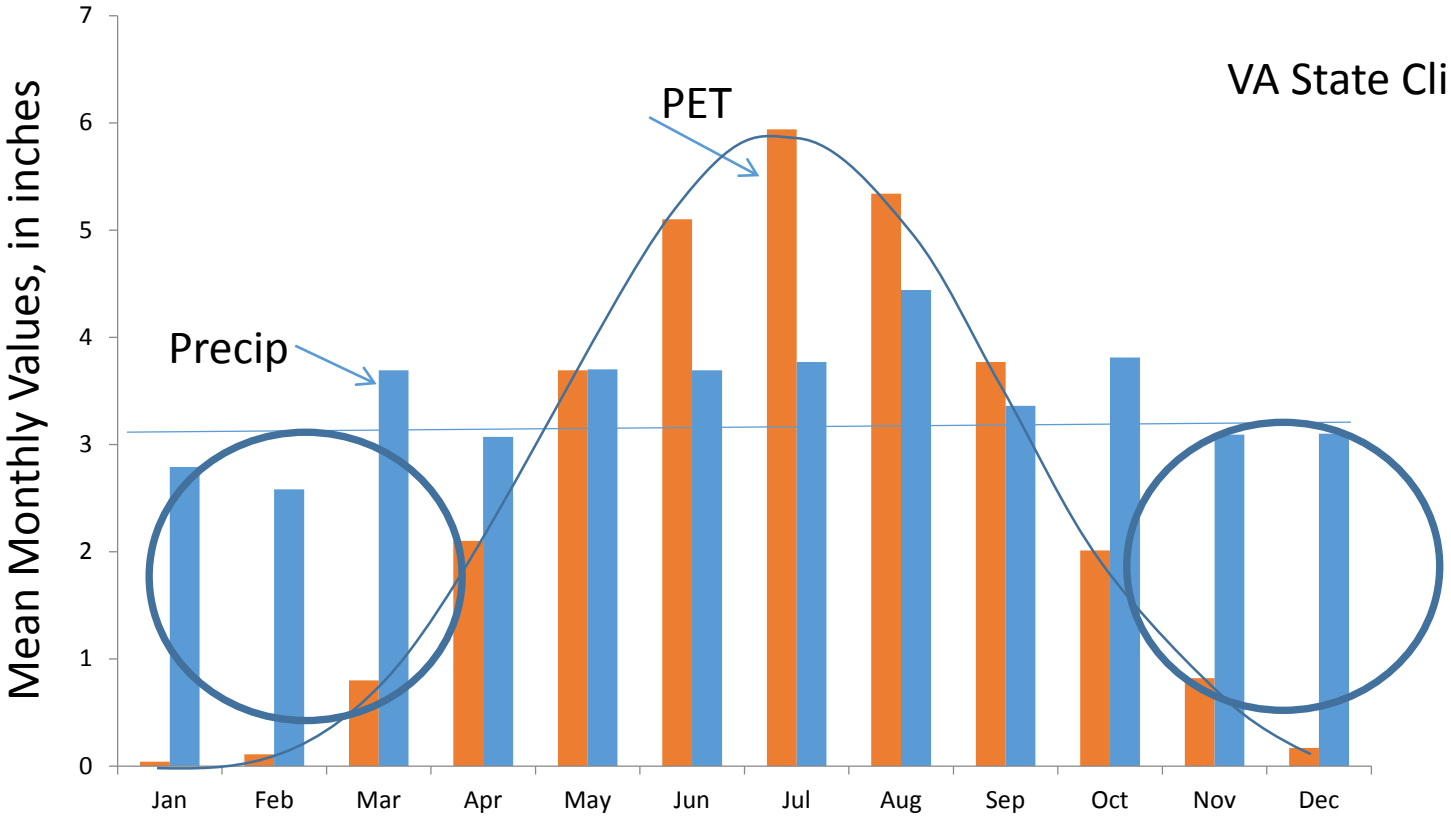
1. No change in storage
Input = Output (i.e. *change in storage = 0*)

Pumping Begins:
Water levels in well drops.
But when pumpage is balanced by increased recharge (or decreased discharge) water levels will no longer drop.

2. Change in storage
Output > Input (change in storage > 0)

(i.e. pumpage + discharge > recharge)

Water levels continue to drop because water is continuously removed from aquifer storage.



The Good News!

Mean Annual Values for Fauquier:
Precipitation: ~41 inches
PET: ~30 inches

Precip – PET = 11 inches.

Therefore total streamflow in Fauquier county watersheds is about 11 inches (or about 25% of precipitation) annually.

The Good News!

Annual Average Watershed Budget

Input - output = 0 (i.e. no change storage)

Input: Precipitation (41”)
Output: Evapotranspiration (30”) and Total Streamflow (11”)

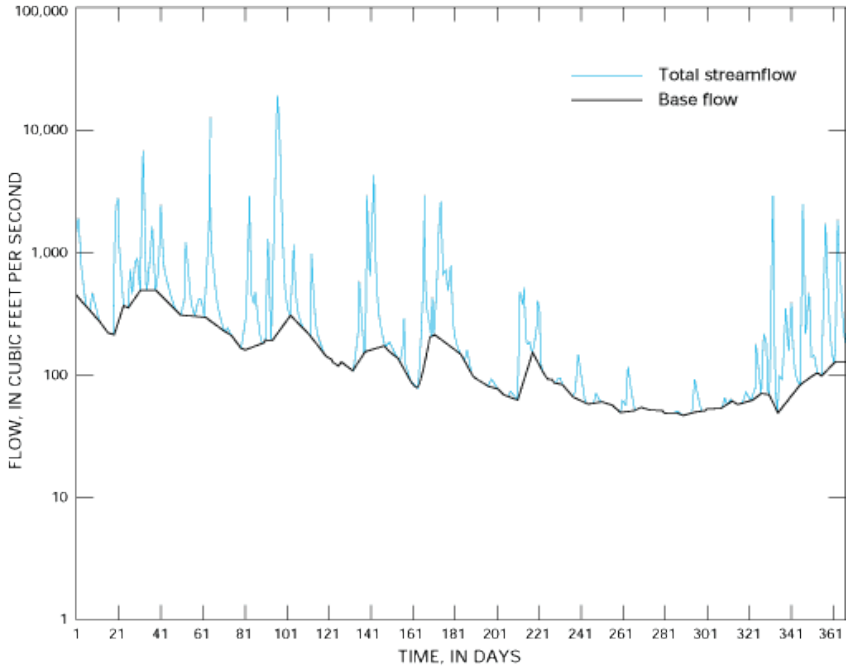
Every inch of water is equivalent to
~ 1.5 million gallons of water per square mile

Marshall land area is ~ 3 mi^2

Therefore total streamflow is equivalent to 11 x 1.5 x 3 = **50 million gallons** of water.

