

City of Petaluma

Groundwater Feasibility Study

Project Management Plan

Prepared for
City of Petaluma

August 18, 2003



Consulting Engineers

269-03-01.01

PROJECT MANAGEMENT PLAN



1. Project Goals

The goals of this project are to investigate the feasibility of integrating groundwater into the City of Petaluma's (City) long-term water supply program, to select the best alternative for conjunctive use of groundwater and surface water, and to develop an implementation plan for the recommended alternative. The primary work product is a groundwater master plan that will be integrated into the City's water resources element of the general plan. A supporting goal is to provide assistance in well siting, well design and groundwater monitoring program planning.

2. Scope of Work

The scope of work is included as Exhibit A: Technical Approach.

3. Project Team

The project team is shown on the organization chart in Exhibit B.

4. Budget

A summary budget for this project is shown in the following table. For a detailed breakdown of staff hours and estimated costs, refer to Exhibit C.

Task	Description	Budget, dollars	Task Manager
1	Project Management	28,996	Jim Yost
2	Compile/Review Information	13,805	Ken Loy
3	Conduct Field Inspection	13,816	Jim Connell
4	Conduct Groundwater Resource Assessment	35,887	Ken Loy
5	Develop/Evaluate Alternatives	38,312	Gerry Nakano
6	Assist in Well Design	16,816	Ken Loy
7	Develop Groundwater Monitoring Procedures	9,780	Ken Loy
8	Prepare Groundwater Master Plan	38,656	Jim Yost
Total		196,068	

5. Invoice Format

A standard WYA invoice will be sent to the City. The Task Manager for each task will be responsible for review of the draft invoice. Final invoices will be approved by a WYA principal prior to being issued to the City. Each invoice will be accompanied by a table summarizing the percentage of work complete, the estimated cost to complete, and the estimate at completion by task.

8. Drafting

Drafting will be performed in the Davis office. Drawings will conform to the WYA CAD Standards.

PROJECT MANAGEMENT PLAN

9. Progress Evaluation

Progress will be measured based on an estimate of percent completion for each of the tasks. The Task Manager will estimate the percent completion for his respective task and compare this to the budget used to determine work progress versus work completed.

10. Quality Control Plan

All work products will be reviewed by Steve Dalrymple or Jim Yost before submission to the client.

11. Schedule

The project schedule is contained in Exhibit D. Interim work products—Technical Memoranda completed as the work product for each task—are due at the completion of each work task as shown on the project schedule. Key project milestones are:

Project Kick-Off Meeting	July 16, 2003
Formal Client Meeting (Tasks 2-4)	October 15, 2003
Formal Client Meeting (Task 5 – midway, Task 6)	November 19, 2003
Formal Client Meeting (Task 5 – complete, Task 7)	December 17, 2003
Formal Client Meeting (Draft MP)	January 21, 2004
Planning Commission Presentation	March 2004
Council Presentation	March 2004
Public Workshop 1	April 2004
Public Workshop 2	May 2004

12. Documentation and Files

Contract and project files will be maintained in the Davis office. Each engineer working on the project will maintain a notebook containing calculations and other pertinent data. Records of telephone conversations, correspondence, emails, and other original documents will be sent to the project files. All computer files will be backed-up regularly on the network server and tape drive.

Below are the Project Files to be maintained in the Davis office:

Standard Project Files

File #	Category Name
/1	Contract/Project Management Plan
/2	Correspondence/Meetings/Contact Records/Email
/3	Resource Materials

Other Files

File #	Category Name
/4	Draft Technical Memoranda

PROJECT MANAGEMENT PLAN

13. Client Communications

Communications with the client regarding contract, budget or schedule issues will be conducted by Jim Yost. Presentations to the client will be directed by Jim Yost, with other team members participating as appropriate.

