

NELSON DAM REPLACEMENT PROJECT

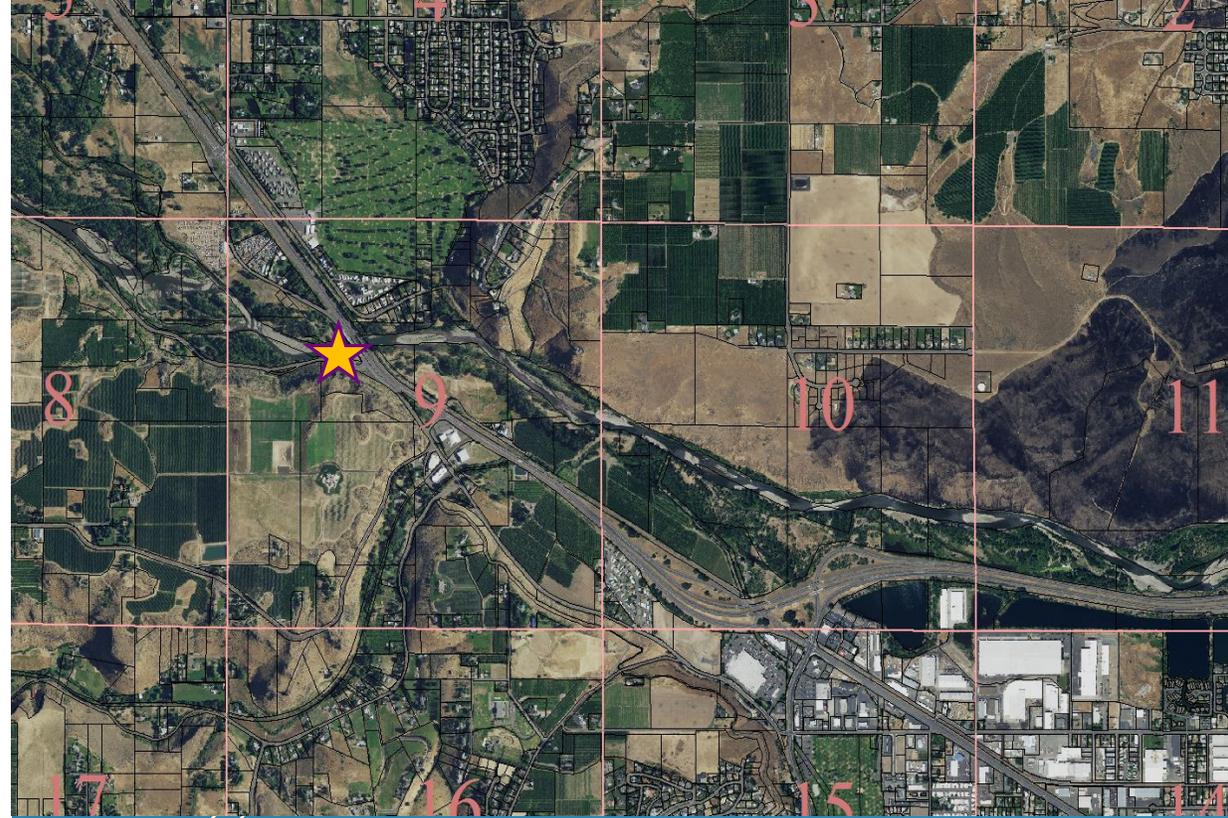
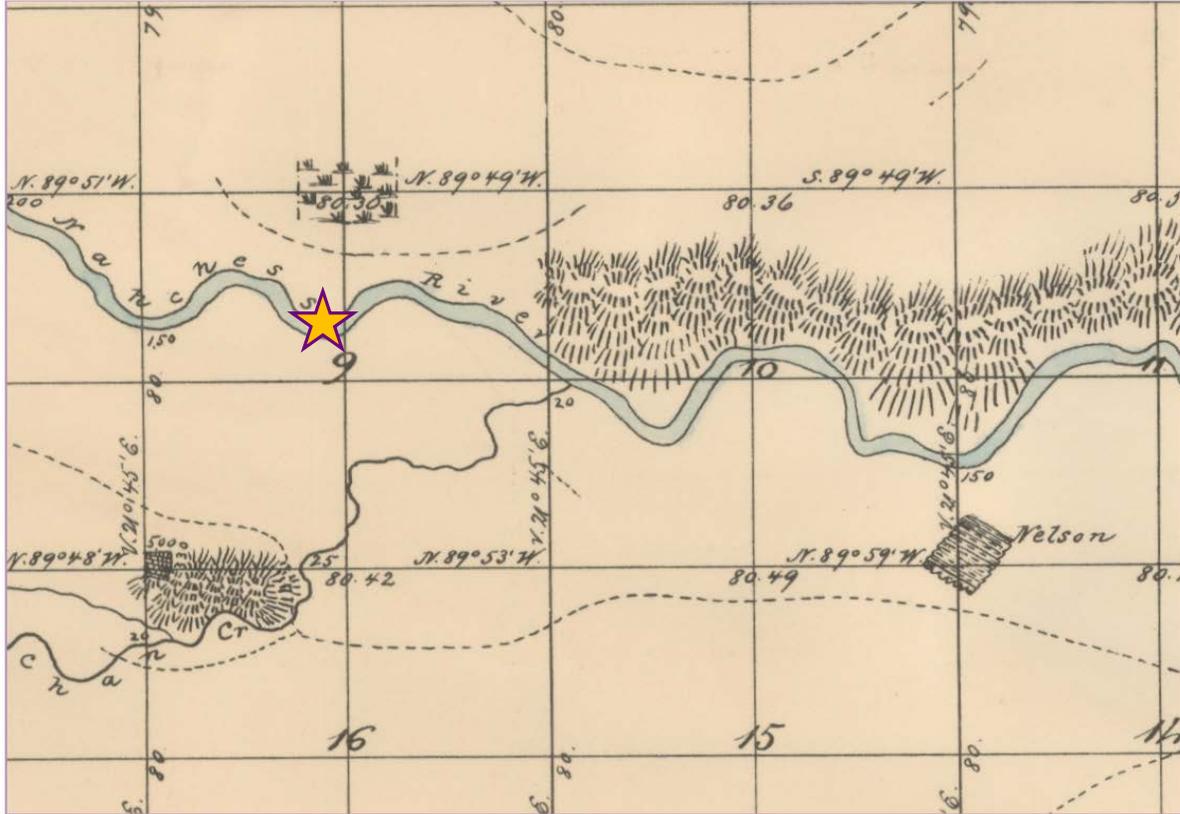
HISTORY, CAUSAL FACTORS, EFFECTS, CURRENT AND FUTURE RESPONSES

