Tualatin Valley Water District

Integration of ASR Into Water Systems Operations

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Tualatin Valley Water District

Presentation Overview

Background

Overview of Tualatin Valley Water District's (TVWD) system and pressure zones surrounding ASR Site

Establishing ASR – Factors Considered

Why TVWD began ASR and what factors influenced integration into system

Implementation & Intergration

Cycle 1 through Cycle 4, implementing a full scale ASR project

Customer Service

The importance of customer relations before, during, and after integration

Q & A

TVWD Background

TVWD at a Glance:

~200,000 customers served in Washington County, Oregon;

Approximate elevation between 200 and 900 amsl;

38 pressure zones;

Three water supplies – Joint Water Commission (JWC), Portland Water Bureau (PWB), and ASR since 2008;

25 Reservoirs and 12 pump stations; and

Average daily consumption of 21 MG, peak daily consumption of 44 MG (08-09 fiscal year).

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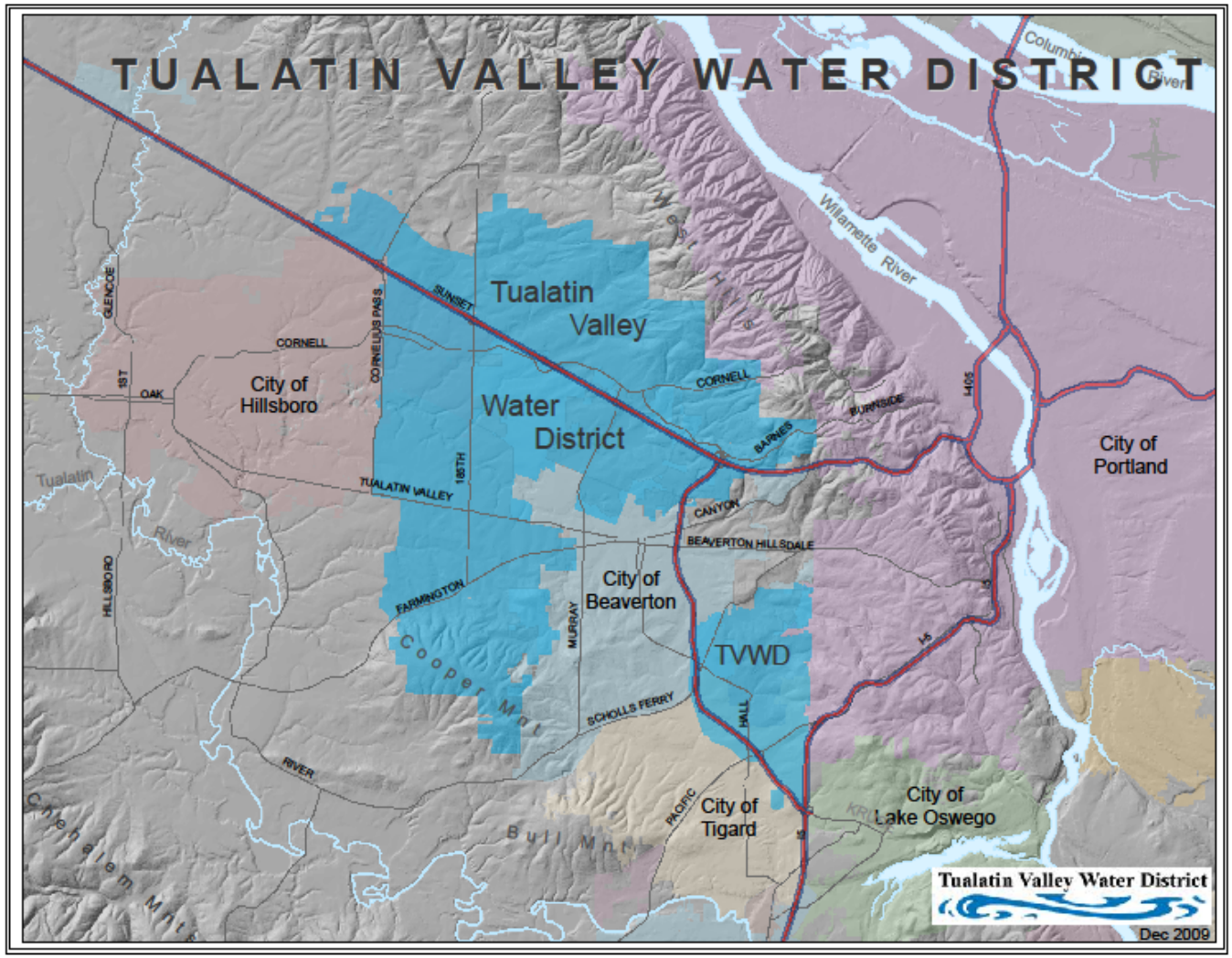

