



Managing for the Future: Building Drought Resiliency and Reliability into Municipal Water Supply

May 4, 2023

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What is Resiliency?

“Reliable Source of Physical and Legal Water Supply...”

Physical Availability

- Well Yield
- Well Efficiency
- Source Redundancy
- Water Quality



What is Resiliency?

“Reliable Source of Physical and Legal Water Supply...”



STATE OF WASHINGTON
FINAL
REPORT OF EXAMINATION
FOR WATER RIGHT APPLICATION

Legal Availability

- Authorized Water Right Quantities
- Water Right Priority
- Instream Flow Rules, Groundwater Management Subareas, Federal Flow Targets (Chapter 173 WAC)
- Impairment (RCW 90.03.290 and RCW 90.44.060)
- Long-term Groundwater Trends (RCW 90.44.130)



Session Topics

Mitigation Suitability

Consumptive Use

Project Examples

- City of Mabton
- City of Tieton
- City of Kittitas

Mitigation Suitability

What is Mitigation Suitability?

“Mitigation means measures that offset adverse effects on a water source to eliminate impairment and/or detriment of the public interest”

- **Same Source of Water**
- **Hydraulic Continuity**
- **Impairment**
- **Availability**



What is Same Source?

Ecology Policy 2010:

Defining and Delineation of Water Sources

“To provide a consistent framework for determining the source of water in water resources permitting, rulemaking, and other administrative actions.”

Technical Considerations of Same Source

Surface waters and/or groundwater in hydraulic connection, meeting the following four conditions:

- 1. They share a common recharge area.**
- 2. They are part of a common flow regime.**
- 3. They are separable from other water sources by effective barriers to hydraulic flow.**
- 4. They are an independent water body for the purpose of water right administration, as determined by Ecology.**

