



City of Santaquin Utah Reuse Program

Trevor R. Lindley, P.E. – Brown and Caldwell

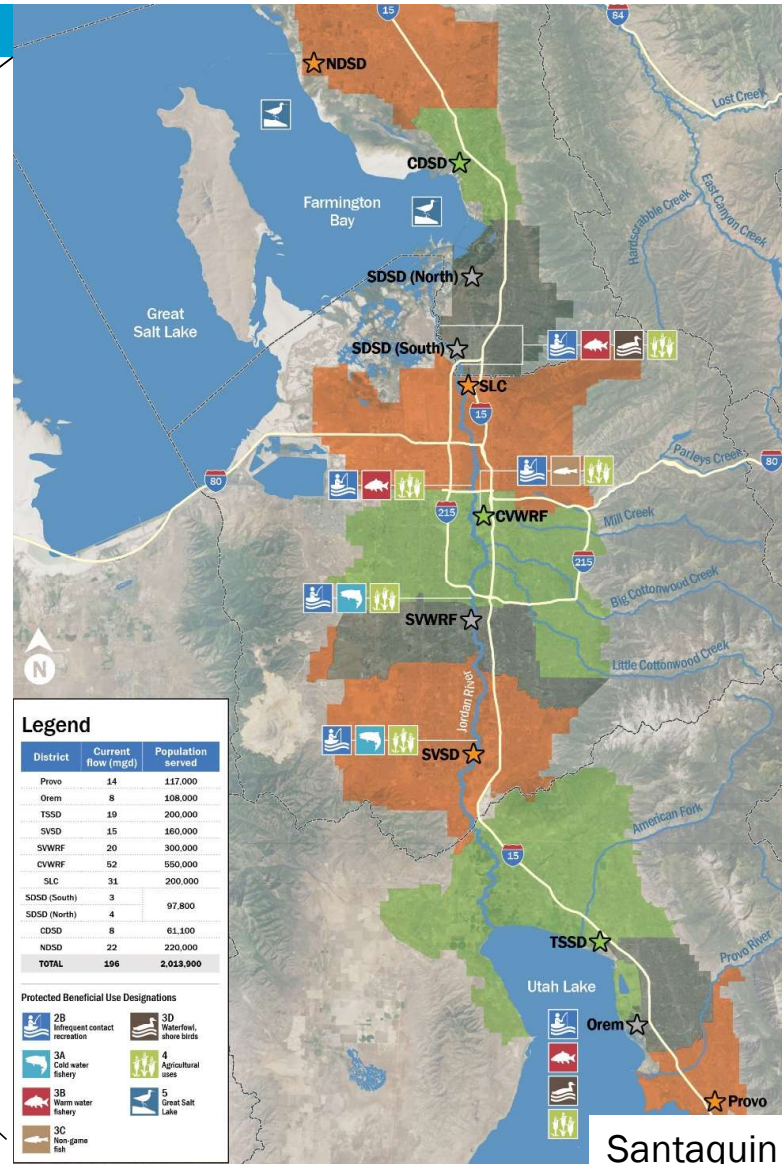
Norm Beagley, P.E. – Santaquin City



In the spirit of full disclosure...

- First speaker
 - Engineer of Record – Santaquin WRF (treatment side)
 - While at J-U-B Engineers; 2006-2014
 - Now employed at Brown and Caldwell, SLC
- Second speaker
 - Engineer of Record – Santaquin WRF (offsite facilities)
 - While at J-U-B Engineers; 2006-2014
 - Currently City Engineer – Santaquin City

The lay of the land...



...and why its important

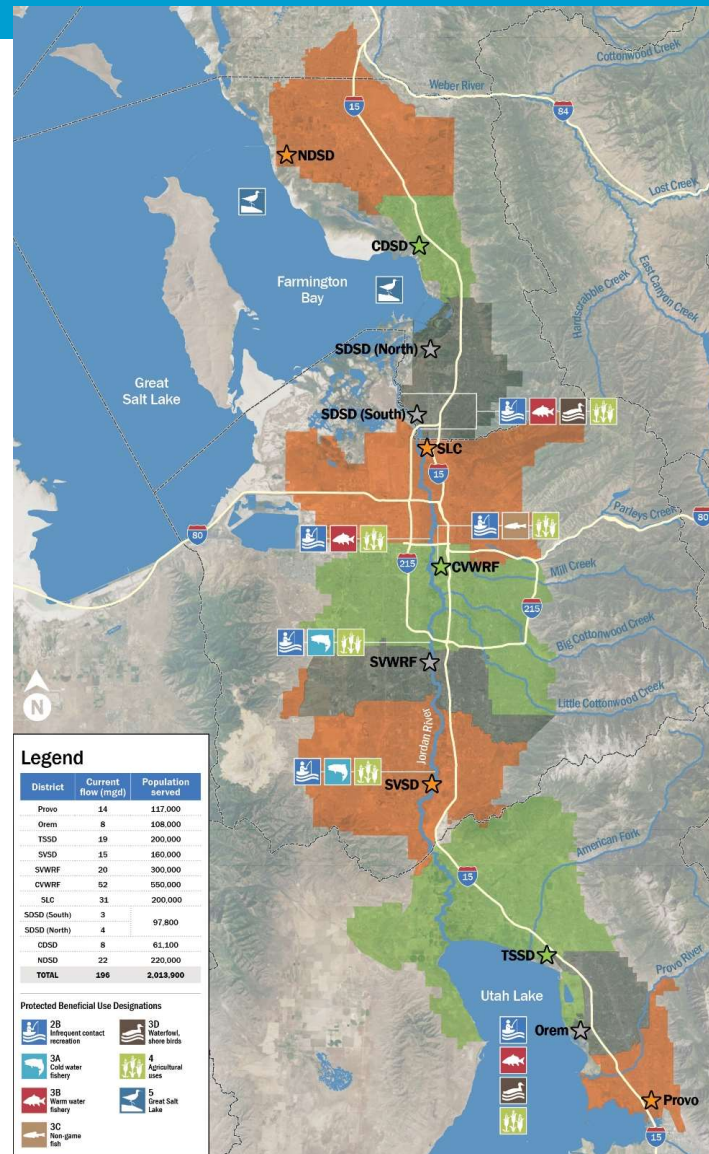
1995 Conservation and Use of Sewage Effluent Act