The primary client contact and project manager will be:

Dean Eckerson, Engineering Manager
Department of Water Resources and Conservation
City of Petaluma
(707) 778-4583

Other client contacts are:

Michael Ban, Interim Director
Department of Water Resources and Conservation
City of Petaluma
(707) 778-4487

Steve Simmons, Public Works Superintendent
Water Field Office
City of Petaluma
(707) 778-4392

Pamela Tuft, Director of General Plan Administration
City of Petaluma
(707) 778-4552

Copies of project deliverables, *i.e.* technical memoranda and the draft and final Groundwater Master Plan, will be provided to each of the four client contacts listed above.

attachments

EXHIBIT A: TECHNICAL APPROACH



INTRODUCTION

The City of Petaluma (City) is currently preparing a new General Plan, and the Water Resources Element of this plan provides an opportunity for the City to define its long-range approach for managing its water resources. The City's current primary water supply is provided under a contract with the Sonoma County Water Agency (Agency). Supply yield and reliability from the Agency has become somewhat uncertain because of recent developments regarding endangered species protections (Section 7 consultation), water rights concerns and interim impairment conditions related to delays on construction of Collector 6. For this reason, many of the Agency contractors, including the City, have begun to analyze alternatives to supplement the surface water supply provided by the Agency.

The City has begun the implementation of a recycled water program that will provide supplemental supply for irrigation of local parks and golf courses. Although groundwater has been utilized as an emergency supply in the past, it has not been seriously considered before as a potential supply source. To complete a comprehensive analysis of all water resources available to the City in the General Plan update, the City would now like to more seriously analyze the potential role that groundwater could play in a long-term sustainable water resource program, and has contracted West Yost & Associates (WYA) to conduct a groundwater feasibility study and groundwater master plan.

This project should provide answers to the following primary questions:

How much groundwater supply could the City expect to obtain from groundwater without adversely impacting the groundwater basin and other groundwater pumps in the region?

What portion of the City's long-term supply should be provided from groundwater? This question in part relates to the quality of this potential supplemental supply and the ability to comply with primary and secondary drinking water standards; costs for production (including treatment, if needed), transmission and distribution and how these costs compare with Agency supply costs; reliability of this supply versus Agency deliveries; and the role of other supply sources (such as recycled water) in meeting overall City demands.

The answers to these questions must also consider how the ongoing negotiations of the "New Water Supply Agreement" proceed between the Agency and all its contractors. It is not clear at this time how development of groundwater supplies by contractors will impact contractor entitlements, how this supplemental supply is expected to be integrated into long-term Agency planning and sizing of transmission main capacities, reservoir storage capacities, Agency consideration of new prime contractors, and other related contractual issues.

OVERALL APPROACH

WYA will conduct this work using a phased approach. This will allow the City to better understand how, and how much, groundwater can potentially be integrated into a long-range water supply program, before expending major financial resources on efforts like modeling or detailed determination of sustainable yield, before the data are available to develop a creditable model, or the need for such a tool has been clearly demonstrated. Following a phased approach, expenditures on each succeeding work phase can be tailored to match the objectives for that phase. Work efforts and costs can be keyed to the degree of importance groundwater supply will play in the City's overall program. Decisions by the City on how to proceed can then be based on the more detailed information available at the end of each phase. This will facilitate much more informed decisions. The planned work phases are:

EXHIBIT A: TECHNICAL APPROACH

Phase 1 – This work will satisfy the basic requirements of the City's RFP, including completion of the groundwater feasibility study and development of a master plan. The scope and level of detail in this work will be matched with the need to provide sufficient information so the City can determine the potential role of groundwater in its long-range supply plan. This work will result in a conceptual plan for long-term use of groundwater. The primary objective of this effort will be to develop the information needed to integrate logical findings into the Water Resources Element of the General Plan, and provide the City guidance on implementation of the findings. A groundwater program implementation plan, matched to the role groundwater will play in the City's long-term water supply program, will be a key product of this work.

In addition, WYA will assist the City in siting and designing two new wells, and in the development of groundwater monitoring procedures for existing City wells.

