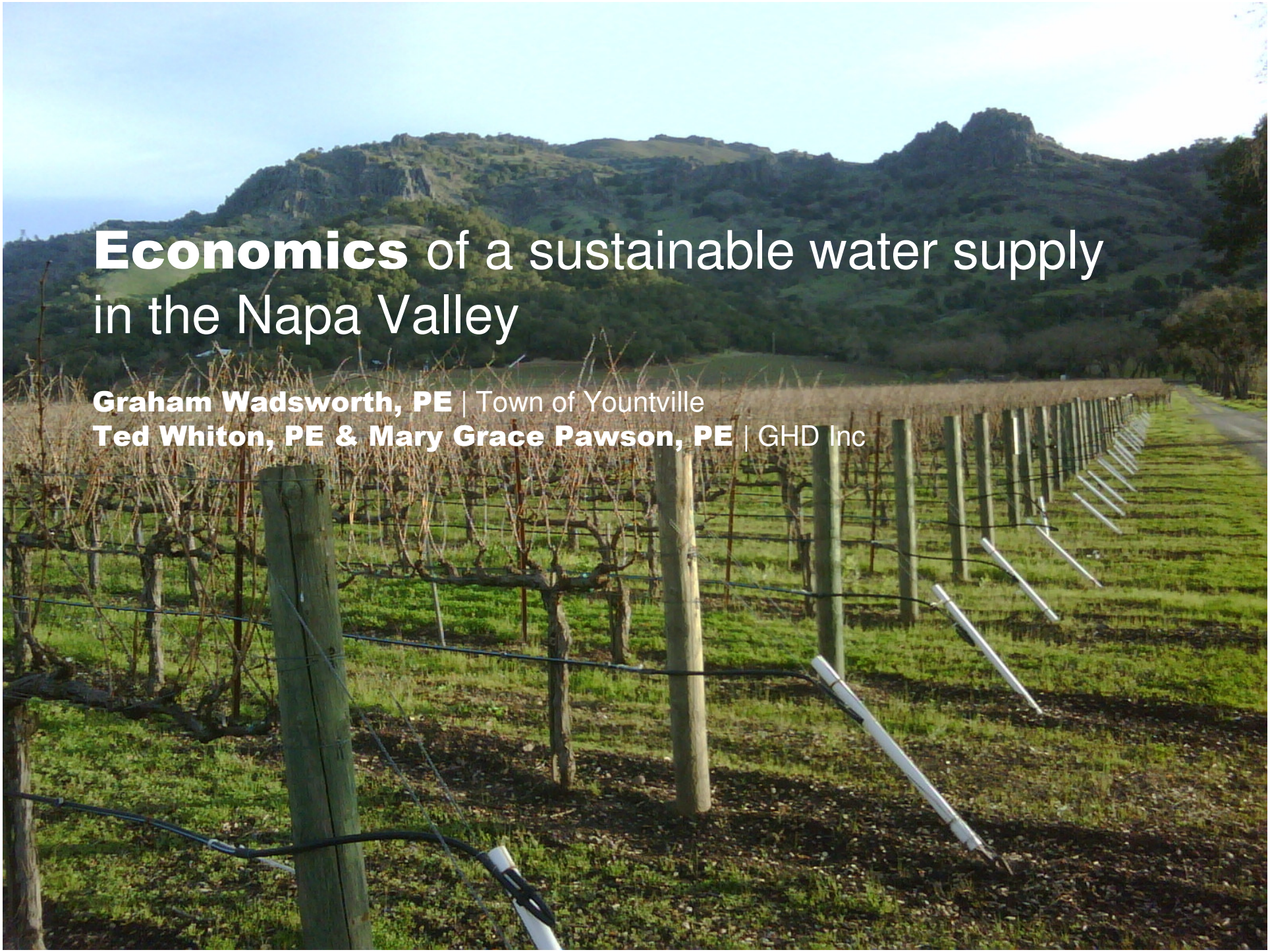