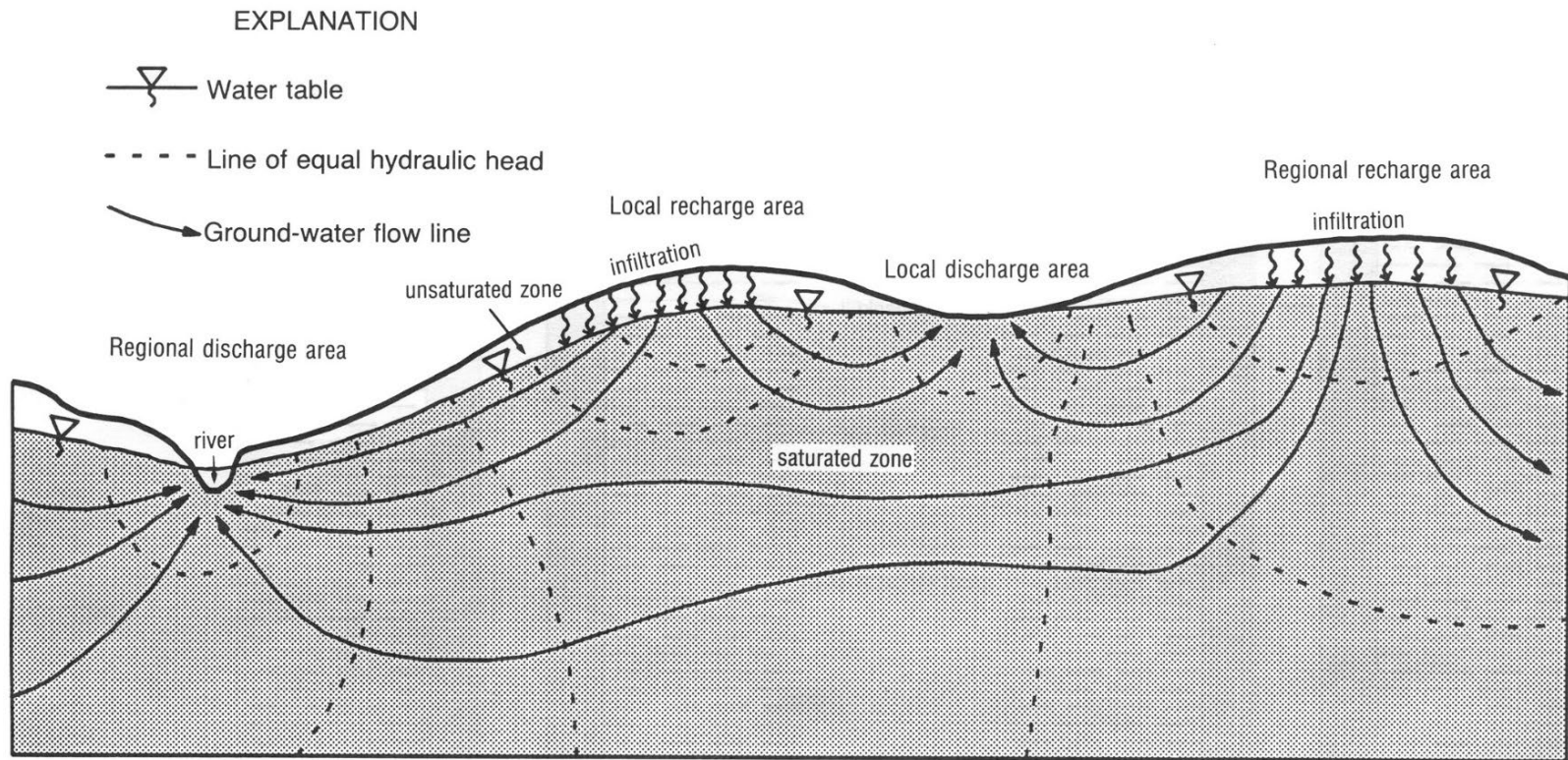
Technical Considerations of Same Source

Series	Group	Formation	Member	Isotopic Age (m. y.)	Magnetic Polarity		
Miocene	Upper	Saddle Mountains Basalt	Lower Monumental Member	6	N		
			Ice Harbor Member	8.5			
	Basalt of Goose Island			N			
	Basalt of Martindale			R			
	Basalt of Basin City			N			
	Buford Member			R			
	Elephant Mountain Member		10.5	R.T			
	Pomona Member		12	R			
	Esquatzel Member			N			
	Weissenfels Ridge Member						
	Basalt of Slippery Rock			N			
	Basalt of Tenmile Creek			N			
	Basalt of Lewiston Orchards			N			
	Basalt of Cloverland			N			
	Asotin Member		13				
	Basalt of Hurtzinger			N			
	Wilber Creek Member						
	Basalt of Lapwai			N			
	Basalt of Wahluke			N			
	Umatilla Member		13.5	N			
	Basalt of Sillusi			N			
	Basalt of Umatilla Member			N			
	Middle	Wanapum Basalt	Priest Rapids Member	14.5			
			Basalt of Lolo		R		
			Basalt of Rosalia		R		
			Rosa Member		T.R		
			Shumaker Creek Member		N		
			Frenchman Springs Member				
			Basalt of Lyons Ferry		N		
			Basalt of Sentinel Gap		N		
			Basalt of Sand Hollow	15.3	N		
			Basalt of Silver Falls		N.F		
			Basalt of Ginkgo		E		
			Basalt of Palouse Falls		E		
			Eckler Mountain Member				
			Basalt of Dodge		N		
			Basalt of Robinette Mountain		N		
			Vantage Horizon				
			Lower	Grande Ronde Basalt	Member of Sentinel Bluffs	15.6	N ₂
					Member of Slack Canyon		
					Member of Field Springs		
					Member of Winter Water		
					Member of Umtanum		
					Member of Ortlei		R ₂
		Member of Armstrong Canyon					
		Member of Meyer Ridge					
		Member of Grouse Creek					
		Member of Wapshilla Ridge					
		Member of Mt. Horrible				N ₁	
		Member of China Creek					
		Member of Downey Gulch					
		Member of Center Creek					
		Member of Rogersburg					
		Member of Teepee Butte		R ₁			
		Member of Buckhorn Springs	16.5				
		Imnaha Basalt			R ₁		
					T		
					N ₁		
				17.5	R ₂		

Nomenclature of the Columbia River Basalt Group (from Reidel and others, 2002)

What is Hydraulic Continuity

“...the interconnection between groundwater (aquifers) and surface water sources.”



Source: Indiana Geological Survey, Hydrogeologic Framework

Why is Hydraulic Continuity Important?

- **RCW 90.44.030**

Chapter not to affect surface water rights.

“...any underground water is part of or tributary to the source of any stream or lake“

- **RCW 90.54.020(9)**

Full recognition shall be given in the administration of water allocation and use programs to the natural interrelationships of surface and ground-waters

- **Postema v. PCHB (2000)**

Groundwater permits may be denied based on impacts on instream flows

- **Swinomish v. Ecology (2013)**

Instream flow rights are entitled to impairment protection



- **Foster v. Yelm (2015)**

Stream depletion must be mitigated with in-kind and in-time mitigation

- **Hirst v. W. Wash. Growth Mgmt. Hearings Board (2016)**

GMA requires consideration of exempt well impacts on instream flows

When is Hydraulic Continuity Important



- **New Appropriations**
- **Surface to Groundwater transfers**
- **Impairment analysis**
- **Mitigation requirements**
- **Exempt well availability determinations**

What is Impairment?

- Senior water rights
- Instream Flows
- Native American Time Immemorial Water Rights
- ESA-listed species*
- Water Quality (TMDL)*
- *“Recency” Test**

* Under the Public Interest test



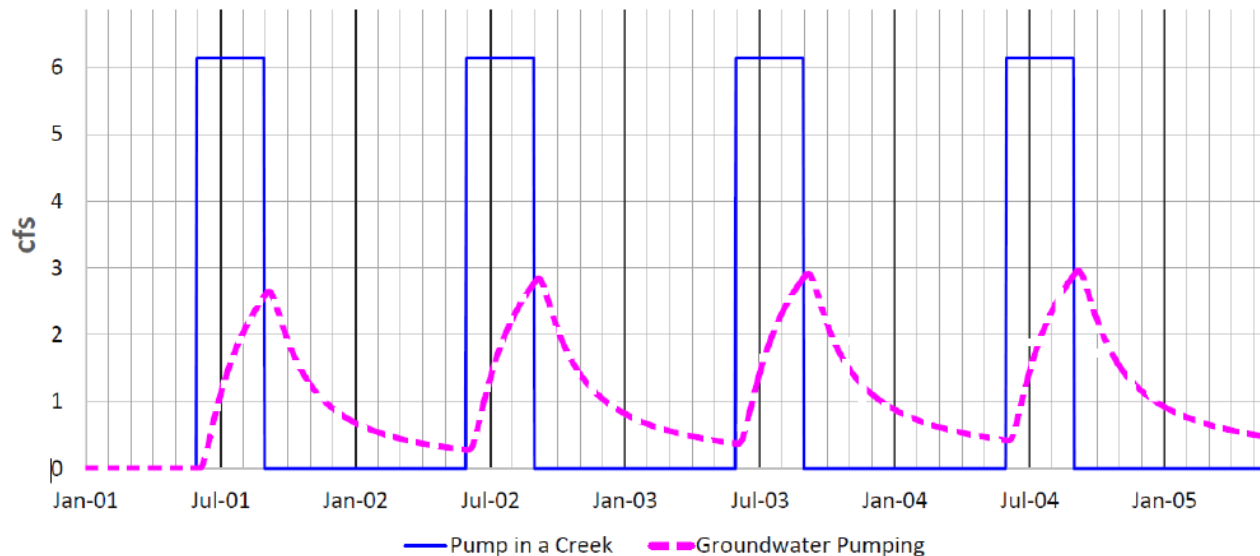
Focus on: Foster v. Ecology

“Mitigation must be in time, in kind, and in place”

■ Ecology’s focus sheet (Publication 20-11-083)