Phase 2 – This phase will be designed to match the results of Phase 1 (i.e., how important will groundwater be in the long-term supply). It will be directed toward the development of a comprehensive monitoring program (if that matches the level of importance of groundwater in the City's long-term water supply program) to develop the basic information needed to design a groundwater supply program in a manner that maximizes production of high quality water, minimizes the impact on other pumpers in the region, and provides the most cost-effective use of limited City resources for capital facilities. This would include construction of strategically located monitoring wells (to confirm regional lithology, water quality, water level trends, impacts on other uses, etc), focused aquifer/pump testing and associated water level monitoring (of both City and appropriate private wells) to more accurately determine aquifer characteristics such as transmissivity and storativity, and direction of groundwater flow and gradients. The result of this work will be a more detailed plan for well construction and operation, and will facilitate a much more informed decision whether a model is needed to guide future decisions on well development and operation.

Phase 3 – This work will be heavily dependent upon the results of the previous two phases. It may be appropriate at this point to develop a groundwater model to conduct "what if" testing/analysis of well construction and operational scenarios, and to help quantify a sustainable yield estimate. The basic data needed to develop a model will be available from the Phase 2 work, and the City will be in a much better position to determine if the expense of such an effort is warranted.

An option for this work phase will be to proceed with the construction of any additional wells, and the implementation of the well operational procedures defined in Phase 2. If it is decided to proceed with this work, either the model will be delayed until Phase 4, or postponed until a more pressing need for this effort is identified.

Phase 4 – Dependent upon the decision regarding the scope and actions taken during Phase 3, this phase will either be the implementation of the detailed groundwater management plan, or development of a model and its use in refining the long-term program.

PHASE 1. WORK SCOPE

A detailed description of the scope of work for this first phase of work is provided below. It is designed to match the work scope defined in the City's RFP, to the extent appropriate. The scope of work presented here was updated based on discussions with City staff conducted during the July 16, 2003 kick-off meeting.

Task 1. Project Management

This task will encompass the following work elements:

- Overall coordination and direction of the project team

EXHIBIT A: TECHNICAL APPROACH

- Regular communication with the City (bi-weekly conference calls, monthly invoicing with work progress reporting, informal meetings to gather information and obtain direction/input, *etc.*).
- Formal meetings with City staff to review work products (four meetings are envisioned – see Exhibit D for schedule) – plus the project kick-off meeting.

The Project Management Plan has been provided to all project team members, including the City's Project Manager. This document provides the basic framework for the project management approach. It summarizes the scope and objectives of the work, deliverables, budget and schedule; lines of communication; and basic information on the work product. This document is intended to organize the work effort, and to minimize false starts that could affect budget and schedule performance.

Work Product: Project Management Plan, monthly invoices/progress reports, and minutes from biweekly conference calls and formal meetings.

Task 2. Compile and Review Available Information

WYA will complete the following subtasks:

1. Obtain and review all appropriate reports that the City has available, and that are available from other agencies, to provide background information (this will include City reports listed in the RFP, DWR Bulletin 118, *etc.*).
2. Obtain and review City data on existing well historical production, groundwater levels and water quality, water transmission and distribution system, testing of new wells, and basic data on all existing wells (well logs, geophysical logs, construction details, equipment specifications and pump curves, *etc.*). This effort will include review of the yield and quality of the two recently constructed City wells.
3. Obtain computer files for base mapping (from City GIS system).
4. Obtain geographical location, logs, and any available data on construction/operation/production of other wells in the area.
5. Contact Regional Board and DHS to obtain information that could be used to identify any reported contaminant plumes in areas tributary to existing/proposed wells, any installed monitoring wells, resultant water quality and/or site specific hydrogeologic conditions.
6. Work with City Community Development and General Plan Administration staff, and review aerial photos, to identify any current land uses or other activities that could potentially impact groundwater quality in the vicinity of existing or proposed wells.
7. Obtain information from the consultant preparing the City's Water Master Plan including the demand projections for the three General Plan scenarios being evaluated, costs of supply from the Agency for surface water, distribution system model and results of analysis of existing system capacity, and any other information that will be useful in analyzing potential groundwater system improvements needed to meet both the City's existing and build-out demands under the three scenarios.
8. Prepare a summary of the current and anticipated drinking water standards that will impact the use of the City's wells.