The majority of this water flows away from Marshall and towards the Chesapeake Bay annually and is not available to us because we are not capturing or managing it.

We currently use about 30 million gallons per year in Marshall.



Annual Average Groundwater Budget:
Recharge = Discharge (change in storage = 0)
or
Baseflow=recharge=discharge

Recall: Total Streamflow = Stormflow + Baseflow = 11 inches

Every inch of groundwater recharge is equivalent to
~ 1.5 million gallons of water per square mile of aquifer

Marshall land area is ~ 3 mi^2

Therefore for every inch of recharge we get: 1 x 1.5 x 3 = **4.5 million gallons** of water.

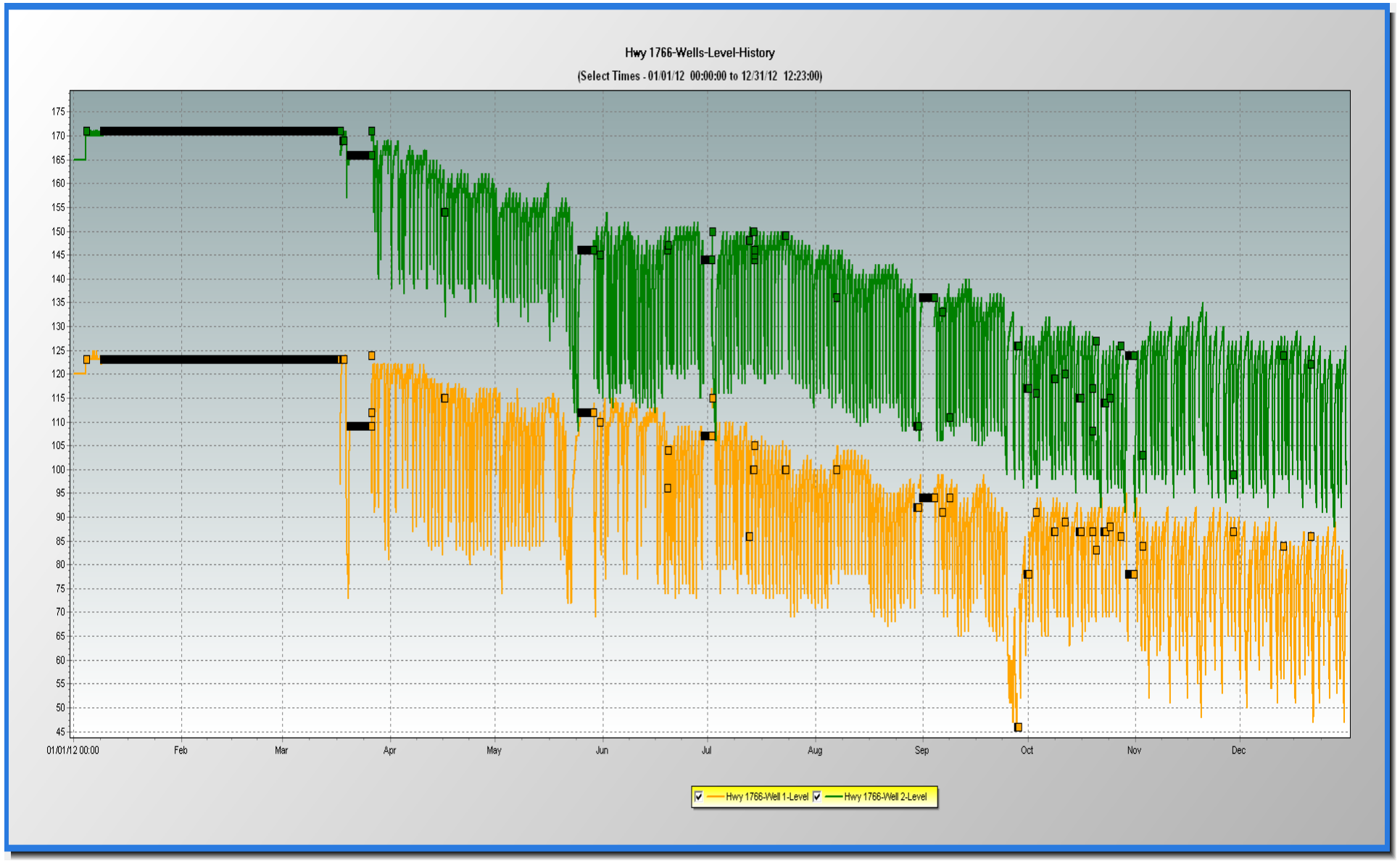
We need about 6.5 inches of recharge to supply current usage of 30 million gallons per year in Marshall.