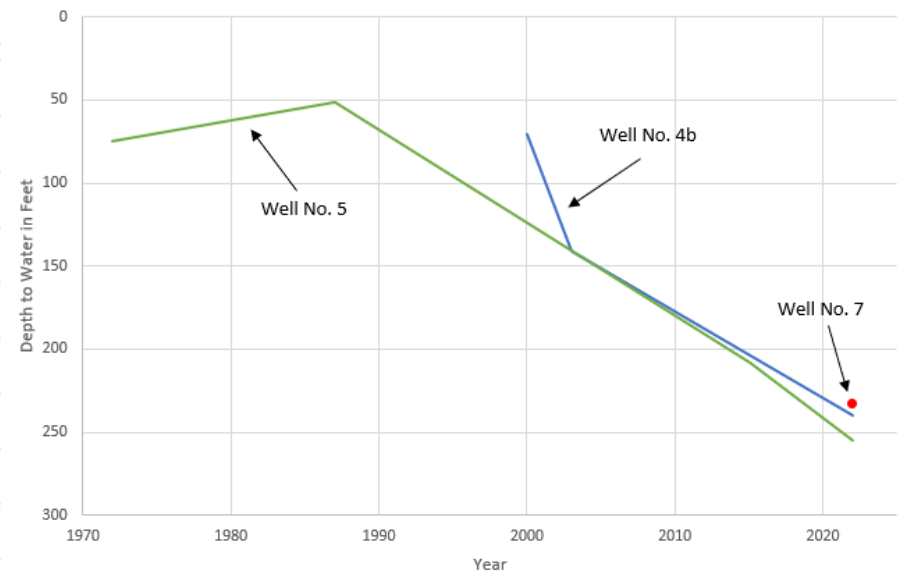
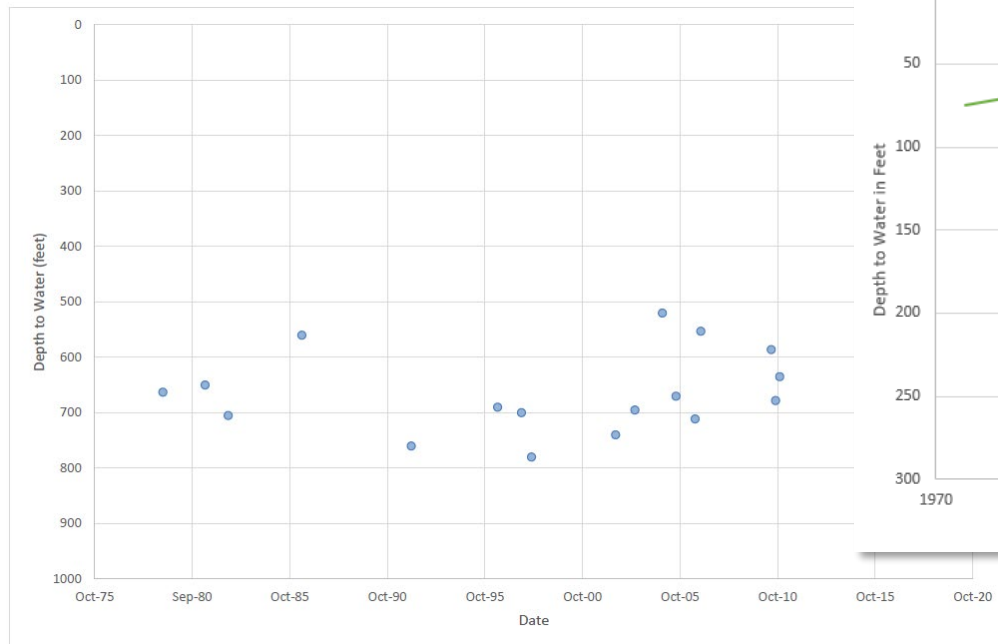
■ Implications:

- Water Right Change Applications
- Mitigation Packages
- Water Banks
- Overriding Consideration of Public Interest
- Streamflow Restoration Projects

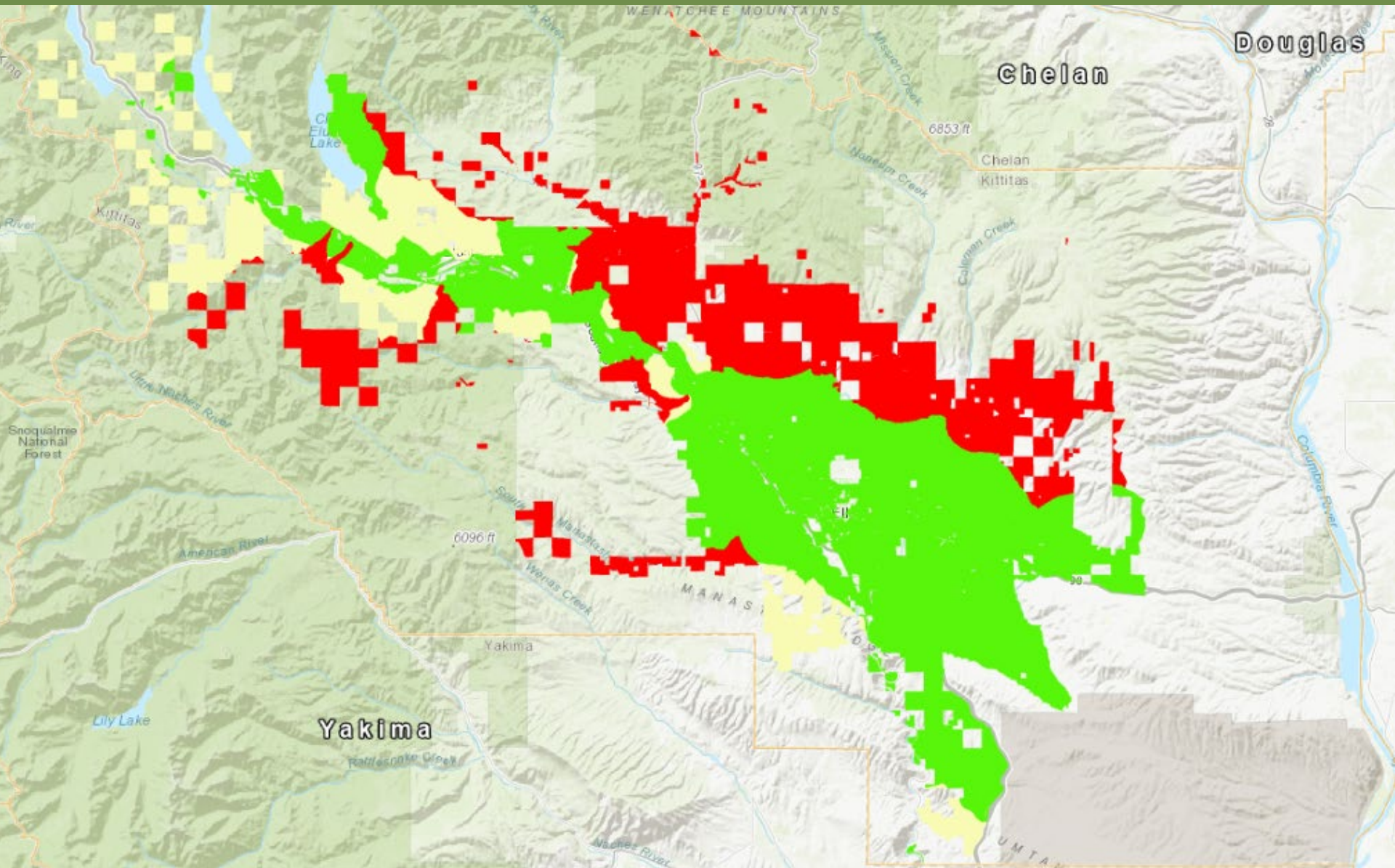


What is Legal Availability?

“...shall administer the groundwater rights...and it shall have the jurisdiction to limit withdrawals by appropriators of groundwater so as to enforce the maintenance of a safe sustaining yield from the groundwater body.”



Mitigation Suitability – Kittitas County



What Makes the Yakima Basin Unique?

- Senior water rights – *Acquavella Adjudication*
- Instream Flows – *Total Water Supply Available*
- Native American Time Immemorial Water Rights – *Yakama Indian Nation*
- ESA-listed species – *Major Tributary to the Columbia River*
- Yakima Basin Project – *Agriculture; Reservoirs*

These factors contribute to a high degree of water portability via collaboration with Basin Stakeholders.

What Makes the Yakima Basin Unique?