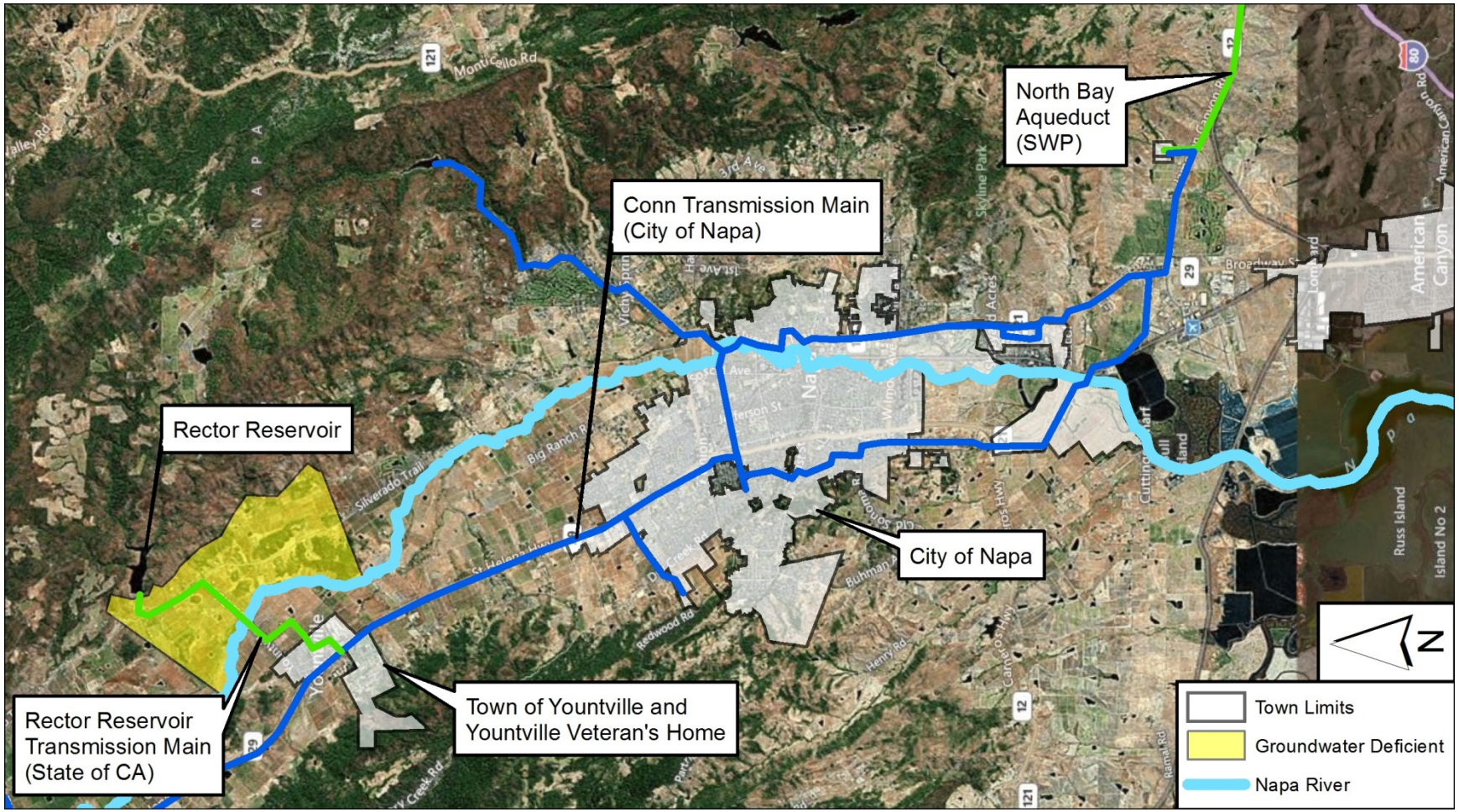