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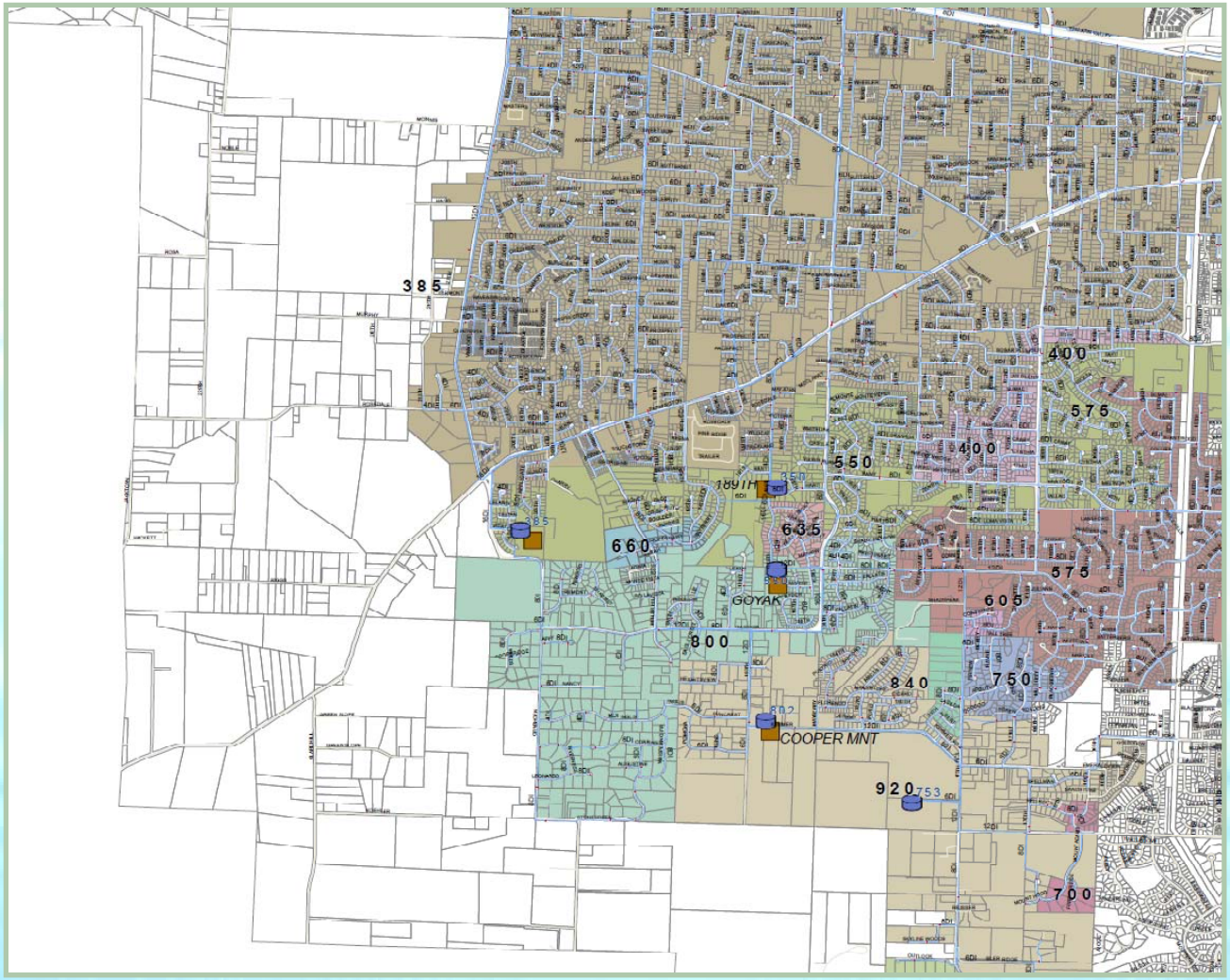

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Establishing ASR – Factors Considered

Why ASR and What Factors Considered

ASR additional strategy to meet peaking demands:

- *Two sources, contractual agreements with both PWB and JWC; and*
- *Capturing excess winter water for summer usage is cost effective.*

Existing municipal well, native water rights (3.91 cfs, 16" to 400').