Water Transfer Working Group

- *Washington State Department of Ecology*
- *Yakama Nation*
- *Bureau of Reclamation*
- *Washington State Department of Fish and Wildlife*
- *Other Major Claimants (Irrigators, Municipalities)*

The “Box” Checklist

- *Provides Evaluation Criteria*
- *Water Budget Neutral*
- *“...no adverse change to instream flow”*

WTWG “Box” Checklist	YES	NO
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1. Validity

Is there continued beneficial use history sufficient to ensure that the right has not been relinquished or abandoned?		
Is it free of any “cloud” or claim on the title of the water right?		

2. Water Budget Neutrality

Is the transfer water budget neutral?		
Is the transfer TWSA (Total Water Supply Available) neutral?		
Does the transfer of the right result in equal or less consumptive use?		
Can the transfer be made without detriment or injury to existing rights? (RCW 90.03.380(1))		

3. Timing and Availability

Temporary Transfers: If a seasonal transfer, can the transfer be implemented in the time remaining in the season?		
Permanent Transfers: Is there a map of the fallowed land or discontinued use and can it be confirmed?		

4. Impairment of instream flow

Does the transfer cause no adverse change to instream flows?		
Is all the water accounted for at Parker and Prosser (if applicable)?		

5. Operational Considerations

If the transfer relies on space in existing Reclamation storage, is storage capacity available?		
Can the transfer be “bucketed”, with different rate and timing, without adverse impacts on other users and fish and other aquatic life?		
Does the transfer have no impermissible impact on Yakima Project operations?		

6. For Transfers Between Surface Water and Ground Water

Can the hydrologic impacts of the transfer be accurately evaluated?		
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7. Other considerations

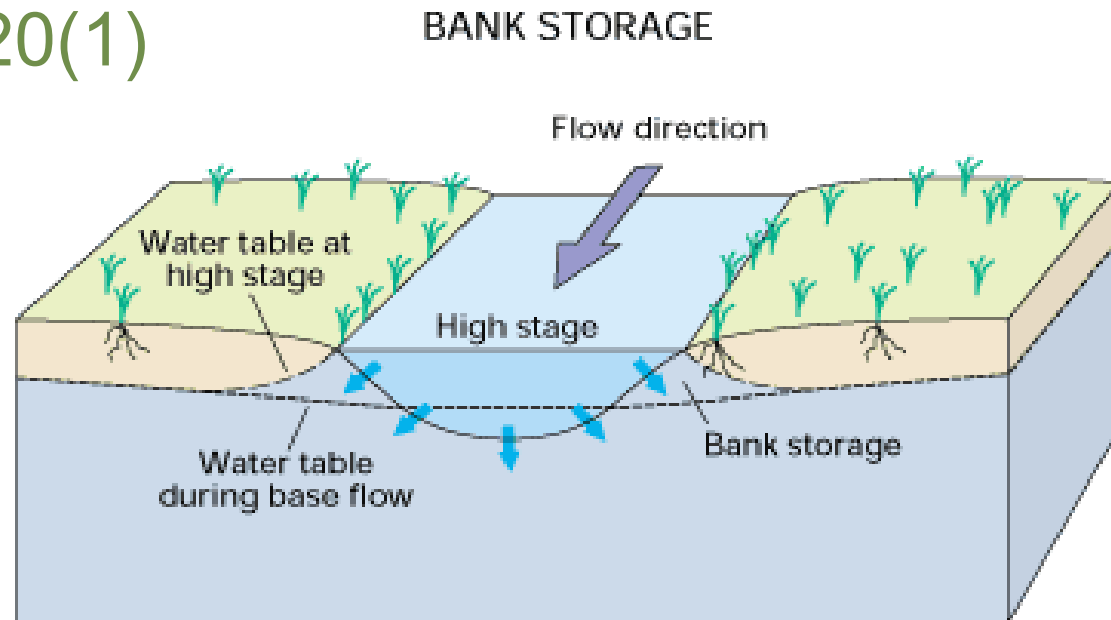
Is the transfer in agreement with public policy?		
Is the transfer free of unacceptable secondary effects – economic, environmental, or cultural?		
Does the transfer not rely on return flow?		

Revised Final February 19, 2009

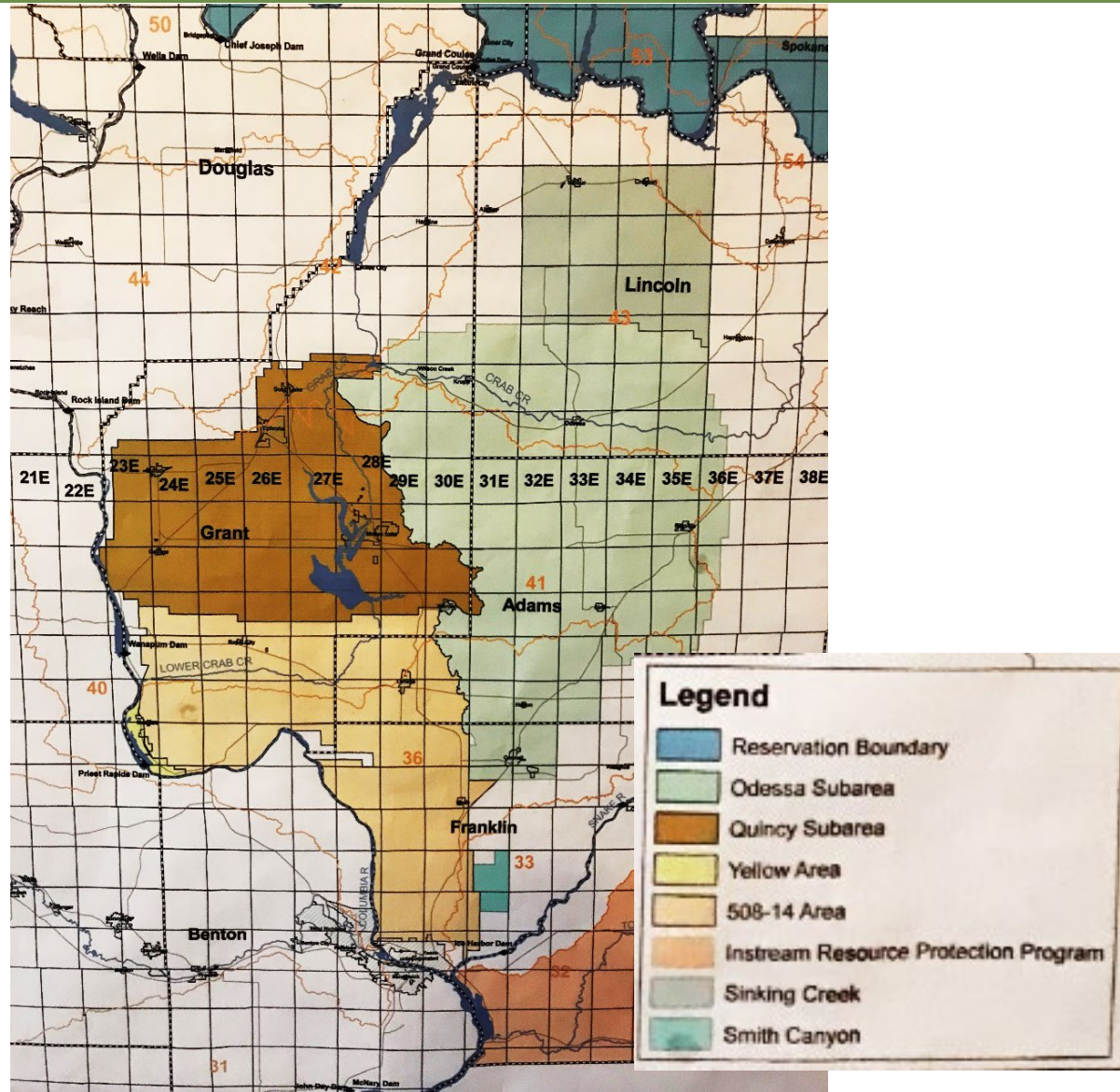
What Makes the Columbia River Unique?