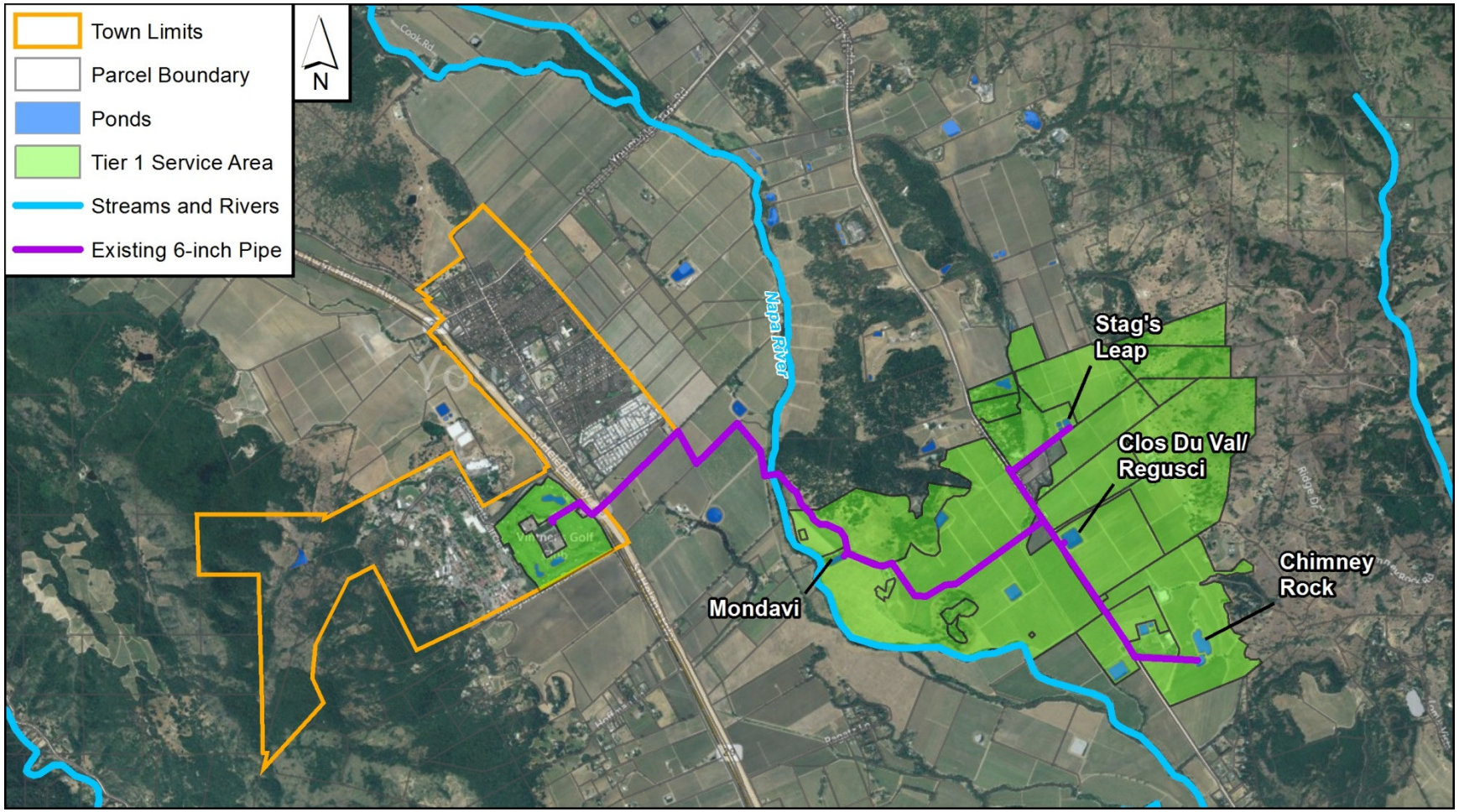
Economics of a sustainable water supply in the Napa Valley