Work Product: Database containing the compiled information, and a brief technical memorandum (TM) summarizing data available for the study, pertinent drinking water standards, potential data gaps or data needs, and how they will be overcome to complete the Phase 1 work. Copies of the TM will be distributed to each of the four client contacts listed in the Project Management Plan.

EXHIBIT A: TECHNICAL APPROACH

Task 3. Conduct Field Inspection/Assess Current Facilities Condition

It will be essential for WYA to meet with the operational staff to develop a clear understanding of the current condition and operational procedures followed for use of the existing wells. This work will include:

1. Meet with operational staff to obtain background information on existing facilities, current staffing and operational procedures, well equipment and controls, pump curves and efficiency testing, and any other information pertinent to understanding how the current system works, its condition and operational effectiveness.
2. Confirm that the basic data on the wells compiled in Task 1 is correct, and update if needed.
3. Obtain copies of video inspections of the wells, if available, or any other information that will assist in assessing the condition of the existing wells.
4. Conduct a field inspection with selected operational staff of up to 10 well sites and appurtenant facilities to assess the condition of the facilities at each site.
5. Review water quality data and expected drinking water standards, and discuss need for treatment with operational staff.
6. Work with City staff to develop recommendations regarding the operation of existing wells, including the two recently constructed wells.
7. Prepare a TM that summarizes the results of the inspections and identifies any improvements needed at each facility to meet current operational standards/efficiencies or to comply with current or projected drinking water standards.

Work Product: TM describing the results of the interviews and field inspections, potential improvements needed at each site, and recommendations for well operation. Copies of the TM will be distributed to each of the four client contacts listed in the Project Management Plan.

Task 4. Conduct Groundwater Resource Assessment

Using the data available from Tasks 2 and 3, WYA will complete the assessment of the groundwater resources that could potentially be available to the City for consideration in development and analysis of alternatives for the groundwater master plan. Work tasks will include:

1. Create a groundwater basin base map showing the boundaries of the individual sub-basins underlying the region. This will be created using the DWR Bulletin 118 mapping, and integrating refinements resulting from review of local studies and data gained in previous tasks.
2. Create a layer on the City's GIS mapping system that shows the well locations and groundwater basin boundaries.
3. Analyze the available hydrogeologic data and develop geologic sections through the areas of the basin that have sufficient data to develop a credible section. Show the section cuts on the geologic section layer in GIS.
4. Estimate the basic groundwater basin parameters, for each subbasin as appropriate, based on available data (including storativity, transmissivity, and water quality).
5. Estimate the sustainable yield available for the underlying groundwater basin that could be available for use by the City (this task is discussed in more detail below).
6. Identify and characterize potential areas for groundwater recharge in the basin.
7. Prepare a TM summarizing the approach followed and the results.

EXHIBIT A: TECHNICAL APPROACH

It is anticipated that sufficient data are available only to prepare a rough water balance for the area that could lead to an estimate of the sustainable yield of the underlying groundwater basin or subbasins.

Sustainable yield can be estimated using one of two methods:

1. Estimating basin yield by comparing total historic groundwater pumpage to change in storage within the basin. Annual groundwater pumpage (assuming data are available) will be plotted against annual change in storage (using groundwater level data), and a best-fit line drawn taking into account excessively wet and dry years. The sustainable yield will be set at the zero-intercept of the best-fit line. The associated groundwater pumpage will indicate the pumpage that will result in no net change in groundwater storage. If annual pumpage data are not available, they will be estimated based on land use, cropping patterns, typical water use factors, and total land use area. It may be possible, because of data limitations, that this method can only be used on selected areas of the basin.
2. Estimating sustainable yield using the hydrologic balance method. This relies upon basic aquifer characteristics and existing hydrologic data. The balance formula is:

$$\text{Basin sustainable yield} = \text{Natural inflow} - \text{Natural outflow} + \text{Groundwater Storage}$$

By estimating the natural recharge to the basin, the outflow from the basin, and the change in groundwater storage, one can estimate the basin's sustainable yield. Natural inflow includes estimates of percolation from rainfall and applied urban/irrigation water, stream recharge, and inflow/leakage across basin boundaries. Natural outflow includes discharge to streams and outflow across basin boundaries. Percolation can be estimated from rainfall records and irrigation, minus crop and natural evapotranspiration. Recharge from and discharge to streams can be estimated from stream flow records, and estimated infiltration rates based on soil types. Inflow and outflow across basin boundaries can be estimated from groundwater gradients.