- Upstream water right holders maintain the water rights

Great Salt Lake

- Terminal inland salt sea
- Facing challenges similar to other resources that have 'dried up'

Brown and Caldwell



Utah Lake

- Active phosphorus TMDL
- Public scrutiny due to algal blooms

Reuse framework – water quality perspective

Design Criteria	Type I	Type II
Public contact	Likely	Not likely
Treatment level	Tertiary (filtration)	Secondary
Turbidity, NTU	Average < 2 If > 5 then alternative discharge or disposal is required	-
BOD, mg/L	< 10	< 25
TSS, mg/L	(turbidity intent is < 5 mg/L TSS)	< 25/35
E-coli org/100 mL	Median - Non detect No sample > 9	< 126



Santaquin, UT

- Strong growth (1995-2007)
- Lagoon system out of capacity
- After some ‘challenges’ the City elected to move forward with a full reuse system

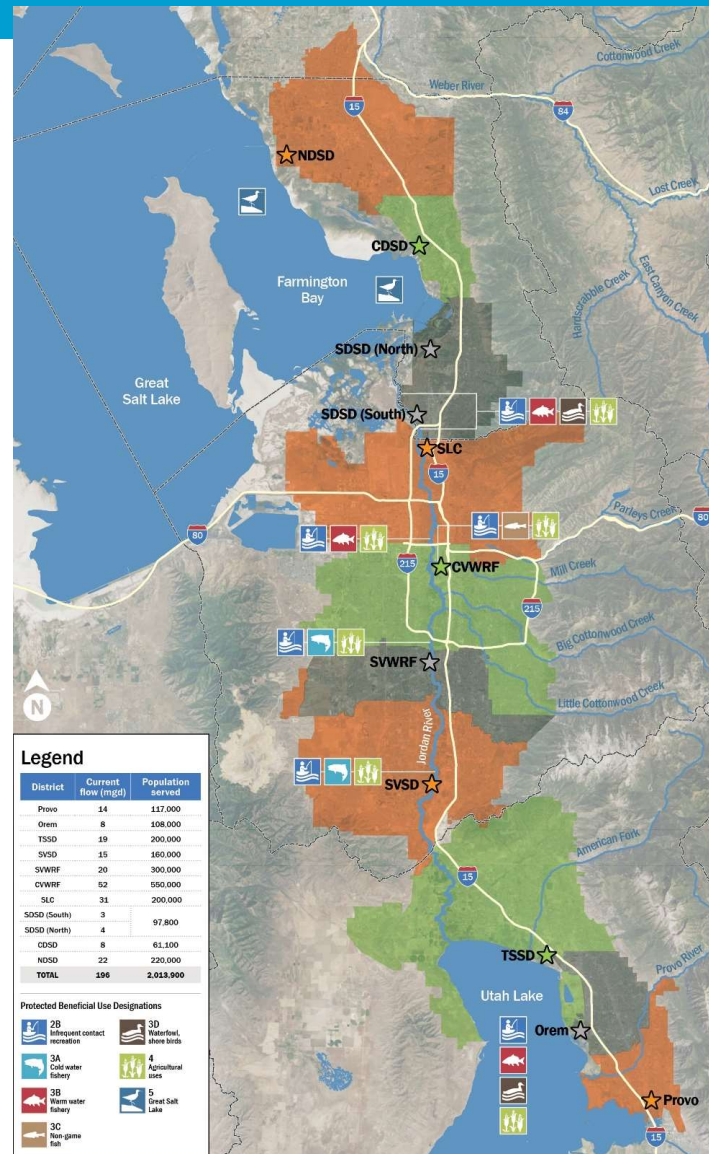
Santaquin WRF had higher initial cost...and more long term benefits

Option Description	20 Year Life Cycle	Adds to water supply portfolio	Gets away from Utah Lake discharge?	Meets City land use planning objectives
1. Regionalize with nearby facility	\$23M-\$25M	No	No	Yes
2. Expand lagoons, store, land apply	\$18M-\$20M	No	Yes	No
3. Advanced reuse facility (includes filtration)	\$25M-\$27M	Yes	Yes	Yes

“Secondary Water” has been a common practice in Utah (before it was called purple pipe)

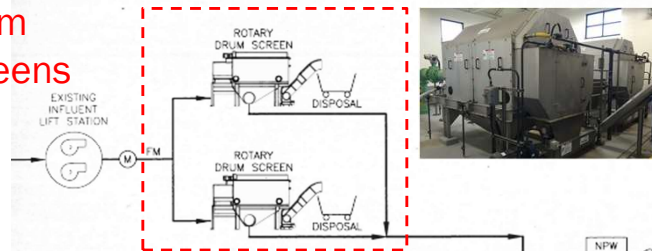
1970s until today

- Conversion of ag water supplies (untreated) to “secondary supplies”
- Mostly pressurized
- Common selling point for residential homes