Geographic location of site:

- *Adequate water for injection from existing system infrastructure; and*
- *Distribution and storage system able to accommodate recovery operations.*

High quality water for injection.

Geology of aquifer conducive to ASR:

- *Geochemical compatibility and good aquifer transmissivity.*

Implementation & Integration

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Cycle 1, May, 2008

Small scale pilot test (1.5 MG injection volume), positive results.

Cycle 2, May – August, 2008

Larger scale injection volume (48 MG) and recovery period (22 days) which allowed TVWD first opportunity to integrate ASR water into distribution system, positive outcome:

- *First run of re-chlorination and fluoridation systems;*
- *Water potability confirmation, WQ Monitoring; and*
- *Tracking within distribution system.*

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Full Scale ASR Program (Cycle 3) Began in December, 2008, After Positive Results of Previous Cycles

Cycle 3 target volume was 311 MG based on an estimated recharge rate of 1200 gpm over the course of 6 months:

Initial water quality from both sources was considered and due to complexities of pressure zones in Cooper Mtn. service area, a blend of both was used for injection.

After Six Days of Injection, Water Level Response Indicated an Abrupt Increase in Rate of Buildup…

What Happened During Injection?

Likely scenario – a quantity of high turbidity water was injected:

- *PWB source unfiltered, predominant WQ at time of occurrence.*

Several aggressive backflushing events were performed to recapture lost well performance:

- *Outcome successful, specific capacity restored; and*
- *Backflush volumes integrated into accounting data.*

Moving Forward, What Would Our Operational Strategy be to Control This Potential Risk?

Began Looking at Solutions to Control Incoming Water to Cooper Mtn. Service Area

Complex, one supply point serves upper pressure zones:

- *Solution: Re-valve distribution system, allow more JWC water to enter Cooper Mtn. service area through 189th Pump Station; and*
- *Isolation would not impact fire protection through extensive fire flow testing.*

Was It Successful?

Yes, but not as a long term solution.

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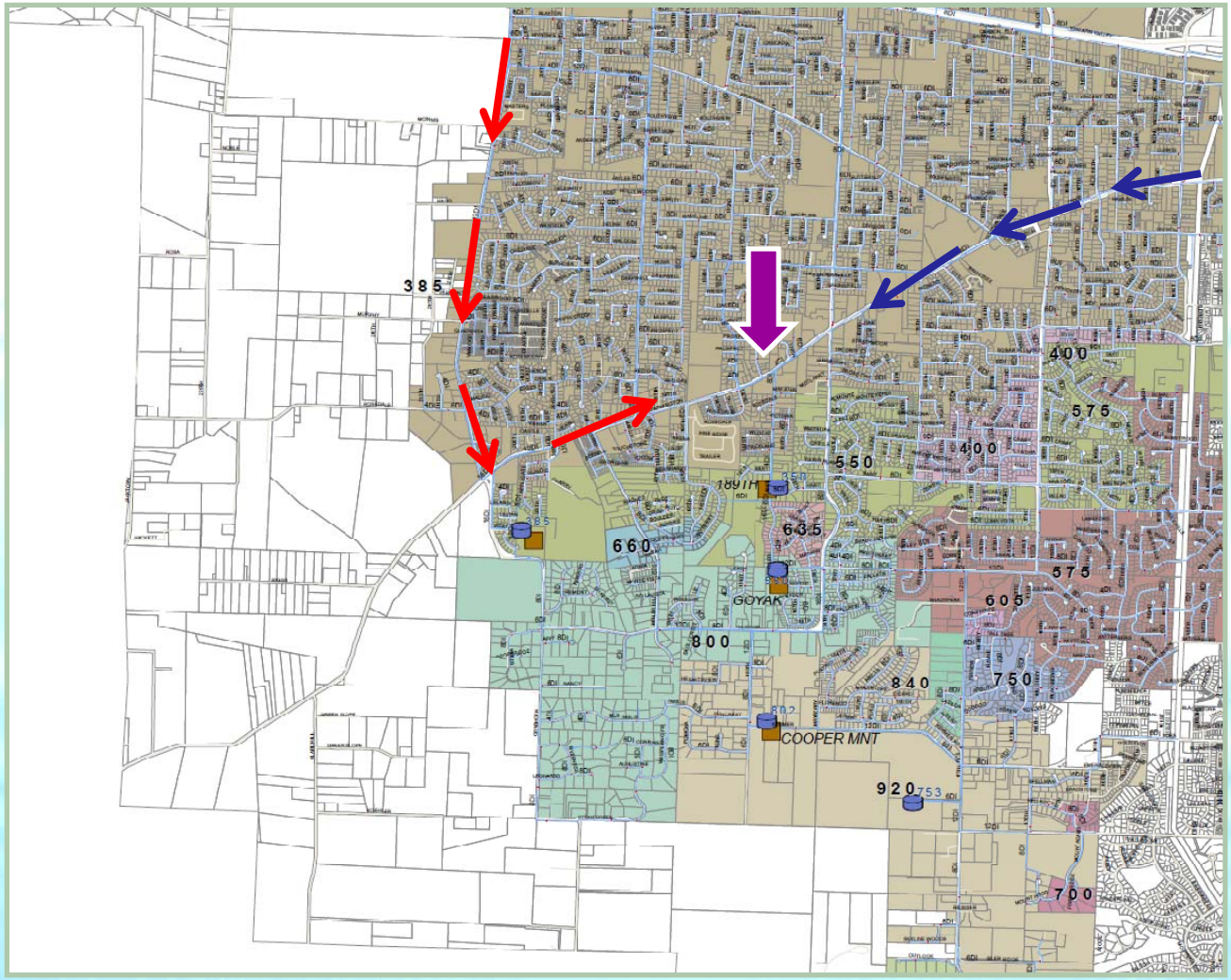