It is not clear at this point how important groundwater will be in the City's future water supply plans, and thus how much groundwater pumping may be envisioned in the future. If pumping is relatively limited, the value of spending a large effort attempting to quantify sustainable yield is questionable. However, if the analysis of alternatives in the following task concludes that significant groundwater pumping will be cost-effective for the City in the future, this analysis could be conducted to a higher level of detail. It is also important to note that in Phase 2 (described earlier), much more reliable data will be obtained, and could be used to develop a much more refined estimate of sustainable yield. It is recommended that this preliminary analysis be delayed until Task 5 is completed, and then WYA and City staff can jointly determine the value and need for this analysis, and the level of effort that should be expended in its completion.

It has been assumed in the estimate of work effort, that this initial effort will be minimized, and that only a rough estimate will be prepared in Phase 1. The effort may also concentrate on making an initial estimate for a limited number of subbasins that appear to be the most likely areas of groundwater production, and/or that could potentially be used as basin recharge areas.

Work Product: TM containing basin base map and appropriate cross-sections, estimate of basin (or subbasin) sustainable yield, and identification of potential recharge locations and storage potential of selected recharge sites. Copies of the TM will be distributed to each of the four client contacts listed in the Project Management Plan. Digital information on well sites and groundwater basin boundaries will be provided in a format compatible with the City's GIS system.

EXHIBIT A: TECHNICAL APPROACH

Task 5. Develop and Evaluate Alternatives

This work task will be conducted to evaluate the role groundwater will play in the future water supply program for the City. The work will be conducted following these general steps:

1. Meet with City staff and brainstorm on alternatives that could provide supplemental water supply either through direct pumping, or through groundwater recharge (banking) and later pumping, using varying amounts of surface and groundwater to meet City demands. WYA has been assisting some clients in the analysis, planning, design, and testing of Aquifer Storage and Recovery (ASR) wells. This technique for banking water in the ground in times of excess supply, for later pumping in times of restricted supply, offers many agencies a cost-effective mechanism for increasing the yield of current supplies. This, and other options discussed in the City's RFP, will be integrated with those options coming out of the brainstorming session. The options that appear most viable will be developed in this brainstorming session in sufficient detail so that all participants agree on their basic structure, and an agreed upon list for evaluation by WYA will be developed.
2. Criteria will be defined for comparison of the alternatives. These will also be discussed in the brainstorming session, and those that are consistent with the approach and objectives of the overall water resources program for the City will be used to compare alternatives. It is expected that the criteria will include those identified in the City's RFP, and others WYA has used for other projects, if appropriate for this study.
3. The alternatives will be developed in sufficient detail to rate them using these criteria, and ranked. The results will be presented in a second review session with City staff, and the highest ranked alternative, or some modification of it, will be selected.

Options that could be considered in the development of alternatives include:

- Rehabilitation of existing City wells
- Construction of new production wells
- Construction of ASR wells
- Construction of spreading basins
- Recharge using natural stream/creek channels
- Recharge using stormwater runoff or excess entitlement from aqueduct
- Treatment of pumped groundwater to level required to meet drinking water standards
- Use of groundwater to meet or offset non-potable demands

It is expected that these options, and others that come out of the brainstorming session, will be combined into alternatives that can be evaluated and screened. Alternatives will likely include:

- Continuation of the City's current practice of meeting peak demands (based on 2025 land use and buildout population) with untreated groundwater. The need for facilities rehabilitation, as defined in Task 3, will be integrated into the costing of this alternative.
- Same as the preceding alternative, but adding well head treatment to existing or future wells to improve water quality, in addition to the facilities rehabilitation defined in Task 3.
- Use of groundwater to help meet peak demands, and increasing base demands associated with future growth. This implies no additional surface supply would be delivered by the Agency for use in the City.