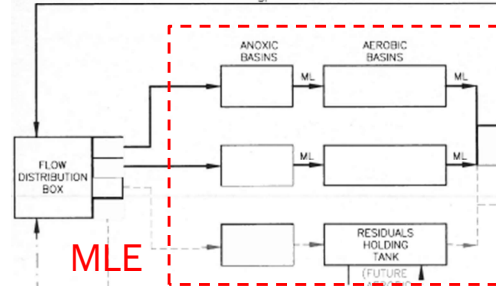


Process Schematic

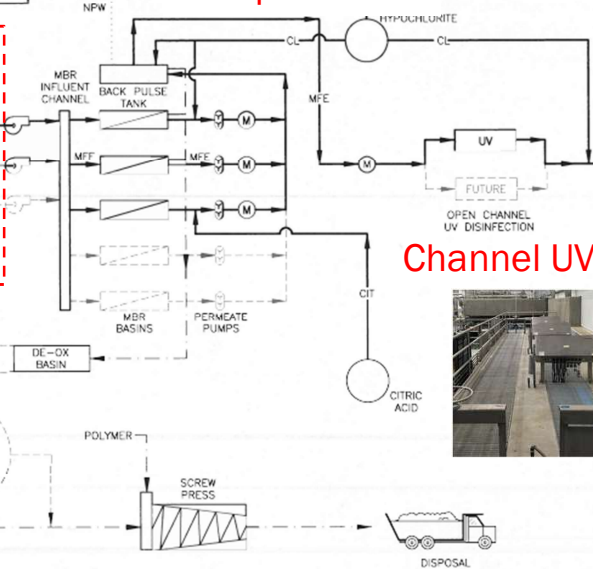
Drum Screens



GE/Zenon Pump-to-MBR



MLE

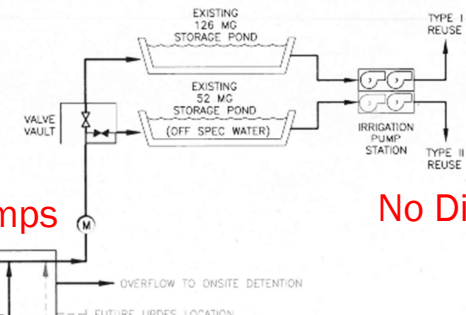


Channel UV

RW Pumps



RW Storage



No Discharge



C1 PROCESS FLOW DIAGRAM
SCALE: N.T.S.