Graham Wadsworth, PE | Town of Yountville
Ted Whiton, PE & Mary Grace Pawson, PE | GHD Inc

The water resources backdrop around the Town of Yountville is fairly complex



Within this backdrop, the Town has managed a recycled water system for wastewater benefits since 1977



The system uses trickling filters for secondary treatment

The Fuzzy Filter, used for tertiary treatment, was one of the first approved in California

Seasonal storage, necessary for agricultural reuse is provided by Town owned storage pond

And also by vineyard-owned storage ponds

Like many systems, Yountville's has evolved to provide meaningful water supply benefits

- Five existing customers with two since 1977
- Supply in winter and demand in summer
- Since 1977, land uses changed and storage doubled with additional customers
- Existing agricultural users do pay for a small portion of their water supply costs
- In an average year, over 60% of the treated water is beneficially reused, and 85% recycled in 2009
- For some customers, recycled water is their only supply because of restrictions on Napa River diversions and groundwater availability

New NPDES Permit requires Town to expand Recycled Water Program

- Prohibits discharge of effluent to the Napa River when there is less than 42:1 dilution.
- Expand Recycled Water System by December 2013.
- Install SCADA by December 2015.
- Additional sampling and reporting.

Scope of Recycled Water Expansion Project

- Apply for U.S. Bureau of Reclamation and State Water Resources Control Board grants and financing.
- Master Plan / Feasibility and Rate Studies with Stakeholder Meetings.
- NEPA and CEQA environmental studies and documents, such as wetland delineation and archaeological survey.
- Geotechnical studies and right-of-way acquisition.
- Design of plans, specifications and estimate, and utility coordination.
- Construction support with a separate construction manager.

The current master planning effort has water and wastewater drivers

Local water supply driver – the Town would benefit from additional dry year water supplies

	Full Entitlement (acre-feet)	Normal Year Supply (acre-feet)	Dry Year Supply (acre-feet)
Rector Reservoir	500	500	125
Groundwater	300	300	300
State Water Project	NA	NA	200
Totals	800	800	625
Demand	679	679	679
Difference	121	121	**(54)**

The current master planning effort has water and wastewater drivers

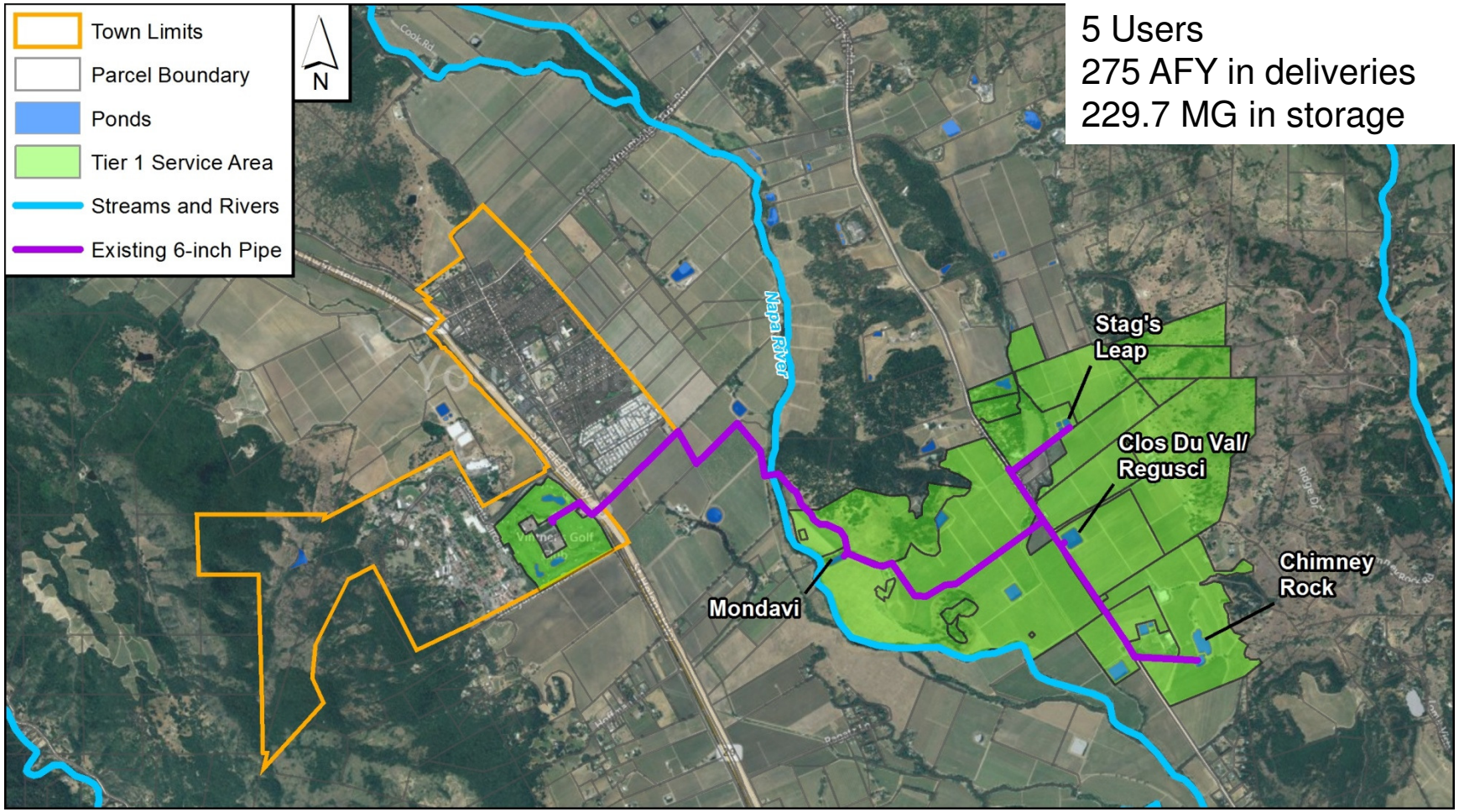
Regional water supply driver – the total water supplies for unincorporated Napa Valley are also insufficient in dry years