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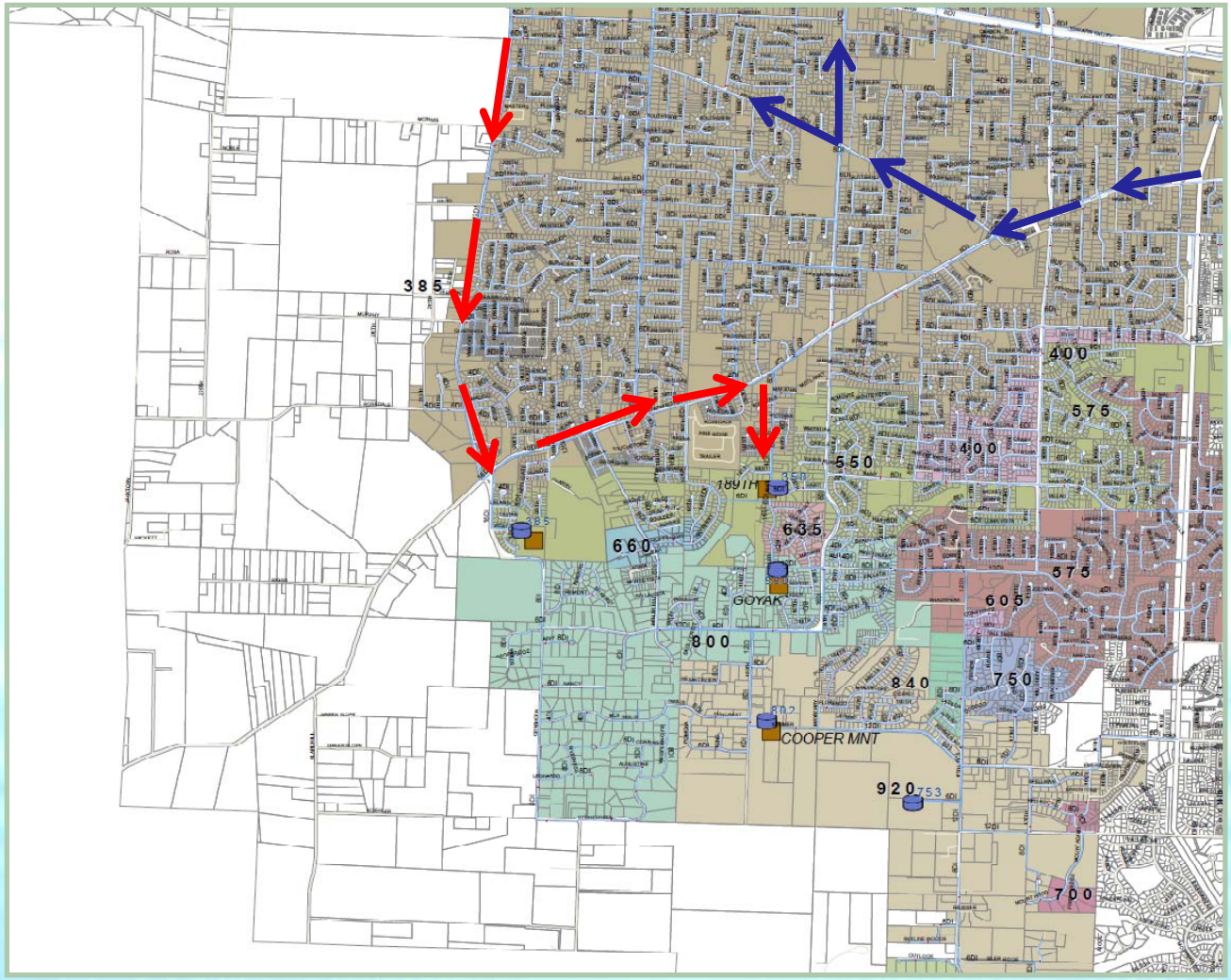