WRF Layout



Brown and Caldwell

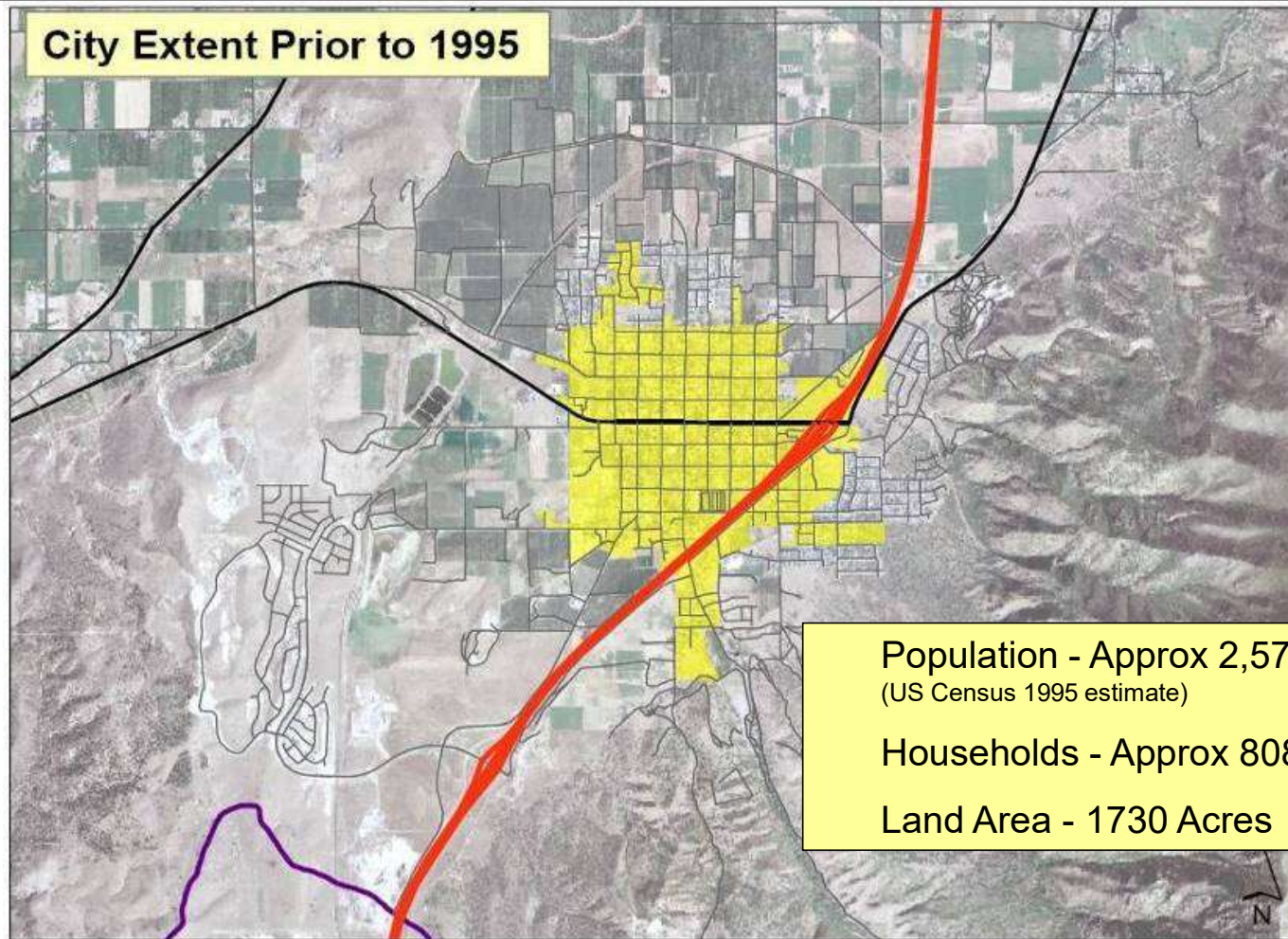
Overall Process

1. Headworks/dewatering
2. Biological process
3. Membrane filtration
4. UV disinfection
5. Reclaimed water pumping
6. Biofilter

Historical context, performance and impact on Santaquin's water supply portfolio



Santaquin . . . Agreements



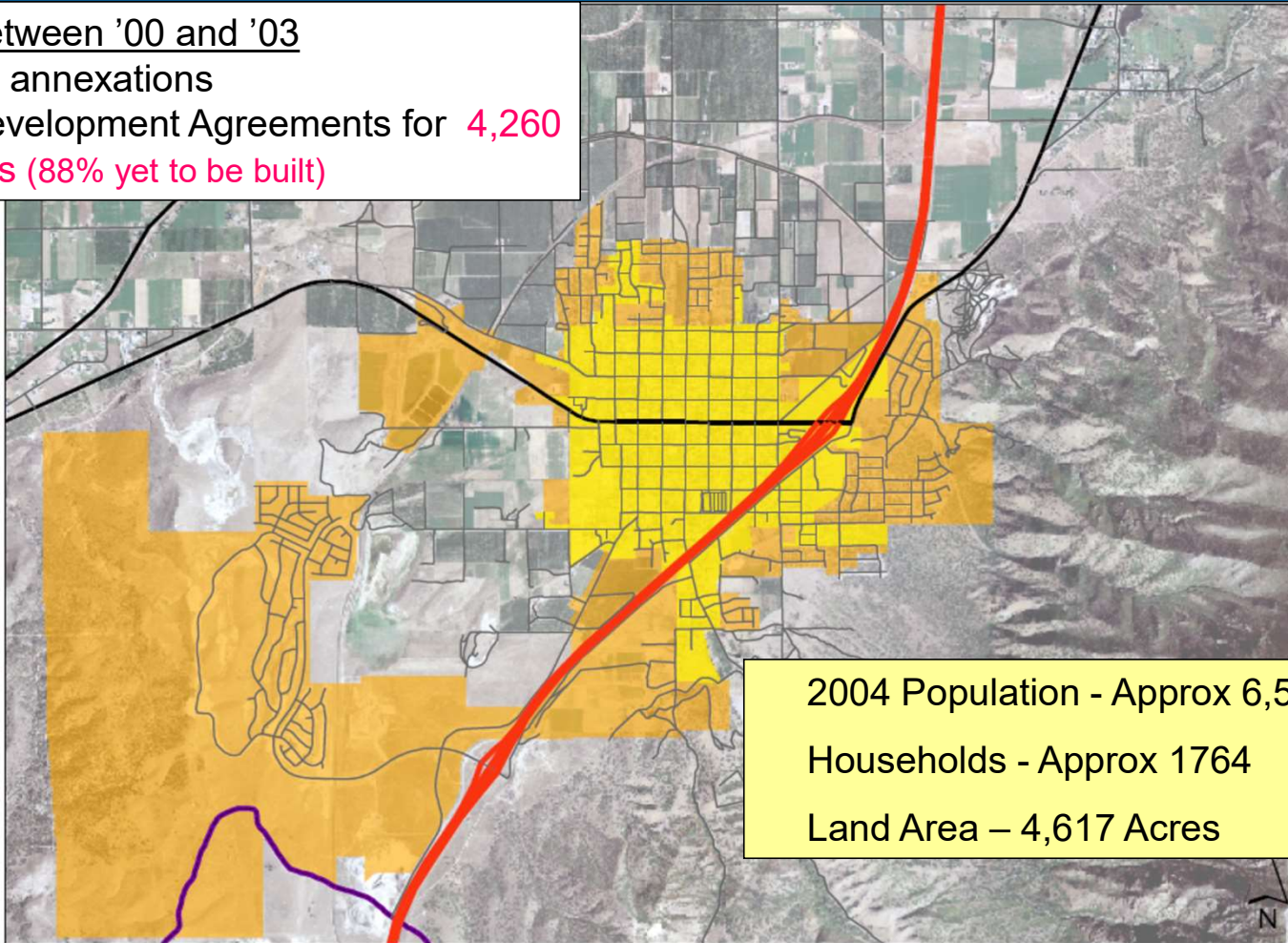
Santaquin . . . Agreements '00 to '03

Between '00 and '03

20 annexations

Development Agreements for 4,260

lots (88% yet to be built)



