City of Santa Rosa
Groundwater Master Plan
Presentation to BPU Study Session
June 6, 2013
Presentation Outline

- Groundwater Policy Background
- Groundwater Master Plan Objective
- How Did We Get Here?
- Key Groundwater Master Plan Elements
- Summary of Key Findings
- Recommended Policies
- CEQA Compliance
- Next Steps
Groundwater Policy Background

- 1998 – City identified need to develop additional 8.7 mgd of emergency groundwater supply
- September 2003 – Council directed Utilities staff to ask BPU to evaluate role of local supply in meeting water supply needs
- December 2003 – BPU adopted Resolution No. 776
  - Directed Utilities to pursue development of water sources to provide reliable water supply through the General Plan Building Horizon
  - Include development of local groundwater, additional recycled water use, additional supplies from SCWA and other sources as they become available
  - Evaluate sources based on supply reliability, cost, timing and environmental impact
Restructured Agreement Requirements

- Sections 1.13 and 1.15 of the Restructured Agreement contain specific requirements for local supply and recycled water:
  - **1.13 Recycled Water and Local Supply Project Requirements** – Within 10 years from the date of the Agreement, the Water Contractors shall use best efforts to develop at least 7,500 AFY of recycled water or local supply projects, with approximately 50% coming from recycled water projects.
  - **1.15 Local Production Capacity Goals** – Highly desirable for each Water Contractor to develop and maintain local water production capacity capable of meeting approximately 40% of the Water Contractor’s average day maximum month demand.
Groundwater Master Plan Objective

- To provide a strategic road map for the City’s Utilities staff, Board of Public Utilities, and City Council of how available groundwater resources could be most effectively used to meet the needs of the City’s existing and future customers
- Expand the City’s understanding of the available GW resources
- Focuses on need for emergency supply wells
- Future use for production not evaluated due to lack of data from the USGS Study
- Groundwater Master Plan to be updated every five years
Groundwater Master Plan Timeline

- **2011**
  - March: BPU authorized staff to prepare and issue an RFP to prepare a GW Master Plan
  - October: BPU approved development of GW Master Plan

- **2012**
  - May: BPU Study Session—Status Update on GW Master Plan & Related GW Programs
  - July: Meeting with BPU Ad Hoc Committee—Discuss GW Quality
  - August: Meeting with BPU Ad Hoc Committee—Discuss Emergency GW Supply
  - October: BPU Study Session on Emergency GW Supply Analysis & Water Quality and Aquifer Storage and Recovery
  - November: Presentation to WAC and TAC on Groundwater Master Plan and preliminary findings
Groundwater Master Plan Timeline

- **2013**
  - April 2: Presentation to BPU Ad Hoc Committee
  - June 6: BPU Study Session
  - Late June: Release of Mitigated Neg Dec for 30-day public comment
  - September: BPU Meeting to consider adoption of Mitigated Neg Dec and Groundwater Master Plan
Key Groundwater Master Plan Elements

1. Development of a GIS-based groundwater database
2. Determination of required emergency groundwater supply
3. Establishment of a City-wide well monitoring network
4. Feasibility-level evaluation of Aquifer Storage and Recovery
5. Development of recommended groundwater policy and projects
6. CEQA support activities
City’s Historical Use of Groundwater

- Prior to 1959, City relied primarily on groundwater for water supply.
- After 1959, City relied almost exclusively on purchased water from SCWA for water supply.
- In July 2005, City converted Farmers Lane Wells 1 & 2 from emergency to active status.
- City began using Farmers Lane Wells 1 & 2 in 2007 to provide supplemental supply during summer months.
City Water Supply (2000-2012)