Existing wells currently or previously in our portfolio for Marshall

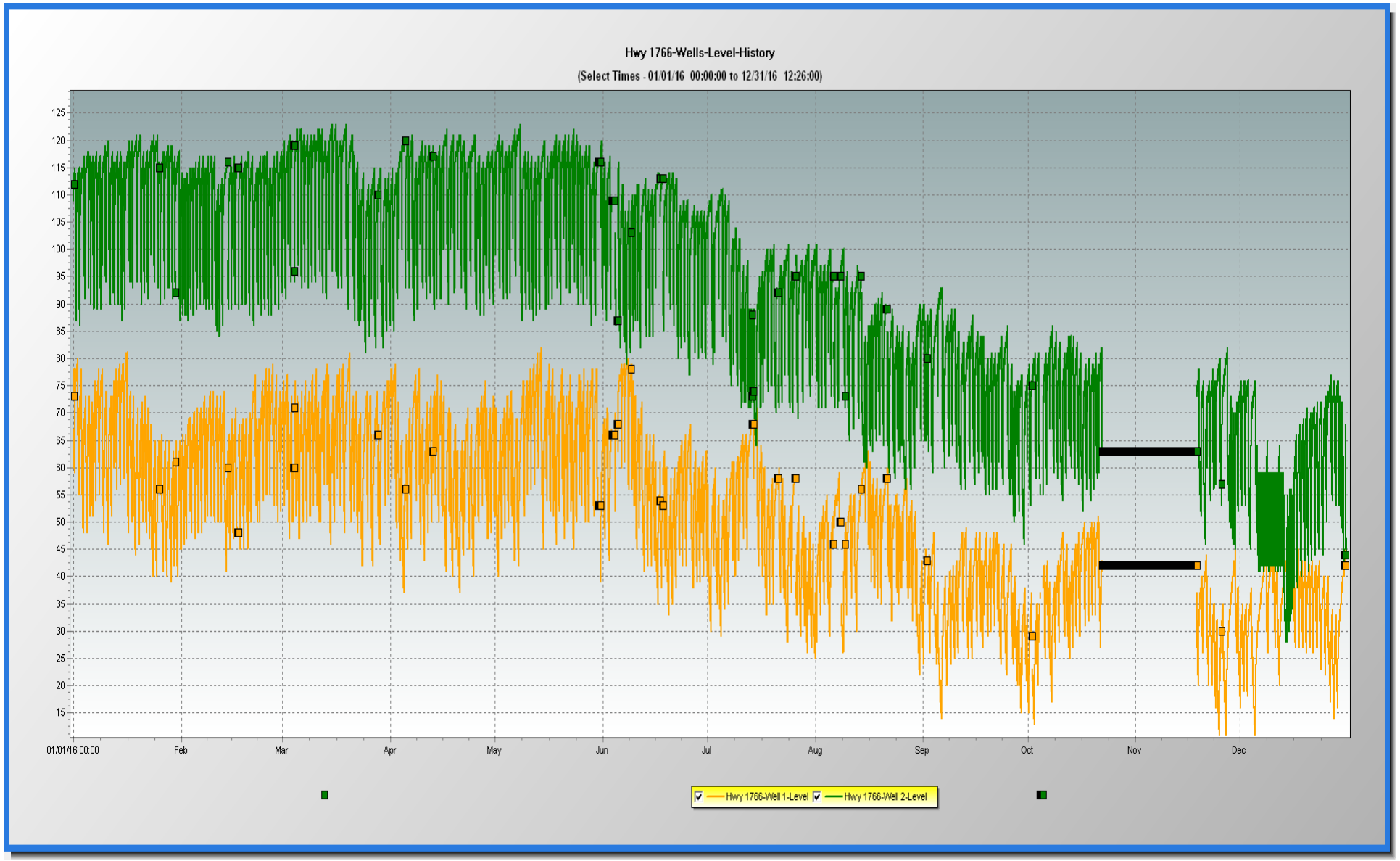
Source	GPM	GPD
Online		
Salem 4	50	72,000
17/66 (1 and 2)	150	217,200
Piedmont	13	18,720