EXHIBIT A: TECHNICAL APPROACH

- Use of groundwater to increase supply reliability. This would be similar to the preceding alternative, with the inclusion of recharge capability, so excess supply, when available, can be banked for later use in times of limited surface water supply.

The alternatives will be developed in sufficient detail to include:

- Detailed project descriptions.
- Identification of the facilities needed to extract (treat if necessary) the groundwater and pipe it to the most logical point of integration into the City's distribution system. This may mean using the City's distribution system model to confirm pipe sizes are adequate to transmit/distribute the water. Conceptual system maps, and operational scenarios, will be developed to demonstrate how each alternative would function in conjunction with deliveries from the Agency.
- Estimated capital and O&M costs will be developed, and a life cycle cost comparison completed.
- Other non-economic criteria will be defined and compared for each alternative.
- Each alternative will be developed to comply with the expected drinking water standards, and any other regulatory requirements.

The results of this analysis will be presented in tabular and graphic presentations to facilitate clearer understanding. The apparent, most feasible alternative will be selected and a proposed plan for its implementation will be developed. This will include identification of an action plan and time schedule for implementation.

Work Product: A TM, and minutes of brainstorming sessions, that provide the background on how the alternatives were developed, a description of each alternative, the criteria used to screen and rank them, the analysis approach and results, and the action plan for moving into Phase 2. For ease of reading, the results will be summarized in tabular format, and flow charts provided to explain how the alternatives were developed and ranked. Copies of the TM will be distributed to each of the four client contacts listed in the Project Management Plan.

Task 6. Design/Construction of New and Existing Wells

WYA will assist the City in defining requirements/standards to include in future contracts with the well drillers/contractors. WYA has developed very detailed specifications for well design and construction. These specifications will be shared with the City staff, and appropriate portions will be provided to the City for use in future contracting. The primary elements that will be of major value to the construction of the City's upcoming wells will include procedures for well construction (sizing of the casing, seal zones, perforation interval/zones, screening, casing materials, etc.), logging requirements during drilling, water quality testing by zone, drawdown testing by zone, and other similar items.

WYA will also provide assistance during drilling of two new wells. WYA will prepare a lithologic log for each of the borings based on soil cuttings collected and archived by the drilling contractor.

After the wells have been constructed and completed, WYA will review the contractor's data on production rates versus drawdown, water quality and other pertinent testing and assist the City in defining the proper equipment for the well (pump, motor and ancillary facilities).

WYA will support the City in the assessment of impacts due to sustained pumping from the City's Stony Point well and will provide recommendations for possible engineering solutions to mitigate the impacts, if the well is used for supply.

EXHIBIT A: TECHNICAL APPROACH

WYA will also support the City in the evaluation of the McDowell Park well and will provide recommendations for possible engineering solutions to enhance yield and water quality.

Work Product: Suggested modifications or additions to the City's current contractual requirements for well construction, and recommendations for equipping each well, transmitted to the City by letter. Lithologic logs for two new wells. Recommendations regarding the Stony Point and McDowell Park wells.

Task 7. Develop Initial Groundwater Monitoring Recommendations

WYA will be working with the City in the previous tasks to understand what data the City is collecting, how the data are collected and reported, and what procedures are followed by the City to analyze and interpret the data. WYA will assist the City in determining what modifications or additions could be made to the current monitoring procedures to better improve the usefulness to the City in defining the long-term operational procedures for integration of groundwater into the City's long-term supply.

Work Product: A TM that lays out a preliminary set of procedures for monitoring the existing City wells, and that can be integrated into a comprehensive monitoring program. Copies of the TM will be distributed to each of the four client contacts listed in the Project Management Plan.