<table>
<thead>
<tr>
<th>Year</th>
<th>Supply, acre-feet</th>
</tr>
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<tbody>
<tr>
<td>2000</td>
<td>23,314</td>
</tr>
<tr>
<td>2001</td>
<td>23,990</td>
</tr>
<tr>
<td>2002</td>
<td>22,310</td>
</tr>
<tr>
<td>2003</td>
<td>23,001</td>
</tr>
<tr>
<td>2004</td>
<td>23,995</td>
</tr>
<tr>
<td>2005</td>
<td>22,897</td>
</tr>
<tr>
<td>2006</td>
<td>23,804</td>
</tr>
<tr>
<td>2007</td>
<td>832, 1,501</td>
</tr>
<tr>
<td>2008</td>
<td>22,701</td>
</tr>
<tr>
<td>2009</td>
<td>21,905, 1,350</td>
</tr>
<tr>
<td>2010</td>
<td>18,896, 898</td>
</tr>
<tr>
<td>2011</td>
<td>18,516, 1,259</td>
</tr>
<tr>
<td>2012</td>
<td>17,181, 792</td>
</tr>
</tbody>
</table>

- **Agency Supply, af**
- **Groundwater Supply (Farmers Lane Wells 1 and 2), af**
Santa Rosa Plain Groundwater Management Plan (GWMP)

- SCWA is the lead agency
- Work plan and funding agreement initiated in May 2011
- City of Santa Rosa is part of Basin Advisory Panel (BAP) developing the GWMP
- Plan anticipated to be complete by January 2014

BAP consists of about 30 members representing key groundwater interests:
- Agriculture (Dairies, Farmers, Grape Growers and Wineries)
- Business/Developers
- Environmental
- Government (Tribal, State, County and Cities)
- Public Health
- Rural Residential Well Owners
- Water Supply and Groundwater Technical Expertise
On-Going USGS Study of the Santa Rosa Plain

- City entered into funding agreement in March 2005
- Participants include SCWA, Sonoma County, City of Santa Rosa, City of Rohnert Park, City of Sebastopol, City of Cotati, Town of Windsor, Cal-American Water Company
- Completion of study and model are delayed (anticipated by late 2013)
- In May 2012, BPU provided direction to proceed with GW Master Plan and not wait for USGS Study Results
California Statewide Groundwater Elevation Monitoring (CASGEM)

- State mandated a statewide groundwater elevation monitoring program in November 2009
- SCWA is the designated Monitoring Entity for the Santa Rosa Plain
- City providing semi-annual groundwater level data to SCWA
Key Wells

Supplemental Wells
Salt and Nutrient Management Plan

- Required by State Water Resources Control Board Recycled Water Policy
- Developed by a Stakeholder Group
- City of Santa Rosa Subregional System lead agency
- Submitted to Regional Water Quality Control Board for consideration
Relationship between GW Master Plan and these Other Programs

- Information developed as part of the Master Plan will assist with GWMP and CASGEM
- Recommended monitoring wells can be coordinated with needs of Salt and Nutrient Mgmt Plan and CASGEM
- Provides staff direction for participation in the GWMP
REQUIRED EMERGENCY GROUNDWATER SUPPLY
Emergency Planning Framework

- **City Plans**
  - Emergency Operations Plan
  - Utilities Department emergency response plans
    - Estimate the amount of Groundwater that needs to be available during an Emergency
  - Urban Water Shortage Contingency Plan

- **County Plans**
  - Sonoma County Water Agency Emergency Response Plan
Existing Utilities Emergency Operations

- Study Session in September 2012
- City-wide Emergency Operations Center
  - Utilities Department has a Department Operations Center
- Emergency Response Plan
  - Outlines our response in an emergency
  - Dedicated routes for identifying issues and coordinating response and repair
  - Drills conducted by the Department
  - Multiple contingencies, including back up generators and flexible, portable hose
- Role of the GW Master Plan is to identify amount of groundwater required in an emergency condition
Utilities Department
Emergency Mobile Equipment
## Emergency GW Analysis Assumptions

### FACILITY STATUS
- All Tanks Half Full
- Pump Stations Operational
- Pipelines Operational
- Existing City Wells Operational
- New Emergency Wells Produce 700 gpm (equivalent to 1 mgd)

### DEMAND CONDITIONS
- Existing & Buildout Conditions
- Buildout Demand based on uniform growth in City
- Health & Safety = 50% Average Day Demand

### OUTAGE DURATIONS
- Short-term (2 days)
- Long-term (14 days)

### EMERGENCY SCENARIOS
- Full Loss of Agency Supply
- Partial Loss of Agency Supply

### LEVEL OF SERVICE
- Service to all pressure zones to extent possible
- Provide supply to key pump stations or other key locations within City for distribution to customers
City’s Existing Water System