Wells 1 and 2 at 17/66 provide the majority of Marshall's current water supply

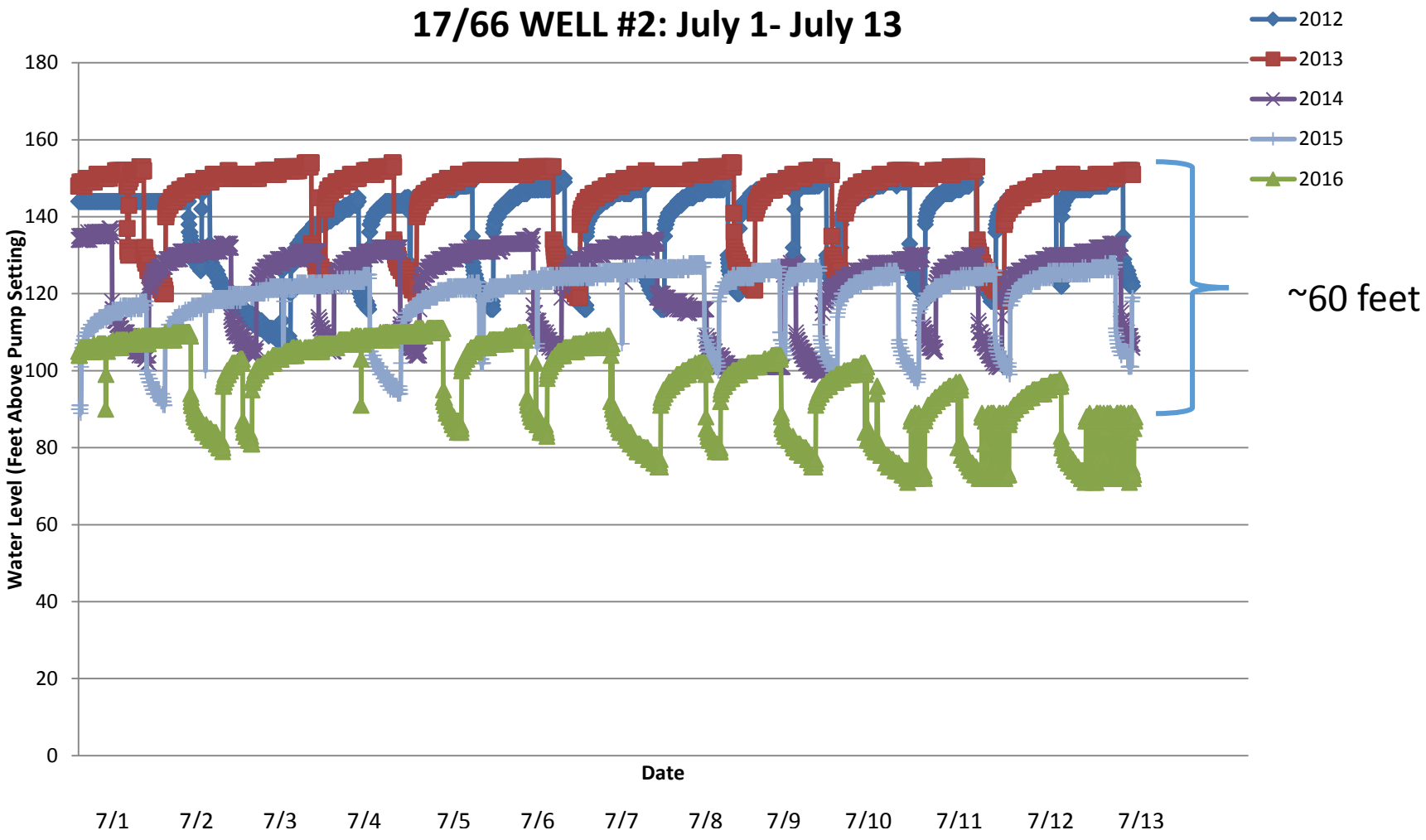
Our Current Resource



Our Current Resource



Our Current Resource



Water Quality

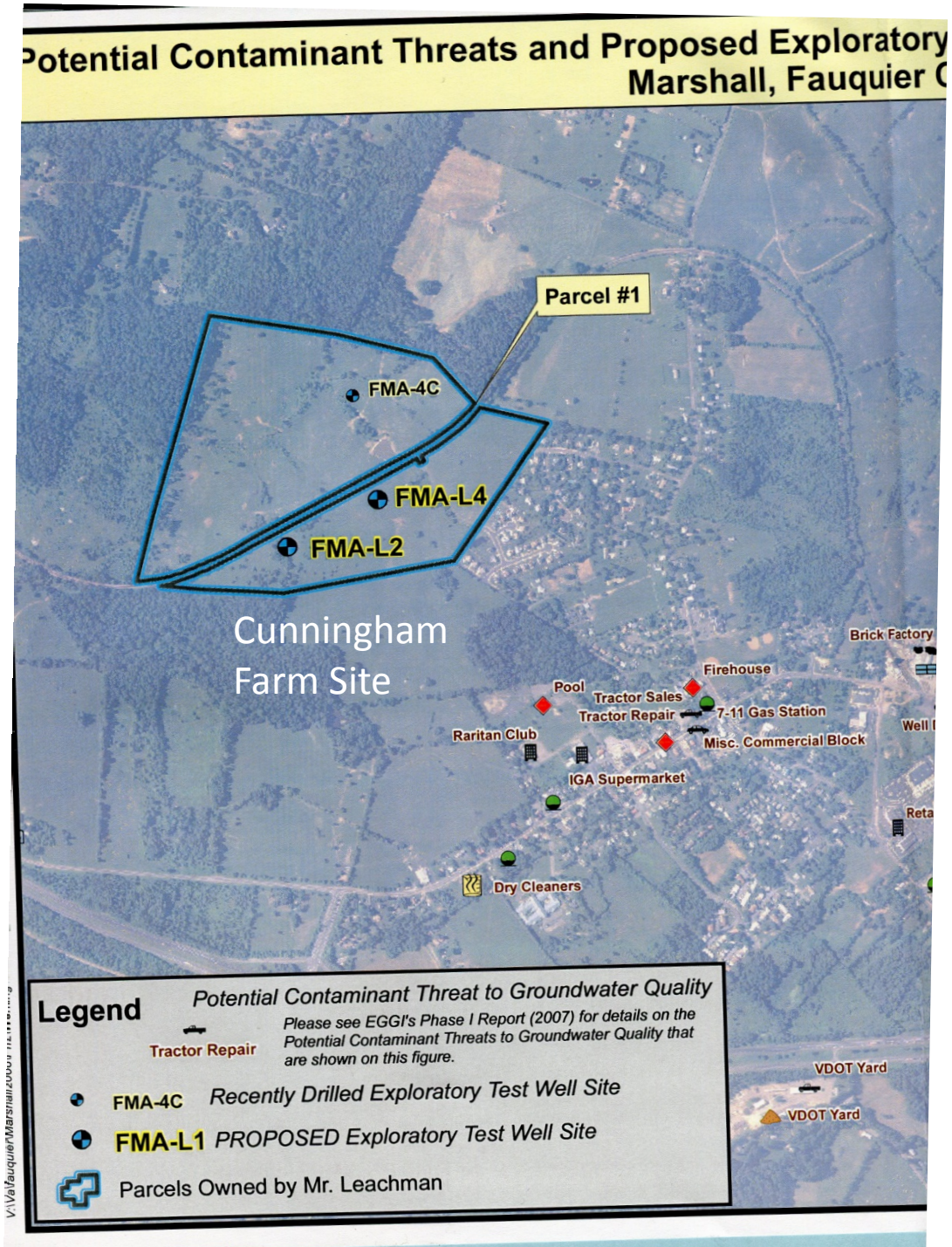
Source	GPM	GPD	Treatment Issue
Online			
Salem 4	50	72,000	
17/66 (1 and 2)	150	217,200	Fe, Mn
Piedmont	13	18,720	
Permitted/Off			
Lawrence	35	20,000	VOCs (TCE)
Lane	20	28,800	Radium
Closed			
Marshall Manor			VOCs (TCE)
Anderson			VOCs (TCE)

Source	GPM	GPD	Treatment issue
Salem 3	125	100,000	Fe, Mn
Salem 2	100	80,000	Radium
Salem 5	80	64,000	Bacteria, Mn
North Sports 4	125	100,000	?
North Sports 6	15	12,000	Fe, Mn