Task 8. Prepare the Groundwater Master Plan

TMs will be developed as the work product for each of the preceding tasks, and will be reviewed by City staff. These TMs, integrating City review comments, will be consolidated into a draft master plan report. Technical appendices will be included as appropriate to provide base data and other pertinent information. An executive summary will also be developed and integrated into the draft master plan report. The master plan will include a detailed action plan laying out the activities needed for implementation over the next 20-year period, in 5-year increments. Ten copies of the draft master plan report and executive summary will be submitted to the City for review and comment. Ten copies of the revised draft master plan report and executive summary, incorporating City comments, will be issued approximately two weeks after City comments are received.

The revised draft report will be presented and discussed at one Planning Commission meeting and one City Council meeting. Key members of the WYA project team will participate in two public workshops, which are anticipated to be held on Saturdays after the Planning Commission and City Council meetings. Commission, Council and public questions and comments will be noted at each. Comments will be integrated as appropriate, and 10 copies of the final master plan will be developed and submitted to the City. WYA will also prepare and submit 10 copies of the executive summary as a separately bound document to the City. One PDF copy, and a camera-ready original, of the final master plan and the executive summary will also be provided to the City.

The executive summary will be prepared in such a way as to facilitate incorporation of the information contained in the Environmental Impact Report (EIR) and Water Resources Element of the General Plan by City staff. WYA will review the relevant sections of the EIR and Water Resources Element of the General Plan and will provide written comments to City staff.