Water/Irrigation

City of Yakima Public Works

David Brown

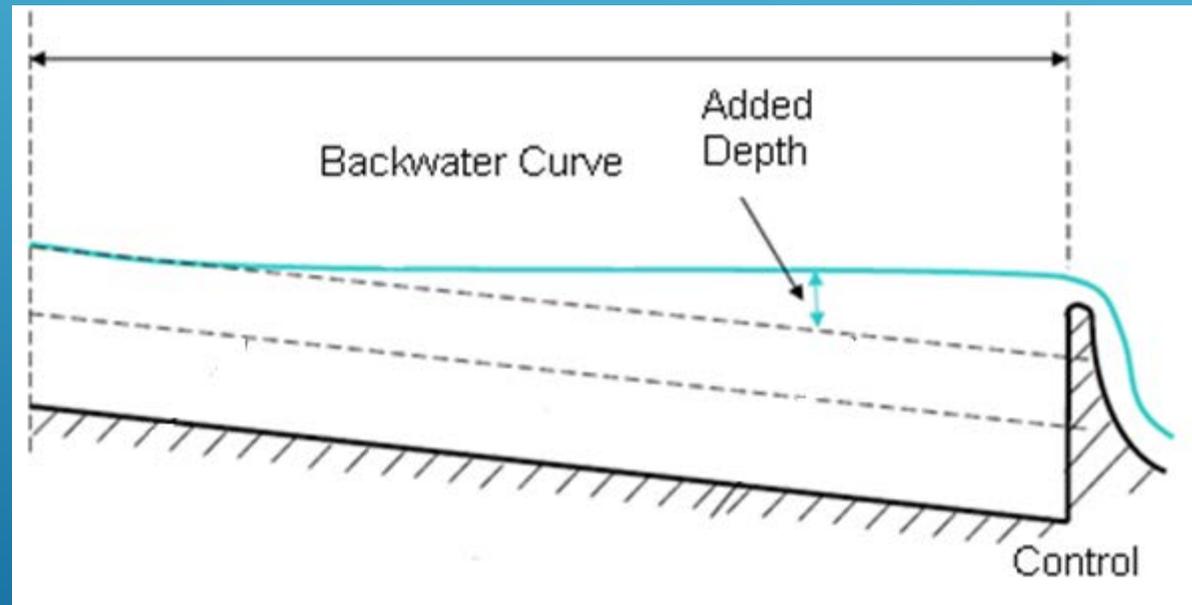
Assistant Public Works Director

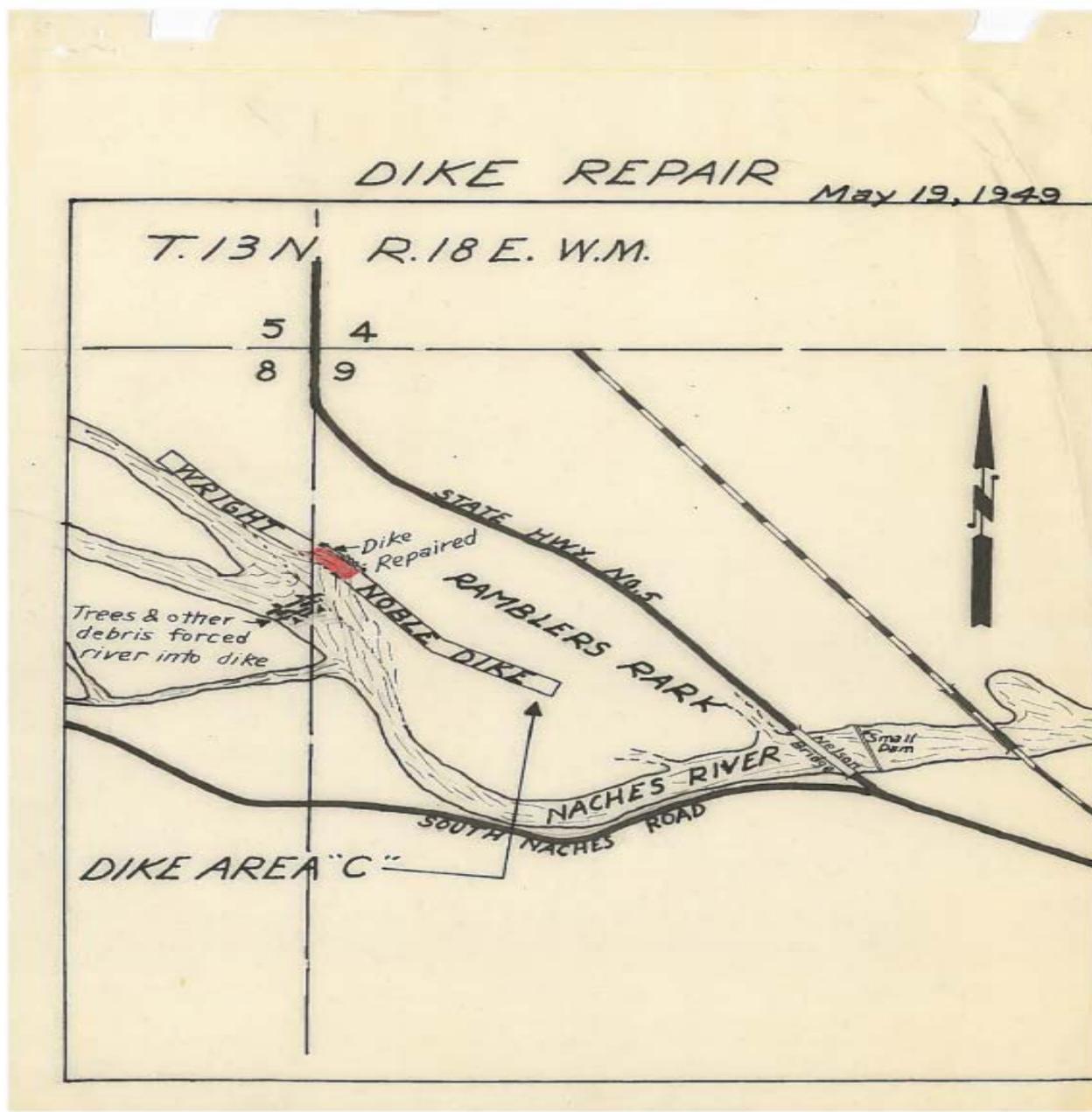


1865 General Land Office Cadastral Survey showing Nelson Homestead, Naches River, unnamed stream meandering in SW of Section 9 is Cowiche Creek, orange star indicates approximate current location of Nelson Dam.