Goal: One Source for ASR

Initial delivery of water relied on pumping water to higher elevation to supply Grabhorn ASR:

- *Reduce pumping = reduced operational costs.*

Direct supply line proposed from entry point of JWC water:

- ***Short Term*** *– Isolation during recharge; and*
- ***Long Term*** *– Reduce pumping by installing additional main to directly supply ASR from Joint Water Treatment Plant (Fern Hill Reservoir).*

Engineering/planning underway while injection completed and recovery operations began for Cycle 3.

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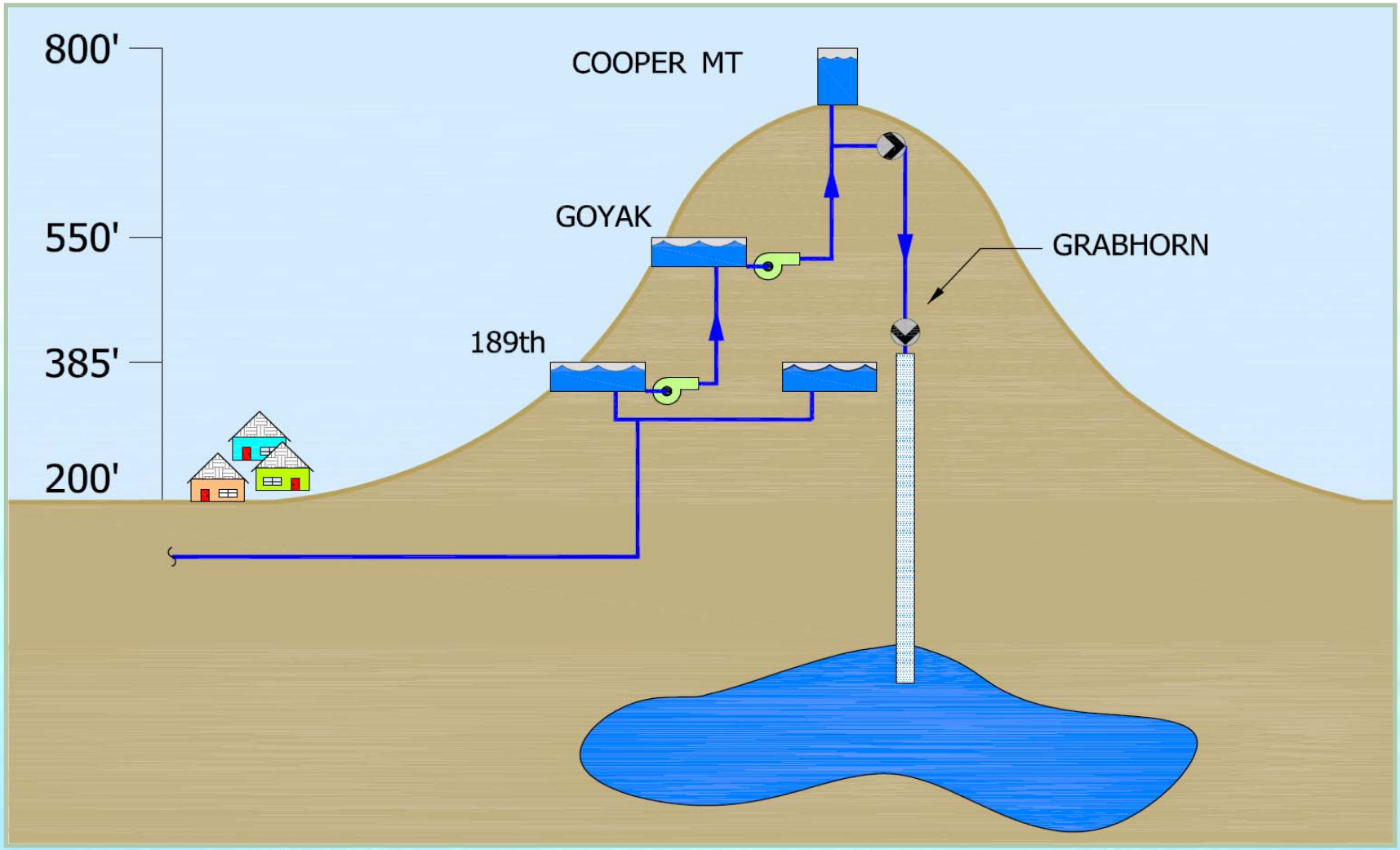