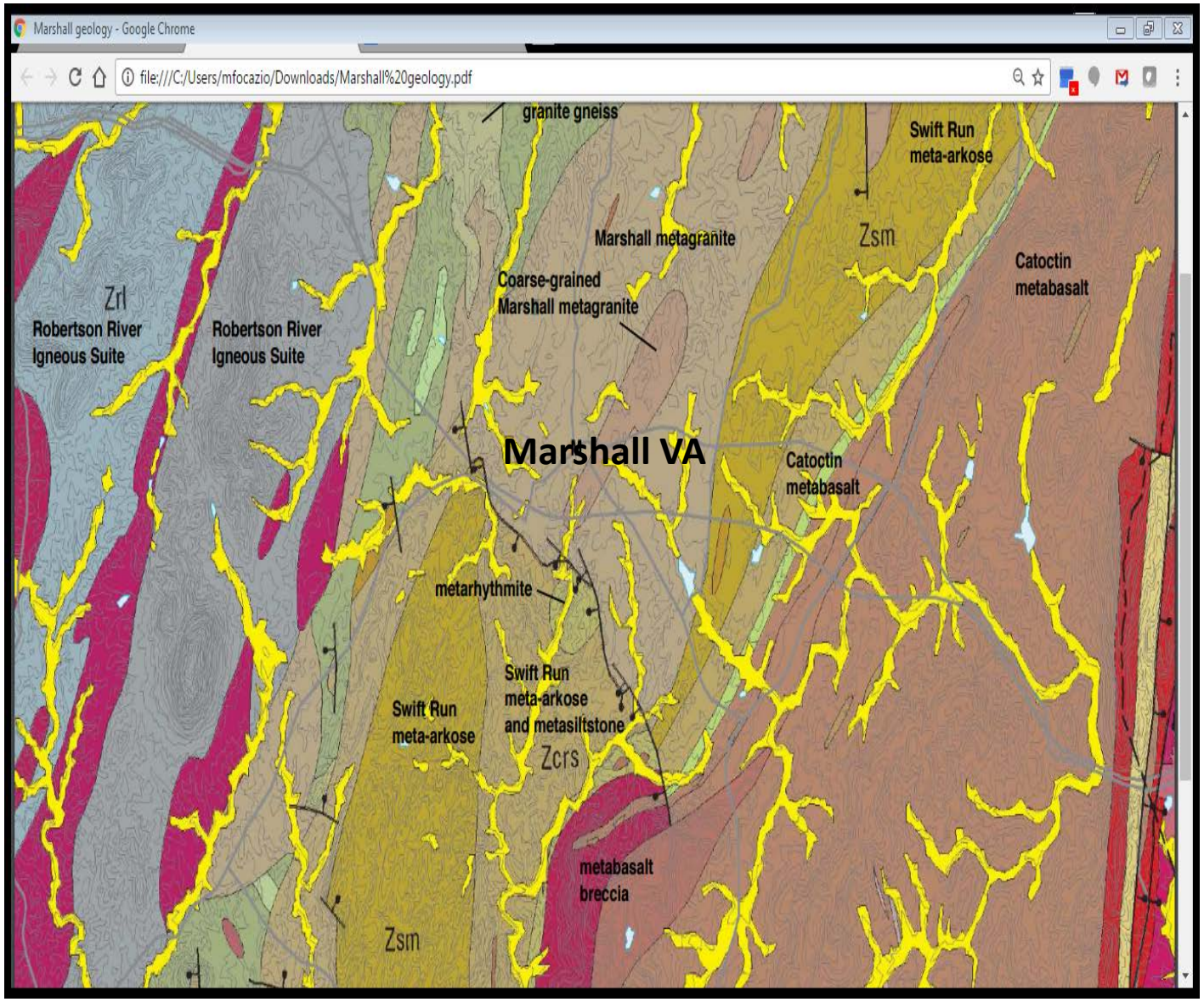
Excerpt from:
"Results of Phase II – Additional Geophysical Surveys. Assessment of the Potential Availability of Groundwater Resources within the Leachman Property Marshall Service District"

-EGGI 2009

VanMetre recently drilled wells that were contaminated with TCE and radium.



Got Radium?


Marshall geology - Google Chrome
file:///C:/Users/mfocazio/Downloads/Marshall%20geology.pdf
granite gneiss
Swift Run
meta-arkose
Zsm
Marshall metagranite
Catoctin
metabasalt
Zrl
Robertson River
Igneous Suite
Robertson River
Igneous Suite
Coarse-grained
Marshall metagranite
Marshall VA
Catoctin
metabasalt
metarhythmite
Swift Run
meta-arkose
and metasiltstone
Zcrs
Swift Run
meta-arkose
metabasalt
breccia
Zsm

Groundwater availability in Marshall is limited by

the groundwater budget,
the fractured rock hydrogeology,
the water quality

A sustainable water supply in Marshall is limited by

the groundwater budget,
the fractured rock hydrogeology,
the water quality

policies against conjunctive use of groundwater and surface water

“growth pays for growth”

no plan

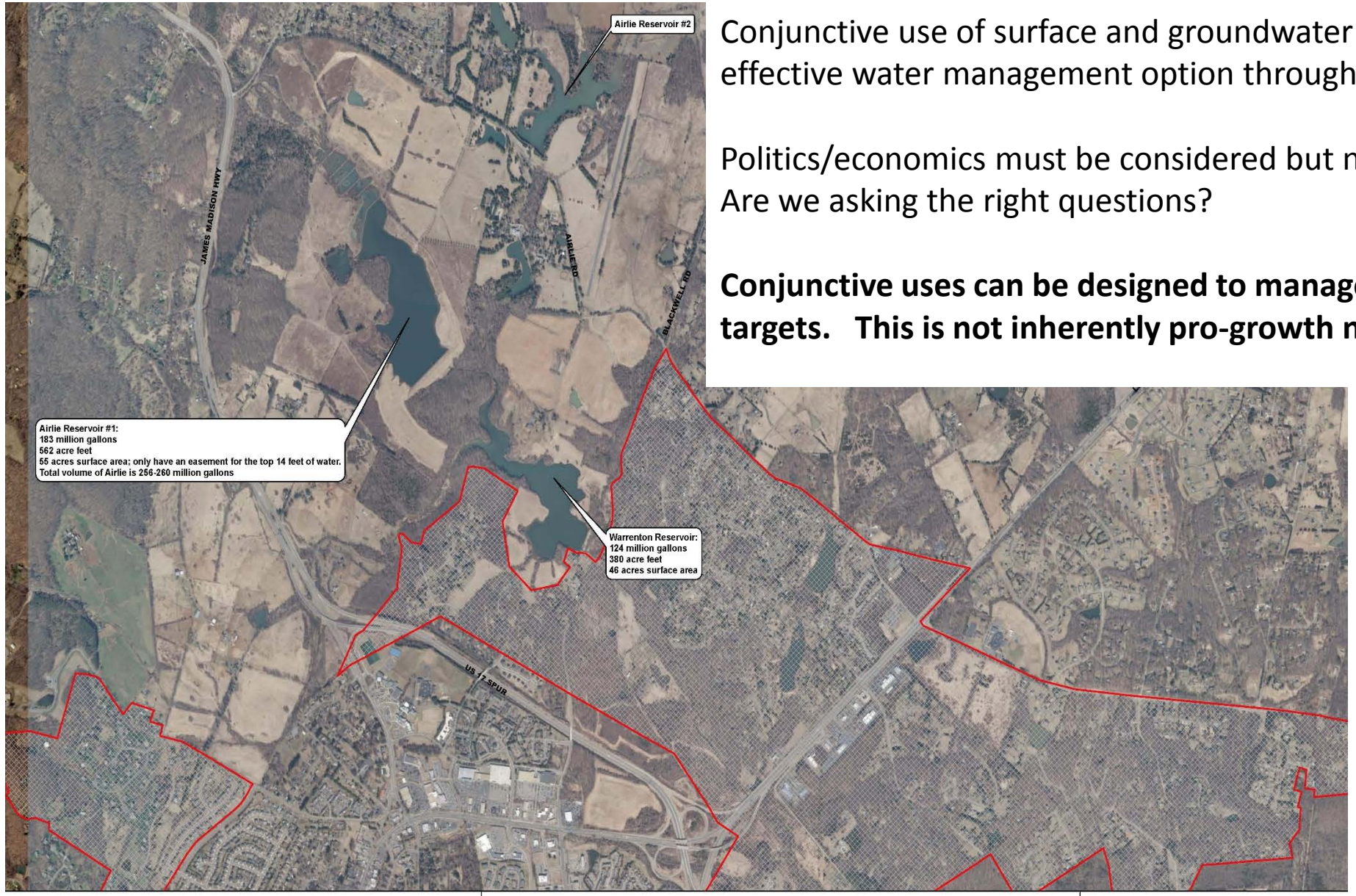
Options not currently addressed in Marshall:

Water treatment
Conjunctive groundwater and surface water
Water re-use
Punitive rate model
Wellhead protection

Conjunctive use of surface and groundwater is a viable and potentially effective water management option throughout Fauquier County.

Politics/economics must be considered but nature can provide the water. Are we asking the right questions?

Conjunctive uses can be designed to manage growth based on population targets. This is not inherently pro-growth nor is it anti-development!

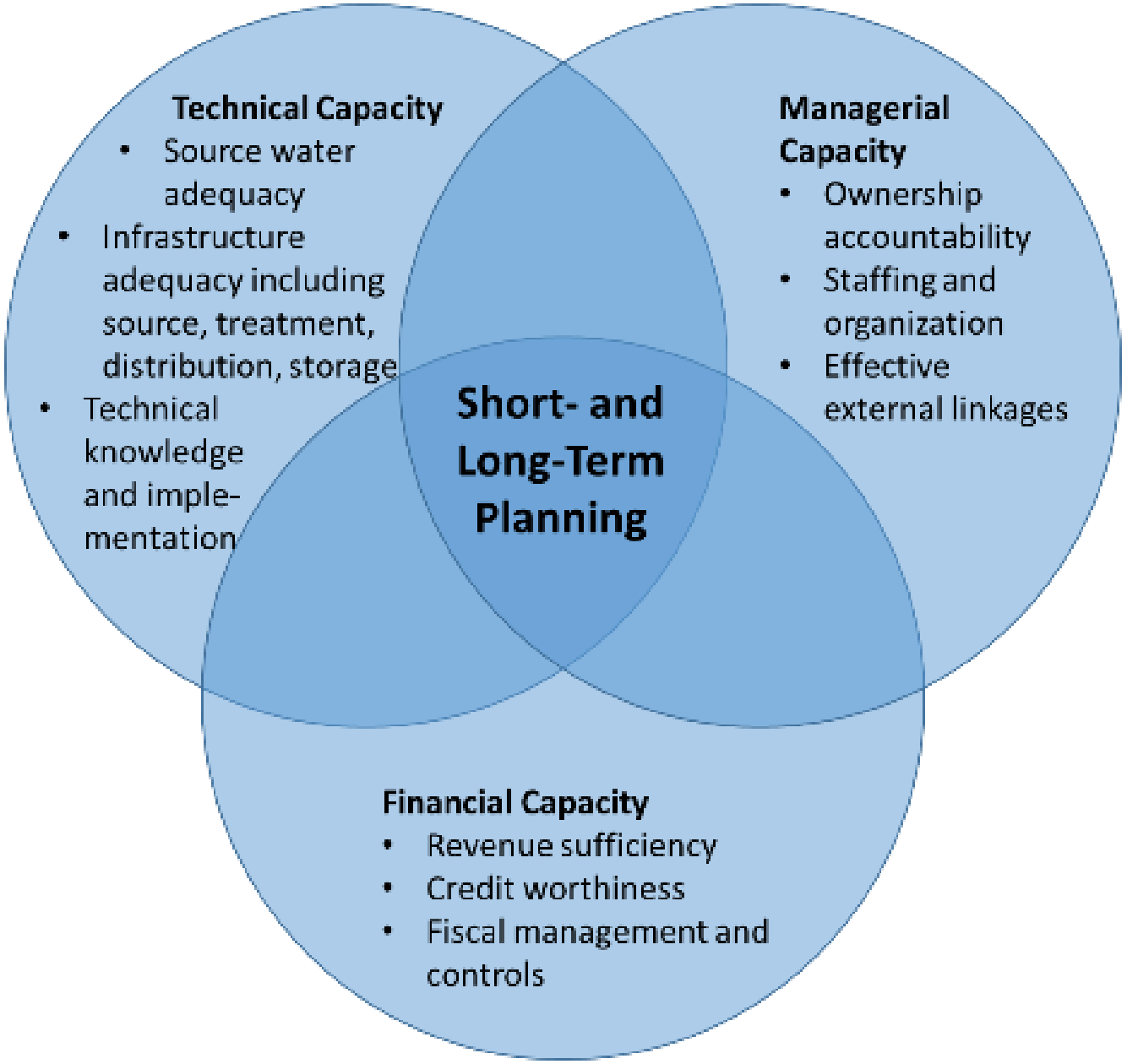


'N OF WARRENTON RESERVOIRS

Town of Warrenton

0 500 1,000 2,000 3,000 4,000 Feet

1 inch = 1,000 feet


Technical Capacity
• Source water adequacy
• Infrastructure adequacy including source, treatment, distribution, storage
• Technical knowledge and imple-mentation
Managerial Capacity
• Ownership accountability
• Staffing and organization
• Effective external linkages
Short- and Long-Term Planning
Financial Capacity
• Revenue sufficiency
• Credit worthiness
• Fiscal management and controls