RIVERS CHANGE VERTICALLY

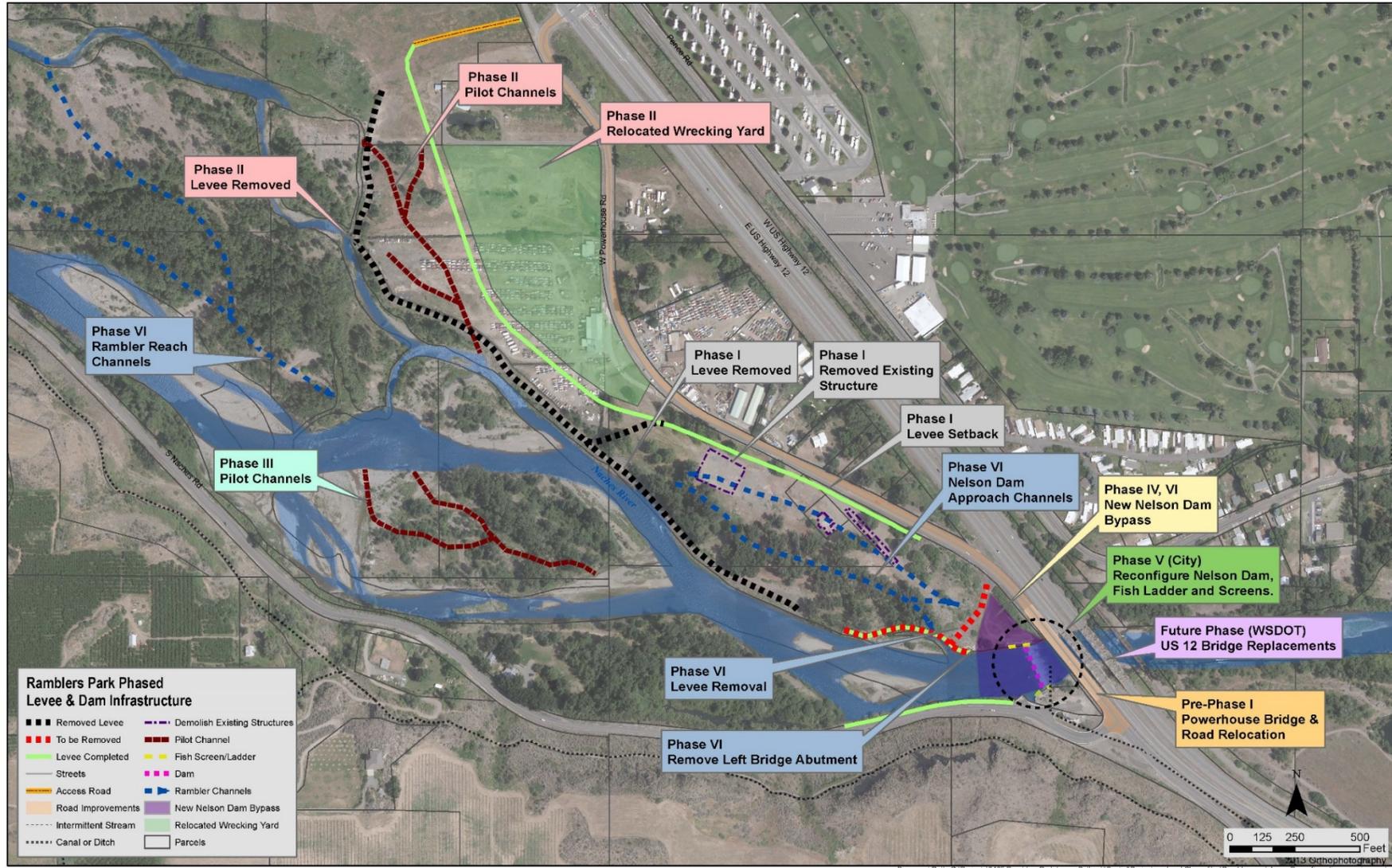
WHAT MOST PEOPLE THINK HAPPENS WHEN YOU PUT A DAM IN A RIVER





1949 Sketch of infrastructure at Nelson Dam. South Naches Road is located on a shelf cut into the Tieton Andesite. Most of State Highway No. 5 lies in a very active floodplain and regularly was flooded due to its location, the narrow bridge constriction, and the raised water surface elevation as a result of Nelson Dam.