- **Chapter 173-563 WAC**
- **Consultation-based**
WAC 173-563-020(4)
- **“Significant and direct impacts”**
WAC 173-563-020(1)

- **Bank Storage**



What Makes the Columbia Basin Unique?



What Makes the Columbia Basin Unique?

- **Columbia Basin Project** – *Large amount of imported surface water. Over appropriation of natural groundwater. Commingling of natural and artificially stored groundwaters.*
- **Chapter 173-130A WAC** – *Odessa Groundwater Subarea Management Policy*
- **Chapter 173-134A WAC** – *Quincy Groundwater Subarea Management Policy*
- **Chapter 508-14 WAC** – *Columbia Basin Project - Groundwater*

These factors contribute to increased management (and permitting) of groundwater resources.

Consumptive Use

Why Do We Care?

- **Annual Consumptive Quantity (ACQ)** RCW 90.03.380(1)
- **Impairment** RCW 90.03.380(1)
- **Trust Water** RCW 90.38 and RCW 90.42
- **Mitigation** RCW 90.03.255



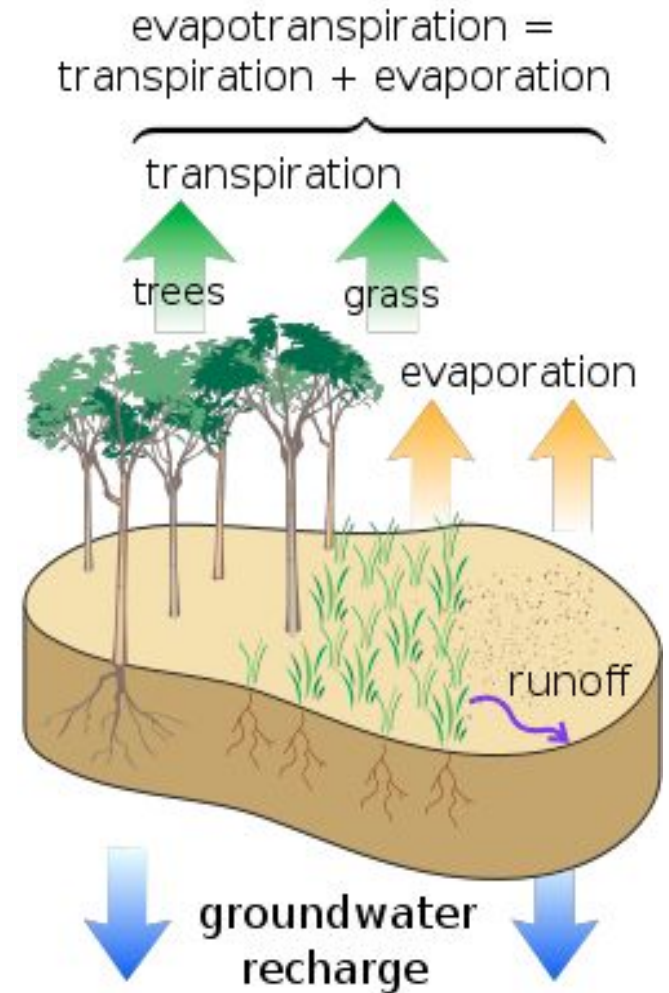
Photo Credit: Duckboy Postcards

Definition

Consumptive Use (CU) –
Consumptive use includes crop
evapotranspiration, and water
evaporated during irrigation
application (e.g., spray, canopy, and
wind losses.

*“...means use of water whereby there
is a diminishment of the water
source.”*

$$\%CU = Ea + \%Evap$$
$$CU = TIR * \%CU$$



Irrigation Spreading Example

- I buy 40 acres of apples with microspray in Yakima and want to transfer them to grapes in Prosser on drip.
- **Consumptive use for apples:**
 - Washington Irrigation Guide Yakima, CIR = 3.5 ac-ft/acre
 - Microspray = 85% efficient, 95%CU, 5%RF
 - $TIR = 3.5 / 0.85 = 4.1$ ac-ft/acre
 - $Consumptive\ use = 4.1 \times 0.95 = 3.9$ ac-ft/acre
 - $Return\ flow = 4.1 - 3.9 = 0.2$ ac-ft/acre
- **How many grape acres?**
 - Prosser grapes = 1.5 ac-ft/acre consumptive use (WIG)
 - Drip irrigation = 100% efficient, 100% consumptive
 - $New\ acres = 3.9 / 1.5 \times 40\ acres = 104\ acres$

Domestic Water Budgets

Historic Direct Measurement Data of Indoor CU is Difficult...

USGS Circular 1200, Estimated Use of Water in the United States in 1995 (USGS, 1995)

- 20 Percent CU for Domestic-Commercial

Upper Kittitas County Groundwater Rule (WAC 173-539A-050(3))

- 30 Percent CU – Septic tank and drain field
- 20 Percent CU – Treatment plat and discharge to surface water

Ecology Guidance 2094 – Streamflow Restoration

- 10 Percent CU – Septic Tank
- Permit-Exempt Only

Timing and location of sewer return flows are important.