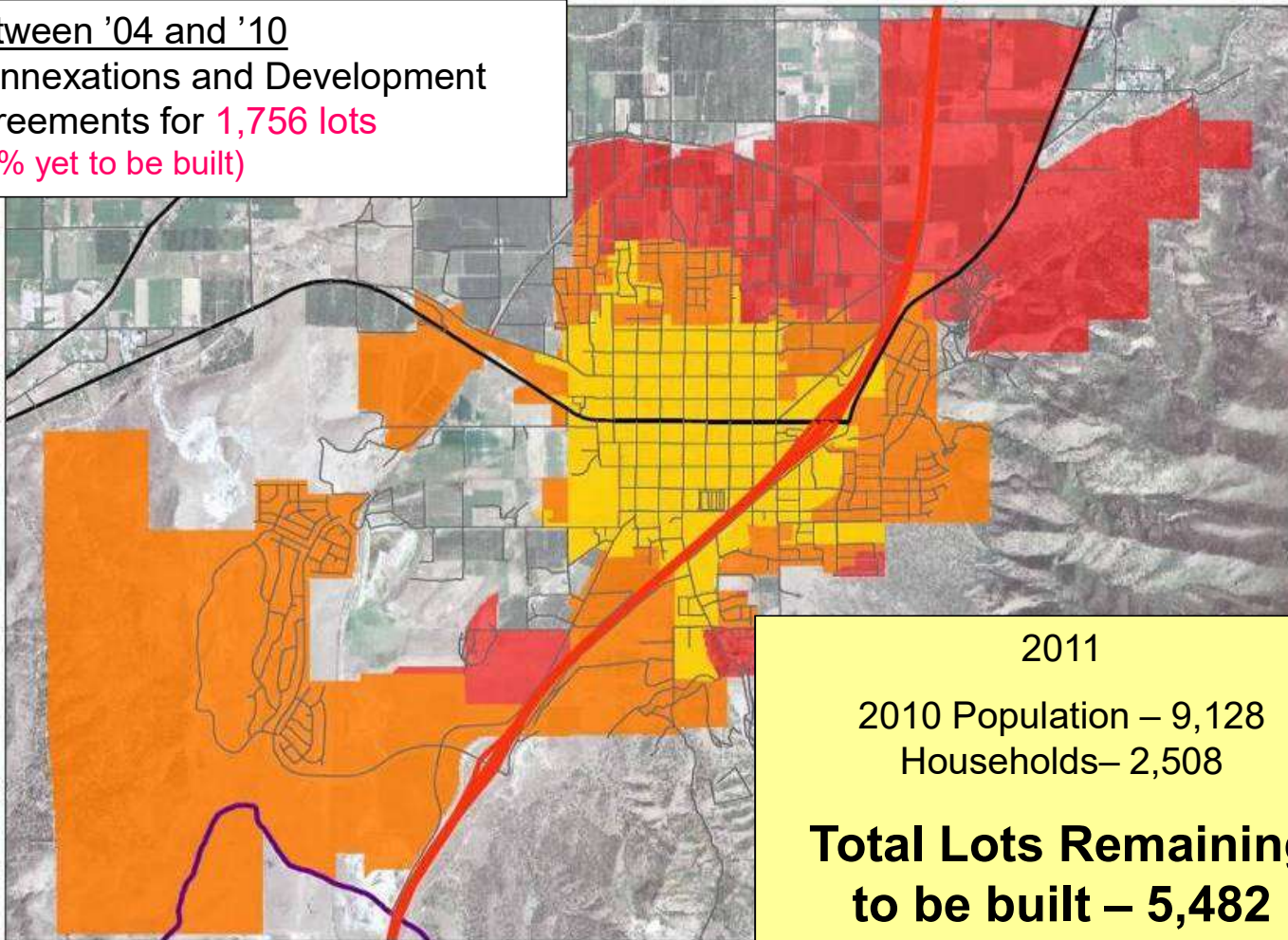
2004 Population - Approx 6,545

Households - Approx 1764

Land Area – 4,617 Acres

Santaquin . . . 2004 to 2010

Between '04 and '10
5 annexations and Development
Agreements for 1,756 lots
(98% yet to be built)