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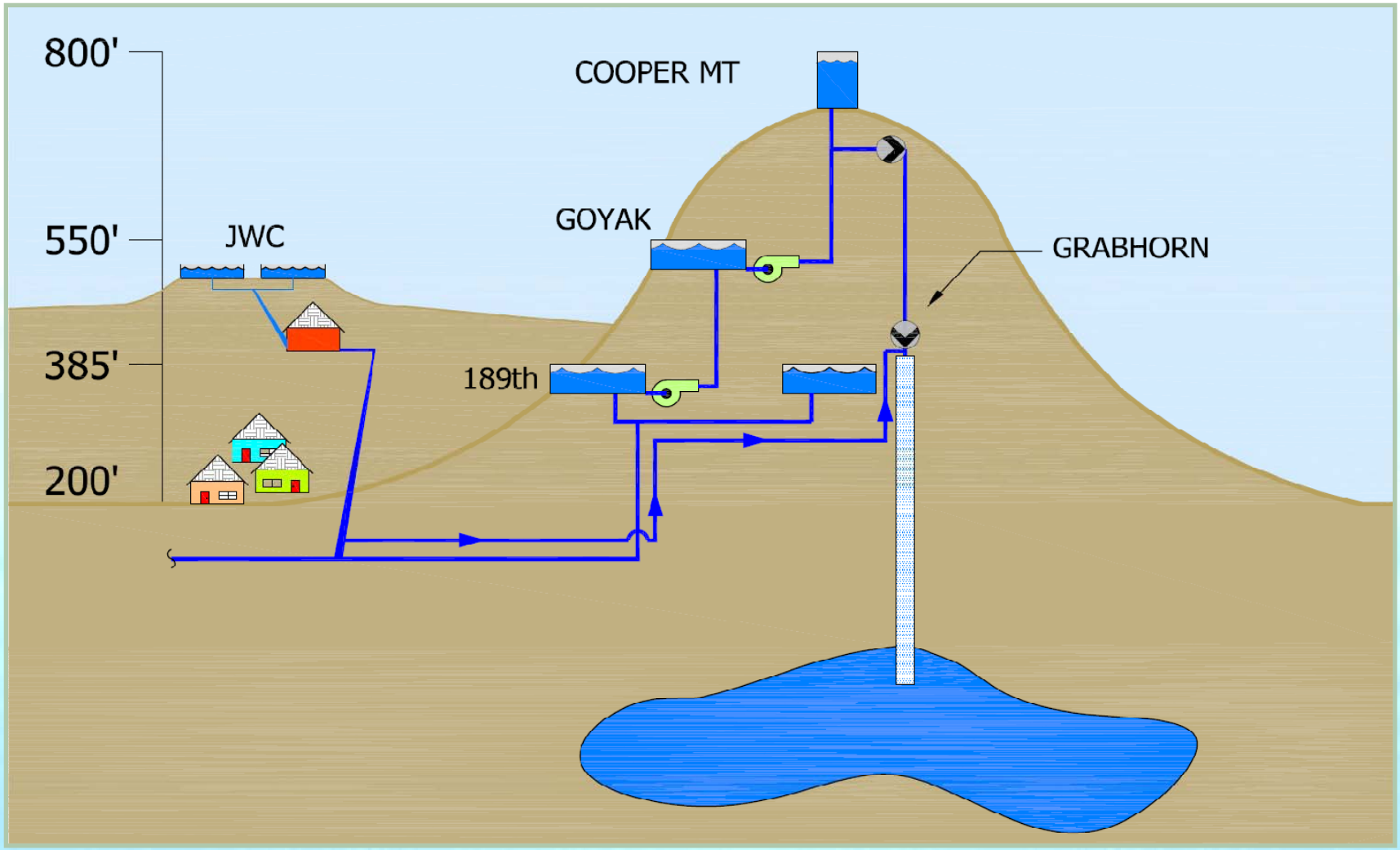