Supply Year Condition	Estimated Supply (acre-feet)	Estimated Demand (acre-feet)	Difference (acre-feet)
2010			
Normal	34,904	33,656	1,248
Multiple Dry	32,060	33,656	(1,596)
Single Dry	30,480	33,656	**(3,176)**
2020			
Normal	35,076	36,416	**(1,340)**
Multiple Dry	32,232	36,146	**(4,184)**
Single Dry	30,650	36,146	**(5,764)**
2050			
Normal	35,504	41,148	**(5,644)**
Multiple Dry	32,660	41,148	**(8,488)**
Single Dry	31,080	41,148	**(10,068)**

The current master planning effort has water and wastewater drivers

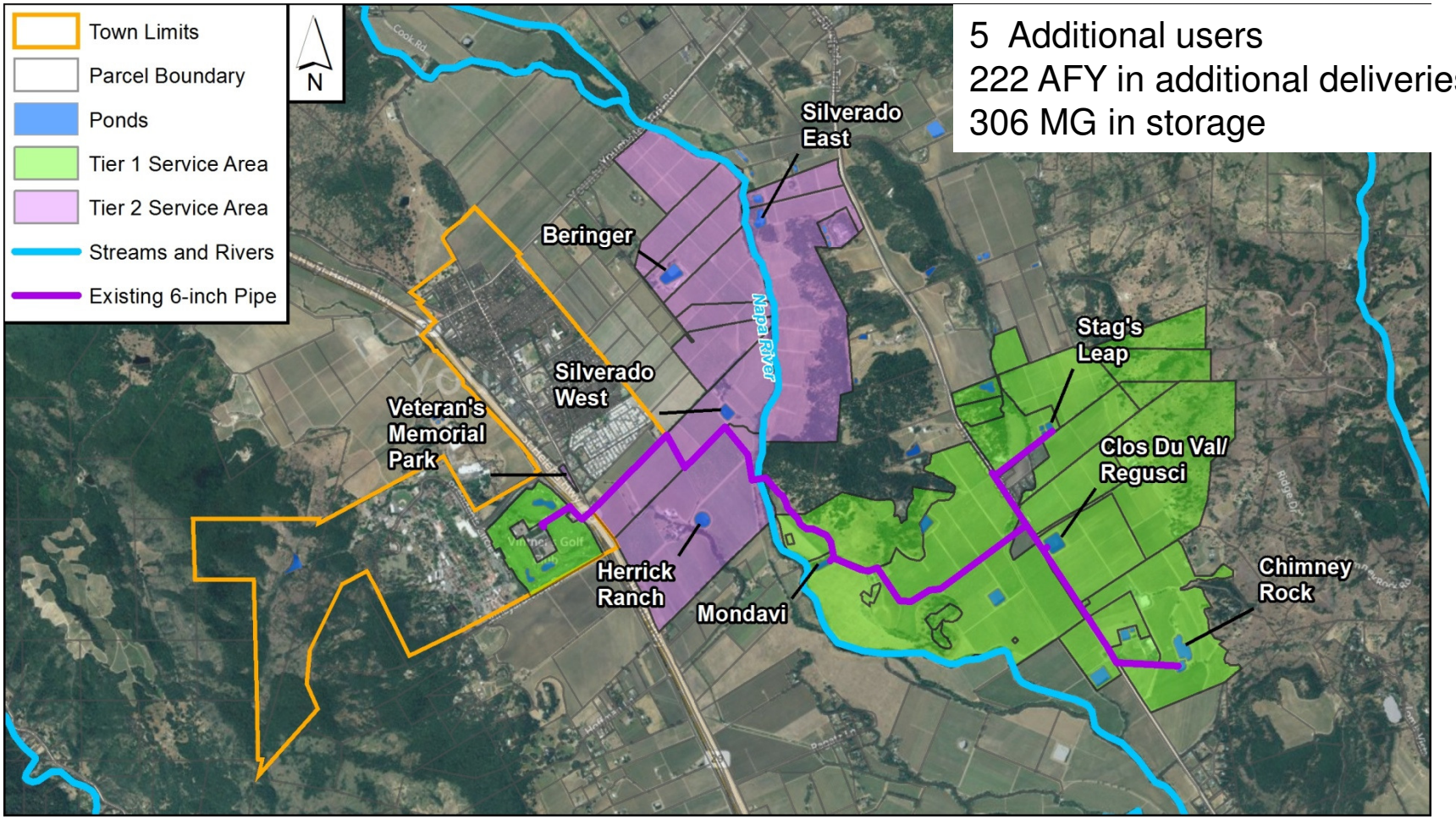
San Francisco RWQCB Order R2-2010-0072 Recycled Water Expansion Tasks	
Task	**Deadline**
Upgrade & upsize electrical system, recycled water pumps & pipelines and variable frequency drives	December 1, 2013
Install SCADA to record pump operation, storage pond volumes, operational alarms and continuous monitoring results	December 1, 2015
Submit annual reports on progress and future projects	Annually beginning in 2012

Developing an expanded recycled water system included reviewing the system water balance and potential users