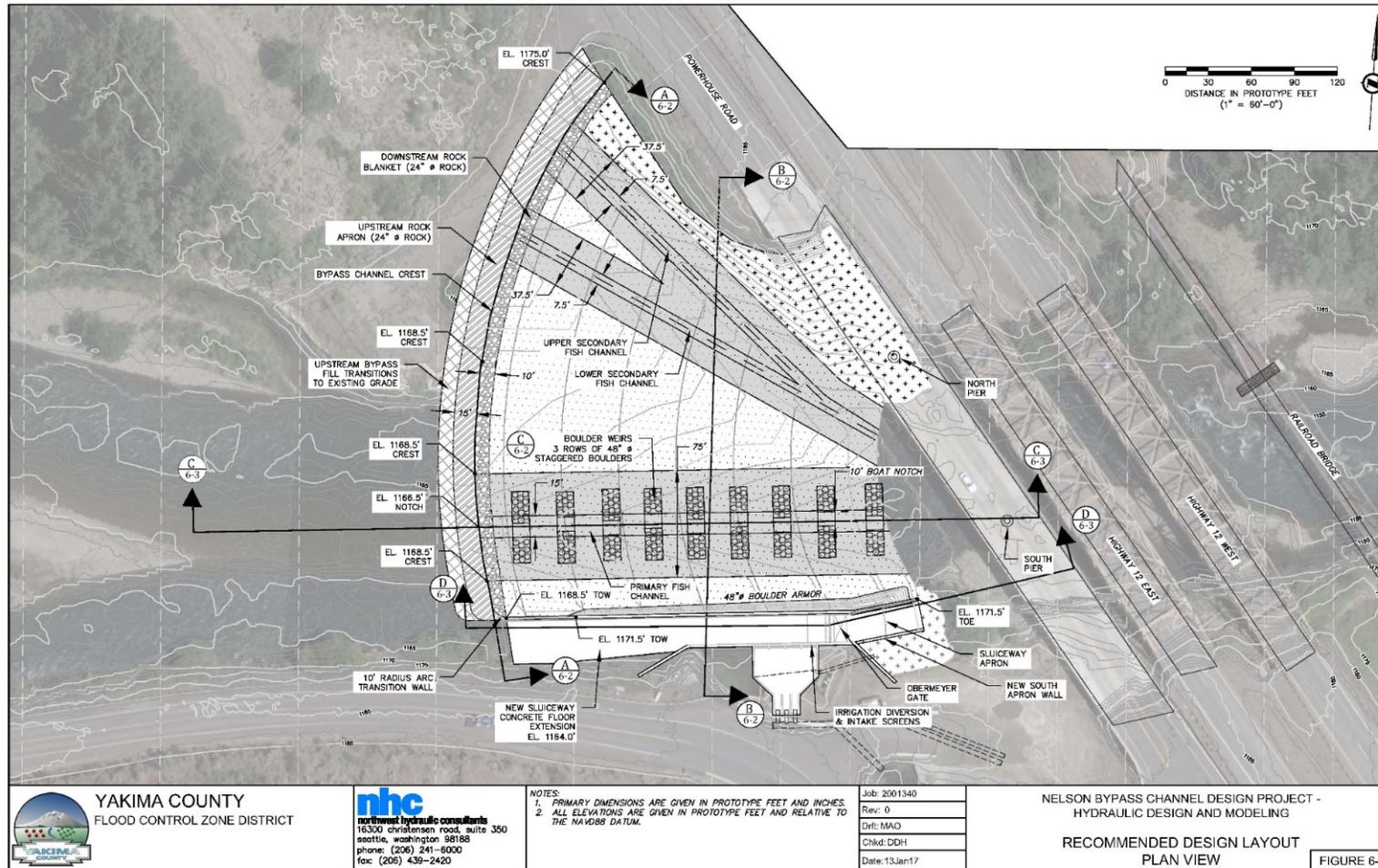
RAMBLERS REACH AND NELSON DAM PHASES



NELSON DAM DIVERSION MODIFICATION



CURRENT PROPOSED NELSON DAM



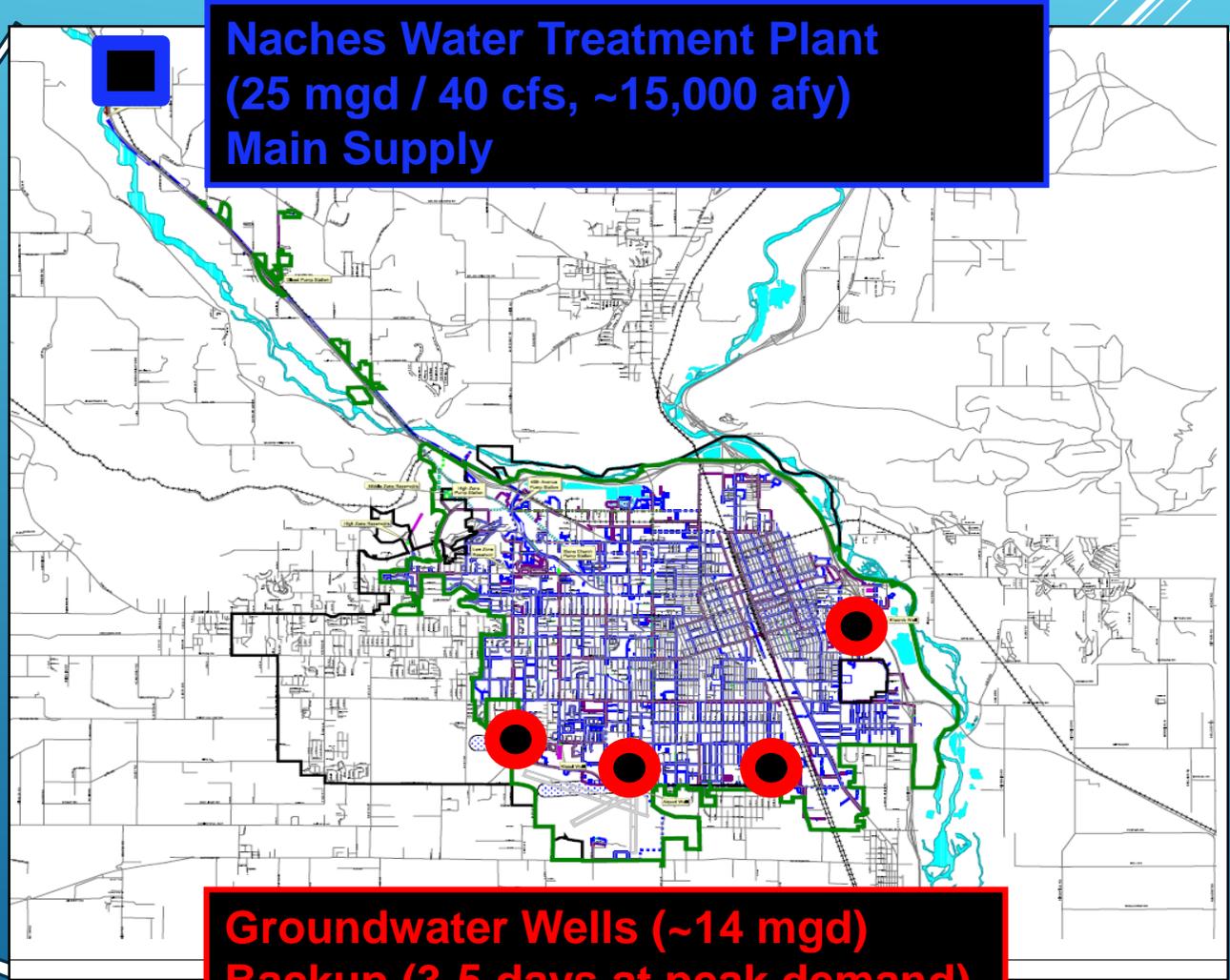
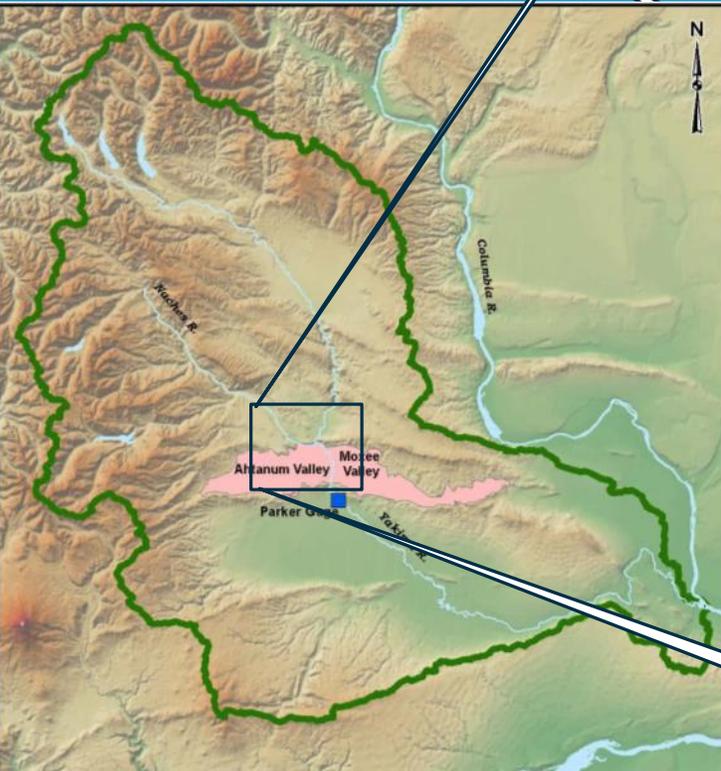
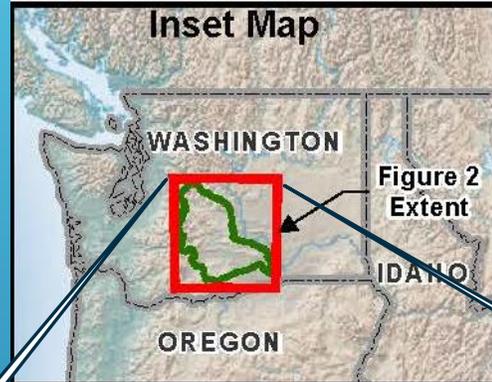
- ▶ Design and Permitting - \$1.8M
- ▶ Construction Dam and Conveyance Structures - \$13-14M

- ▶ Floodplains by Design - \$400K for Prelim Design, and \$4.7M for construction
- ▶ City of Yakima - \$6M bond for utility construction
- ▶ BPA/YBIP/USBR to be determined

MONEY AND FINANCING



City of Yakima – Location & Water Supply



**Naches Water Treatment Plant
(25 mgd / 40 cfs, ~15,000 afy)
Main Supply**

**Groundwater Wells (~14 mgd)
Backup (3-5 days at peak demand)**



City of Yakima

Water Supply Responsibilities



PEAK DEMAND = SUPPLY (25 mgd)

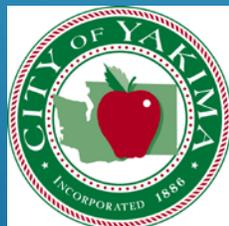
EMERGENCY GROUNDWATER BACKUP

PLANNING – How to meet:

- ◆ Drought, climate change
- ◆ Possible curtailment of using water rights
- ◆ Interruption of supply (maintenance, contamination)
- ◆ Growth

ADDITIONAL THREATS TO SURFACE WATER SUPPLY

- ▶ Maintenance
- ▶ High flow turbidity
- ▶ Run off from Norse Peak Fire
- ▶ Ice/debris jams of intake
- ▶ Watershed forest fire
- ▶ Chemical spill from HWY 12