Integration of Recovery Operations

Recovered at a rate of 1000 – 2000 gpm, or up to 2.88 MGD into system or storage reservoir, depending on fill/draw cycle:

- *Implications for compliance with GW Rule;*
  - *a) Sample at ASR source when TC+; and*
  - *b) Review CT time in storage reservoir.*

Re-chlorination and re-fluoridation:

- *Sodium Hypochlorite, delivered as needed;*
- *Re-flouridation a more dynamic process (Cycle 2 data); and*
- *Flow meter placement in relation to injection point(s).*

How Was This Water Used In Overall Supply Strategy?

Relatively consistent recovery rate (1600 gpm average) to act as buffer for peak demand days:

- *Recovered 94% of total injection volume (243 MG);*
- *Accurate accounting for projections necessary;*
- *Small amount of carryover for 2010 supply season; and*
- *Flexibility with available use of GW as defined in Limited License not employed during Cycle 3.*

Direct Supply Highly Successful, Completed Early 2010, Start of Cycle 4

Dramatic reduction of pumping costs:

- *Payback estimate less than three years, sooner with ETO credit.*

Incoming water quality preferable:

- *Very low turbidity (0.021 – 0.023); and*
- *Consistent in regards to WQ monitoring and reporting.*

Specific capacity and build up rate indicating long term favorable trends in operating ASR:

- *Less frequent routine backflush events*

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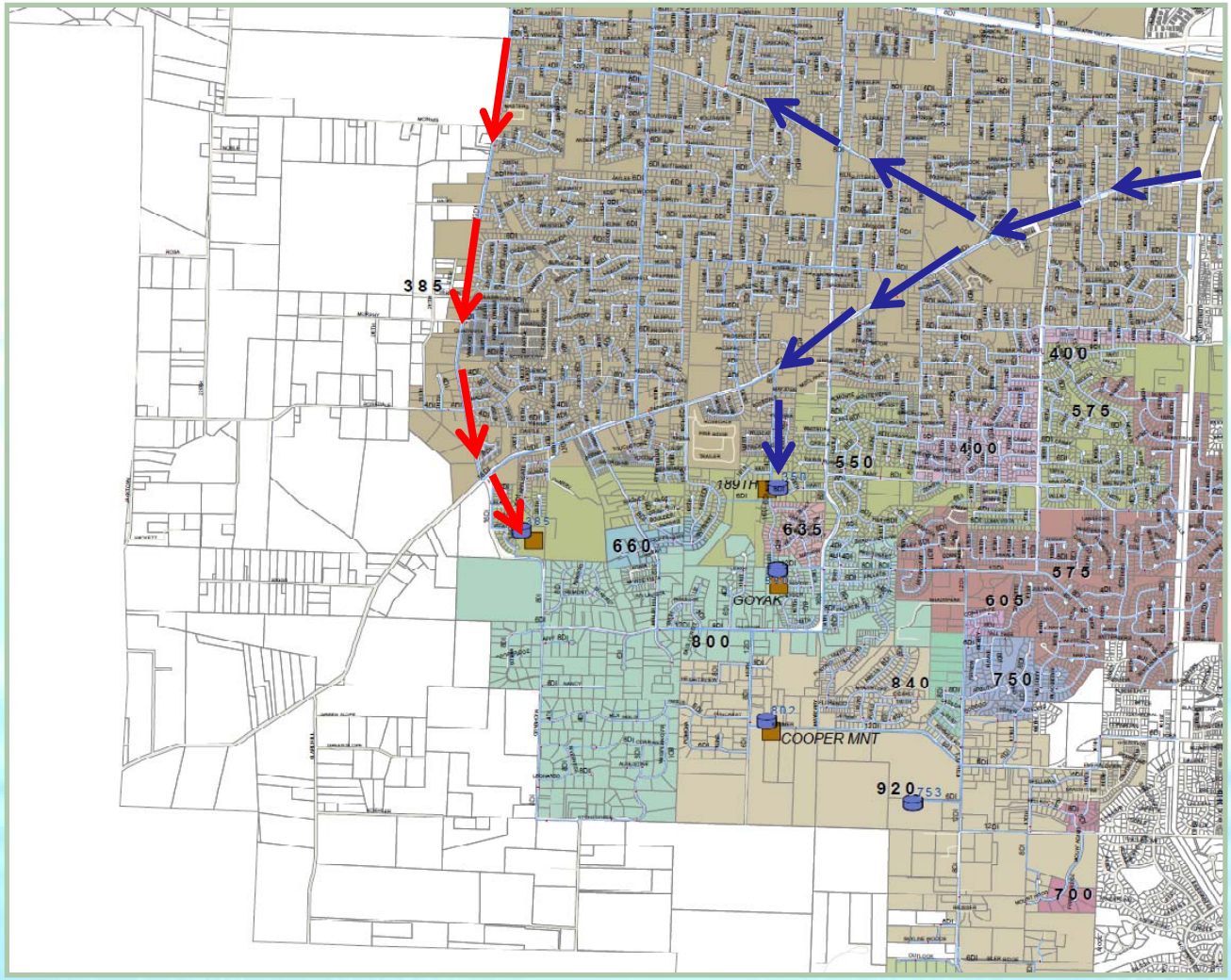