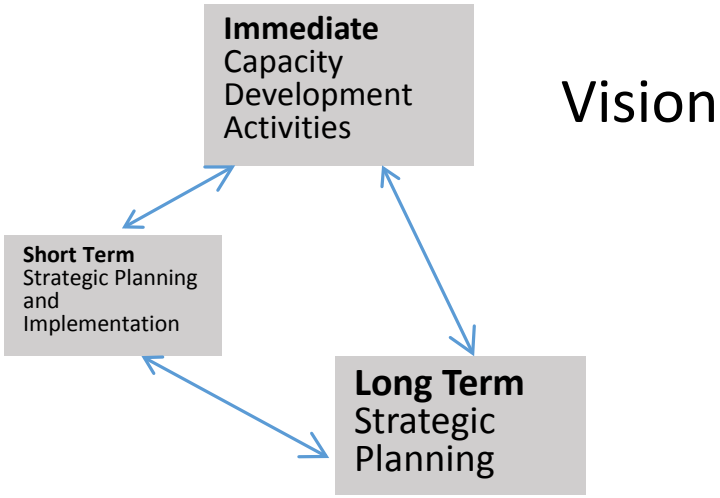
US EPA

Communities Working Together

Short and Long Term Water Management Planning depends on vision, creative solutions, and serious professional collaborations among all stakeholders including:

Potential stakeholders, representatives, or experts:

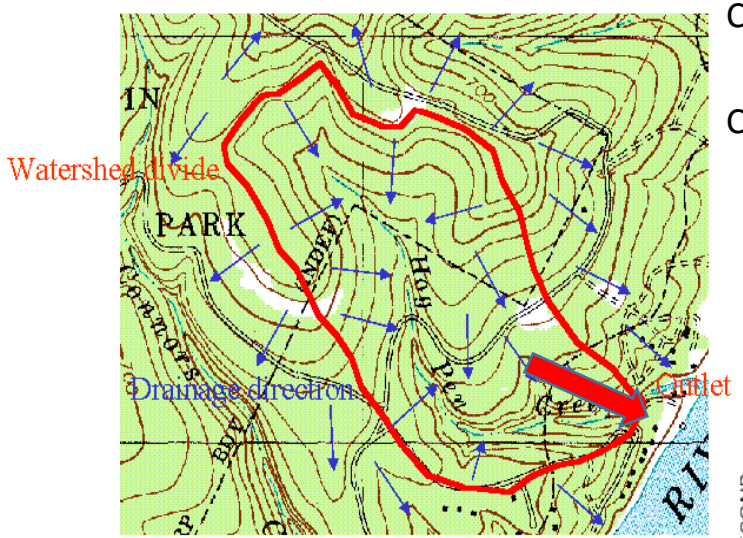
- Residents and business,
- Large landowners in the surrounding area,
- Land developers,
- Conservation groups,
- County community development,
- County land planners,
- County supervisors,
- WSA Board,
- Hydrogeologists,
- Water planners and managers



Vision

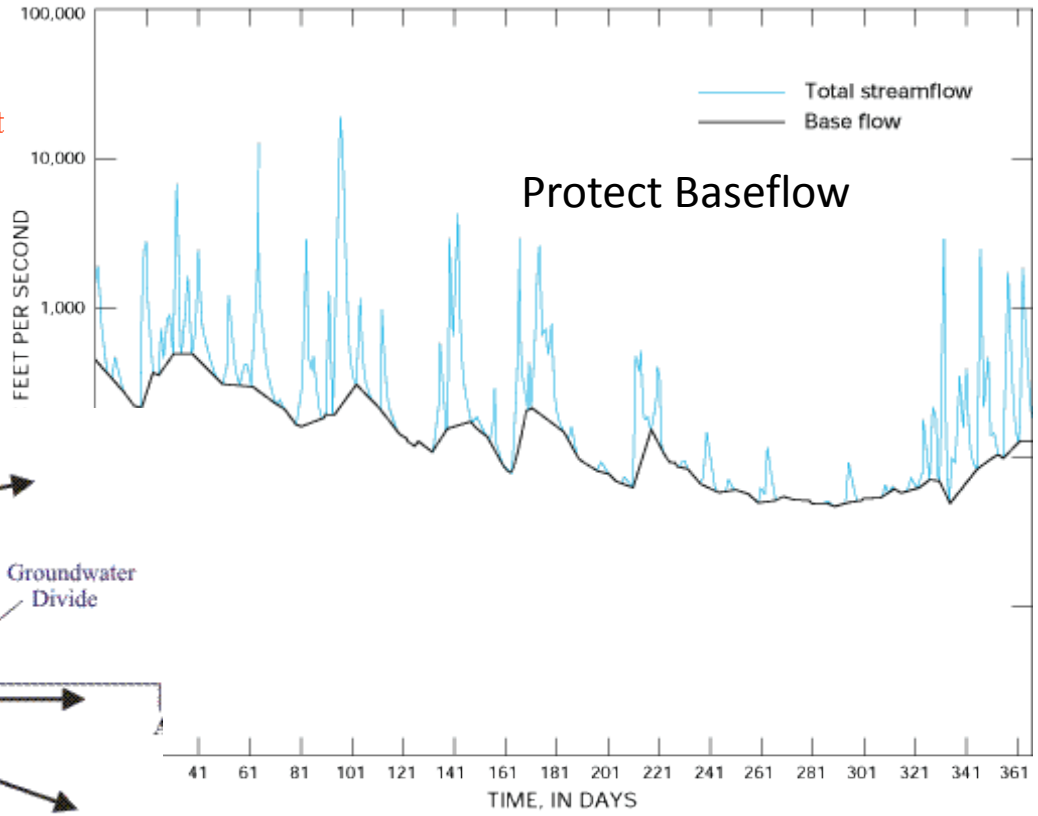
Conservation?