GROUNDWATER



- ▶ Groundwater and surface water:
 - ▶ Were separate (1977; Aquavella adjudication).
 - ▶ Now connected (2011; USGS study)
- ▶ Most groundwater rights are post-1905 (i.e., Junior)
- ▶ Now groundwater may be @ risk to be cut off in drought year?
- ▶ **Groundwater aquifer levels dropping**
- ▶ **City needs existing wells AND more for the 4 Rs**
(reliability, redundancy, resilience & robustness).
- ▶ **City can't develop on water subject to curtailment**
- ▶ No new groundwater rights available, unless:
 - ▶ Significant environmental benefit
 - ▶ Non-consumptive (water budget neutral)

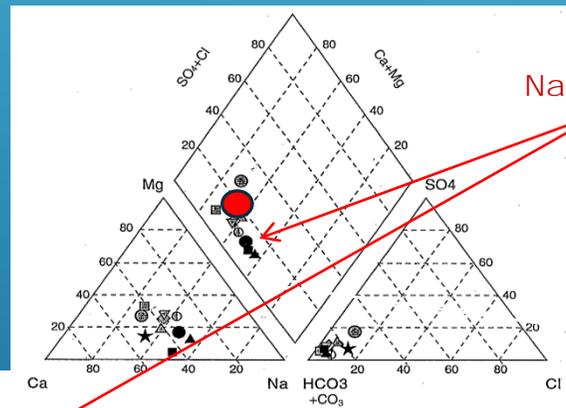
Aquifer Storage & Recovery (ASR) fills the bill



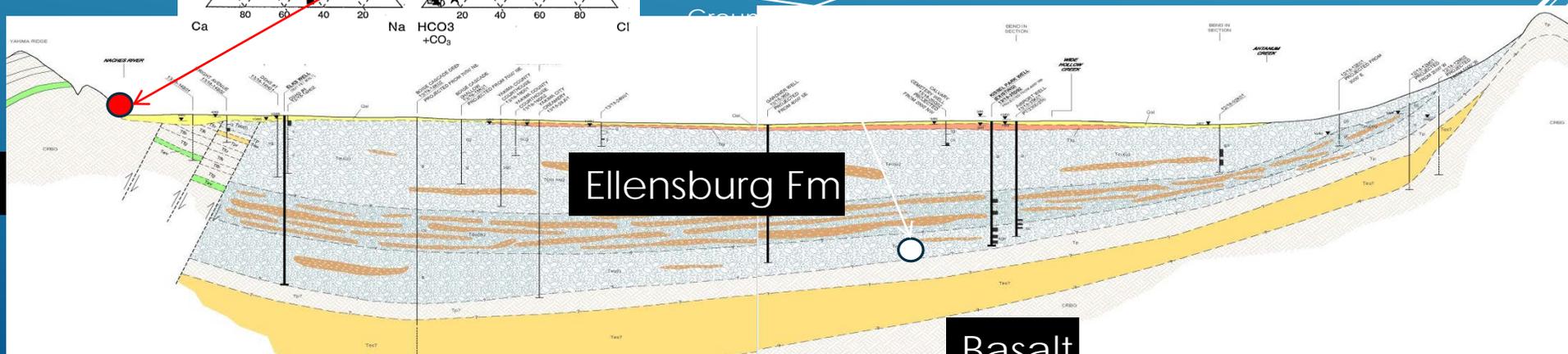
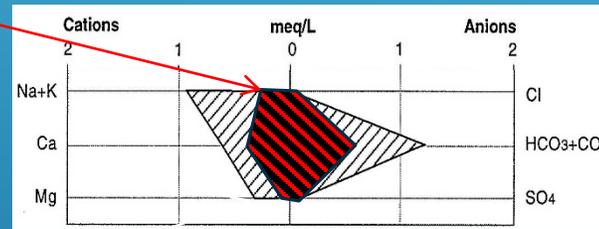
THE RIGHT GEOLOGY



- ▶ Aquifer is Ellensburg Formation sandstone
- ▶ Mineralogy is volcaniclastics (glass)
- ▶ Aerobic environment (redox reactions are not a concern)
- ▶ Surface water is a dilute form of groundwater.