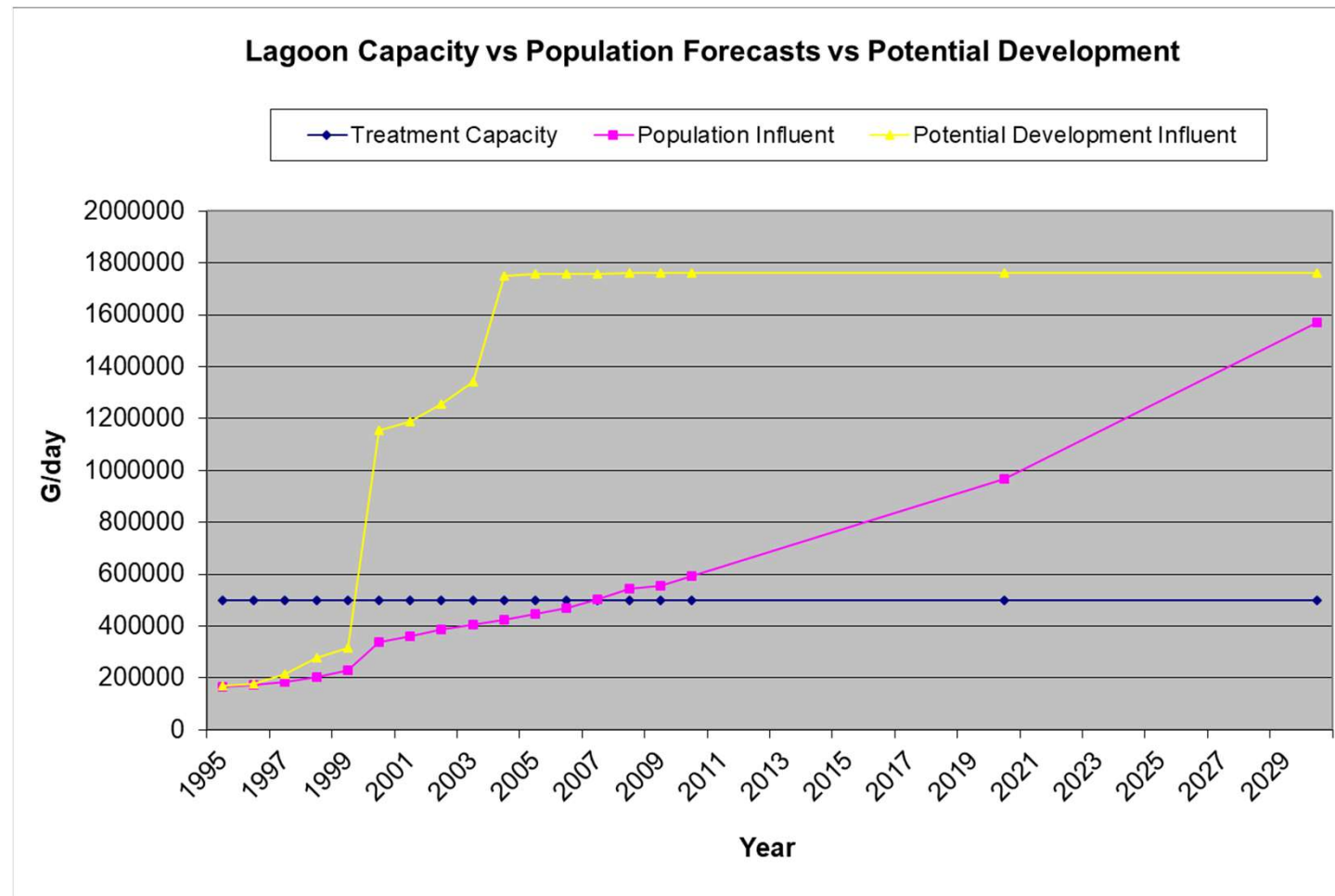


Santaquin . . . Waste Water History

- Pre-1991: septic systems
- 1991-1995: City evaluates options and plans, bonds, and builds 0.49 mgd lagoon and winter storage system; all disposal via land application
- 2001-2003: Very fast growth, regional studies considered, additional winter storage is constructed at lagoon location
 - Did not include any additional treatment
 - Did not include discharge permit or any additional land for land application
- 2005: further review of mechanical options

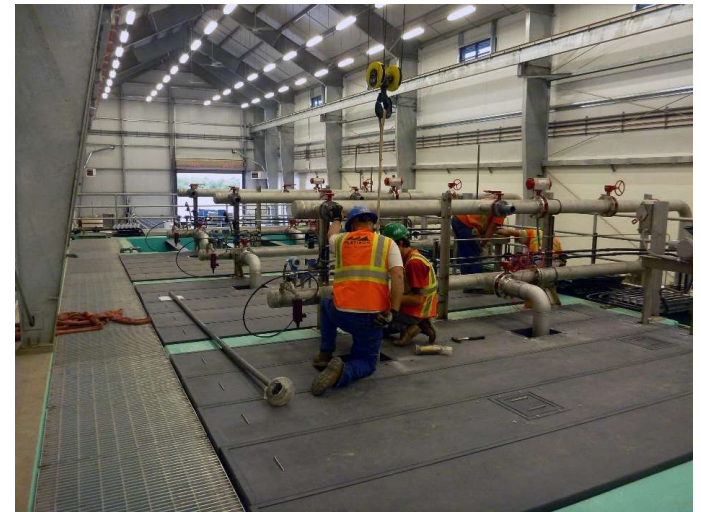
Santaquin . . . Waste Water History (Cont)

- 2006-2009:
Engineering study and facility plan to reconsider long-term treatment options and mechanical plant technologies before funding additional expansions while facing system failure concerns



Santaquin Waste Water

- 2009: City Council adopted a resolution selecting the option for a new mechanical Membrane Bio Reactor (MBR) treatment plant (with reuse) to be built north of the City
- 2011: Residents & some nearby residents move to stop/block funding for constructing the new MBR plant
- 2011 (November): Referendum Vote
 - First defeated by 3 votes
 - After a (2nd) recount by the court, passes by 3 votes
 - Moving wastewater treatment facility ends up being very contentious issue
- 2012: Construction begins on Water Reclamation Facility (WRF)



WRF Performance

- GE/Zeeweed 500
 - No turbidity excursions to date
 - Maintenance cleans
 - Periodic CIP
- UV Disinfection
 - No coliform exceedances
- Operations staff
 - Two operators
 - No staff at nights or on weekends



Distribution Strategies and TDS Management

Water Source	TDS, mg/L
Canyon/Runoff Irrigation Supplies	180-200
Santaquin WRF	500-600 mg/L
Blend*	300-400 mg/L

* Over 2,500 feet of additional distribution pipe was installed to move reclaimed water into large distribution main line to provide mixing