City of Mabton

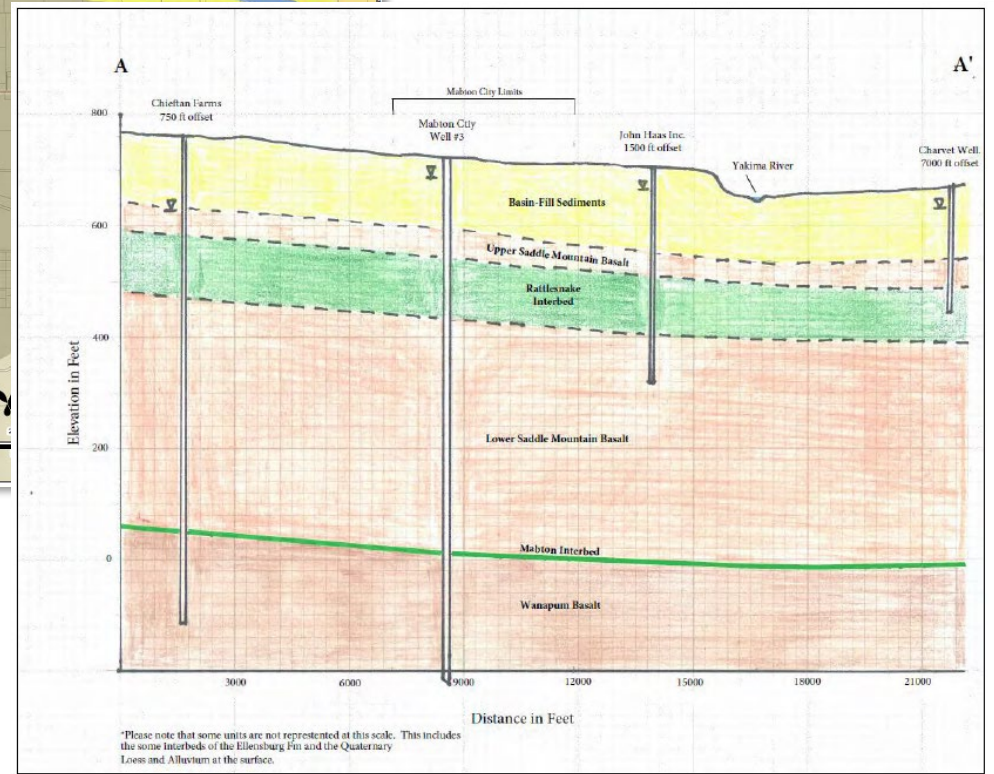
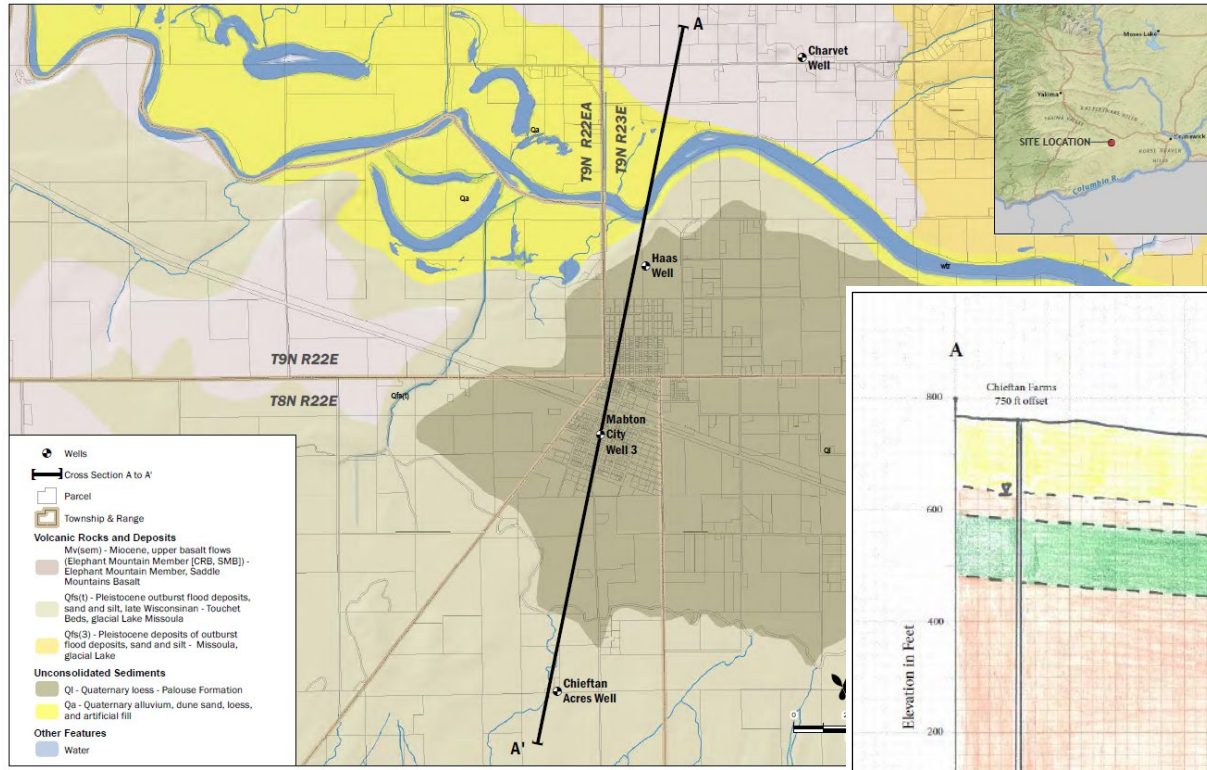
Case Study – City of Mabton

- Water rights are fully allocated
- Existing groundwater rights
 - Junior (post-1905) Priority Date
 - Poor Water Quality
 - Regional Declining Groundwater



City of Mabton Water Rights					
Source	Water Right Number	Type	Priority Date	Maximum Instantaneous Withdrawal (gpm)	Annual Withdrawal (Acre-Feet)
Well Nos. 2 & 3	G3-00027C	Certificate	3/3/1971	1,400	280 ⁽¹⁾
Well No. 4	G4-29212C	Certificate	2/24/1987	1,000 ⁽²⁾	452.4 ⁽²⁾
Well Nos. 4 & 5	CG4-29212C	Change Cert./ROE ⁽³⁾	4/27/2004	--	--
Subtotal (Sources used in City's water system)				1,000 ⁽²⁾	452.4 ⁽²⁾
Other:					
WWTF Well ⁽⁴⁾	G3-00381C	Certificate	6/2/1972	15	2
Total				2,415	454.4