Protect Source-Water Quality

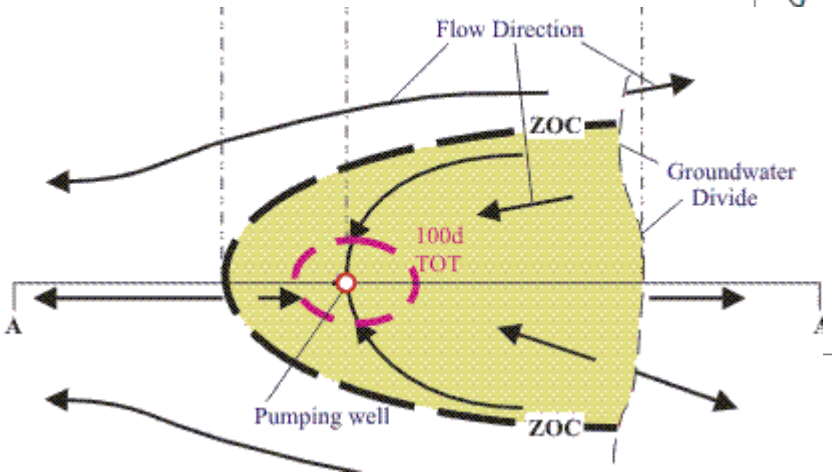


Can help to protect existing and future drinking water resources.

Can be done from a quantity as well as a quality perspective simultaneously or separately.

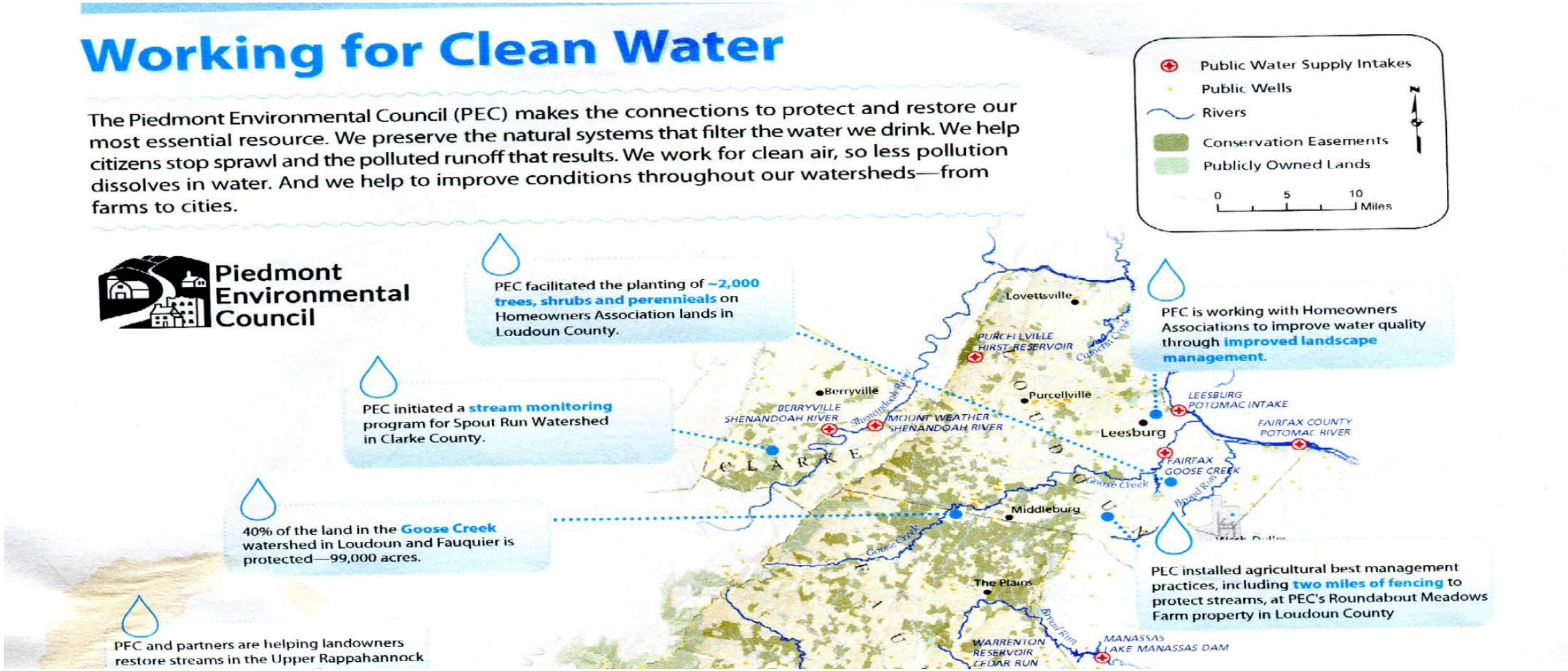


Protect Wellheads



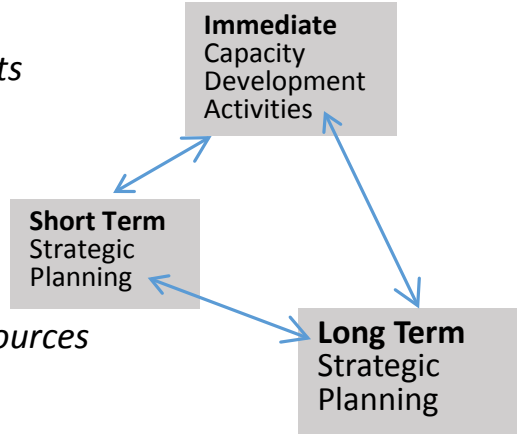
Conservation: Are there unexplored opportunities?

Are there opportunities for collaborative easements, PDRs, etc. that are based on principles of land stewardship with a *deliberate* focus on protection of *drinking water*?



Scoping Considerations for Cost/Benefit Analysis for Marshall

- A laundry list of ideas for short and long term needs

What are data and resource needs of staff and WSA Board?

- *Assess comparative costs/benefits of hydrogeologic exploration vs treating existing wells*
- *Assess comparative capital, operational, and maintenance costs for all conveyance and treatment infrastructure for the range of plausible scenarios*
- *Assess logistics and costs of conjunctive groundwater and surface water*
- *Assess administrative, legal, and other costs due to land purchases, environmental policies, regulations etc.*
- *Assess comparative cost/benefit ratios for a prescribed range of scenarios including conjunctive use, reuse water, treatment for a range of contaminants, purchasing water from neighboring counties, etc.*
- *Account for, and balance, all remaining Phase II and III improvements*
- *Assess monitoring well network costs and logistics*
- *Define data gaps and uncertainties in cost/benefit analyses*
- *Explore new conservation easements focused on drinking water resources*
- *Other?*