EXHIBIT B: PROJECT TEAM

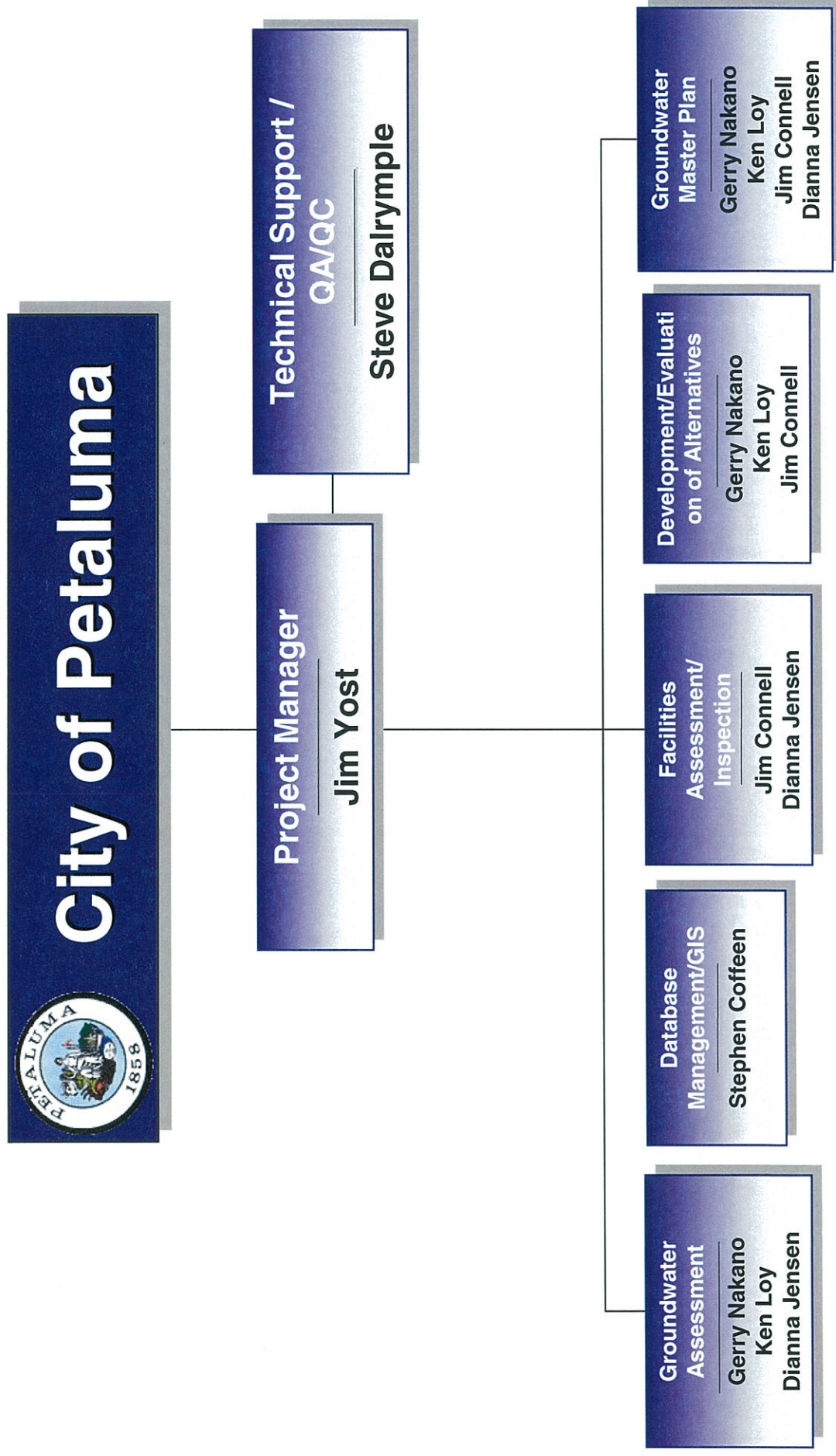




EXHIBIT C: ESTIMATED COSTS AND FEE SCHEDULE (UPDATED 7/21/03)
City of Petaluma—Proposal for Engineering Services
Groundwater Feasibility Study

Task	Estimated WYA Staff Labor Hours										Other Direct Costs, \$	Total Estimated Cost
	Jim Yost \$155	Steve Dalrymple \$155	Gerry Nakano \$155	Jim Connell \$132	Ken Loy \$118	Dianna Jensen \$106	Stephen Coffeen \$80	Admin \$55	CAD \$72	Computer \$15		
Task 1. Project Management	60	0	32	24	32	24	8	24	24	16	1,200	\$28,996
Task 2. Compile and Review Available Information	4	-	4	8	32	40	32	4	4	10	250	\$13,805
Task 3. Conduct Field Inspection/Assess Current Facilities Condition	2	2	4	40	24	16	4	2	24	4	500	\$13,816
Task 4. Conduct Groundwater Resource Assessment	16	2	32	20	80	80	60	8	16	24	750	\$35,887
Task 5. Develop and Evaluate Alternatives	24	4	32	32	120	60	12	8	24	32	600	\$38,312
Task 6. Design/Construction of New and Existing Wells	2	-	8	24	60	-	24	4	24	40	500	\$16,816
Task 7. Develop Initial Groundwater Monitoring Recommendations	2	-	8	8	40	16	-	4	4	2	200	\$9,780
Task 8. Prepare the Groundwater Master Plan	48	4	16	32	96	24	24	24	40	40	3,000	\$38,656
Totals	158	12	136	188	484	260	164	78	160	168	7,000	\$196,068



EXHIBIT D: PROJECT SCHEDULE (UPDATED 7/21/03) **City of Petaluma—Proposal for Engineering Services** **Groundwater Feasibility Study**

Work Task	2003						2004				
	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Task 1. Project Management	●			●	●	●	●				
Task 2. Compile and Review Available Information			▲								
Task 3. Conduct Field Inspection/Assess Current Facilities Condition				▲							
Task 4. Conduct Groundwater Resource Assessment				▲							
Task 5. Develop and Evaluate Alternatives					▲	▲					
Task 6. Design/Construction of New and Existing Wells					▲	▲					
Task 7. Develop Initial Groundwater Monitoring Recommendations						▲	▲				
Task 8. Prepare the Groundwater Master Plan							▲	▲	◆	◆	★

- Formal Meetings with City Staff
- ◆ Planning Commission or City Council Presentation
- ▲ Work Product Submittals (TM or Draft/Final Report)
- ★ Public Workshop