City of Mabton



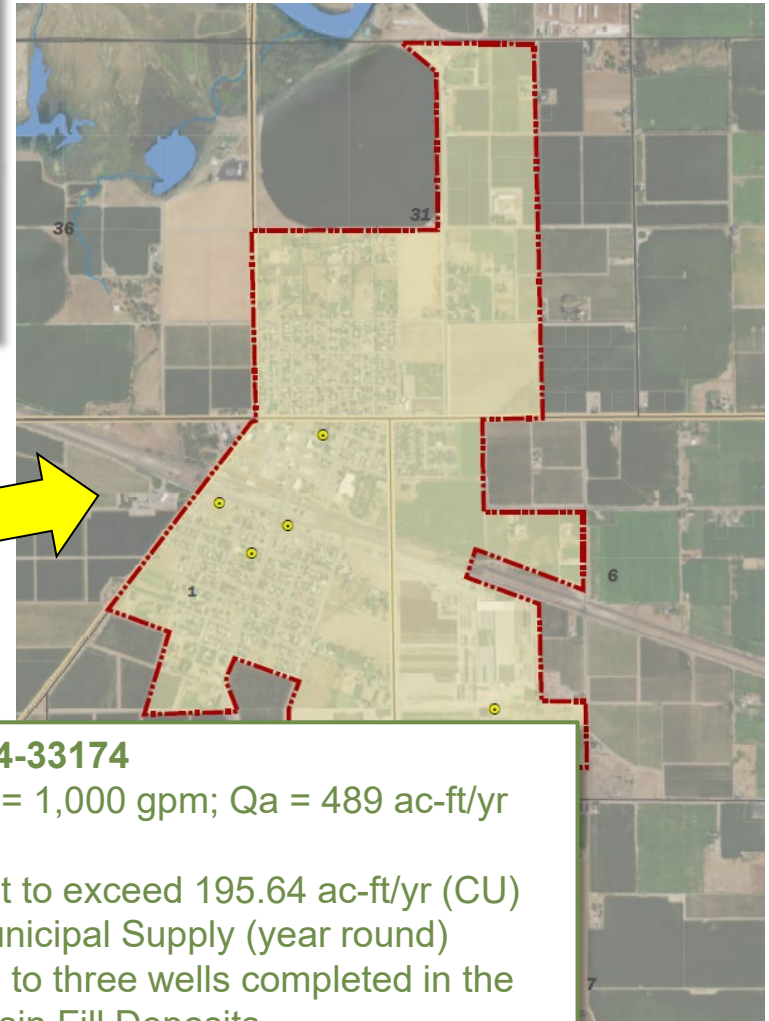
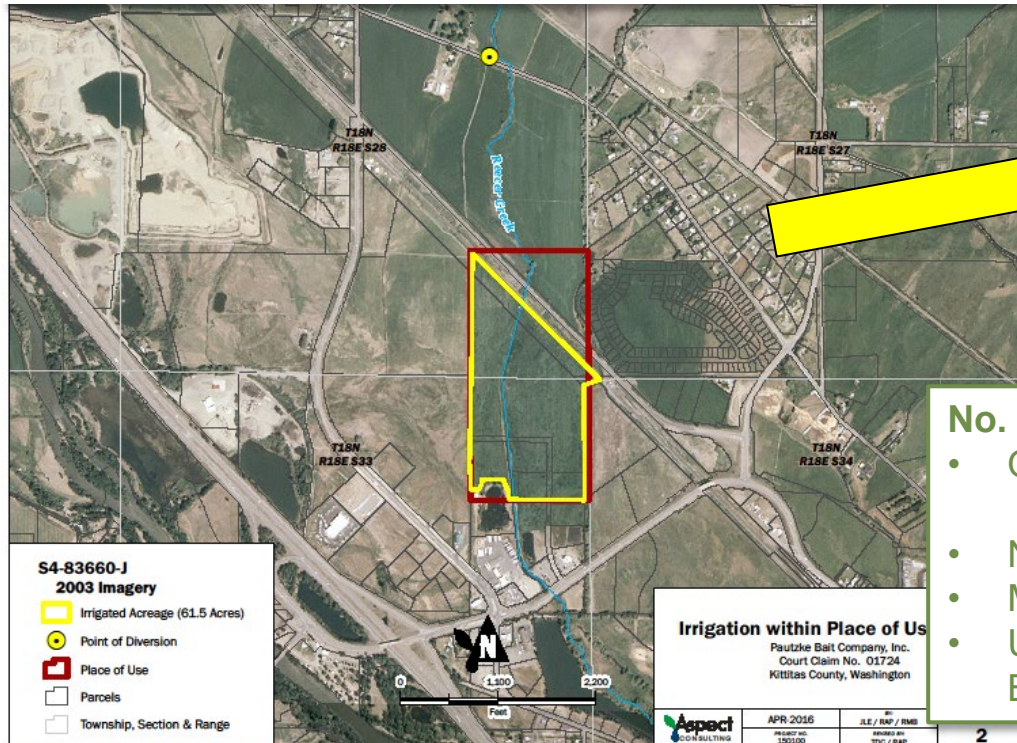
City of Mabton

Table 2 – Total Irrigation Requirement (TIR)

	Unit	May	Jun	Jul	Aug	Sep	Oct	Total
Qa	acre ft.	65.03	143.70	196.89	157.15	89.51	12.84	665.11
Average Qi	cfs	1.06	2.42	3.20	2.56	1.50	0.21	-

Table 3 – Consumptive Use (Secondary Reach)

	Unit	May	Jun	Jul	Aug	Sep	Oct	Total
Qa	acre ft.	19.13	42.27	57.91	46.22	26.33	3.78	195.64
Average Qi	cfs	0.31	0.71	0.94	0.75	0.44	0.06	-