Aquifer Response

Local network of observation wells monitored since inception of program:

- *Began with six, presently monitoring ten due to several wells becoming artesian during injection phase*

High level of hydraulic response across fault line.

Active response to landowners:

- *Seal wells with continued monitoring and interaction with landowners.*

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Long Term Monitoring

In order to meet need of continued monitoring while addressing time constraints, permanent water-level indicators installed in wells with significant depth or access challenges.

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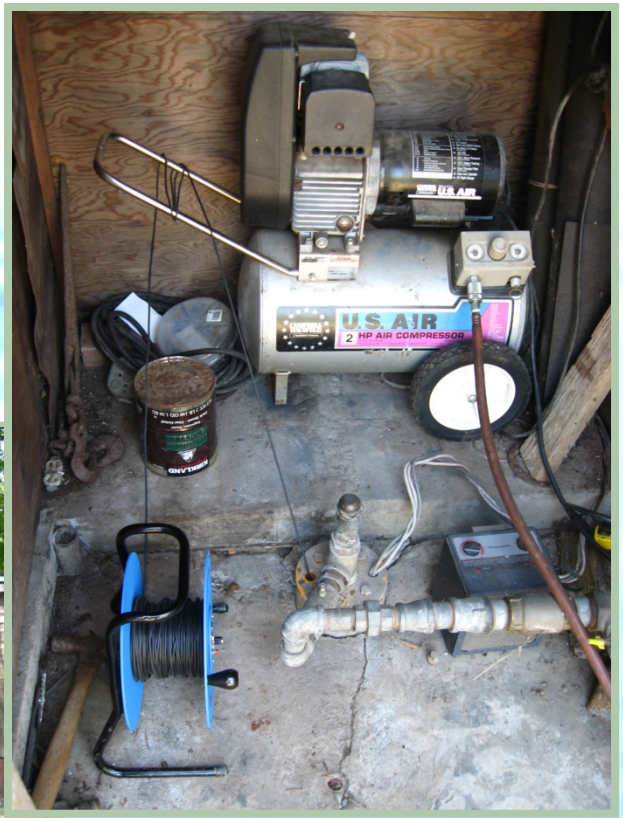

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Customer Service

The Importance of Customer Service

Intergration of ASR water into annual system operations can create opportunity for communication with large users:

- *Users with high quality water needs first to notice;*
- *Prompted plant tour for better understanding of WQ needs; and*
- *Length of recovery phase greatly influences geographic extent of recovered water into system (Cycle 2 vs. Cycle 3).*

Positive results with local well owners crucial to long term success of project.

Integration Has Been Successful Thus Far – What Is Happening for Cycle 4 Recovery?

Target goal of 311 MG storage volume.

Increase flexibility during Cycle 4 operations (summer 2010) to better utilize ASR within TVWD's supply schematic:

- *Possible carryover for next year to reduce water quality impacts;*

Continue to actively address any aquifer response.

Implementing SCADA improvements for accounting.

Q & A

Thank You