**33 Pressure Zones**
- 31 Hillside Pressure Zones
- 2 Aqueduct Pressure Zones (Central City & Oakmont)

**Existing Wells**
- Production Wells
  - Farmers Lane Nos. 1 and 2
- Emergency Wells
  - Leete Well (currently out of service)
  - Carley Well
  - Peters Springs Well
- Landscape Irrigation
  - Farmers Lane No. 3

**Storage Reservoirs**
- 8 Agency Reservoirs
  - 61.5 MG total capacity
  - 50% of 61.5 MG = 30.75 MG
  - 40% available to City = 12.3 MG
- 25 City Reservoirs
  - 28.3 MG total capacity
  - 50% of 28.3 MG = 14.2 MG
Master Zone S-1 (Fountain Grove)
### Operational Zones

<table>
<thead>
<tr>
<th>“Master Zones”</th>
<th>Pressure Zones</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-1 (Fountain Grove)</td>
<td>R1, R2, R3, R5</td>
</tr>
<tr>
<td>S-4 (Montecito Valley)</td>
<td>R4, R16, R17</td>
</tr>
<tr>
<td>S-6 (Rincon Valley)</td>
<td>R6, R7, R8</td>
</tr>
<tr>
<td>S-9 (Bennett Valley)</td>
<td>R9, R10, R11</td>
</tr>
<tr>
<td>S-12 (Oakmont Hillside)</td>
<td>R12, R13, R14, R15</td>
</tr>
<tr>
<td>Central City</td>
<td>Aqueduct Zone</td>
</tr>
<tr>
<td>Oakmont</td>
<td>A8</td>
</tr>
</tbody>
</table>

Each “Master Zone” has a key pump station that can provide water to other Pressure Zones within that “Master Zone”
Methodology

- Calculate Health & Safety Demand
  - 50% of Average Day Demand for each scenario for each Master Zone
- Determine available City and/or Agency storage in each Master Zone
- Identify existing well capacity in each Master Zone
- Calculate supply shortage under each scenario
- Determine the number of new emergency wells required within each Master Zone
# Required New Emergency Supply

<table>
<thead>
<tr>
<th>Master Zone</th>
<th>Existing Demands</th>
<th>Buildout Demands</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14-day outage, gpm</td>
<td>14-day outage, mgd</td>
</tr>
<tr>
<td>S-1 (Fountain Grove)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>S-4 (Montecito Valley)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>S-6 (Rincon Valley)</td>
<td>646</td>
<td>0.9</td>
</tr>
<tr>
<td>S-9 (Bennett Valley)</td>
<td>~0</td>
<td>~0</td>
</tr>
<tr>
<td>S-12 (Oakmont Hillside)</td>
<td>81</td>
<td>0.1</td>
</tr>
<tr>
<td>Central City</td>
<td>1,845</td>
<td>2.7</td>
</tr>
<tr>
<td>Oakmont</td>
<td>164</td>
<td>0.2</td>
</tr>
<tr>
<td>Add’l Emergency GW Supply Req’d</td>
<td>~2,700</td>
<td>~3.9</td>
</tr>
</tbody>
</table>

Original City Target Emergency Groundwater Production Capacity = 8.7 mgd
Current Emergency Supply Capacity (Farmers 1&2, Carley, Peters Spring) = ~4.3 mgd
Future Required Emergency Supply = 4.3 mgd + 8.4 mgd = 12.7 mgd
## Required New Emergency Wells

<table>
<thead>
<tr>
<th>Master Zone</th>
<th>Existing Demands</th>
<th>Buildout Demands</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2-day outage</td>
<td>14-day outage</td>
</tr>
<tr>
<td></td>
<td>2-day outage</td>
<td>14-day outage</td>
</tr>
<tr>
<td>S-1 (Fountain Grove)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1*</td>
</tr>
<tr>
<td>S-4 (Montecito Valley)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>S-6 (Rincon Valley)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>S-9 (Bennett Valley)</td>
<td>0</td>
<td>~1</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>~1</td>
</tr>
<tr>
<td>S-12 (Oakmont Hillside)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1**</td>
</tr>
<tr>
<td>Central City</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>6*</td>
</tr>
<tr>
<td>Oakmont</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1**</td>
</tr>
</tbody>
</table>

* S-1 well could also be used to serve Central City  
** S-12 well could also be used to serve Oakmont  
Total required wells reduced to account for wells which can be used to serve multiple zones.