Storage and Distribution

- Reclaimed water introduced in the Citywide pressure irrigation system April 2014
- Lagoons decommissioned as lagoons, now winter storage for Type 1 water

Reclaimed from WRF
to Storage



Irrigation water to
distribution system



Santaquin had control

- Either by good luck or good management, or a combination of the two, Santaquin never obtained a discharge permit to the waters of Utah
- With no discharge to State waters, Santaquin retained full water rights to wastewater effluent. (6,000 a.f. with 5,300 a.f. reuse)



GARY R. HERBERT
Governor
GREGORY S. BELL
Lieutenant Governor

State of Utah DEPARTMENT OF NATURAL RESOURCES Division of Water Rights

MICHAEL R. STYLER
Executive Director

KENT L. JONES
State Engineer/Division Director

OCT 20 2009

ORDER OF THE STATE ENGINEER In the Matter of Sewage Effluent Reuse Application Number NS015

Sewage Effluent Reuse Application Number NS015 in the name of Santaquin City was filed February 2, 2009. It is proposed to reuse 6,099.9 acre-feet per year of treated effluent water from a future water reclamation facility located within the Santaquin city limits. The notification states that Water Right Numbers 51-1013, 51-1347, 51-1348, 51-7045, and 53-1496 are the basis for the proposed reuse. There are currently no discharges to receiving water and the City does not hold a discharge permit. Under this notification it is proposed to use the treated effluent water for municipal purposes within the service areas of Santaquin City.

The application was advertised in the Payson Chronicle on April 29 and May 6, 2009. A protest was filed by the Bureau of Reclamation. The protestant expressed concerns related to the quantification of the underlying water right based on historical diversion and depletion and potential infiltration of water into the sewage system. A hearing was not held.

The State Engineer has reviewed the application, the protest, and the underlying water rights. The State Engineer's review of a sewage reuse application is limited to determining whether or not the use of the sewage effluent is consistent with the underlying water rights and to determine the amount of water able to be used under these rights. The applicant provides the following review of the underlying water rights, including the diversion/depletion and return flow requirements:

Water Right	Source	Use	Quantifying Document	Diversion		Depletion	
				CFS	AF	CFS	AF
51-1013	Summit Creek	Mun./Dom.	Certificate 1238	2.00 ¹	1447.9	1.72	1245.2
51-1347	Underground	Mun./Dom.	Certificate 6251	2.52	1824.4	2.52	1824.4
51-1348	Underground	Municipal	Certificate 9073	2.48	1795.4	2.48	1795.4
51-7045	Underground	Irrigation	Change a26290	--	224.8	--	95.3
53-1496	Underground	Irrigation	Change a25719	--	807.4	--	342.3
Total:					6099.9		5302.7

The applicant claims the right to divert water under Water Right Numbers 51-1013, 51-1347, and 51-1348 at the full flow rate 24 hours a day, 365 day a year, and the right to deplete 100% of that water. The law states, "Beneficial use shall be the basis, the measure and the limit of all rights to the use of water in this state." The beneficial use, in this case, is municipal use. This is a general definition that differs from, for example, an irrigation water right which can be quantified for

Reclamation and Reuse

- Reuse has become a boon for Santaquin City
- During 2014 & 2015 irrigation seasons, reuse water was very much needed
- During 2015 more than 20% - 22% of water used in the City's secondary pressure irrigation system was Type 1 water
- This percentage will increase as growth continues to occur

IRRIGATION SEASON NOTICE: Santaquin Residents, remember the irrigation water that comes out of our pressurized irrigation system is NOT potable water. It should NOT be used for drinking, filling kiddie pools, or other human consumption. The water is safe for human contact, agricultural and residential uses excluding human consumption. It is normal for the irrigation water to smell different than drinking water because it originates from a pond. Please educate your children by explaining the proper use of the irrigation water.

www.santaquin.org

Key to Santaquin's water supply portfolio and future

- Santaquin City has obtained a groundwater recharge permit
 - In the future, Santaquin plans to recharge type 1 water for winter storage (waiting on a recovery permit to make use of recharged water)
- Water reuse in Utah will be important in the future as water resources continue to be strained due to continued growth