Source: USDA-FSA-APFO NAIP Mosaic, 2003

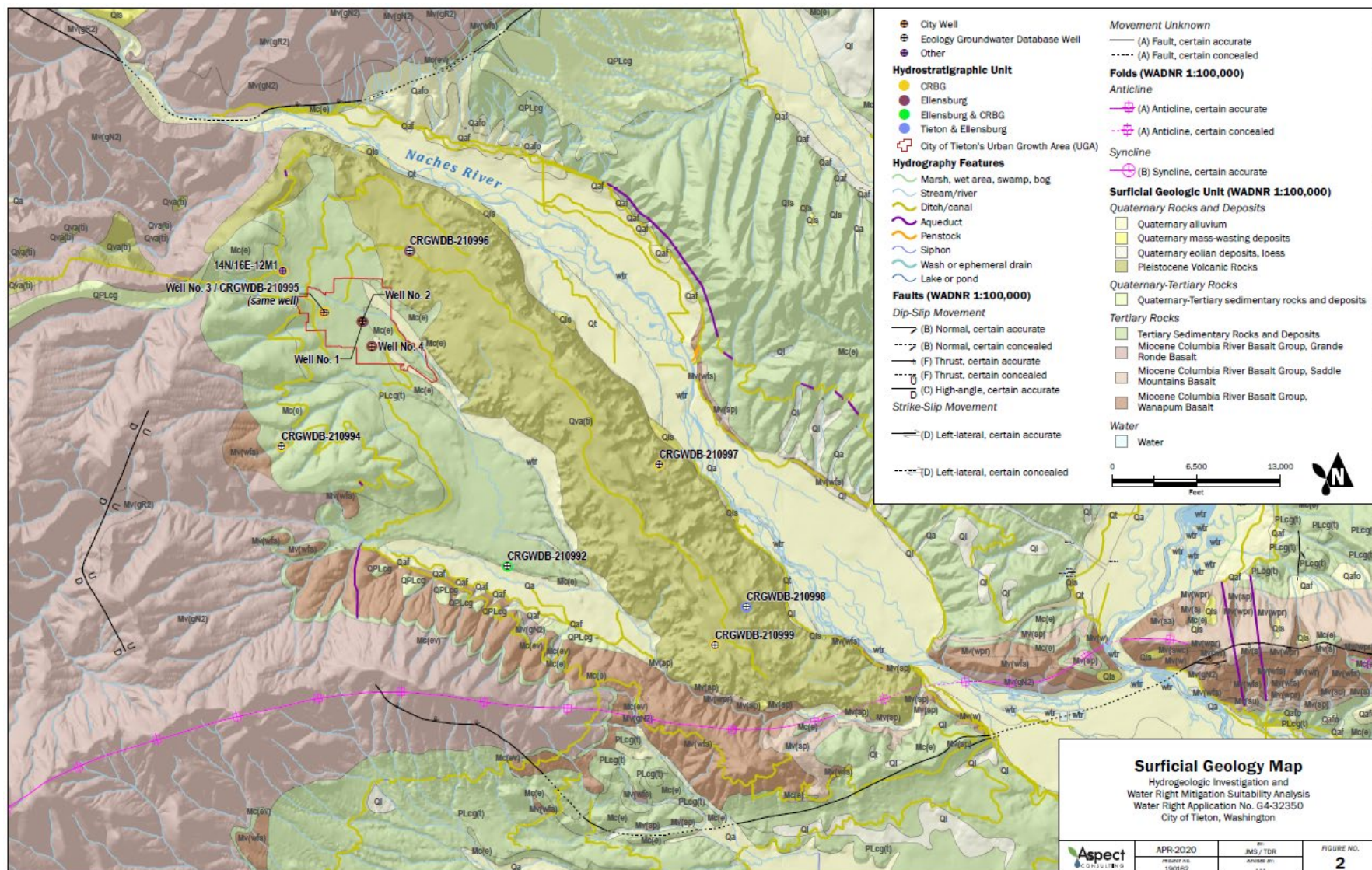
City of Tieton

Case Study – City of Tieton

- **New Water Right Application** submitted in August 1995
- **Ecology's Targeted Application Processing (TAP)**
 - Withdrawal Application
 - Process Application (likely denial)
 - Submit Mitigation Plan
- **Mitigation Suitability**
 - Mitigation for Administrative Bodies of Groundwater
 - Hydraulic Continuity with the mainstem Yakima River
 - Impairment and Availability



City of Tieton



City of Tieton



City of Tieton

- Purchases 40 acre-feet (CU) of Mainstem Yakima River Water Right
- Permit for 20.19 acre-feet (CU) assuming 20% CU for $Q_a = 100.95$ acre-feet (indoor use)
 - 19.81 acre-feet (CU) in the “Bank”
- Implementation of a Metering Program to determine %CU
- Future Permit will be reflective of city-specific indoor %CU

City of Kittitas

City of Kittitas

- **Established in 1883**
- **Water Supply authorized by two 1932 groundwater claims**
 - Railroad and City Wells
 - Current used as Emergency Backup
- **Primary Water Supply from Warm Springs Water Company**
 - Temporary Lease
 - Post-1905 water right



City of Kittitas

■ Two Water Right Change Applications with the local Water Conservancy Board

- Tentative Determination of Extent and Validity
- Consolidate Existing Wells + New Well

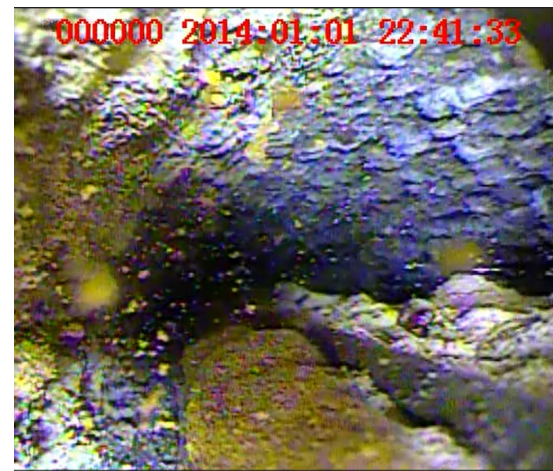
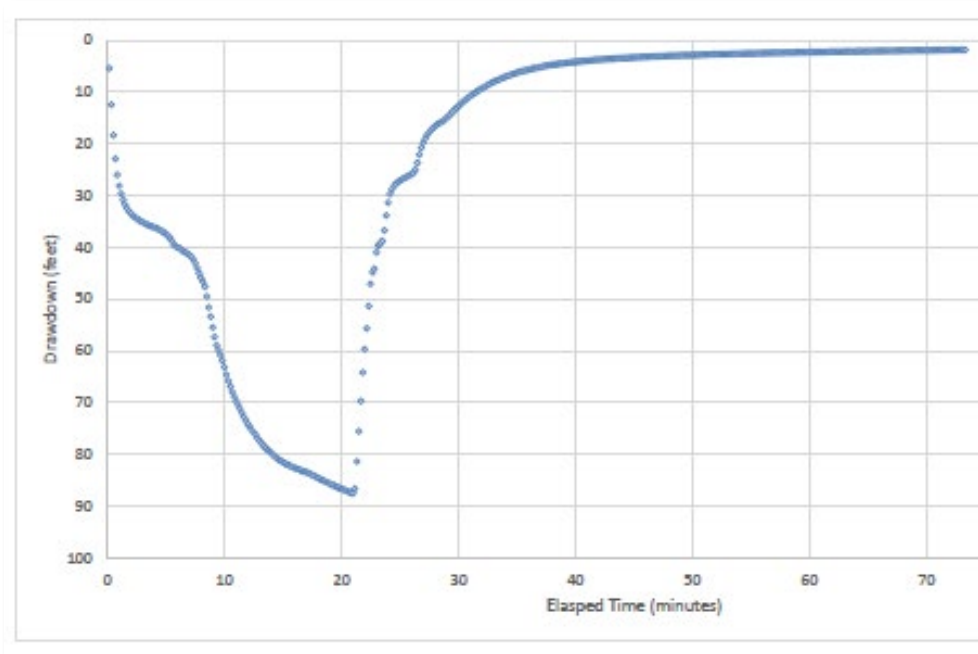
■ Partnership with Kittitas County

- Acquisition of additional water
- Water Banking Grant Proviso (\$660k)
- New Mitigated Water Right (>280 acre-feet (CU))
- City-specific %CU
- Mitigation Suitability Map



Permit Certificate or Claim #	Name of Right Holder or Claimant	Priority Date	Source Name/ Number	Additive or Non-additive	Existing Water Rights	
					Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
Permits/ Certificates						
Certificate of Change	Warm Springs Water Co.	Pre 1917	Warm Springs	Additive	1.44 cfs (650 gpm)	Not specified
Claims						
300951 (1998)	City of Kittitas	1932	RR Well	NA	300	484
300952 (1998)	City of Kittitas	1932	City Well	NA	600	967

City of Kittitas



Questions?



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