Each new emergency well is assumed to produce 700 gpm (1 mgd)  
If > 700 gpm, less emergency wells will be required  
If < 700 gpm, more emergency wells will be required
RECOMMENDED GROUNDWATER PROJECTS
Recommended Near-Term Projects (next 5 years)

- Maintain and Update City Groundwater Database
- Prepare Annual Groundwater Report
- Evaluate ASR Feasibility: Phase 2 - Pilot Demonstration Program
- Construct Four Emergency Wells
  - Three (3) in Central City Master Zone
  - One (1) in Oakmont/S-12 Master Zone

Each new well is assumed to produce 700 gpm (1 mgd)

If > 700 gpm, less emergency wells will be required
If < 700 gpm, more emergency wells will be required

One or more test wells may be required to site each new emergency well
## Recommended Near-Term Groundwater Projects and Programs

<table>
<thead>
<tr>
<th>Project/Program Name</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain and Update City Groundwater Database</td>
<td>$ -</td>
</tr>
<tr>
<td>Annual Groundwater Report</td>
<td>$ 25,000</td>
</tr>
<tr>
<td>Phase 2 Aquifer Storage and Recovery Feasibility Evaluation—Pilot Demonstration Program</td>
<td>$ 150,000</td>
</tr>
<tr>
<td>Construct Two Emergency Wells in Central City Master Zone</td>
<td>$ 4,270,000</td>
</tr>
<tr>
<td>Construct One Emergency Well in Vicinity of Martha and Slater Test Well Sites</td>
<td>$ 2,135,000</td>
</tr>
<tr>
<td>Construct One Emergency Well in Oakmont/S-12 Master Zone</td>
<td>$ 2,135,000</td>
</tr>
<tr>
<td><strong>Subtotal Near-Term Project Costs</strong></td>
<td>$ 8,715,000</td>
</tr>
</tbody>
</table>

These potential projects have not yet been budgeted. Does not include costs for City’s Exploratory Well Program.
Recommended Mid-Term & Long-Term Projects

- **Mid-Term Projects (5-10 Years)**
  - Construct Three Emergency Wells
    - One (1) in Central City/S-1 Master Zone
    - One (1) in S-6 Master Zone
    - One (1) in S-9 Master Zone

- **Long-Term Projects (10-15 Years)**
  - Construct Four Emergency Wells
    - Two (2) in Central City Master Zone
    - Two (2) in Master Zone S-6

- Update Groundwater Master Plan every five years

Each new well is assumed to produce 700 gpm (1 mgd)
If > 700 gpm, less emergency wells will be required
If < 700 gpm, more emergency wells will be required

One or more test wells may be required to site each new emergency well
## Recommended Mid-Term and Long-Term Groundwater Projects and Programs

<table>
<thead>
<tr>
<th>Project/Program Name</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construct One Emergency Well in Central City/S-1 Master Zone</td>
<td>$2,505,000</td>
</tr>
<tr>
<td>Construct One Emergency Well in Master Zone S-6 (Rincon Valley area)</td>
<td>$2,490,000</td>
</tr>
<tr>
<td>Construct One Emergency Well in Master Zone S-9 (Bennett Valley area)</td>
<td>$2,490,000</td>
</tr>
<tr>
<td><strong>Subtotal Mid-Term Project Costs</strong></td>
<td><strong>$7,485,000</strong></td>
</tr>
<tr>
<td>Construct Two Emergency Wells in Central City Master Zone</td>
<td>$5,560,000</td>
</tr>
<tr>
<td>Construct Two Emergency Wells in Master Zone S-6 (Rincon Valley area)</td>
<td>$5,560,000</td>
</tr>
<tr>
<td><strong>Subtotal Long-Term Project Costs</strong></td>
<td><strong>$11,120,000</strong></td>
</tr>
<tr>
<td><strong>Total Near, Mid and Long-Term Project Costs</strong></td>
<td><strong>$27,320,000</strong></td>
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</table>