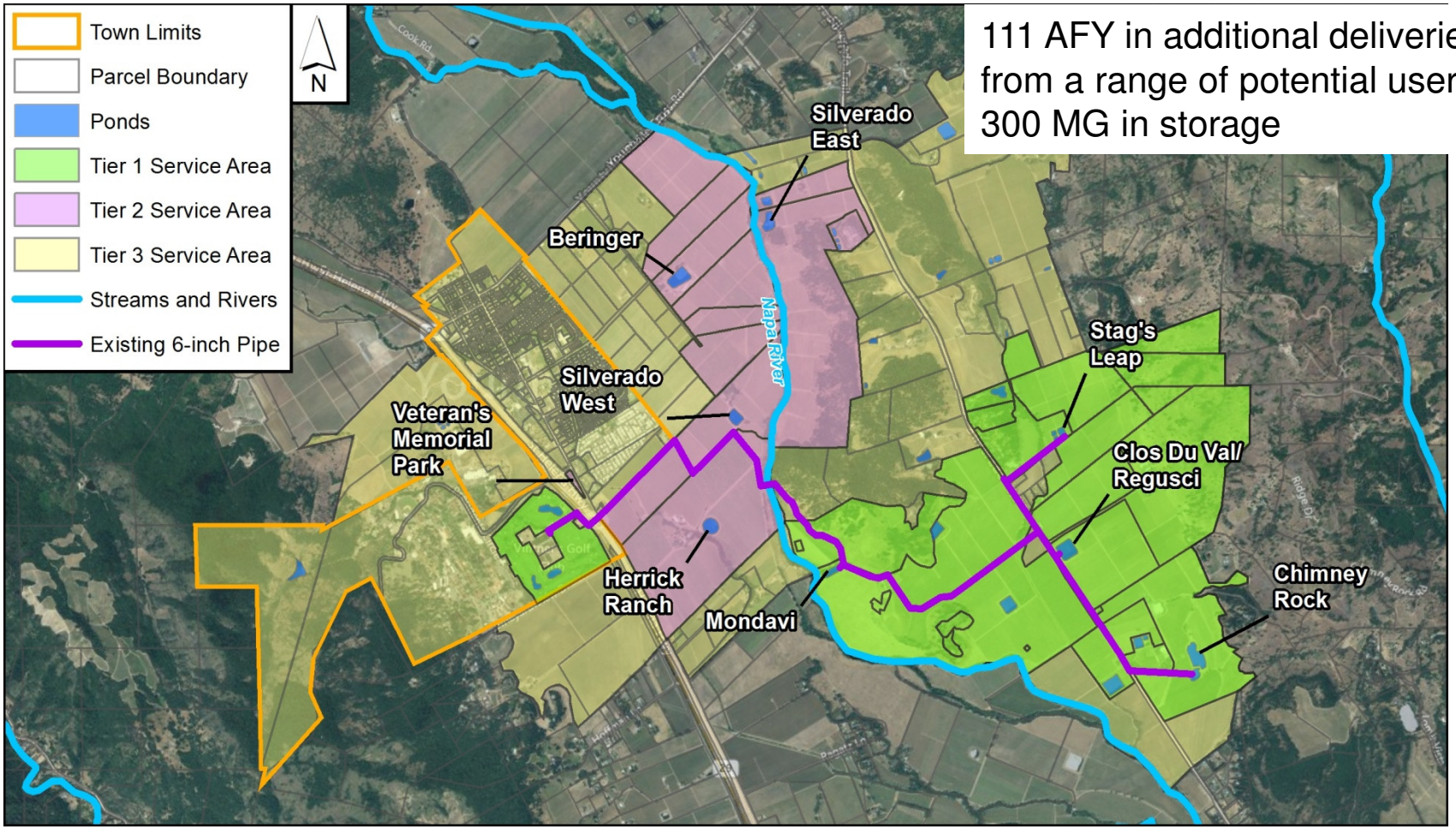
5 Users
275 AFY in deliveries
229.7 MG in storage

Tier 2 users represented a reasonable expansion of the system with a focus on accessing grower storage