Naches River



THE RIGHT INFRASTRUCTURE



- ▶ System scale clogging reduced Kissel Well efficiency 25% - 100% restored by back-flushing
- ▶ No clogging of Gardner Well (newer distribution system zone)
- ▶ Recharge pressure will be monitored to control clogging and conduct preventative flushing
 - ▶ All major components are in place:
 - ▶ 12 MGD winter water recharge supply
 - ▶ Gravity transmission to 3,000 gpm wells
 - ▶ Kissel Well ASR retrofitted for \$30k
 - ▶ Gardner Well installed with ASR capability
 - ▶ Permit in place



Kissel Well

Production



ASR PROGRAM DEVELOPMENT

- 1998: ASR potential recognized as climate change relief
- 2000: Kissel Well retrofitted for ASR & tested – all's good
- 2002: Reservoir application submitted
- 2003: State ASR rule passed
- 2009: BoR/Ecology – modeling defines recoverable quantity
- 2010: Purpose-built ASR well installed
- 2014: Gardner Well ASR Test
- 2015: Temporary permit issued 2015-02-24.
- 2016: Testing
- 2017: Permit issued by Ecology



19 years

KEY PERMITTING POINT

2. WATER QUALITY

- ▶ Chlorinated drinking water is recharged.
- ▶ Contains chlorination disinfection byproducts (DBPs; e.g., **10-40 ppb** trichloromethane – SDWA allows **80 ppb**).
- ▶ Conflicts with WA Groundwater Antidegradation Rule (WAC 173-200 allows **7 ppb** trichloromethane).
- ▶ Variance allowed by Director of Ecology based on AKART analysis.
- ▶ Variance must be reviewed every 5 years.



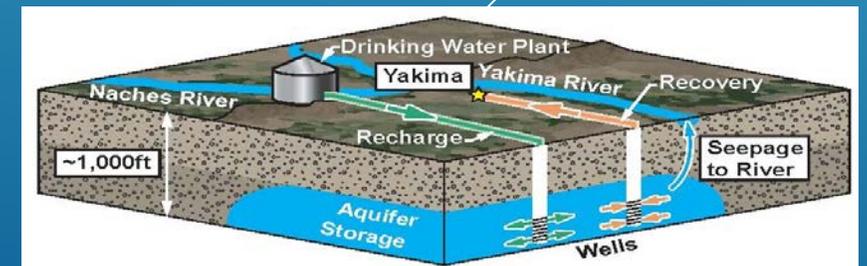
BENEFITS BEYOND MUNICIPAL SUPPLY

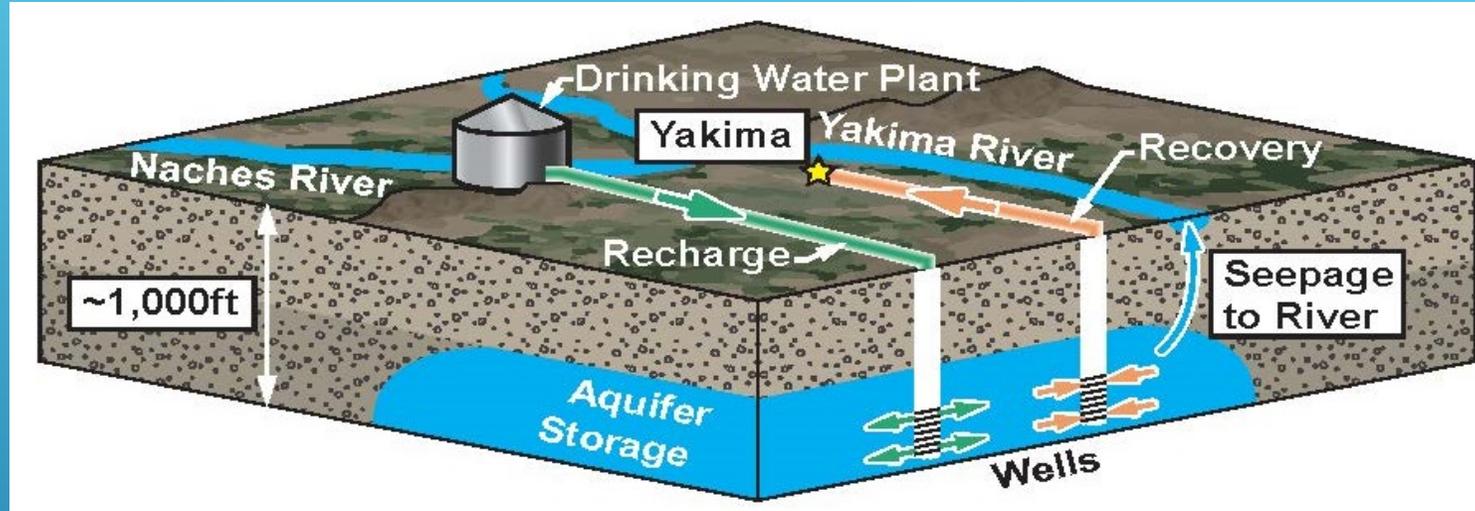
Passive Recovery:

- ▶ Water leaks from storage to stream. Water will be recharged every year – but only recovered when needed.
- ▶ Leaked water could be accounted against rural development impacts
- ▶ Unrecovered water returns to the Yakima River, above Parker Gage, and increases TWSA (e.g., 3 cfs modelled)

Active Recovery:

- ▶ With 100% groundwater redundancy:
 - ▶ Surface water diversion by the City could be temporarily suspended
 - ▶ Making 40 cfs available to others
- ▶ Could pump directly to river





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Supported by

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