These potential projects have not yet been budgeted. Does not include costs for City’s Exploratory Well Program.
City Exploratory Well Program

- After passage of Resolution No. 776, Utilities staff developed program to establish a more thorough understanding of hydrogeologic conditions & evaluate potential future emergency well sites.
- Eight (8) test wells installed and tested to date with on-going monitoring.
- Additional test wells planned in conjunction with emergency well siting.
Benefits of City’s Exploratory Well Program

- Provided Foundational data and information for the GW Master Plan
  - Impetus for Master Zone concept
  - Guidance for siting near-term projects
- Extremely valuable data for the USGS Study
- Fostered closer coordination between Operations and Planning
AQUIFER STORAGE & RECOVERY
Aquifer Storage and Recovery

- ASR is the Use of a Specially Designed Well To Inject and Extract Potable Water From A Target Aquifer
  - The same well is used for injection & extraction
  - Treated, potable water is the source water for injection
  - Source water can be taken anywhere in the distribution system
ASR Preliminary Feasibility-Level Evaluation Findings

- ASR wells are technically feasible in certain aquifer zones underlying the City
- Could assist City in seasonal storage/offset of peak demands, help stabilize water quality, increase perennial yield of basin
- A more focused evaluation of ASR feasibility should be performed at more favorable locations
  - Martha Way, Madrone and Carley
  - Locations to be identified through the City’s test well program
GROUNDWATER DATA MANAGEMENT
City Groundwater Monitoring

- Objectives of Key Well Monitoring Network
  - Develop comprehensive groundwater monitoring system
  - Provide data for Salt and Nutrient Management Plan
  - Provide data for Santa Rosa Plain GWMP

- Monitoring Network
  - 20 Key Wells
  - 5 Supplemental Wells
  - Additional data from future test well sites
  - Initially includes water level data only
City Groundwater Data Collection & Management

Data Collection from Key Wells and Supplemental Wells

- Reporting for Statewide CASGEM Program
- Maintain City Groundwater Database
- Maintain City Groundwater Web Page
- Prepare Annual Groundwater Report
GROUNDWATER POLICY
Recommended Master Plan Policies

- Aligned with Groundwater Management Plan’s Draft Basin Management Objectives
  - Integrated Groundwater Management
  - Stakeholder Involvement and Public Awareness
  - Groundwater Protection and Recharge
  - Monitoring and Modeling
  - Climate Change Planning
Recommended Policies for Integrated Groundwater Management

- Regional Coordination & Partnerships
  - Support regional groundwater management goals and objectives which are consistent with the City’s goals and objectives
  - Develop and maintain partnerships with other agencies in support of regional groundwater management activities

- Use of Existing City Wells to Help Meet Peak Demands
  - Continue the use of Farmers Lane Wells Nos. 1 and 2 to help meet peak water demands
Recommended Policies for Integrated Groundwater Management

- Development of Emergency Groundwater Pumping Capacity
  - Provide/maintain emergency groundwater pumping capacity (additional 8.4 mgd, for a total of 12.7 mgd)

- Evaluation of Aquifer Storage and Recovery (ASR)
  - Evaluate the feasibility of ASR in localized areas of the City to meet localized needs
Other Recommended Policies

- **Stakeholder Involvement and Public Awareness / Monitoring and Modeling**
  - Prepare Annual Groundwater Report

- **Groundwater Protection & Recharge**
  - Follow development of the Salt and Nutrient Management Plan
  - Consider policies in identified groundwater recharge areas to protect and enhance groundwater recharge

- **Climate Change Planning**
  - Continue to work with Agency staff to better understand the potential ranges in impacts to the City’s water supplies
CEQA COMPLIANCE
CEQA Compliance

- Mitigated Negative Declaration (MND) being prepared based on CEQA requirements
- Draft Initial Study/Mitigated Neg Dec available in late June
- Final Mitigated Neg Dec anticipated in September
NEXT STEPS
Next Steps

- Late June
  - Release of Mitigated Neg Dec for 30-day public comment
- September — BPU Meeting
  - Consider adoption of Mitigated Neg Dec and Groundwater Master Plan
DISCUSSION