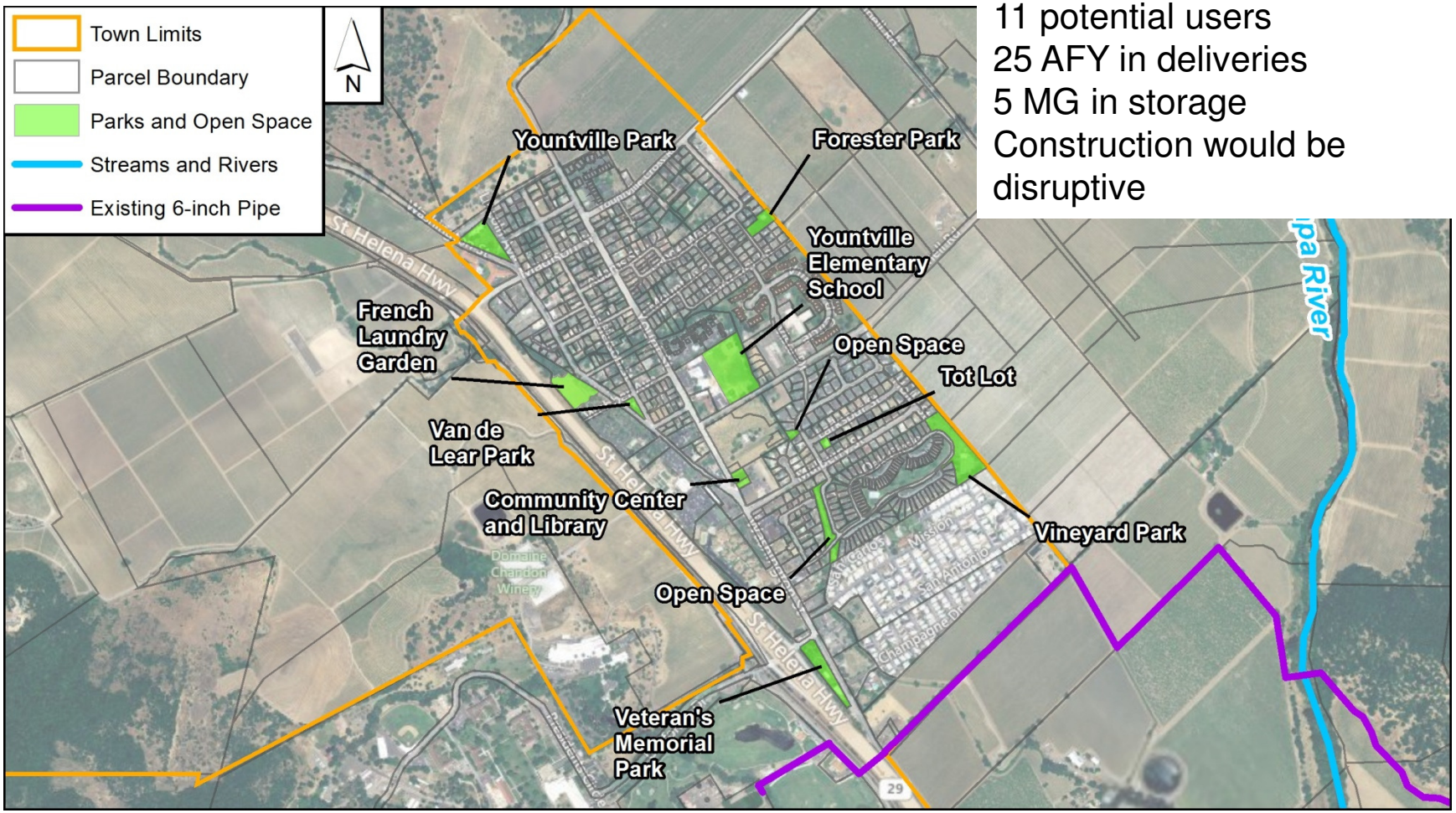
5 Additional users
222 AFY in additional deliveries
306 MG in storage

Tier 3 users require more infrastructure to serve



111 AFY in additional deliveries from a range of potential users
300 MG in storage

Urban reuse was also reviewed although potential demand offsets are fairly small



11 potential users
25 AFY in deliveries
5 MG in storage
Construction would be disruptive

System water balance clearly indicated that expanding storage was critical to expanded use

Alternative	Available Storage (MG)	Needed Storage for Average Year (MG)	Difference (MG)
Current Program (Tier 1)	229.7	229.7	0
Add Tier 2 Customers	229.7	306.2	76.5
Add Tier 3 Customers	229.7	400.3	170.6
Urban Reuse System	229.7	235.0	5.0

Alternatives were compared based on the cost of the water supply delivered

Alternative	Capital Cost ($ million)	Water Delivered (acre-feet)	Cost per acre foot ($ thousand)
Urban Reuse System **(SUPPLY AND DEMAND CONFLICT)**	2.0	25	80.0
System for Tier 2 Users **(MOST COST EFFECTIVE)**	4.3	222	19.3
System for Tier 2 & 3 Users	11.7	333	35.1

Comparing the recycled water alternatives against other supply options illustrates that a recycled water project provides the best value for the study area

Alternative	Capital Cost ($ million)	Water Delivered (acre-feet)	Cost per acre foot ($ thousand)	Notes
Additional State Water Project Supply	NA	NA	NA	Town's contract limits ability to purchase additional supply
Tolerate Drought	24.0	600	40.0	Impacts all water users
Urban Reuse System	2.0	25	80.0	Benefits all water users
System for Tier 2 Users	4.3	222	19.3	Benefits all water users **VIABLE**
System for Tier 2 & 3 Users	11.7	333	35.1	Benefits all water users **VIABLE**

Town's current recycled water rate structure reflects a practice of "encouraging" users

- Rates have been individually negotiated by contract reflecting unique circumstances
- Meter Charge: $0 to $667.57 per month
- Usage Charge: $103 to $108 per acre foot
- Revenue recovered: +/- $30,000 per year

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