Questions



City of Santaquin Utah Reuse Program

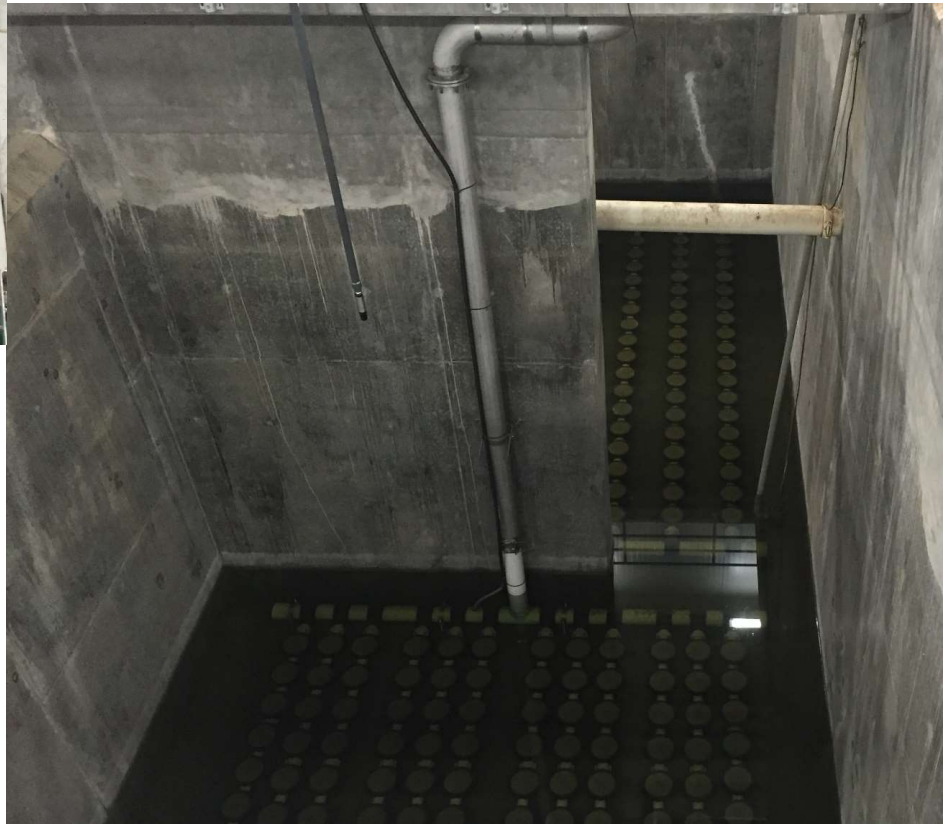
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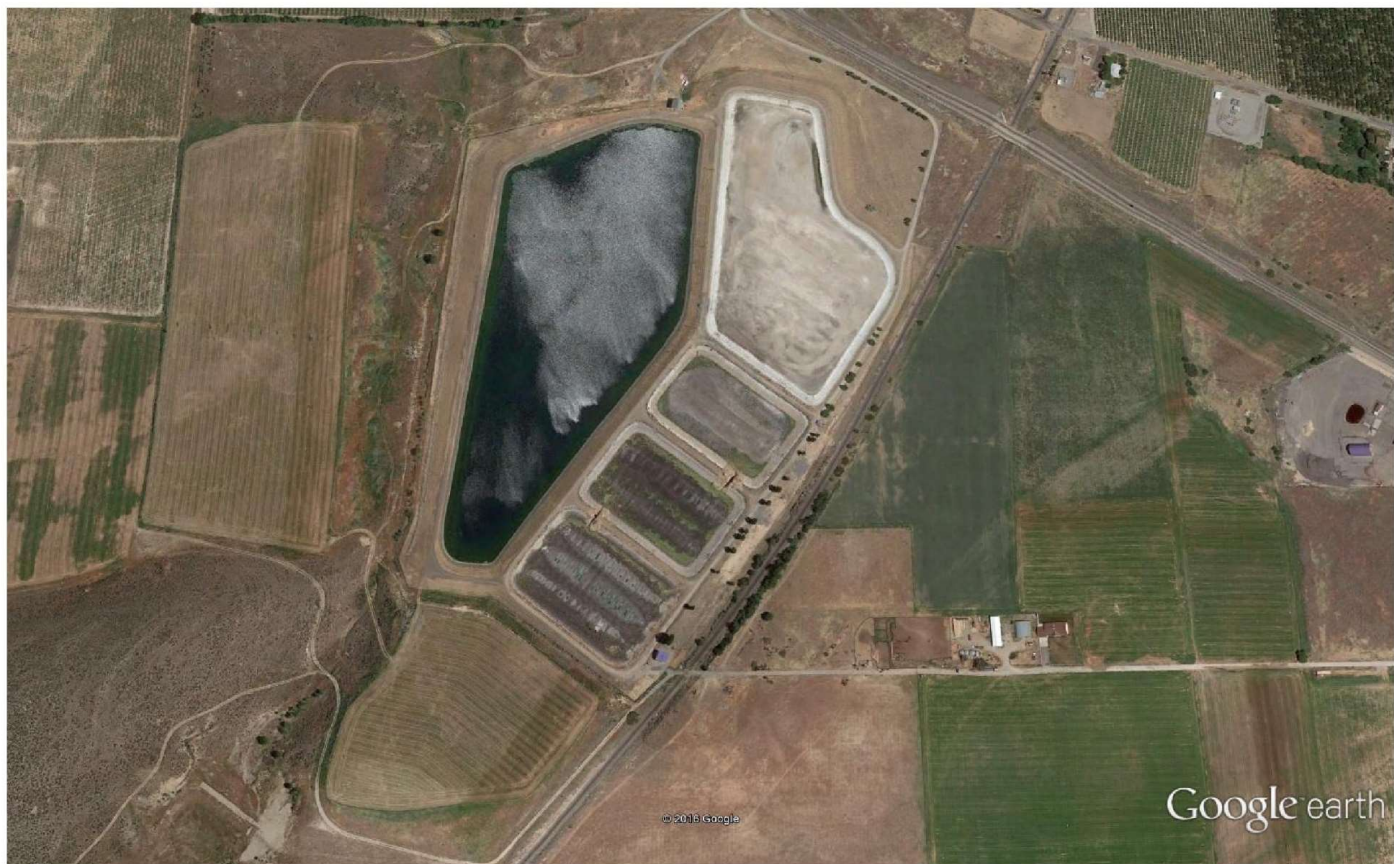












Google earth

feet 2000
meters 600





Utilizes hollow
fiber membrane
filters to
separate
biological solids
from reclaimed
water





Project highlights

- 5 funding partners
- No discharge permit; 100% reuse in secondary irrigation system
- No off spec water in over 5 years of operation
- Currently adding a fourth membrane train due to community growth

Santaquin . . . 2011

